

**Office of Research**

University of South Carolina

2019

# DISCOVER USC

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## Collected Abstracts:

Collected abstracts that showcase research, scholarship, leadership and creative projects by undergraduate and graduate students, postdoctoral scholars and medical scholars representing the entire USC System.

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UNIVERSITY OF  
**SOUTH CAROLINA**  
Office of Research

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# **Undergraduate Students**

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# **presentations**

**Abdun, Sophia**

**Mentor(s): Ms. Katie Hopkins**

**Becoming a global citizen**

During fall semester of 2017, I studied abroad in Iringa, Tanzania at Ruaha Catholic University. My father is from Kenya, so I always had dreams of going back to his home, absorbing the culture, learning the language, and, as a public health major, learning about their healthcare systems. At the university, I was able to take classes on poverty analysis of Tanzania, how community development works in the country, and the history of East Africa. I was able to conduct research in a rural village I lived in which was a very unique experience. Naturally with my interest in public health, I wanted to take this chance to research something health related. I did my research on the means and level of accessibility to sex education and services. This experience taught me so much about the people of this village, their culture, and the way their health systems functions. This experience has allowed me to find my niche in public health and delve deeper into that sector. I have a deep interest in my roots and the health problems that plague their population. My language skills improved greatly which has given me a new skill I hope to use in my future working with Swahili speaking populations. I hope to continue down the path of being a health educator in these communities and continue to further my global citizenship through these opportunities. The experience was pivotal who I am today and who I want to become in the future.

**Abedini, Delara**

**Mentor(s): Mr. Anthony Androulakis, Dr. Alexandra Basilakos, Dr. Julius Fridriksson**

**Analyzing melodic repetition in post-stroke aphasia**

Background: Aphasia is a language and communication disorder caused by damage to the brain, usually by stroke or other types of brain injuries. Aphasia usually impairs speech repetition; however, whether aphasia affects a broader range of skills, such as melodic repetition, is not yet known. Additionally, brain regions critical for repetition errors in aphasia are not well understood. The long-term goal of this project is to identify the neuroanatomical correlates of melodic repetition impairment in chronic stroke patients.

Method: Two MATLAB programs were developed and implemented (by author AA) to encode and assess sung melodies of patients with aphasia. The first program converts the recording of a patient's sung melody into a matrix containing the frequency and corresponding duration of each note voiced. The second program compares this matrix to the matrix of the target tune to give a quantified, objective assessments of the melodic repetition deficit. Using the above methods, 1269 audio files were analyzed from 47 stroke patients (27 audio files per patient, 9 tunes, 3 trials per tune). These assessments were then correlated to lesions and connections in the brains of stroke patients using voxel-based lesion-symptom mapping (VLSM) and diffusion tensor imaging (DTI) data.

Results: The melodic repetition quality of each patient is represented by the average duration error, average melodic interval error, and average number of notes added/deleted by each patient. The number of notes added or deleted was found to be correlated to the left globus pallidus. The melodic repetition interval error was correlated to a connection between the left inferior frontal gyrus pars orbitalis and the left postcentral gyrus.

Conclusion: This computerized quantified assessment of melodic repetition reduces inter-rater and intra-rater errors that can occur during subjective scoring, and therefore provides an objective assessment of sung melodies in stroke patients. The brain regions correlated with repetition deficits from this study can be useful in assessing and treating aphasia in stroke patients.

**Abels, Jacob**

**Mentor(s): Ms. Tricia Kramer**

**Sexual Trauma Services of the Midlands Internship**

During the Summer of 2017 I completed an Internship at the non-profit organization The Sexual Trauma Services of the Midlands. I did this internship as part of the Criminology and Criminal Justice program at USC so that I could expand my studies past simply listening to lectures about law or law enforcement. During this internship I completed several trainings that qualified me for several positions to include, working the front desk/client intake, speaking at events and manning the STSM booth at fairs, and being a victim advocate. A majority of my internship was spent at the front desk of the Forrest Acres location letting clients in, adjusting appointments, and completing a variety of projects to assist the full time staff. This internship helped me discover my passion for this type of work and it allowed me to give my time to bettering my community here in Columbia. This work took a large emotional toll from me and made me respect the women and men that work in this field every day.

**Adamkowski, Rachel**

**Mentor(s): Dr. Brie Turner-McGrievy**

**Effect of weight loss on blood pressure in low-fat vegan and low-fat omnivorous diets**

**Background**

African Americans (AA) have the highest prevalence of hypertension in the United States and are under-represented in nutrition intervention studies. The Nutritious Eating with Soul (NEW Soul) study aims to help AA adults with a body mass index (BMI) between 25 and 49.9 lose weight and decrease risk factors, such as hypertension, related to cardiovascular disease. The study uses a healthier soul food diet, either low-fat vegan or low-fat omnivorous (omni), and encourages participation in physical activity.

**Purpose**

To determine the correlation between weight loss and blood pressure (BP) after participants had been in the intervention for 6 months.

**Methods**

There were 67 AA participants (mean age 47.7+11.2 years; mean BMI 36.6+8.0 kg/m<sup>2</sup>) enrolled in the NEW Soul study and 58 (87%) completed the 6-month assessments and were included in analyses. Participants were randomly assigned either a low-fat vegan diet or low-fat omnivorous diet, and for 6 months attended weekly meetings which included cooking demonstrations, recipes, educational presentations, and social support. At baseline and six months, weight (digital scale) and blood pressure (digital monitor) were assessed. Pearson correlation was conducted to examine the relationship between weight loss and change in BP.

**Results**

Participants in both the vegan and omni groups lost significant weight at 6 months (-3.2+3.9 kg,  $p < 0.001$  vegan; -2.6+4.9 kg,  $p < 0.01$  omni). Significant reductions in systolic BP were achieved in the omni group (-6.2+13.2 mmHg,  $p = 0.01$ ), and not in the vegan group (-3.2+14.3 mmHg,  $p = 0.25$ ). Significant reductions in diastolic BP were achieved in the vegan group (-3.5+8.5 mmHg,  $p = 0.04$ ), and not in the omni group (-1.9+6.5 mmHg,  $p = 0.10$ ). There was no significant correlation between weight loss with systolic BP ( $r = 0.07$ ,  $p = 0.62$ ) or diastolic BP ( $r = 0.18$ ,  $p = 0.17$ ).

**Conclusions**

The findings suggest success in achieving weight loss on both the low-fat vegan and low-fat omni diet. As the vegan group significantly reduced diastolic BP and the omni group significantly reduced systolic

BP, factors outside of weight loss could be responsible for these reductions in BP. Future studies should examine other factors that could cause reductions in BP, such as physical activity, reduced sodium intake, or increases in potassium intake.

**Addahoumi, Isra**

**Mentor(s): Dr. Sarah Keeling**

**Getting Involved in Research While Studying Abroad**

In my study abroad, I tried to learn as much as possible. One of the ways that made me involved in my major, the university, and community is research. I started working in a research study called New Soul Study. This study is all about vegan food and cardiovascular health for African American. Before this study, I thought that American food is just burgers and fries, however, after I start working in the study, I learn about different American food and how to change it to be a healthy vegan dish. I was able to interact more with students and work as one team. My English has improved and I learned also how research work in Public Health, I learned more about graduate school from grad students who are with me in the study. I became more interested in pursuing mph and Ph.D. in Health Promotion and education behavior. Moreover, I was able to exchange cultures through food. I shared some healthy vegan Libyan dishes with the participants like Tajen and Red Lients Soup. In my poster, I will write about what the study is, what we do, how it helped me in my studying abroad.

**Agho, Victory**

**Mentor(s): Dr. Cheryl Armstead**

**Hope's Law: What Do African American Women In South Carolina Know About Breast Density and Their Breast Density Notification Rights?**

Background: Limitations of screening mammography in patients with dense breasts combined with increased risk for breast cancer have made the issue of dense breasts a matter of great concern in recent years, leading to advocacy for policy change and legislation in South Carolina (Hope's Law, SECTION 44-115-160, 2016). Dense breast notification (DBN) legislation requires notification of mammographic results indicating the presence of dense breast tissue. We know little about the impact of DBN on African American women's breast density knowledge and awareness after the enactment of Hopes Law in 2016. African American women (AAW) represent a disproportionate prevalence of dense breast tissue mammographic findings compared to white women. Ethnic disparities in breast density likely influence late stage detection of breast cancer. This qualitative study explores the lived experiences of AAW interpreting the concept of breast density and legally mandated DBNs' impact on future mammography screening intentions.

Methods: We are currently assessing DBN recall in semi-structured telephone interviews among African American women ages 40 to 74. This conveniences sample is composed of pre-screened volunteers who were informed that had dense breasts. Recruitment will continue to occur among local Black churches and snowball recruitment. Final analyses of 50 women will include content coding characterizing their recall of the breast density notification content, perceptions of breast density, and planned or actual participation in medical follow-up.

Results: This preliminary analysis of ten AAW indicates that seventy-three percent recalled receiving a DBN, but few could recall specific content. They expressed confusion about the medical meaning of breast density. AAW created their own culturally-based explanatory models of dense breasts (e.g. "large, pendulous breasts") that differed from medical explanations. Women planned to discuss the DBN with their primary care doctors but did not have a specific plan for this discourse.

Conclusions: AAW receiving DBNs may have limited knowledge and many misperceptions about the implications of having dense breasts in cancer risk that must be addressed through health education. Provider support is needed to promote informed decision-making that incorporates open discourse about potential DBN experiences, personal risk, and cultural meanings of breast density.

**Alba, Rebecca**

**Mentor(s): Mr. David Deweil**

**New Perspectives on Pollution, Income Inequality, and Subjectivity: Global Learning in Thailand**

During the spring semester of my Junior year, I studied abroad at Mahidol University International College in Bangkok, Thailand. I always knew that I wanted to spend a semester abroad, and I chose this university in Thailand because the program had classes that I would be able to use towards my minor and Carolina Core requirements. Being in Thailand allowed me to easily travel to other countries in Southeast Asia, enjoy delicious food, and experience spectacular scenery. I have always had a passion for traveling, and studying abroad allowed me to explore a new part of the world I never thought I would get to see. Being in Southeast Asia allowed me to realize how tremendous of an issue pollution is and how it is affecting our planet. Since returning, I have made changes to be more environmentally friendly and educate others on what they can do to help. Living in Thailand also opened my eyes to income inequality, helped me notice it more once back in the United States, and realize that something needs to be changed. My experience abroad also helped me to understand that people can be judgmental of other cultures not because of their own ignorance, but because biases and opinions are formed from the situations in which one is brought up in.

**Almond, Jenna**

**Mentor(s): Dr. Ambra Hiott**

**Peer Mentorship is Necessary for Success in College**

As a resident mentor in Capstone I interacted with first-year students and assisted them in their transition into the University of South Carolina. Throughout my time as an RM, I was given the resources and opportunities to make my residents' first year the most rewarding. As a freshman myself, I had a rocky transition into college life. I struggled to find my place at this large university I now call home. I wanted to make an impact on the next group of first-year students so that they could fully enjoy their college experience and feel as if they were a part of the South Carolina family. After applying, I was given the opportunity to become a Resident Mentor in Capstone House. Throughout my 2 years as a Resident Mentor, I found that it is not only about being a policy enforcer, but a friend who they can relate to and confide in. Yes, these first-year students need guidance, but they also need a confidant they can rely on. They need someone to share their first college successes with, and someone to reassure them through their failures. With this experience I discovered that being a mentor and a peer leader is about listening, guiding, and encouraging my peers. It is evident to me that this is the way most people succeed. When first-year students are put in an environment that incorporates a mentor who advocates for their success, they thrive.

**Alsheimer, Quinn**

**Mentor(s): Dr. Myriam Torres**

**Analysis of the 2015 Youth Risk Behavioral Surveillance System**

Data from the 2015 Youth Risk Behavioral Surveillance System (YRBSS) was analyzed to examine the association between carrying a weapon to school, bullying, and feeling safe at school. The YRBSS is a survey conducted by the Centers for Disease Control and Prevention (CDC) that looks at six categories of priority health behaviors in high school aged students. This examination of selected factors will help to further determine what influences a student's decision to carry a weapon, and will help public health profession-

als to assess and target the problem. Although the percentage of students who carry weapons to school is small, the result of that action can be devastating. It needs to be better understood why students carry weapons in order to stop further violence. The YRBSS had 15,624 responses in 2015. The YRBSS was distributed to randomly selected grades (9-12) and classrooms within 180 high schools chosen through a two-stage cluster sample design. For the analysis of this previously collected data, Statistical Analysis Systems (SAS) was used. Data tables of the various factors were created, and these tables were then analyzed for associations. Participants were evenly split amongst grades 9-12, approximately half were male and the other half female, and one third of participants reported they were Hispanic/Latino. The violent risk behaviors analyzed were carrying a weapon, both on and off of school property, carrying a gun specifically, and engaging in physical fights both on and off school property. Other risk behaviors included having been bullied at school or online, having been injured with a weapon or in a fight at school, and feeling unsafe at school. Bullying was the most frequent risk creating behavior, as approximately one fifth of all participants reported experiencing bullying of some form. Similarly, approximately one fifth of students reported having carried a weapon and having engaged in a physical fight. This study concludes that it is very likely that risk provoking behaviors, such as bullying, are directly associated with risk behaviors, such as fighting or carrying a weapon.

**Amiridis, Aspasia**

**Mentor(s): Prof. Parastoo Hashemi**

**Developing a Copper-Specific Carbon Fiber Microelectrode for On-Site Detection**

The detection of trace contaminants in the environment is a constantly evolving frontier in analytical chemistry. Some of the most harmful environmental contaminants are metal ions, and one of the more under-researched of these ions is copper(II) (Cu(II)). Trace amounts of Cu(II) act as micronutrients for healthy ecosystem function; however, excessive accumulation or depletion of Cu(II) can lead to adverse effects on all trophic levels. The toxicity and mobility of Cu(II) in the environment is controlled by speciation. Generally, free metals are of most concern because they are free to engage in chemical processes. Current techniques for metal detection cannot, in a simple way, report free metal ion concentrations because sampling alters speciation. The purpose of this paper is to characterize a novel electroanalytical approach for rapid Cu(II) speciation sensing in environmental systems. To achieve this, fast-scan cyclic voltammetry was performed at carbon-fiber microelectrodes (CFMs) covalently grafted with Cu(II)-specific ionophores. This work details the characterization of both ionophore-grafted and bare CFMs in environmentally relevant parameters and highlights the utility of our novel method for speciation analysis.

**Arias, Maya**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Tutoring Center**

Once I graduate from the University of South Carolina I want to teach in Elementary schools. When I heard that the Anderson Library at the University of South Carolina was hiring, I immediately applied as a Spanish Tutor. I was ecstatic when I was hired because, I felt that being a tutor would be a great experience. When I started tutoring, I started to doubt myself in whether or not I would do well, however, after helping a couple of students with Spanish, I learned that I was good at tutoring. Many students have thanked me for helping them in their Spanish class. Tutoring students in Spanish has made me one-hundred percent sure that teaching is right for me. It has been very humbling to have students come to me because, they have taught me to be better and more confident at Spanish. Tutoring has made me look forward to my future in teaching because I cannot wait to see what I can accomplish when I finish my education.

**Armstrong, Kaitlyn**

**Supervisor(s): Brittany Hughes**

**Mentor(s): Dr. Andrew Hatchett**

**The Influence Cannabidiol has on Delayed Onset of Muscle Soreness**

Exercise-induced muscle damage (EIMD) can result in a condition commonly known as delayed onset of muscle soreness (DOMS). The influence the well-known anti-inflammatory effects of cannabidiol (CBD) can have of DOMS has yet to be determined. The aim of this study was to determine the influence CBD can have on EIMD DOMS. Materials and Methods: Twenty-three trained participants completed a lower extremity EIMD protocol prior to being randomly assigned to either a CBD, placebo or null groups. Self-report visual analog scale (VAS) scores were used to determine the level of soreness the participant was experiencing throughout the study (pre-, post-EIMD protocol, 24-, 48-, 72- and 96-hours post-EIMD protocol). The CBD group was offered a 1ml solution containing 16.67mg of CBD. The placebo group received 1ml of medium chain triglycerides (MCT). The null group received nothing. Results: Each group reported significant differences in pre-EIMD and post-EIMD VAS scores. The CBD group reported significant differences in VAS score at post-EIMD to 24-hours post-EIMD and at 48-hours post- EIMD and 72-hours post-EIMD. At 96-hours post-EIMD the CBD group reported VAS scores closer to pre-EIMD levels than either the placebo or null groups. Conclusions: CBD appears to have a significant influence on muscle soreness associated with EIMD DOMS when consumed immediately after strenuous exercise. Additionally, the rate of recovery with CBD use is greater when compared to MCT only or no intervention.

**Askins, Amanda**

**Mentor(s): Dr. Nathan Hancock**

**Development and Analysis of an Activation Tagging System in Wheat**

Transposable elements are DNA sequences that can excise from one location and reintegrate into a new place within the genome. Transposable elements can be used for mutagenesis because of their ability to induce changes to an organism's genetic sequence. Thus, mutagenesis is used as a tool for gene discovery by providing information on how specific genes effect the growth and development of an organism. A modified version of mutagenesis uses an activation tagging sequence, which shows the function of genes by causing their overexpression. A non-autonomous transposable element used for mutagenesis, known as mPing, was first discovered in rice and requires two proteins, ORF1 and Transposase, for mobilization. An activation tagging version of mPing, known as mmPing20F, was created by inserting an enhancer sequence from the promoter region of the figwort mosaic virus into a hyperactive version of mPing. Plant transformation was used to get mmPing20F:GUS and an ORF1/TPase expression construct inside the wheat genome. The first five generations after cross-pollination was completed were analyzed through PCR analysis and GUS staining to detect active transposition and determine transposition rates for each generation. The result of these experiments showed that homozygosity was achieved for the mmPing-20F:GUS plasmid and that transposition of mmPing20F in transgenic wheat lines occurred when paired with both mobility proteins. Excision behavior of mmPing20F was also analyzed and demonstrated behavior similar to mPing in soybean, rice, and Arabidopsis thaliana. Further work will focus on increasing transposition rate per generation as well as cultivating plants that are homozygous for the ORF1/TPase expression construct.

**Atkins, Jessica**

**Supervisor(s): Christopher Terry**

**Mentor(s): Dr. Jeanne Britton**

**The Digital Piranesi**

The Digital Piranesi is an interdisciplinary, digital humanities project focusing on Giovanni Battista Pira-

nesi, an 18th century Italian 'architect.' Piranesi was known for his incredibly complex, detailed engravings of Roman ruins, both contemporaneously and in their ancient forms, as well as complicated maps and imaginative prisons. The main goal of the Digital Piranesi is to digitize his body of works in a way that we feel completes his original vision and intention for his works, since so many of his works almost seem to be made in anticipation of the digital revolution, pushing the boundaries of what the medium could accomplish. So far, Christopher and Jessica have worked with other members of the team, being paid through an ASPIRE grant and Magellan Scholar grant, to turn several of Piranesi's engravings into interactive webpages through SCALAR, an application developed and run by the University of Southern California based on Wordpress to create image-based interactive, informative digital 'books.' Chris has been designing and creating interactive architectural visualizations using Unity and Blender based on works by Piranesi that represent multiple views of the same area. Additionally, he has been planning and creating videos showing the large size of USC's Piranesi collection with the goal of providing digital users with the same experience of flipping through the various pages and books that we as researchers have experienced. Jessica has been continuing to supplement our efforts in SCALAR by adding more maps and architectural studies, adding more detailed annotations to the images already in SCALAR, adding images from another previously unincorporated volume into SCALAR. Additionally she has been producing introductory essays for each 'chapter' of the SCALAR 'book' that contextualize both Piranesi and his works for viewers.

**Atwood, Erika**

**Mentor(s): Ms. Lisa Camp**

**Becoming an Air Force Leader**

As an Air Force Reserve Officer Training Corps cadet, I had the opportunity to meet and lead a group of peers from across the county during our summer field training, L.E.A.D.. Complete strangers from all 50 states came together and throughout the 3 weeks we were there, we got the chance to learn so many things about being a leader by rotating positions such as commanders and vice commanders. Within 3 weeks, I had to establish rapport and trust with my peers by showing my capabilities as a commander. It showed how important it is that when the "bullets", they know that a leader will have their back. With so many personalities, I really was able to see how to persuade or use ethos in order to lead them in the direction I envisioned when I had command. I personally found this experience to be the most rewarding thing I have done thus far because it taught me a lot about pushing my comfort zone in order to make a team. I will utilize this presentation to detail the many lessons I learned about leadership and how they have shaped me along my journey to become a better leader.

**Aucoin, Claire**

**Supervisor(s): Shivali Desai**

**Mentor(s): Dr. Kate Flory**

**Association of Household Income with Mental Illness Diagnosis, Treatment Access and Satisfaction for Rural Youth**

In the United States, access to mental healthcare is critical for children as the onset of many mental disorders is before age eighteen. However, access can be difficult due to rising healthcare costs and lack of affordable insurance, issues especially relevant to people of a low socioeconomic status (SES). In fact, research suggests that financial stressors can contribute to poor mental health, and since families of low SES tend to live in rural areas, they often cannot access quality treatment due to cost and distance. Regarding children, a lower SES can affect their development and lead to the onset of a mental illness. The purpose of this study is to investigate the association between SES and mental health among rural youth by examining the relationship between annual household income and 1) prevalence of mental illness, 2) access to treatment, and 3) satisfaction with treatment among children in a rural South Carolina school district. It was hypothesized that children from low SES families would be more likely to receive a mental

illness diagnosis, less likely to access treatment, and less satisfied with treatment. Using data from PLAY-MH-II, data on 555 children ages 5 to 17 were analyzed. Results indicated that children with a mental illness diagnosis had a significantly lower household income ( $M=5.97$ ) than those without a diagnosis ( $M=6.84$ ),  $p<0.001$ . However, children who accessed treatment had a significantly lower income ( $M=5.66$ ) than children who did not access treatment ( $M=6.79$ ),  $p=0.008$ . Furthermore, families who reported wanting treatment but not being able to access it had a significantly higher income ( $M=7.29$ ) than those who did not ( $M=5.85$ ),  $p=0.037$ . There was no significant difference in income between those who were satisfied with treatment and those who were not. Possible explanations for these findings are explored, including the effect of Medicaid coverage on access to treatment. Results of this study help demonstrate the mental healthcare needs of children in a rural population.

**Augenblick, Lee**

**Mentor(s): Dr. Susan Wood**

**Effect of clodronate on stress-induced neuroinflammation and anhedonia**

There is a link between the development of depression and comorbid diseases such as cardiovascular disease, with females exhibiting increased susceptibility. Our lab has shown that neuroinflammation regulates susceptibility to social stress in males and we are interested in determining whether neuroinflammation regulates enhanced stress sensitivity in females. To answer this question we are testing the ability of Clodronate, a compound toxic to microglia, to knock down microglia and the resulting neuroinflammation when injected directly into the locus coeruleus, a region known to regulate stress-related behaviors and cardiovascular responses. Cytokines are released by microglial cells, and this study will test whether decreasing microglial expression in specific brain areas can reduce the cytokine expression in those brain regions following stress and whether this inhibits the development of depressive-like anhedonia. In this study female rats were treated with 25ug Clodronate or vehicle and exposed to either non-stress control or witness stress, whereby a rat bears witness to social defeat between two male rats. Five days after exposure to stress anhedonia was measured using the sucrose preference test. 25 ug of Clodronate knocked down microglial expression by approximately 50%. When injected with vehicle, the locus coeruleus contained  $55.3 \pm 5.3$  microglia, but 3 days after injection with 25  $\mu\text{g}$  of Clodronate the locus coeruleus contained  $27.4 \pm 2.6$  microglia. It was also found that stress produces anhedonia and Clodronate produces a moderate yet not significant reversal of this behavior. There are ongoing studies that are quantifying the number of inflammatory cytokines present in the locus coeruleus of rats exposed to stress in the presence or absence of Clodronate. This study will help identify the role of neuroinflammation on stress sensitivity and specifically cytokine's effect on depressive-like behaviors.

**Ayres, Bonnie**

**Mentor(s): Mrs. Hayley Ross**

**Peer Leadership Within the School of HRSM**

During the fall 2018 semester, I served as a peer leader for a University 101 class of incoming students within the college of Hospitality, Retail and Sport Management. This course is designed to engage students and provide them opportunities to ensure a fulfilling experience in their time as a student at the University of South Carolina. There was a strong focus on building a community and helping students to understand resources available to them at the University to create a smooth transition as they entered college. Due to my prior experiences within the same major field as the students in my class, I was able to contribute knowledge within a classroom setting that will aid them in the future. Throughout this experience, I facilitated classes and expanded upon my leadership skills, while serving as a mentor to other students. In my role as a peer leader, I developed skills and created a positive relationship with my co-instructor, which will translate into my future career within the retail industry. I was able to recognize and understand the vastly different skills that were represented within our class that contributed to what

made each of the students unique and strong as individuals.

**Ayub, Zeeshan**

**Mentor(s): Dr. Mohamad Azhar, Dr. Mrinmay Chakrabarti, Mr. Rico Reed**

**Effect of Different Strains of TGFB2 on Cardiovascular Structure**

Tgfb2 is a protein that is extremely important for the growth and development of embryonic tissues. This is because systemic knockout mice of Tgfb2 exhibit developmental defects in multiple organs and die at birth. Mutations in Tgfb2 have been shown to relate to cardiovascular issues such as cardiovascular disease. The goal is to see to what extent does Tgfb2 have an impact on cardiovascular problems. The Azhar lab at the University of South Carolina School of Medicine has 3 different strains of Tgfb2 mice. These strains carry tm1a (Knockout-First allele), tm1c (Conditional-ready allele), and tm1d (Conditionally-deleted allele) alleles. These different strains carry a modified form of the Tgfb2 wild type allele. These mouse strains have different versions of gene-modification of Tgfb2 that will allow deletion of Tgfb2 in all tissues (tm1a) and specific cells or tissues or organs to see what effect does Tgfb2 deletion would have on the mice. The lab uses DNA PCR amplification techniques to find which allele of Tgfb2 the mice carry. The genomic DNA is first extracted from mouse tail clips and then amplified via polymerase chain reaction (PCR). Then through agarose gel electrophoresis, the DNA is analyzed and the strain of the mouse is determined by looking at bands present on the agarose gel. In conclusion, I was able to detect Tgfb2 tm1a and tm1c alleles. In future, I will be using the PCR DNA amplification method to detect Tgfb2 tm1d allele. My work is important as graduate students and postdocs are currently using these various Tgfb2 strains in the Azhar Lab to make novel discoveries about the physiological role of Tgfb2 in cardiovascular development and disease.

**Bailey, Allison**

**Mentor(s): Mrs. Ambra Hiott**

**Culture and Health**

Last semester, I had the life-changing opportunity to study abroad in Khon Kaen, Thailand. During my semester in the Land of Smiles, I took classes relating to community public health while immersing myself in a culture I had previously known nothing about. I focused my studies on the ways that cultural traditions, political history, and social expectations can affect the health of people in different countries. I used homestays, field trips, and research projects to enhance my understanding. Over the course of the semester, I was able to design a research project and conduct an intervention program regarding the rate of Type II Diabetes in Buddhist monks. My classmates and I had to be very careful to understand the religious tenants that aggravated the high prevalence of this disease before we could begin our project, and we had to consider these factors as we were designing our intervention program. For one week during the semester, I visited Laos to learn about the healthcare system there. I was able to see how their recent political history had affected their economy, which in turn affected their healthcare system to the point where it is non-functioning without foreign aid. As I graduate and begin my career as a public health professional and a global citizen, I must take care to learn what I can about the culture of the people I am helping. Culture, politics, and social structure affect every aspect of our lives. Healthcare is no exception to that. In order to enact effective change, these factors must be considered and respected.

**Bain, Ian**

**Supervisor(s): Zachary Laprise, Johanna Perez, Lauren Trevino**

**Mentor(s): Mrs. Hayley Ross**

**Reclaimed Runway Fashion Show**

Reclaimed Runway is a fashion show where the outfits are designed only out of recycled and upcycled

materials. This year, Sustainable Carolina hosted Reclaimed Runway for the sixth time on April 23, 2019. Waste is a large problem around the world and at USC. According to the 2016 Sustainability Tracking Assessment and Rating System (STARS) report, the University generated more than 4,400 tons of waste, with only 19 tons of waste re-used or donated. Reclaimed Runway strives to demonstrate the importance of reducing our waste, while educating attendees on the less-known and more environmentally friendly ways to reduce waste, other than simply recycling plastic. Planning Reclaimed Runway fosters our development of project planning, networking, communication, problem solving, and research skills, and it is a valuable experience that can be applied to Graduation with Leadership Distinction and future career endeavors.

### **Bangs, Abigail**

**Mentor(s): Ms. Maegan Gudridge**

**Time in Taipei- Exploring Emerging Economies and Cultural Dynamics**

In the Spring of 2018, I studied abroad at National Chengchi University in Taipei, Taiwan. I studied here as a part of my International Business major at the Darla Moore School of Business, and I was the first student from the program to study at this university. My goal when I chose where I wanted to study abroad was to gain a greater understanding of emerging economies and cultures outside of the United States of America. While I was studying there, I learned about the economic history of Asia, the dynamics between Taiwan and China, and the emerging social issues in an increasingly global world. I also had the chance to get involved travel almost all the island and to teach English at a local middle school. I knew that my experience abroad would be unique and change me, but I absolutely underestimated how much I would learn about myself and the world. The immersive nature of study abroad dramatically increases your understanding and appreciation of the place you study in and yourself. During my time in Taipei, I learned how to be a more self-sufficient person and how to be a better global citizen by understanding the world around me.

### **Baquet, Jacqueline**

**Mentor(s): Dr. Jerry Hilbish, Ms. Lindsey Schwartz**

**Population Genomic Analysis of Natural Selection in a Hybrid Zone**

Along the southwestern coast of England, biological hybrid zones exist between two species of marine mussels: *Mytilus edulis* and *Mytilus galloprovincialis*. These species have diverse fitness traits that they have adapted in response to climate. Natural selection helps maintain balance within these areas which can be observed by looking at the allele frequencies of the hybrid populations throughout their lives. Previous studies have shown that the genotypes of mussels in the hybrid zone of interest, Whitsand Bay, have been reported to favor *M. edulis* alleles when the size class is under 25 mm, but selection shifts in favor of *M. galloprovincialis* alleles as shell length approaches 40 mm. Currently, to genotype mussels, DNA is extracted from the mantle tissue and undergoes polymerase chain reaction (PCR) which amplifies, or copies, the DNA to make it easier to visualize. The PCR product is then run on an agarose gel using electrophoresis with a molecular marker of the DNA region of interest. This project analyzes the genomes of animals located in the hybrid zone using five 5 mm shell-size classes ranging from 25 mm to 40 mm to determine the degree to which natural selection affects different portions of the hybrid genomes. If the genome is selected against with varying strength, the linkage groups that are selected against can measure the accuracy of the current marker used to genotype *Mytilus* mussels (Glu-5'). We tested the hypotheses that there would be varying degrees of selection throughout the genome and that we would be able to identify linkage groups that are significantly affected by selection. A total of 101 individual genomes were analyzed at 70 loci. Based on available reference populations, we have concluded that there are multiple linkage groups that are under varying selection across the genome. There are 32 highly differentiated genetic markers that would be useful for future diagnostic genetic analyses. Interestingly, despite

being highly differentiated, not all of those markers show evidence of the same strength of selection.

**Bardes, Jacquelynn**

**Mentor(s): Mrs. Katie Hopkins**

**Peer Tutoring and Professionalism**

For two semesters in my time at the University of South Carolina I served as a peer tutor in the Student Success Center (SSC). I tutored in a variety of classes all offered in the business school as I am a business student. I hosted drop in sessions as well as one-on-one peer tutoring. I was interested in peer tutoring because I loved being able to get through to someone and explain a concept well enough that they would stop struggling with it. Originally this started out with just helping my friends but based on their feedback, it led me to believe I could do this for money with a diverse set of students. I wound up loved tutoring and have seen so many concepts from the practical-based business classes show up in my experiences with the student success center. The biggest lessons I took away from this experience was that I was able to think more analytically and see not only problems within corporations but also identify solutions through a management lens. I also learned how to connect with strangers on a day to day basis and turn them into to not only connections but also friends and mentors. As I look back on my experience as a peer tutor in the SSC, I can clearly see now how this one-year period in my life encompassed so much growth and learning in various areas. Looking back, I see peer tutoring not only as a culmination of everything I have experienced at this University, but also of everything I will continue to achieve because of those experiences.

**Barnes, Tyler**

**Mentor(s): Dr. William Jones**

**Discovering my future career through leading the community around me**

Throughout my time at the University of South Carolina, I have taken many classes and had many opportunities that have pushed me further toward my goals and the profession I am pursuing. This being said, some of the most impactful experiences I have had during these four years have been both in the classroom and beyond the classroom. Each experience I have been involved in has given me chances to find more meaning in what I do each and every day. I have been lucky enough to have great influences in my time here at USC, and those influences in turn shown me better ways I can lead others in my community. The first experience was a medical mission trip to Nicaragua with the intention to provide medical care to the underserved population in the rural communities. This experience occurred during March of 2016, my freshman year, and truly reinforced my decision of wanting to pursue the medical field so I could help others when they need it most. Seeing the world from a different point of view such as this opens your eyes to the possibilities to help those around you.

The second experience was during the fall semester of my senior year when I had the opportunity to be a peer leader for University 101 (U101). I worked as a co-instructor for a class of 19 first-semester freshmen and aided them in their transition from high school to college. Coming to a large university such as USC can be an extremely difficult transition, which taught me that leading my peers and help them in their journey of becoming a Gamecock.

The third experience is working as an emergency medical technician (EMT) for LifeGuard Ambulance Service for the past year and a half. I have had the opportunity to directly care for patients and assist them in every way that I can while I am with them. It has helped fortify my decision to enter the medical field and showed me how important leading and caring for others can change someone's life.

**Bathalter, Marvel**

**Mentor(s): Prof. Jay Pou**

**Seeing the World in a Different Perspective**

Europe is extraordinary! Having the opportunity to travel abroad and get many global learning experiences, I was able to use what I have learned at the University of South Carolina to enhance my learning experiences outside of the classroom. This has allowed to me to see the world in a different perspective and learn new things about myself, the world, and what's to come in the future.

Over my four years at the University of South Carolina, I have learned a lot that will help me thrive in my future. Classes such as UNIV 101, CSCE 102, MGSC 290, and MGSC 486 helped me develop a growth mindset, see how impactful technology can be, and learn the key to teamwork which allowed me to get a more in depth experience while studying abroad in Europe. Therefore, I feel going abroad is so important to experience in everyone's life, as it opens a whole new perspective.

I learned first-hand how important it is to experience the world outside of what you know. I lived abroad for nine months in Europe, six months in the Netherlands and three months in Ireland. I was fully engulfed with different cultures as I took classes with locals about corporate finance and marketing and worked a nine to five job as a financial services intern at a firm called Irish Insolvency Solutions. I learned from both my own experiences and others who traveled abroad how important it is to explore the world. Living in Europe for nine months allowed to strive and grow outside of my comfort zone. I tried new things and did things I thought I would never do. All in all, I truly believe that our world is an amazing place and we should never stop exploring it. We can learn so much from the being adventurous and leap-ing outside of your comfort zone.

**Beaman, Jack**

**Mentor(s): Ms. Lisa Camp**

**Violence Against Women Act: My Work Helping SC Implement This Legislation**

This presentation discusses my work this year as an intern in the Violence Against Women Act section of the South Carolina Office of the Attorney General. This work is made possible by the landmark 1994 federal law signed by President Clinton and is vital to all states in the U.S., including South Carolina. The state of SC has one of the highest rates of domestic violence and sexual assault in the country every year. My work responsibilities have included, but are not limited to, helping plan a statewide event in honor of victims, conducting research on topics vital to statewide efforts to eradicate sexual assault and domestic violence, educating myself on SC statutes regarding sexual assault and domestic violence, and analyzing victim services in the state. Also discussed is the importance of everyday citizens being willing to look beyond just their own problems and engage in the kind of work and advocacy that reaches all kinds of people in need.

**Beman, Molly**

**Mentor(s): Prof. Nina Moreno**

**Guiding Gamecocks Home**

Throughout my time at USC, I have served as a University Ambassador, which has allowed me to welcome prospective students and families to the University of South Carolina, give them tours, and show them an insight into what it's like to be a student at USC. At first being a tour guide seemed to be all about the material aspects of campus: the buildings, the physical appearance, and the specific classes and professors. But as I became more experienced, it became evident that my role as a tour guide exceeds this. Each time I give a tour, I have the opportunity to help a prospective student fall in love with the dream of higher

education as a whole, and all of the opportunities, growth, and future success that this may bring. I am not simply selling them on the physicality of USC, but rather the abstract feeling of home, belonging, and future opportunity. Through my Developmental Psychology class, I was able to delve into the psychological evidence that explains why that feeling of home is essential to one's experience. As a University Ambassador, not only have I gained an appreciation for the resources and programs that USC offers to students, but I have also gained empathy and patience for others. These skills I have acquired throughout serving as a tour guide have changed my career trajectory and have made me ecstatic about pursuing a career in Higher Education and Student Affairs.

**Benton, Donzelle**

**Mentor(s): Dr. Claudia Grillo**

**Regulation of food intake and neuronal activation following intranasal leptin administration**

Leptin is an adipocyte derived hormone involved in the regulation of body weight, food intake, and energy expenditure in order to maintain a stable amount of adipose tissue. When an individual is obese, they may develop hyperleptinemia which is thought to be caused by alterations in leptin receptors in the arcuate nucleus of the hypothalamus or by an inability of leptin to cross the blood brain barrier. Intranasal (IN) drug administration bypasses the BBB, allowing compound to directly access the brain and avoid first-pass elimination via the liver. Rats received 25  $\mu$ L of either leptin solution (0.2 mg/kg bodyweight) or 25 vehicle (saline). We hypothesized that intranasal leptin administration will reduce both food intake and bodyweight. Leptin treated animals will show higher levels of neuronal activation in the arcuate nucleus and the dorsal raphe nucleus. Animals were intracardially perfused with 4% paraformaldehyde 2 hours after intranasal leptin administration. Brain sections were stained for C-fos using immunohistochemistry. Plasma levels of leptin were analyzed from the first day of treatment using an ELISA. IN leptin did not cause a significant decrease in bodyweight and daily food intake between the two groups. IN leptin did result in a significant transient decrease in food intake on the first day of treatment, but no significant effect on food intake on the last day of treatment. C-fos expression in the dorsal raphe and arcuate nuclei were higher in leptin treated animals as compared to saline treated animals. Leptin treated animals did not show any increase in plasma leptin levels, indicating that intranasally administered leptin did not leak into the periphery. IN leptin had a transient effect on food intake at 2 and 3 hours after administration. Leptin treated animals showed higher C-fos expression than saline treated animals.

**Bernard, Olivia**

**Mentor(s): Dr. Nina Moreno**

**GlobeMed: Extending Beyond the Comfort Zone**

The most important this I have come to understand throughout the course of my undergraduate career is that nothing good or important can be accomplished through complacency; to grow we must allow ourselves to be uncomfortable. While I was made aware of this reality within the classrooms through courses such as SAEL 200, it was really my beyond the classroom experiences that solidified the importance of this concept to me. Specifically, my work with a student organization called GlobeMed illustrated this concept clearly. This organization is a model nonprofit that emphasizes ethical and sustainable partnerships with other nonprofits worldwide. As a member of GlobeMed, we work to raise funds for our partner in Odisha, India and then have the opportunity to intern with that nonprofit during the summer. I took advantage of this opportunity, and although I would not describe this experience as comfortable, I would certainly say that it has been one of the most significant instances of personal growth I have ever had the pleasure of experiencing. I am immensely appreciative of privilege provided to me which has allowed me this experience, and I hope to continue putting this lesson into practice in my life through both personal and professional choices as I work to extend my given privilege to others.

**Bernard, Olivia**

**Mentor(s): Dr. Douglas Wedell, Dr. Svetlana Shinkareva, Ms. Christine Weber**

### **Relating Naturalistic Discrete Emotions to Core Affect Dimensions and Physiological Reactions**

The aims of this research project were to 1) develop a set of naturalistic silent video clips that were identified as expressing one of seven discrete emotion states, 2) relate how well these emotion expressions are predicted by the three core affect dimensions of valence, arousal and dominance, and 3) evaluate the physiological signature of these discrete emotion expressions. First, in a series of behavioral experiments (n = 163) we validated a set of 4s naturalistic silent video clips depicting either individuals or a group expressing a uniform discrete emotion: anger, disgust, fear, happiness, neutral, sadness, and surprise. In study 1 (n = 27) participants rated each video clip on valence, arousal and dominance and chose a discrete emotion that best described the clip. Based on these ratings (75% or greater consistency across participants), the final stimuli set was selected and consisted of 147 video clips, 21 clips for each emotion category. We were able to identify the discrete emotion category from the core affect dimensions with 79% accuracy ( $p < .01$ ). Study 2 (ongoing) was designed to examine the physiological profiles elicited by viewing these consistent emotional expressions. Participants were presented with the video clips grouped in sets of three by emotion category and were asked to judge the discrete emotion being expressed in each group. Arousal was measured using heart rate and skin conductivity and valence was measured via electromyography of the corrugator supercilii and the zygomaticus major muscles. These physiological data are analyzed to determine whether discrete emotional expressions can be identified by physiological measures of core affective states.

**Berning, Karena**

**Mentor(s): Ms. Lisa Camp**

### **Cultural Understanding through Immersion**

In high school, while I was searching for a university to attend, I had a few criteria. I wanted a large southern school, which offered marketing, entrepreneurship, advanced German courses, and the ability to go abroad for a semester. The University of South Carolina offered all of that and more through the International Business major. In this major, you required to minor in a language and study abroad. I chose German as my language of study and I was given the opportunity to study in German on two occasions. My first chance to study abroad was a five-week language program in Lutherstadt-Wittenberg, in Saxony-Anhalt Germany, which took place during the summer after my freshman year of college. This was an incredible experience, in which I not only met some of my best friends, but I also lived in the home of a local German couple and experienced the way they lived on a daily basis. In contrast, during my semester study abroad at WHU Otto Beisheim School of Management in Vallendar Germany, I lived in an apartment with other exchange students, many of whom were American. In order to experience more of the culture, I began a part time position with an older German couple, Herr and Frau Weißbrod, who owned and operated a small local student bar and café. This was the most significant part of that study abroad experience because it gave me the opportunity to improve my German speaking and comprehension, but not only that, it also allowed me to meet and interact with the older German generation and the German students. As an international business major, it is imperative that I have a deeper understanding of a country's culture before I can bring products or services to that country. These two experiences of daily contact with Germans gave me the ability to learn about the ways they live, the types of products they use, and the relationships between one another, which will ultimately help me in my future career.

**Berry, Tavashia**

**Mentor(s): Dr. Evan Meaney**

**Depression & YouTube: An Analysis of How Information is Found Through Online Platforms**

This study aims to explore how YouTubers play a role in information dissemination about depression and how large that spread is within the YouTube communities. Depression is a growing topic among teens and young adults and they use different platforms as outlets to talk about it and seek advice. YouTube communities formed around popular YouTubers have become one of these outlets, YouTubers often share their own depressive moments and how to combat them. By looking into the sentiments of YouTube comments and basic stats of popular YouTube videos about depression, information can be found about how younger people gain information about depression and coping mechanisms.

**Besse, Margaret**

**Supervisor(s): Mary Elizabeth Sullivan**

**Mentor(s): Dr. Jane Roberts, Ms. Jordan Ezell, Ms. Chandler Knott**

**The Relationship Between Atypical Sensory Processing and Anxiety in Siblings of Children with Autism Spectrum Disorder**

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects 1 in 59 children (CDC, 2018) and is characterized by challenges with social interactions and communication paired with restricted, repetitive behaviors (Germani et al., 2014). Younger siblings of those diagnosed with ASD (ASIBs) are 30 times more likely to also be diagnosed with ASD when compared to typically developing (TD) children (Miller et al., 2019). ASIBs are at an increased risk for comorbid disorders such as anxiety, making early screening imperative in this population (Milosavljevic et al., 2017). Atypical sensory processing is one possible early biomarker of ASD and anxiety, characterized by reduced or exaggerated responses to sensory stimuli (Baranek et al., 2018). One study found that of children seeking treatment for anxiety, about 93.2% had at least one symptom of sensory over-responsivity, suggesting a relationship between sensory behaviors and anxiety (Conelea, Carter & Freeman, 2014). Anxiety and ASD are inextricably linked, with approximately 50% of children with ASD receiving an anxiety diagnosis (White et al., 2009). Since ASIBs are high risk for both ASD and anxiety, it is essential to understand early features of these disorders. Our study will assess atypical sensory processing as a predictor for anxiety in preschool aged ASIBs. Based on the existing literature, we hypothesize that higher atypical sensory behaviors will predict higher anxiety symptoms compared to TD children. We will utilize the Anxiety, Depression, and Mood Scale (ADAMS) to quantitatively measure anxiety and Sensory Experiences Questionnaire (SEQ) to survey for atypical sensory processing. We will also use the Mullen Scales of Early Learning (MSEL) to measure the mental age of ASIBs to compare them to TD subjects. First, a t-test analysis will compare the rates of atypical sensory behaviors and anxiety symptoms across ASIBs and TD children. Then, a linear regression model will be used to see if atypical sensory processing predicts anxiety symptoms. The findings from this study will help characterize the relationship between atypical sensory processing and anxiety diagnosis in ASIBs.

**Bhandari, Rohan**

**Mentor(s): Dr. Chin-Tser Huang**

**Analyzing and Mitigating Device-to-Device Malware Infection in IoT Networks**

The advancement of technology enables a whole new paradigm of data transmission and exchange over the Internet, which is referred to as the Internet of Things (IoT). IoT consists of small devices which have some form of sensor, storage, memory, computational power, and user interface ability. The number of IoT devices is growing very quickly, with a projected total of 26 billion devices by 2020. With this growth, IoT devices have become a prime target of hackers. There have been several severe IoT network attacks such as Mirai, Hajime, Linux.Darll0z, and BASHLITE malware. The above-mentioned reasons make it necessary

to research malware transfer in IoT devices. During the research, the environment consisted of one host computer and three client devices to simulate a real-life scenario of communication between IoT devices. The client systems were Raspberry Pi's running Ubuntu on them. After the system was running and working, file transfer between the Raspberry Pi's was initiated. During the process of exchanging data amongst the clients, Wireshark software was used to monitor the data transfer and analyze the individual packets. The analysis and careful examination would flag the files which contained malware. Moving forward a comprehensive system can be developed which can automatically detect and flag the malware infected files and prevent any damage to the data.

**Biesecker, Claire**

**Mentor(s): Dr. Whitney Zahnd, Dr. Swann Adams, Dr. Jan Eberth**

**Mapping Cervical Cancer Access and Prevention in SC**

**Objectives:** South Carolina (SC) ranks 14th for cervical cancer mortality in the United States. The purpose of this study was to identify counties in South Carolina (SC) where there are low access to locations that provide primary (HPV vaccination) and secondary (cervical cancer screening) prevention services for vulnerable populations, and low rates of usage of these preventative measures. These results will assist in locating areas in which an intervention would be most impactful.

**Methods:** Best Chance Network (BCN) and Vaccines for Children (VFC) locations were geocoded and summed in each county. Prevalence rates were mapped using the number of BCN locations against the population of females ages 20 to 64 to portray access based upon age eligibility per 100,000. To show prevalence of VFC locations, choropleth maps were created to visualize the number of VFC locations to the population under age 18 per 100,000 for each county. Behavioral Risk Factor Surveillance System data were used to map county-level Pap test and HPV vaccination utilization rates among eligible women. Results were compared across rurality as defined by the 2013 Rural-Urban Continuum Codes.

**Results:** Results showed a high percentage of counties in SC that do not provide adequate spatial access to BCN or VFC locations for the populations they are serving. The percentage of females who ever had a Pap test was lowest in urban counties of the state such as Richland, Greenville, Aiken and Florence. The percentage of eligible adult women who ever had HPV vaccination ranged from 2-20%, with the lowest rates observed in rural counties such as Dillon and Cherokee.

**Conclusions:** For HPV vaccination, focus should be directed toward rural counties where an increased number of VFC providers would achieve greater access to services and subsequently, facilitate greater HPV vaccination use. Increasing access to BCN providers in urban counties may also positively impact Pap test utilization. Identifying areas with low access to primary and secondary prevention services will help determine which communities may benefit most from targeted interventions or policy changes.

**Billinson, Paul**

**Mentor(s): Dr. Bentley Coffey**

**The Spiritual Healing Effects of the Natural Environment**

Through working at a summer camp for children affected by cancer, conducting research & learning as an environmental studies student, and spending a May semester in the Galapagos Islands, I have seen the effects that the natural environment plays on individuals spiritual healing first hand. The purpose of this presentation is to formally describe and explain this occurrence, by using firsthand experiences as well as research from previously taken classes.

**Biro, Beata**

**Mentor(s): Prof. Scott White**

**The humanly-fundamental value of pushing personal boundaries and the progression of my personal growth through University 101 Peer Leadership**

Getting involved in an organization on a University campus is one of the top ways to keep student retention rates up and have these students feel an important connection to their school. One of my main goals freshman year at the University of South Carolina, coming from 600 miles away, was to diverge from my previous lack of involvement and incorporate myself at UofSC beyond my required classes. I began my involvement one step at a time, and over the course of my four years here I have gotten involved in Capstone Scholars, Service Saturday, a student supervisor job, a research lab, Sustainable Carolina, and more. Through my extensive beyond the classroom involvement, reflection, and introspection, I was able to connect the experiences of my four years here into a meaningful whole. Specifically, my University 101 Peer Leadership allowed me to step out of my comfort zone, grow as a leader, and find value in my growth. During this experience I had to provide my co-instructor with feedback, formulate lesson plans and facilitate classes for 18 students – all things which were initially nerve-wracking. This opportunity to teach, lead, and learn shaped me into a more responsible, empathetic, and capable person. Serving as a peer leader made it evident to me that a leader constantly strives to develop themselves further, and never deems their personal growth complete. Through conscious effort to persevere through situations which initially made me uncomfortable, I was able to expand my comfort zone and am now more equipped to handle similar situations and fully prepared to face new situations. The ability to value fear and work to overcome it has instilled me with bravery and persistence to not back away from any personal challenge. I intend to incorporate this value into my future work in medicine through exemplifying a confident approach to challenges. I plan to bestow this confidence upon my peers, which will allow for more resilient individuals that are capable of embracing the present and overcoming adversities.

**Blalock, Jonathan**

**Mentor(s): Dr. Renee Chosed**

**Cell-Free DNA Content and Differential Apoptotic Gene Expression in Blastocoel Fluid Between Euploid and Aneuploid Embryos**

Selecting the best quality embryo for transfer is a demanding quest of ART, utilizing morphological assessments, embryo biomarkers or ploidy status. However, other determinants of embryo developmental potential may be employed. Apoptosis, a normal physiological process, plays a role in the correction mechanism for chromosomal abnormalities during preimplantation embryo development and leads to cell-free DNA (cfDNA) within blastocoel fluid. While blastocoel cfDNA has been used as a PGA-T source with minimal success, it may have potential as an indicator of embryonic quality. This study compared blastocoel fluid cfDNA content and apoptotic gene expression in euploid and aneuploid blastocysts. Cell-free DNA was quantified in all blastocoel fluid-conditioned medium samples (35 embryos total), euploid embryos (43.15 ng/mL) had significantly ( $P < 0.05$ ) more (1.57X; or 56.5% greater) cfDNA than aneuploid (27.57 ng/mL) embryos. Apoptotic genes BAK1, BCL3 and IFT57 were expressed in aneuploid but not euploid blastocysts.

**Blanton, Karsyn**

**Supervisor(s): Xeerak Muhammad, Samantha Jean**

**Mentor(s): Dr. Suzanne Adlof, Dr. Lauren Baron**

Identifying Children at Risk for Developmental Language Disorder -- Developmental language disorder (DLD) affects approximately 7% of kindergarten students, but most cases of DLD are undetected. DLD is associated with delayed speech, vocabulary, and grammar, and negatively impacts children's ability to

learn to read. The principal objective of this study is to develop a group-administered language screening procedure that can accurately and efficiently identify children at risk for DLD. In this presentation, we will describe the initial stages of developing and testing a language screen with kindergarten and second grade students. A total of 1295 students (610 in kindergarten and 685 in second grade) completed one of the trial versions of the language screen, which was administered to whole classrooms of students simultaneously. We will present descriptive statistics and distribution of scores for each screening measure. Next steps are to administer individual assessments that will be used to validate the language measure. The implications for improving the identification and treatment of children with DLD will be discussed.

**Bligen, Cheyane**

**Mentor(s): Dr. Gretchen Woertendyke**

**What Does Representation Look Like? The Power of Diversity Amongst Faculty Members**

The lack of representation of nonwhite faculty members correlates to the academic success of minority students. It is essential that a minority at the college level have someone in which they can learn from and most importantly feel comfortable engaging with. Many students at the University of South Carolina have stressed the difficulty of being successful academically due to not seeing the reality of what could be a career for them in their major. By examining the professor to student ratio, the demographics of the student body, professor to student relationships, and comfort levels on the campus, I will be able to conclude if the success of minority students is related to the non-white faculty member population at the University of South Carolina.

**Bodie, Dalton**

**Mentor(s): Dr. Nathan Hancock**

**Evaluation of mPing Transposition in Arabidopsis Thaliana DNA Methylation Mutants**

Transposable elements (TEs) are mobile DNA sequences that move from one area in a genome to another through excision and insertion. TE movement is catalyzed by the activity of transposase enzymes. In this project we are testing the TE known as mPing, originally from rice, in the model plant Arabidopsis thaliana. Arabidopsis is a suitable for this project because of its small size and the ease of manipulating its DNA. Our overall question was whether changes in chromatin structure, specifically DNA methylation effects transposition behavior. A mPing transposition construct was transformed control, met1, and ddm1 mutant plants. In order to observe the transposition of mPing, the plants are being tested for GFP using fluorescence microscopy and PCR. This should allow us to determine if the loss of DNA methylation and its associated loosening of the chromatin structure allows for more transposition.

**Boehm, Katherine**

**Mentor(s): Ms. Tricia Kramer**

**Saying Yes to Studying Abroad Meant Saying Yes to So Much More**

In the Spring of 2017, I studied abroad at La Universidad Menéndez Pelayo in Seville, Spain. I decided to go abroad my Sophomore year because I knew right away I wanted to study abroad twice, so I had to plan ahead. I had taken six years of Spanish at the time and I wanted to continue developing my language skills while studying and seeing as much of the region as I could. Throughout my semester in Spain, I took business, language, and arts classes that allowed me to learn an incredible amount about the country and culture, while also supplementing my coursework at USC. I lived with a host family for the entirety of the semester, which challenged me to practice my communication skills and always be improving. I also was able to spend a significant amount of time traveling and exploring other parts of Spain and Europe throughout my semester. I chose to study abroad because I have always had a passion for traveling and I absolutely love experiencing things I never have before; what better way to experience new things than to

spend a few months studying in a foreign country? I learned that I have the capability to be independent, to learn in challenging environments, and to make the most of the opportunities presented to me. No matter what I was doing, I was always growing because I chose to accept opportunities, take risks, and fully embrace challenges. Realizing this for myself also allowed me to develop my leadership skills within my friendships, as I knew encouraging others to take on a similar mindset would allow them to grow as much as I was. It is my goal moving forward to always remember the lessons I learned and to look back fondly on the opportunities I said yes to regardless of the challenges along the way. In the future, I plan to continue taking risks and exploring so that I can continue to grow and develop myself and others as global learners and leaders.

**Boehnlein, Alexandra**

**Mentor(s): Dr. Mark Nagel, Dr. Nicholas Watanabe**

**Analysis of Trends in MLB Salary Slotting from 2016 to 2018**

In professional sports, maintaining a competitive balance is the key to keeping teams evenly-matched and fans engaged. Major League Baseball (MLB) employs salary slotting to regulate its 30 teams during the annual draft. In this process, teams are allocated signing bonus amounts corresponding to each draft pick from the first overall to the last pick in the fortieth round. Each team's finish in the previous season determines their allocated amount for the entire draft. While these values serve only as guidelines, MLB imposes luxury tax penalties when teams go beyond their slotted amount. This progressive tax steepens with each dollar and each consecutive year teams exceed their overall allotted amount. The goal of the slotting system is to prevent players from being over and undervalued and for less successful teams to have an opportunity to pursue the top incoming talent. This research study examines the divergences in MLB signing bonuses by analyzing a series of variables that impact these payouts. I collected thousands of raw data points detailing draft picks' slotted amount, actual payout, and other measurables such as positions and physical characteristics like height and weight, to determine the correlation between specific physical and positional factors and the signing bonus players received. These factors are being investigated to determine what may cause players to be "overpaid" or "underpaid" during the draft. An analysis of the data reveals that over one-third of picks in the first ten rounds sign at or above slot, with roughly half signing at 90% of the slotted amount or above. Going forward, this research helps us better understand how teams have used the slotting guidelines to improve their competitive advantage in the off-season. The findings from this project will provide additional information regarding the MLB's current system.

**Boggs, Jill**

**Supervisor(s): Grace Alger**

**Mentor(s): Prof. Stanley Dubinsky**

**The indigenous Sami people of Norway and their linguistic struggle**

The study of language and linguistics plays an important and underappreciated role in understanding the development and resolution of ethnolinguistic conflicts around the world. They are valuable tools in determining how and why conflicts develop between groups, where language serve as a useful proxy in articulating identity and differences in ethnic conflict.

This case study, outlining the origin, development, and resolution of ethnolinguistic conflict between the Sami and Norwegian society and government, is part of a project whose goal is the construction of an on-line encyclopedia cataloguing ethnolinguistic conflicts globally, which is a resource intended to be easily understood and accessible to the general public. A nomadic people, the Sami lived in isolation in sub-arctic and arctic Europe for several thousand years. However, during the eighteenth and nineteenth centuries, Norwegian settlers and missionaries moved into traditional Sami territory, bringing Christianity and the Norwegian language with them. A wave of nationalization during the early twentieth century resulted

in forced assimilation to Norwegian culture and language, with considerable political and legal support. In recent decades, the Sami have been recognized and respected as an indigenous people in Norway with the right to their own language, culture, and parliament, however discrimination against the Sami still occurs in isolated instances today.

A range of historical, scholarly, and news articles were used to compile this case study, which involves suppression of the Sami minority in the north by the dominant Norwegians from the south. This presentation recounts the replacement of the Sami language with Norwegian, and documents other related actions taken by the Norwegian government. In addition to writing on the historical and linguistic backgrounds and events in this conflict, several contemporary anecdotal stories are included to humanize the case study and demonstrate the continuation of ethnic tensions into the present-day.

**Bogle, Olivia**

**Mentor(s): Mrs. Kolby Redd**

**DESIRE Intracerebral Hemorrhage Registry: Initial enrollment findings**

**Introduction:** Despite a lower incidence than ischemic stroke, the 13% of strokes that are hemorrhagic account for a staggering 50% of stroke mortality. Intracerebral Hemorrhage (ICH) makes up two thirds of hemorrhage cases and currently lacks an effective acute treatment. This leads to a significantly higher mortality rate and emphasizes the importance of prevention and management of recurrent events with the intention of improving patient outcomes.

**Methods:** DESIRE is a single-center cohort design prospective ICH registry, with the intention to evaluate the effect of pathophysiologically-guided and evidence-based care on patient outcomes in the population of patients with ICH in South Carolina. The registry will collect data from 200 ICH patients, at a single site over a two-year period. Data will be collected on eligible patients by consecutive enrollment to avoid selection bias and will also capture patient outcomes with specific endpoints and measures. The SMASH-U classification will be one of the primary outcomes for all enrolled patients. This classification encompasses criteria for determining etiology of the ICH. Based on the etiology, it is intended to provide clinicians with a standard for evaluating and treating patients, as well as providing researchers with a standard for comparing analysis from different patient populations.

**Results:** As of March 2019, there have been 41 patients enrolled into the registry. Their average height was 67.77 inches, average weight was 183 pounds, and their average blood pressure was 158/89 (hypertensive). The initial enrollment population has a wide-range of risk factors and medical conditions including the following: 80.5% have hypertension, 46.3% have hyperlipidemia, 29.3% have had a prior stroke, and 29.3% have diabetes. The most common location of the ICH was in the parietal lobe (39%). The most common etiology found to date was due to hypertension with 39% of the patients falling into this SMASH-U criterion.

**Conclusion:** The results of this prospective longitudinal registry of ICH cohort will enhance our understanding of the disease and the application of health care services associated with treatment. It specifically addresses the knowledge gap of existing or prior registries in their ability to understand the pathophysiological mechanism of disparities in ICH.

**Bollar, Gretchen**

**Supervisor(s): Anthony Kocur**

**Mentor(s): Dr. Susan Richardson**

**Disinfection By-Products in Bottled Water: Is it Really Safer than Tap Water?**

In order to disinfect drinking water for public consumption, it is common for water treatment plants to add oxidants such as chlorine, chloramine, chlorine dioxide, and ozone. Though these chemicals remove harmful microorganisms, they react with natural organic matter in the source water to form disinfection

by-products (DBPs). Epidemiologic studies show DBPs can have potential adverse health effects on humans, and while only 11 DBPs are currently regulated by the U.S. EPA in tap water, over 700 DBPs have been identified, many of which are more toxic than those that are regulated. Though identification and assessment of DBPs in public waters is becoming increasingly popular, there is a lack of research with regard to DBPs in bottled drinking waters. The U.S. FDA regulates the same compounds in bottled water as the EPA does in public water, but to our knowledge no studies have comprehensively assessed both known and unknown DBPs in bottled water. This study was designed to identify new DBPs and quantify nearly 60 priority, unregulated DBPs in bottled drinking water. Compounds from popular brands, categorized as name-brand, grocery brand, or designer brand, were extracted for analysis via gas chromatography-mass spectrometry. These results were compared against those of locally-sourced tap water to assess relative risk based on overall DBP content. Quantitative data shows that the number of DBPs in bottled water and their respective concentrations are lower than that of tap water, which indicates that bottled water may be a safer alternative to tap water for limiting DBP consumption.

**Bongalonta, Rina Raye**

**Mentor(s): Dr. David Reisman**

**Interferon-Specific Regulation of Expression of the IRF9 Gene by the p53 Tumor Suppressor**

Although many viruses, such as HIV, have successful treatments, a better understanding of how p53 regulates the interferon-specific anti-viral pathway could lead to developments in the treatment of viruses and the specifics of antiviral immunity. In the interferon (INF) pathway, INFs induce the activation of p53, and p53 then upregulates the transcription of the IRF9 gene, which is crucial in the activation of antiviral genes. The goal of our research is to evaluate the response of IRF9 to wt-p53 expression induced by either interferon treatment or DNA damage in order to determine whether IRF9 gene expression is induced in an interferon-specific manner. Our lab is determining if IRF9 is linked to p53 in a viral and interferon pathway; IRF9 is expected to be induced through the introduction of p53 gene expression, as well as by treatment with INF, but IRF9 is not expected to be induced via DNA damaging agents. IRF9 is also anticipated to be induced by INF in HT116 but not HT116KO, which lacks any p53 expression. This would indicate that the cellular p53 response varies as a function of the cell treatment. If the IRF9 gene is determined to be IFN-specific, IRF9 would be linked to p53 through a viral pathway, and comparisons could also be made with how IRF9 is expressed in viral infections and from DNA damage. Further experiments will determine the mechanism of this distinction. To determine the response of IRF9 is induced through the introduction of p53 expression, multiple cell lines were transfected with wt-p53, and a luciferase reporter assay was used to determine the expression of the IRF9 promoter. To determine the response of IRF9 to DNA damage and INFs, multiple cell lines were transfected with the IRF9 gene and treated with either DNA damaging drugs or INFs, and a luciferase reporter assay was used to determine the expression of IRF9. Our findings indicate that while the IRF9 is gene is activated by p53, the response is dependent on the signal through which p53 itself is activated.

**Boothroyd, Sonna**

**Mentor(s): Mr. Raymond Smith**

**Reducing Childhood Obesity in Richland 1 School District through the Farm-to-School Program**

Obesity is an increasing problem across the United States. Historically, one of the primary contributors of childhood obesity has been the National School Lunch Program. Many children across the United States receive both breakfast and lunch at school from the free or reduced price through the National School Lunch Program. In the past, these meals were notoriously high in carbs and sugar, and contained only small amounts of vegetables, healthy fats, and protein. Consequently, this program was one of the primary contributors of childhood obesity. However, after the implementation of the 2010 Healthy Hunger-Free Kids Act, when the National School Lunch Program began trying to provide healthier options to the stu-

dents, the healthier salt-free and fat-free food options have become so unappetizing that most of the fruits and vegetables provided are discarded.

Yet, several cities have initiated Farm-to-School initiatives, which has shown success in providing more likable meals to children, while concurrently providing healthy and nutritious meals. In these programs, the local school lunch programs partner with local farmers to provide meals with fresh ingredients from nearby farms. To further the effectiveness of the Farm-to-School initiative, co-occurring educational programs are presented to students in order to promote how food is grown, who cultivates the food, and how food can be consumed to promote personal health.

As South Carolina maintains a strong agrarian base, implementing similar programs with Richland One County School District would be successful. These days, farmers are increasingly looking for new markets in order to compete with larger corporate farms, and the demand for farm-fresh food in schools continues to climb as the demand for tasty, healthy options increases. Farm-to-School would give Richland 1 the opportunity to collaborate with local farmers, boosting the local economy while bridging the gap between institutions and agriculture. Farm-to-School provides a well-rounded intervention to combat childhood malnutrition and obesity, and will help diminish the rates of childhood obesity in Richland One.

**Boozer, Christina**

**Mentor(s): Mrs. Anna Oswald-Hensley  
Christina Worlds**

During the Summer of 2017, I got selected to be a USC Sumter Student Ambassador. As a Student Ambassador, it is my job to lead potential USC Sumter students on guided tours of the campus, help recruit students to our school and assist with registration of students enrolled at USC Sumter. I choose this leadership position, because I love working with others. While being a Student Ambassador, it has taught me the value of team work. I have had to learn to work with others that I am not familiar with. It has taught me how to learn from others and has also improved my social skills. Since becoming a Student Ambassador, the skills have helped improved my social skills in the work force. I have also been an outgoing person when meeting new people, but I have struggled with working as a team with other personalities. This leadership position has taught me how to overcome that struggle by using communication skills and patience when situations arise, and things do not go as planned.

**Boswell, Emma**

**Mentor(s): Dr. Myriam Torres**

**Does Sexual Violence Have a Greater Effect on Female Adolescents?**

Relationship violence and sexual assault are worldwide problems that have plagued women and girls for millennium, and their effects on both the physical and mental well-being of victims are significant. Sexual assault is referred to as a "crime against youth" because it affects teenagers at a disproportionate rate (Tjaden & Thoennes, 1998), and is associated with an increased risk of suicide in teenagers (Cash & Bridge, 2009). This study seeks to understand the relationship between relationship violence, sexual assault, and suicidality in American teenagers, as well as any discrepancies in this association between ethnicities, by conducting a bivariate analysis on the results from the CDC's YRBS questionnaire. Although some investigations have explored this topic by the same means on a regional level, a national study into this association is still needed, especially because it has been several years since the last study was conducted. Many of these same studies have not been able to conclusively discern if there are any differences between this association among ethnic groups due to a lack of minority respondents, making this study more impactful. Of the female respondents, 10.9% reported being forced to have sexual intercourse, 14.6% reported experiencing sexual violence, 9.9% reported experiencing sexual dating violence, and 9.9% reported experiencing physical dating violence. All these results are greater than those reported by male participants. Relatively more females (41.2%) reported feeling sad and hopeless nearly daily for at

least two weeks (41.2%) and seriously considered suicide (22.7%) when compared to males (21.7% and 12.2%, respectively). Among female adolescents, being forced to have sexual intercourse was significantly associated with feeling sad and hopeless daily for two or more weeks (OR=4.3; 95% CI= 3.6, 5.0) and having seriously considered suicide in the twelve months before the survey (OR=5.0; 95% CI= 4.3, 5.8). These values are higher than both males and females who did not have similar experiences and males that had similar experiences. As more women and men are stepping forward to share their experiences with assault, the implications of their stories should not be undervalued.

**Bourguignon, Taylor**

**Mentor(s): Ms. Sarah Gay**

**Carolina Judicial Council in Relation to Trial Juries**

During Fall Semester of 2015, I began my involvement in the Carolina Judicial Council. The members of this club honor, uphold, and promote the tenets of the university's guiding philosophy, the Carolinian Creed. The members of the Carolina Judicial Council also serve on the panel for Academic Integrity and Student Conduct hearings. During these judicial hearings, the panel gathers evidence concerning the student and the alleged violation, then the members deliberate to decide responsibility and the appropriate sanctions. Through this membership, I gained the experience to think critically about complex situations, became skilled in the proper etiquette for professional environments, and diversified my perspective in the criminal justice system. My presentation will discuss the key insights I grasped regarding the analogies between the United States Criminal Justice System and the rights given to the students at the University of South Carolina. These insights and the leadership skills I've acquired from the Carolina Judicial Council have helped prepare me for my future profession as a criminal attorney.

**Bourke, Clirae**

**Mentor(s): Prof. Elise Lewis**

**Campus Leadership**

Housing and residence life at the University of South Carolina plays a significant role in promoting academic success, cultivating personal growth, and developing student leaders throughout campus. I can say with confidence that my most significant contribution to the University of South Carolina has been my commitment to serving my campus community as a Resident Mentor for the past three years. Becoming a Resident Mentor has greatly enhanced my college experience by allowing me to develop as a leader and professional, build strong relationships, and enhance my communication skills. Through my experience as a Resident Mentor, I have encountered countless situations that have contributed to my growth as an individual and create meaningful change in the lives of students. Serving as an RM also led to other opportunities including networking with individual's campus-wide, planning and executing events, and even success in an internship. The skills and experiences I have developed in this role are fundamental and invaluable and I will carry them with me throughout the rest of my educational professional career.

**Bowling, Emily**

**Mentor(s): Dr. Rutvik Desai**

**Link Between Semantic and Motoric Function in Stroke Patients**

The sensory and motor systems of the brain are traditionally thought of as being independent from the conceptual or semantic systems. Here, we tested both motoric and semantic function of a cohort of left hemisphere stroke patients. Semantic abilities were assessed with judgments on action and abstract words. Motor abilities were assessed with an exoskeleton robot that provided fine-grained measurements of action speed and accuracy. We found a correlation between motoric function in reading and object hit tasks, and comprehension of action-related words. Patients who were more impaired with actions were

also impaired on processing action, but not abstract, words. This suggests that semantic and motor systems of the brain are tightly linked, and meanings of action words can be grounded in the motor system.

**Bowman, Hannah**

**Mentor(s): Prof. Duncan Culbreth**

**Lessons Learned in Strange Places**

How have I grown during my time at the University of South Carolina and through studying abroad? Sometimes, it does not feel like I have changed at all. While other times, it feels like I am nothing like the wide-eyed girl from freshman year. I was incredibly fortunate to study abroad twice, in Lisbon, Portugal, and Helsinki, Finland. And I cannot help but wonder how I will look back on this period in my life. I wonder what kind of opportunities were opened because of a single decision, and how many doors were closed behind me without my knowledge. The answers to these questions will become apparent in time, and while it is interesting to reflect on them now, there is plenty of time for that in the future. I learned incredible lessons in preparation, decisions and their consequences, and the power of reflection during my college years. Every country I visited taught me something new, whether it be historical facts, modern day events, cultural quirks, or even things about myself. My time living and studying in Lisbon, Portugal taught me about the consequences of our actions, and how the decisions I make can impact me and others on a scale I cannot even fathom. Helsinki, Finland taught me that the 'soft-skills' are just as, if not more, important than the technical information I learn in the classroom, and they are vital to my success in the world after college. Traveling and living abroad taught me the importance of reflection, of acknowledging the changes around and within myself in order to continue to maximize my time. Every place had something to teach me, but was I bold enough to listen?

**Boyd, Emily**

**Mentor(s): Dr. Amber Fallucca**

**My Peer Leader Experience**

My most significant contribution to the University of South Carolina has been my commitment to the University 101 Program as a Peer Leader. Transitioning from high school to college is an important and challenging time in any student's life, and U101 is a program that fosters student success, development, and support during that transition. I have worked with 5 different classes and 70 different students throughout my Junior and Senior year, and fell in love with making connections and helping first year students be successful and comfortable at USC, a place that I loved so much. I never expected to learn so much about myself and others throughout this role. I was able to enhance my communication and facilitation skills, identify my personal leadership style, and understanding of how to work with different learning styles and personalities. During this experience I was able to develop transferable skills for my personal and professional life and was inspired to incorporate working and helping people into my fulltime career.

**Boyer, Hailey**

**Mentor(s): Dr. John Weidner**

**Mathematical Modeling of a Proton-Conducting Solid Oxide Electrolysis Cell (H<sup>+</sup>-SOEC)**

Hydrogen has been identified as a leading contender to replace fossil fuel energy demand due to its high energy density and ability to combust with zero carbon emissions. The proton-conducting solid oxide electrolysis cell (H<sup>+</sup>-SOEC) is a promising type of electrolyzer that could eventually be deployed to produce hydrogen at a commercial level. However, at this point, its development is hindered by the extensive experimental process. A mathematical electrochemical model was written to expedite the experimental progression of this developing technology. The model calculates the current density and overpotential losses a H<sup>+</sup>-SOEC experiences at a given applied potential. The mathematical model is then included in

the calculations executed by the computational fluid dynamics (CFD) software, Fluent. By testing the model with varied operating conditions like inlet gas flow rate, inlet gas composition, operating temperature, and pressure, the operating conditions of the device can be optimized more quickly than with experiment alone. Results in this paper show preliminary efforts to calibrate the mathematical model to published experimental data. Findings also include preliminary CFD results depicting the species, temperature and current density distributions across the cell.

**Boyle, Kristina**

**Mentor(s): Ms. Courtney Buzan**

**From Me to We: Helping Shape the Future Generation through Networking, Leadership and Mentorship**

Dance Marathon at the University of South Carolina is more than just another student organization. It is an organization that is filled with highly passionate and dedicated students who spend most of their time raising money for Prisma Health Children's Hospital. The difference that this organization has made in shaping who I am as a person is unparalleled to any other college experience I have had. During my time serving as the Vice President of Mini Marathons, I learned so much about the power of that leadership, mentorship, and networking have on shaping those around me. In the position, I worked closely with high school students in ten local schools in the Columbia area to help them put on mirrored events like the one we have here at USC. Helping shape this new generation of students gave me a purpose I never knew I needed and helped me understand the importance of working together and putting others first. During my term, I was met with hurdles that shaped me into the person I am today and help give the future generation of Gamecocks a purpose that they can continue to fight towards.

**Bracy, Olivia**

**Mentor(s): Prof. Rico Reed**

**The Power of International Work Experience**

The University of South Carolina (USC) offers a plethora of study abroad opportunities. While I always knew that I wanted to study abroad, I strived to further enhance my experience. I chose to study and intern in Dublin, Ireland through Cultural Experiences Abroad (CEA). Following an in-depth interview process, I was offered a Human Resource Management Intern position at GOAL Global. I chose to intern at an international aid charity because of my passion for helping those in need. This desire began in high school when I traveled to Costa Rica and Ecuador on community service projects through Rein Teen Tours (RTT). Epsilon Sigma Alpha, a community service sorority, kept my love for giving back alive during my time as a student at USC. Focusing back on my experience abroad, I grew significantly both personally and professionally. Working alongside of eighty international staff members in a foreign country came with many challenges. I took each and every challenge as a learning experience. My cross-cultural competence improved immensely. In addition to my international internship, I was enrolled in the International School of Business (ISB) for the Spring of 2019. ISB consisted of students from several different countries; again, through numerous group projects, I was taught the importance of effective cross-cultural communication. Interning, studying, and traveling during my semester in Ireland taught me imperative lessons regarding maintaining a healthy work/life balance. All in all, my experiences both in the classroom and beyond have pushed me to where I am today. Following May 2019 graduation, I will be moving to Hoboken, NJ to work full-time for RTT. I am thrilled to continue my passion for travel and community service, while further developing into a successful business woman. My internship and coursework abroad, in addition to the Darla Moore School of Business, prepared me for this next chapter.

**Brady, Robert**

**Mentor(s): Dr. David Cardenas**

**99 Problems and Parking is All of Them**

What if I told you I could make driving in Columbia and finding a parking space downtown easier overnight without affecting you? Columbia is growing in population, but not so much parking. Each year parking is steadily getting harder and harder to find, almost impossible during peak business hours or on the weekends. Not to mention when we are hosting major events such as concerts or March Madness for example. I would like to suggest a short term and a long-term resolution to the growing parking problem in Columbia. There are currently 34,731 enrolled in the University of South Carolina. Broken down that is 26,362 Undergraduate students, 6,555 Graduate students and 5,851 freshman students all sharing relatively the same parking areas. In my experience as someone born and raised in Columbia and a student, I see the need for more parking spaces from both sides. One sees the inconvenience of cars cluttering the road way between class changes as they are running errands. Where as the student is constantly circling hoping to find a parking space within 5 blocks of the building their current class is in. For the short term I suggest the University of South Carolina adapt a policy that freshman will no longer be permitted to bring cars to campus the following year. Assuming half of those freshman drive a vehicle, this would open around 2,925 parking spaces. To put that into perspective a acre of parking is roughly 242 parking spaces. That means that this policy would effectively open a little more than 12 acres of parking which is about 9 times the size of the football field at Williams Brice. As both a local and a student I would be excited to see USC implement this policy. Parking for both students and the local population would dramatically increase, traffic in between classes would potentially decrease as would numerous safety issues that stem from lack of parking. While giving both USC and the city of Columbia time to acclimate to the substantial growth the city has seen by implementing better bus systems or parking structures.

**Brantley, Kinsey**

**Mentor(s): Dr. Elizabeth Easley, Dr. Sarah Sellhorst**

**Impact of Wearable Fitness Trackers on Body Mass Index and Body Composition**

Wearable fitness trackers are an affordable and easy way for the public to track their daily physical activity. In the United States, one in ten adults own a fitness tracker. Purpose: The purpose of this study was to determine if utilizing a wearable fitness tracker affected body mass index and body fat percentage in traditional-age college females. Methods: Participants included forty traditional-aged college women. The participants filled out a survey about their use of fitness trackers. Height was measured in centimeters (portable Stadiometer Seca Model 213), and weight was measured in kilograms (TANITA DC-430U Frequency Total Body Composition Analyzer). Height and weight were used to calculate body-mass index (BMI). Body fat percentage was estimated using the tetra-polar bioelectrical impedance analyzer (Quantum-X). Independent Sample T-tests were used to compare body fat and BMI between the groups. Results: Thirteen women wore fitness trackers (FT) and twenty-seven women did not (NT). There were no significant differences between the groups in BMI (FT =  $28.43 \pm 8.38$  kg/m<sup>2</sup> vs NT =  $25.75 \pm 7.53$  kg/m<sup>2</sup>,  $p = .317$ ) and body fat percentage (FT =  $38.56 \pm 9.22$  % vs NT =  $34.81 \pm 7.53$  %,  $p = .278$ ). Discussion: Although wearable fitness trackers may provide information on daily physical activity, they may be insufficient in increasing motivation to do physical activity, thus insufficient in lowering body mass index and body fat percentage. This finding is in agreement with literature that is previously published.

**Brennan, Rebecca**

**Mentor(s): Prof. Duncan Culbreth**

**Empowered Women Empower Women: Leading an All-Female Group on Campus**

As a leader of a student organization, specifically one focused around women, I've learned that the oppor-

tunities for women at universities are evolving as diversity on college campuses becomes more relevant. Her Campus as a national organization aims to guide and empower college women at over 300 campuses across the country through content and events. Our South Carolina chapter is a diverse group of women from different backgrounds, offering unique points of view and highlighting the importance of diversity in any organization. My time as president has taught me how to be an effective leader by embracing new ideas and delegating tasks to my team. Being a leader has highlighted the importance of trust and understanding between myself and my team members that I will take with me as I continue into my professional career.

I never expected to gain so much from Her Campus and am proud of the work that our team produces each week. When I joined the organization, rising to a leadership position wasn't part of my plan. Now almost 3 years later, this organization has become an integral part in making my senior year at USC such a success.

**Bright, Cassandra**

**Mentor(s): Mr. Stephen Thompson**

**Importance of meeting patients where they are to provide the highest quality of care**

During the fall semester, I completed my practicum at Lexington Medical Center Cardiac and Vascular Rehabilitation. The focus of this supervised, outpatient program is to improve cardiovascular health for patients after a heart attack or heart surgery, and for patients currently diagnosed with heart failure. During my practicum I was able to facilitate the execution of patient exercise prescriptions including assisting with set up of machines and exercise equipment, instruct patients on proper technique, recording of rating of perceived exertions (RPE) and watts on exercise prescription card, and obtained patient vitals. As an exercise science major we are required to complete an internship to gain hands-on, supervised experience within the healthcare field. Throughout this experience I learned how to communicate with different personality types, how to impose empathy within healthcare, and how to form connections with patients in order to provide them the best possible care. I grew immensely during this experience, specifically in my communication skills and ability to be a leader. Being responsible for somebody else's health is a huge responsibility and can be daunting at first. Being given the opportunity for supervised experience in the healthcare field has reassured me that this is the career path I want to pursue and has given me a newfound confidence in my ability to provide care to patients independently. After graduation, I hope to use my skills and experience to become a healthcare provider.

**Bright, Matthew**

**Mentor(s): Dr. Cynthia Nichols, Dr. David Hicklin, Dr. James Curtis, Dr. Martin Durkin**

**Sedation Dentistry: An application of medical histories and observation records to create a protocol aimed at identifying high-risk patients.**

Through retrospective medical record analysis at the Palmetto Health USC Medical Group Department of Dentistry, this study aimed to evaluate patient outcomes when treated with the sedative medications Midazolam, Fentanyl, Diazepam, and Demerol, in the hope of identifying high-risk markers that will guide patient selection for in-office sedative procedures.

By looking at the established Dental Patient Procedure Observation Records and prescribed combination of sedatives, in conjunction with the self-reported medical histories of approximately 375 sedation patients over a period of three years, a model of linear regression was developed to identify markers of statistical and clinical significance. The use of different sedative combinations was also of particular interest as current sedation practice often groups benzodiazepines with opioids. This study focused on the combination of Fentanyl with Midazolam juxtaposed against Diazepam with Demerol. This study determined that, when used in clinical combination, the drugs Fentanyl and Midazolam significantly reduced in-office recovery time when compared to the combination of Diazepam and Demerol. It was

also determined that a patient's age, number of comorbidities, sex, and weight were important indicators of sedation outcomes. Moderate sedation provides a safe and effective option for treatment to those who need complex dental care or have a phobia associated with dental treatment. The identification of markers significant

to a patient's sedation experience can increase provider confidence, sedation efficiency, and overall patient safety and satisfaction. With a growing number of general dental practitioners eager to provide patients with sedation dentistry, proper identification of high-risk markers, coupled with advanced training in sedation techniques, can help expand this service in a safer manner to those who avoid dental treatment due to fear and anxiety.

**Brizes, Michael**

**Mentor(s): Dr. Sirivatch Shimpalee**

**The calculation of pore size distributions for gas diffusion layers**

The calculation of pore size distribution for a gas diffusion layer (GDL) is important to understanding the permeability of the GDL. The GDL is a component used in a fuel cell to limit mass transfer of the reactant to the anode and cathode. The permeability is important because it is a tell of how readily a fluid or particle will transfer through the material. Through the pore size distribution, one gains an understanding of the pore network that makes up a GDL. This is the relation of porosity, the ratio of void volume to total volume in the GDL. The porosity of a material is important to know because a very porous material cannot easily control the mass transfer that dictates the performance of a proton exchange membrane fuel cell (PEMFC). The porosity is a key component in the calculation of MacMullin number, the measure of relative ionic resistance of a solid to the bulk electrolyte solution. The MacMullin number is a unitless number used to compare various GDL's resistances in order to determine the most suitable GDL for the given process. In addition, the GDL is used to remove by-product water from the catalyst layer because the extra water takes up catalyst locations reducing the performance of the PEMFC. Research is required to understand the pore size distribution to gain an understanding of the allowable amount of mass transfer through the sample.

**Brodie, Bradley**

**Mentor(s): Dr. Fabienne Poulain, Ms. Olivia Spead**

**Effect of BMP Signaling Inhibition on Gpc3 Expression in the Developing Zebrafish Retina**

Proper neuronal connectivity during development depends on the precise timing of gene expression. In vertebrates, two mechanisms ensure proper neural circuit organization – topographic mapping and pre-target axon sorting – both of which can be modeled in the developing visual system of zebrafish. Both mapping and sorting of retinal projections rely on the proper patterning of the retina across the dorso-ventral (DV) and antero-posterior (AP) axes during early development. Bone morphogenetic proteins (BMPs) are secreted factors present in the developing dorsal retina that are known to establish and maintain dorsal retinal fate. Gdf6a, a member of the BMP family, is specifically known to initiate dorsal retinal fate. Gdf6a mutations in radar (rdr) mutants have been shown to expand the expression of ventral-specific genes such as ephb2. Our lab has identified Glypican-3 (Gpc3) as a key regulator of retinal axon sorting that is specifically expressed in the ventral retina. How gpc3 expression in the retina is regulated and maintained during development remains unknown. Our project aimed to determine whether BMP signaling restricts the expression of gpc3 to the ventral retina during development. Using in situ hybridization on wild-type and rdr mutant embryos, we discovered that gpc3 expression becomes dorsalized in rdr mutants. We then used a BMP inhibitor, LDN-193189, to block BMP signaling at different developmental time points to determine when BMP signaling is needed for restricting gpc3 expression to the ventral retina. Altogether, our results have established a novel role for BMP signaling in restricting the expression of a novel gene involved in retinal axon sorting, thereby broadening our understanding of the molecular

mechanisms by which early retinal patterning affects neural circuit formation during development.

**Brokaw, Richard**

**Mentor(s): Dr. Subrahmanyam Bulusu**

**Investigating the Role of the Loop Current System in Developing Patterns of Sea Surface Salinity in the Gulf of Mexico**

The Loop Current System is comprised of the Loop Current and Loop Current Eddies, and is the principal circulation feature in the Gulf of Mexico, which exhibits seasonal salinity changes due to freshwater discharge from the Mississippi and Atchafalaya rivers. Many studies have focused on coastal and shelf circulation of this freshwater, with few concentrating its connection to the Loop Current System. This investigation uses satellite-derived sea surface salinities as well as altimetric sea surface height data to observe and classify the interaction of the Loop Current System with the seasonally-present freshwater plume. When extended far northward, the Loop Current entrains and transports freshwater southward towards the Florida Straits. When the Loop Current is retracted, no interaction occurs and the freshwater remains close to its source near the mouth of the Mississippi and Atchafalaya rivers. When a Loop Current Eddy is present in the northern Gulf of Mexico without an extended Loop Current, freshwater is advected offshore, across the Mississippi/Alabama/Florida shelf and circulated in the central Gulf of Mexico.

**Broom, Addie**

**Mentor(s): Prof. Duncan Culbreth**

**Hands-On Experience for a Hands-On Career**

Hands-on experience for a hands-on career is exactly what I hoped to accomplish as an undergraduate, public health student at the University of South Carolina. I can confidently say that I achieved this goal by integrating my extensive, observation hours with scholastic content. As a future healthcare professional, I recognize the practicality of acquiring real-life exposure in order to strengthen academia and invoke personal growth. I gained invaluable, beyond the classroom experience at The Sigurd Center, The Therapy Place, Inc., and Palmetto Health Baptist, all of which are located in Columbia, South Carolina. My involvement at these clinical settings directly fueled and reaffirmed my passion for occupational therapy as my intended profession. Ultimately, my objective for volunteering was to delve into the secondary and tertiary prevention that occupational therapy offers through the integration of occupation-based activities into the rehabilitation process. I had the unique opportunity to administer assessments, formulate therapeutic plans, and record patient progress, alongside registered and licensed therapists. Overtime, I became competent in regards to the implementation of individualized methodologies used to develop, recover, or maintain daily occupations. Practicing client-centered care exposed me to a wide range of populations, diagnoses, and treatments, while introducing me to diverse, specialty areas within occupational therapy. Above all, I recognized the intimate and rewarding relationships between occupational therapists and their patients. I became thoroughly aware that occupational therapists have the undeniable ability to change lives by offering expert care and providing true compassion for those they serve. Working one-on-one with occupational therapists in a variety of clinical sites allowed me both professional development and personal growth that I will utilize in my future fieldwork.

**Broome, Samantha**

**Mentor(s): Dr. Elizabeth Easley, Dr. Sarah Sellhorst**

**Differences in waist circumference, body fat percentage, and hand grip strength between frame sizes in women.**

Purpose: To determine if there were differences in waist circumference (WC), body fat percentage (BF%), and hand grip strength (HGS) based on frame size in college-aged women.

Methods: 46 Full-time female college students (18-25y) were recruited for this study. Height (cm) was measured using a portable stadiometer (Seca model 215). Wrist and waist circumferences (cm) were measured at standardized locations. Frame size (FS) was calculated by dividing height by wrist circumference. BF% was measured using a tetrapolar bioelectrical impedance analyzer (Quantum-X). HGS was measured in the dominant hand using a handgrip dynamometer (Jamar). Multivariate analysis of variance (MANOVA) was used to determine if there were differences between groups in WC, BF%, and HGS.

Results: The MANOVA determined there was a significance difference between groups based on FS, Wilks Lambda = .672,  $F(3, 42) = 6.841$ ,  $p = .001$ . Pairwise comparisons show differences in BF% ( $F(1, 44) = 14.656$ ,  $p < .001$ ), and WC ( $F(1, 44) = 19.999$ ,  $p < .001$ ). There was no significant difference between groups in HGS ( $F(1, 44) = .570$ ,  $p = .454$ ).

Discussion: This study showed that women with a larger FS could be at risk for sarcopenic obesity later in life based on WC, BF%, and HGS. Women with a larger frame size were considered overfat based on BF%. HGS were relatively the same between frame sizes. Previous studies have shown a positive correlation of body fatness and frame size. The differences in BF% of our population serve to confirm these results. In addition, in both groups HGS were weaker than the norms. Increases in body fat and inadequate strength shown in the larger FS group combine for greater risk of negative health outcomes.

**Brown, Deasia**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Deasia's Fantasy**

During the Fall semester of 2018, I was selected as one of the five students to be an Opportunity Scholars Program Representative. Being a representative is one of the most important roles to play for OSP. As a representative, my job is to assist in meetings, help recruit new students, and engage with my fellow students. Being a representative has taught me how to open up more to people. It has also taught me how to socialize with people from different backgrounds. I choose to be an osp representative to help build my communication skills and learn to speak in front of large crowds.

**Bryant, Hannah**

**Mentor(s): Dr. Debra Cohen**

**Creating Social Change**

Throughout my time as an undergraduate at USC, I have come to understand not only the importance of promoting equality and social justice in our society, but the methods with which to promote these goals. My time spent serving the community in various ways throughout my three years at USC, in addition to my time working for On Your Time Initiative, have given me a deeper understanding of underlying factors that contribute to inequality and I have since submitted a proposal for the implementation of a project that would provide more educational opportunities to those from all walks of life. Additionally, I plan to attend law school this fall and major in international law, which will allow me to serve as an advocate for those who are faced with difficult circumstances around the world upon graduation. My time at USC, in addition to my time in a Greek organization, have given me the tools and the confidence to pursue my goals and improve the world for those around me.

**Buck, Charles**

**Mentor(s): Dr. Natalia Shustova, Dr. Allison Rice**

**A Corannulene-Based Covalent-Organic Framework: An Anode Material for Li-Ion Batteries**

Merging the intrinsic properties of corannulene with the inherent properties of crystalline covalent-organic frameworks (COFs), including their modularity, porosity, versatility, high surface area, and structural tunability, opens an avenue to reveal a new group of graphitic materials. Although there is a great

interest in COFs, and corannulene, merging the areas is in demand due to their potential in the fields of organic light emitting diodes to batteries, but these studies are still in the beginning phases. The attempts that have been made to synthesize and characterize corannulene-based COFs to unlock their full potential have been the focus.

**Burgess, Thomas**

**Mentor(s): Dr. Douglas White**

**Laboratory Studies of Astrochemical Ice Mixtures**

Data about Kuiper Belt ice mixtures are invaluable to scientists studying ice mixtures on the surface of Kuiper Belt objects. These ice mixtures can be recreated in the laboratory and compared to astronomical data. Analogs of ice mixtures found on the surface of Ultima Thule, Pluto, comets, and interstellar dust clouds will be measured using infrared spectroscopy. These spectra will be uploaded to a database, providing accessible information to scientists studying Kuiper Belt objects. All work thus far has been to prepare the instrumentation for these astrochemical experiments. A closed-cycle helium cryostat has been used to reach temperatures and pressures around 20 K and  $1 \cdot 10^{-7}$  torr, an appropriate representation of Kuiper Belt conditions. Preliminary experiments involving the deposition of methanol have included temperature modulation to achieve sublimation with spectra taken from 20 K to 170 K. A separate glassline vacuum manifold will be used to create gas mixtures to deposit into the cryostat. Future work will involve preparing the glassline to begin experiments.

**Burrell, Sydney**

**Mentor(s): Dr. Jessica Klusek**

**Mother-Child Synchrony as a Predictor of Problem Behavior and Autism-Related Deficits in Individuals with Fragile X Syndrome**

Fragile X syndrome (FXS) is the most common inherited cause of intellectual disability and the most common single gene cause of autism spectrum disorder, with approximately 1 in 4000 males affected. The disorder is caused by an inherited mutation from carrier mothers, who have an abnormality on the fragile X mental retardation-1 (FMR1) gene on the X chromosome. The majority of males with FXS have mild to moderate intellectual disability and roughly 60% have comorbid autism. Anxiety disorders, hyperactivity, impulsivity, and aggressive behavior are seen at higher rates in these individuals as well. The objective of this project was to examine the relationship between mother-child synchrony and development of social skills in FXS, as well as possible maternal depression associated with the quality of mother-child synchrony. Data was collected from existing video-recorded mother-child interactions of 27 mothers and their adolescent/young adult sons with FXS (average age: 18 years old). The videos were coded using the Anchor Points for Observational Ratings of Mother-Adolescent Synchrony, a 9-point scale that provides operational definitions to evaluate quality of synchrony between a mother and child. Once these videos were coded, we evaluated child-problem behaviors and social skills that may relate to quality of synchrony using two maternal-report questionnaires: the Child Behavior Checklist (CBCL) and the Social Communication Questionnaire (SCQ). Maternal depression was measured with the Beck Depression Inventory (BDI-II). We used linear regression models to determine the association between maternal depression symptoms and concurrent synchrony quality. Two general linear models were also produced to test synchrony as a predictor of each of the child outcomes at the one-year follow-up. Findings showed that synchrony was a significant predictor of concurrent child problem behaviors and child social deficits a year later. This shows that better synchrony between a mother-child dyad overall is associated with fewer problem behaviors and autism symptoms in individuals with FXS during adolescence. Findings might suggest synchrony as a potential intervention target for this group.

**Burrell, Sydney**

**Mentor(s): Dr. Sarah Keeling**

**Hands-On Healthcare**

Since the summer of 2018, I have been interning with Palmetto Health-USC Orthopedic Center. Palmetto Health-USC Medical Group is the Midlands regions' largest multispecialty, clinically integrated medical group, bringing together a variety of healthcare providers from two of South Carolina's most respected organizations- Palmetto Health and the University of South Carolina School of Medicine. Specifically, the orthopedic group specializes in joint replacement. As an Exercise Science major at the University of South Carolina, my internship provided me with first-hand clinical experience working with and triaging patients, assisting with injections, studying x-rays, and observing physicians and physician assistants diagnosing patients. Working in these clinics furthered my knowledge of the human body, specifically regarding knees, hips, and shoulders, as well as my knowledge of common medications and how to care for the geriatric patient population. Participating in this internship reaffirmed my decision and reignited my passion to pursue a career as a physician assistant and more broadly, to devote my life to serving others through healthcare.

**Burris, Blaine**

**Mentor(s): Dr. Stephen Thompson**

**A Conservation of Posterity**

During my spring semester of senior year, I was accepted into the National Fellowship program for the Conservation Voters of South Carolina: the largest environmental PAC in the state. Focusing on environmental and conservation related issues, the PAC induces skills of leadership, public speaking, campaigning, and finance accountability. During the course of the internship I assisted in activism and advocacy for underprivileged socioeconomic communities adversely affected by environmental shifts in the state by: canvassing, pushing for petition signatures, and advocating at the local, state, and federal level for increased involvement and assistance (as well as greater concern) for conservation issues in the state. My passion for advocacy and activism allowed me to shine: contributing to a sense of community and further ingratiating me into the world of public policy. By learning HOW to advocate, WHY it is important to advocate, and WHAT contemporary advocacy looks like, I left my internship with a sense not only of personal growth and change, but a sense that our environment is precious and temporal, and deserves to be protected, as well as the people who are adversely affected by its abuse. By completing this internship I will be better able to pursue a future career in advocacy and activism in the non-profit sector for which I am now well equipped.

**Burton, Erica**

**Mentor(s): Dr. Ann Hoover**

**The Role of Gender Identity Threat in Sexist and Homophobic Humor**

Recent research has aimed at identifying factors that reduce harassment, prejudice, and discrimination. One factor to consider is group memberships, or "social identities," which are an important aspect of our self-concept (Tajfel & Turner, 1979). Social identity can be threatened when individuals do not feel like a prototypical group member or when they feel as though their group has been evaluated negatively (Abrams & Hogg, 1988). In the current research, we are interested in subtle forms of prejudice; namely, humor. Humor is an important element because it is explicitly derogatory while also implicitly being free of any prejudicial motives or mal-intentions because "it's just a joke." (O'Connor et al., 2017). Specifically, we will examine if participants' responses to sexist and homophobic humor will be influenced by how strongly they experience gender role stress and whether or not their gender identity is threatened or affirmed.

First, participants (N = 160) will be asked to fill out a subset of questions from the gender role stress questionnaire; (GRSQ Eisler & Skidmore, 1987; Gillespie & Eisler, 1992). Upon completion, participants will complete a filler task and then go on to ostensibly play a trivia game on the computer. The purpose of the game is to provide participants with bogus feedback that either threatens or affirms their gender identity. Then, participants will be asked to rate a series of jokes on a scale from 1 (not at all humorous) to 7 (extremely humorous).

Data will be analyzed using multiple regression with humor ratings as the dependent variable, and feedback, gender, GRSQ, and their interactions as predictors. Overall, I expect to find that threatening feedback, participant gender, and higher GRSQ scores will positively increase humor ratings. Specifically, when identity is affirmed, both men and women will rate the jokes equally low in humor. However, when identity is threatened, men and women will rate the jokes as more humorous, with men rating the jokes as most humorous. Finally, I predict the GSRQ will moderate this interaction; both men and women who score higher on this scale and are threatened will find the jokes more humorous.

**Butler, John**

**Mentor(s): Dr. Matt Childs**

**Fostering Community and Handling Crises: My Experience as a Resident Mentor**

During my Senior Year at USC, I have had the privilege of working as a Resident Mentor (RM) in the Honors Residence Hall. As an RM, my duties include fostering a welcoming community that promotes an understanding of diversity and inclusion for all, as well as helping my residents adjust to college life. Through this leadership role I have improved my interpersonal communication skills, as I routinely coordinate with my fellow RMs to plan events for our respective halls and for the building community as a whole. In addition, I am also responsible for meeting with my residents to assist with their transition to college life and, for the majority of my residents, living independent of their own families for the first time in their lives. I am also required to spend nights on call, where I manage and respond to any and all crises that might arise when I'm on duty. These crises range from something as simple as a resident being locked out of their room to situations as serious as someone having an allergic reaction to which requires immediate medical attention. I have been able to use my own personal experiences from college to help my residents through different issues that have shaped their college experience. These problems are mostly academic and revolve around helping residents find ways to succeed in difficult classes or peer reviewing academic work for them, but sometimes they deal with more personal issues like handling roommate conflicts or talking about social issues in their lives. Some of the skills needed to be an RM, such as teaching and building relationships, were not new to me because of my experiences as a peer leader for Chemistry 334 and as a small group leader in Shandon College Ministry. Whereas others, like handling interpersonal conflicts and managing crises, were skills that I developed and polished during the school year. The RM position has helped me become a more effective communicator on an individual and group level, a more sympathetic empathizer and a better teammate.

**Butler, Susan**

**Mentor(s): Prof. Sarah Keeling**

**The Hidden Community - What I Learned Serving as a Gateway Orientation Leader**

Orientation is often the first look students get of a university, where they make their first adult friendships and start forming experiences. One of my most significant contributions to the University of South Carolina has been serving as a Gamecock Gateway orientation leader. For the past two summers I spent time alongside the advisors and staff of the Gateway program, learning how the program operates and how I could help the incoming students. Through my experiences in the program, I was able to answer

questions for them and provide insight into the program. When I began, the program wasn't too well known, but I have seen it become more widely acknowledged. The experience inside Gamecock Gateway is unique and very similar to international students. I learned a lot about how incoming students viewed their experience and what stuck with them after they left orientation. Freshman are often uncertain, nervous, afraid and curious about college life and how it differs from high school. By having gone through the Gateway program successfully, I could serve as a mentor and guide for their upcoming experience in the fall. I have continued to remain involved in the Gateway program and intend to continue to help them after graduation.

**Byrn, Kelly**

**Supervisor(s): Daniel Gambrell, Andrew Molair, Kathleen Scott, Megan Thackray**

**Mentor(s): Dr. Sanjay Ahire**

**Optimizing Statewide Outreach Initiatives for SC Thrive**

SC Thrive is a non-profit organization in South Carolina that helps the State's underprivileged population with several services, focusing on food security, healthcare resources and financial wellness through work supports such as SNAP, Medicaid and tax credits, like the Earned Income Tax Credit and Child Tax Credits. In addition, SC Thrive offers Mental Health First Aid training to provide awareness and education about mental health, reducing stigma and myths surrounding mental health.

The goal of our project was to develop an optimal resource allocation strategy for SC Thrive to provide the maximum yield of enrollments into the food safety, medical, mental health, and financial counseling services that it helps with across all 46 counties of South Carolina through 22 specific outreach initiatives – including job fairs, back-to-school events, mailers, and tax clinics.

We developed a large scale (1,012 decision variables x 50 constraints) integer programming model for SC Thrive, with the help of inputs on resources, available resource capacities, and per event yields for each initiative from the top management of SC Thrive. The model was executed using the OpenSolver™ optimization software. The recommendations from the model provide roadmap to strategically alter SC Thrive's operating model for most efficient and effective use of their limited resources to maximize the returns in terms of actual enrollments into the social programs they support, thus maximizing the productive use of the resources to serve people in dire need.

**Byrnes, Michael**

**Mentor(s): Dr. Ashley Smuder, Ms. Vivian Doerr**

**Effects of Doxorubicin-Induced Autophagy on Neuromuscular Junction Protein Expression**

Doxorubicin (DOX) is a highly effective chemotherapeutic agent used in cancer treatment. Unfortunately, clinical use of DOX is limited due to toxic effects on skeletal muscle. Specifically, DOX has been shown to promote skeletal muscle atrophy and contractile dysfunction by enhancing mitochondrial reactive oxygen species (ROS) production and increasing autophagy above basal levels. While the effects of increased autophagy signaling on skeletal muscle function following DOX treatment are unknown, evidence indicates that the rate of autophagy can significantly alter the stability of the neuromuscular junction (NMJ). Importantly, signaling between the nervous system and skeletal muscle at the NMJ is required for proper muscle function, and impairments in the NMJ have been linked to muscle wasting. Therefore, we tested the hypothesis that skeletal muscle dysfunction following DOX treatment occurs as a result of autophagy-induced alterations in the expression of proteins responsible for maintenance of the NMJ. To test this, 4-month-old rats were administered an rAAV overexpressing a dominant negative mutation of ATG5 (rAAV-dnATG5), a protein required for autophagy activation, directly into the soleus muscle. Four weeks following rAAV-dnATG5 administration, animals received either DOX (20 mg/kg) or saline (equal volume)

treatment. Our results demonstrate that DOX does in fact alter the expression of proteins required for optimal functioning of the NMJ, and that maintaining autophagy at basal levels is important for regulating skeletal muscle NMJ stability. Therefore, reducing DOX-induced autophagy signaling may have therapeutic benefits in the prevention of DOX-induced skeletal muscle dysfunction.

**Caiello, Benjamin**

**Mentor(s): Dr. Jason Stewart**

**DNA Replication Initiation and STN1 / AND1 Interaction**

DNA replication is an essential step in the life cycle of all cells. In human cells, errors or failures during replication can lead to disease, cell death, or cancer. Replication can be initiated from hundreds of thousands of origins in the human genome, but only a small fraction of the origins are actually fired to form the replication forks that copy the genome. The remaining unused origins (“dormant origins”) are only needed if nearby replication forks stall or fail to completely replicate the DNA. CTC1-STN1-TEN1 or CST is a three protein complex that is important for DNA replication and telomere maintenance. It is known to interact with replication factors such as polymerase alpha and the MCM2-7 helicase. Knockdown of the STN1 subunit in human cancer cells has been shown to delay dormant origin firing after stalled replication. One potential factor that CST may interact with to help fire dormant origins is AND1— a central component of the replisome that interacts with polymerase alpha, the MCM2-7 helicase, and a variety of other factors. Preliminary experiments have shown that STN1 knockdown leads to a reduced level of AND1 bound to the chromatin, indicating that CST plays a role in AND1 localization to DNA. In addition, immunoprecipitation experiments have shown that AND1 and STN1 interact. This project examines whether it is a direct or indirect interaction between CST and AND1 and whether the loss of AND1 on the chromatin with STN1 knockdown is specific to certain types of DNA sequences or to certain stages of the cell cycle. This will clarify mechanisms behind origin initiation during DNA replication.

**Cain, Brennan**

**Mentor(s): Dr. Nikolaos Vitzilaios**

**Bird’s Eye View: A Marsupial Survey System**

Inland bodies of water are constantly evolving. In order to maintain the ecosystem as well as the structures located close to bodies of water, frequent monitoring is required. Currently, these areas and structures are monitored manually, presenting a risk to the surveyors and taking manpower away from other work. Recently, autonomous boats, or Autonomous Surface Vehicles (ASVs), have been proposed to undertake the task. ASVs, however, have limitations such as a restricted field of view and access only where the water is sufficiently deep. Drones, or Unmanned Aerial Vehicles (UAVs), can fly over any terrain and offer a more complete “bird’s eye view” of the environment. However, UAVs have limited operational time due to battery constraints. A solution to these constraints is a Heterogeneous Marsupial Robotic System. These systems are composed of different robots where a larger robot is able to support a smaller robot, much like marsupial mammals. We present a system composed of a UAV which is ferried by an ASV. Using the long operational range of the ASV and the enhanced maneuverability and range of view, we are able to create a robust and time efficient system for monitoring bodies of water and near-shore structures. Experimental results from field deployments at Lake Murray, SC, USA demonstrate the capabilities of the system.

**Calatayud, Brittney**

**Mentor(s): Dr. Susan Wood**

**Mechanisms of anxiety-like behavior in females**

Women are twice as likely as men to develop stress-related illnesses like anxiety and depression, however

the mechanisms of increased stress susceptibility in females are unclear. This study sought to determine the role of estrogen and inflammation on stress susceptibility in females. To explore the role of ovarian hormones, I compared anxiety-like burying behavior during witness stress in intact females treated with vehicle, ovariectomized females treated with either vehicle or estradiol, and males. Stress causes inflammation in the brain, including the stress-sensitive locus coeruleus (LC). In a separate cohort of female rats, to determine whether reduced inflammation in the LC blocked stress-induced burying behavior, a subset of rats were treated with either vehicle or clodronate, a drug that is toxic to microglia, the inflammatory cells of the brain. These findings will determine the contribution of estradiol and inflammation as precipitating factors of anxiety-like behavior in females.

In the witness stress paradigm, a female rat is placed behind a Plexiglass divider to witness social defeat between two male rodents. The intruder male rat is placed into the home cage of a larger resident rat and the two interact for 15 minutes once a day on days 1 and 5 of the experiment. Witnessing this social defeat is stressful for the witness, and often results in anxiety-like burying behavior. Witnessing this stress also has long-lasting psychological effects, such as increased anxiety-like and depressive-like behavior, inflammation in the brain in areas such as the LC and dorsal raphe, and increased incidence of heart arrhythmias.

These studies showed that intact females treated with vehicle exhibited significantly more anxiety-like burying behavior when exposed to witness stress than the ovariectomized females and males. We believe this difference is due to those groups' lack of estrogen. We found that clodronate resulted in significantly decreased burying behavior in all groups, showing the correlation between decreased inflammation in the LC and decreased anxiety-like behavior. Future studies will determine whether there is an effect of estradiol on neuroinflammation/microglia in the context of witness stress.

**Caldwell, Ethan**

**Mentor(s): Dr. Nicholas Boltin**

**Decision Support for Chemical Exposures Using Artificial Neural Network**

When treating patients who have been exposed to unknown chemicals, the first step involves quickly and accurately identifying what chemical the patient has been exposed to. The National Library of Medicine (NLM) list thousands of chemicals in their Hazardous Substance Database, and oftentimes the signs and symptoms for different classes of chemicals overlap. This overlap increases the risk of misdiagnosis and could potentially create confusion among healthcare providers, which could ultimately lead to a delay in treatment. To mitigate these potential misdiagnoses, Artificial Neural Networks (ANN) can provide decision support to healthcare providers by quickly and accurately narrowing the list of potential chemicals from a patient's exposure related signs and symptoms. Our approach is to train a back-propagated neural network in R.Studio using a dataset containing 438 of the most common NLM chemicals and their related 79 signs and symptoms. Training results utilizing a standard 70/30 split of the data produced an ANN model 95% accurate at identifying a chemical culprit. Additional testing was performed using simulated signs and symptoms by perturbing the original data by 5%, 10% and 15%. This work has ultimately lead to the development of a pipeline for creating robust ANN models capable of providing support to emergency caregivers as they diagnose and treat patients who suffer from various chemical exposures.

**Callaham, Jasmine**

**Mentor(s): Prof. Sarah Keeling**

**Exploring the Depths of Cardiac and Pulmonary Rehabilitation**

This past Fall semester, I witnessed the transformative power of modern medicine and comprehensive lifestyle changes, as an Exercise Science student intern at Lexington Medical Cardiac and Pulmonary Rehabilitation. The goals of these two 36-session programs are to provide patients with the tools needed to jumpstart their recovery and or improve their current quality of life. In order to do this, patients are ed-

uated on the benefits of physical activity, stress management, dietary changes, and much more. While the goals of both outpatient programs overlap, Cardiac Rehab is designed for individuals recovering from cardiac events and surgeries and Pulmonary Rehab is designed for patients with both COPD and non-COPD respiratory conditions. During these four months, I was given the opportunity to assist in checking vital signs, to create and review patient charts, and even explore parts of the interdisciplinary team ranging from Pulmonary Function Testing to Cardiac Catheterization. I was able to gain knowledge that includes being able to recognize and understanding abnormal heart rhythms, how to tailor treatment plans to the individual, and the different evaluations to measure progress. As a future physical therapy student, this internship not only deepened my interest to work with the middle-aged to geriatric populations, but overall solidified my decision to work in healthcare, where I can be a champion for others on their journeys to full recovery.

**Calloway, Erin**

**Mentor(s): Dr. Heather Brandt, Ms. Hiluv Johnson**

**Planning, Implementing, and Evaluating a Social Media Campaign for Colorectal Cancer Awareness Month**

Colorectal cancer (CRC) is the second leading cause of cancer deaths in the United States. CRC screening rates are lower than for other cancer screening tests. Awareness raising activities remain important to ensure the public has actionable information on CRC screening. The Colorectal Cancer Screening Program in South Carolina (CCSPSC) works with health centers to implement evidence-based interventions to increase CRC screening. As part of the CCSPSC, a social media campaign on Facebook and Twitter was planned, implemented, and evaluated in March 2019, which is Colorectal Cancer Awareness Month. Social media best practices from George Washington University's Colorectal Cancer Awareness Month Social Media Toolkit (2019) were used to guide development of social media posts. To organize content, a spreadsheet was used to ensure synergy across social media platforms and to capitalize on national and state activities. Buffer was used to manage social media posts, which were timed for release at 9:00 am, 12:00 pm, 3:30 pm, and 7:15pm on Facebook and on Twitter each business day in March 2019. Social media analytics will be monitored weekly. The results of this study will be available after March 31, 2019 when the final social media posts are made. Analytics by each platform, as appropriate, will be collected and reported, such as total number of posts, number of engaged users, total users, organic reach, impressions, retweets, and likes. The results will inform the investment of using social media as an awareness-raising strategy for CRC as part of the CCSPSC.

**Campanelli, Alyssa**

**Mentor(s): Dr. Jessica Klusek**

**Social Interaction Style and Language Ability in Males with Autism and Fragile X Syndrome**

Introduction: Three distinct subtypes of autism have been proposed by psychiatrist Lorna Wing based on style and quality of social interaction—aloof, passive, and active-but-odd (Wing and Gould, 1979). This study aims to determine the social interaction style profile of boys with autism that is comorbid with fragile X syndrome (FXS), a single gene disorder associated with increased risk for autism. Since previous research has suggested that more severe autism symptoms are correlated to better language ability in boys with FXS (Kaufmann et al., 2004; Thurman et al., 2017), this study also aims to analyze the effect of subtype on measures of language ability in order to better understand the language profile of males with FXS and co-occurring autism. Methods: Two raters observed samples of the ADOS that exemplified social interaction for 24 participants aged 15-27 who have both autism and FXS. The raters assigned the subject into either an active-but-odd or a collapsed aloof/passive group based on Wing's descriptions of the characteristic social behaviors of each subtype. The aloof group is characterized by rejection of social contact and few spontaneous social approaches. The passive group also rarely initiates social contact but

will accept social approaches, and is considered the most socially-accepted subgroup. The active-but-odd group frequently initiates social contact but in an unusual, one-sided manner. Data was analyzed using ANOVA. Results: 12 subjects were classified as active-but-odd and 12 as aloof/passive. Social interaction style subtype was not found to have a significant effect on ASD severity ( $p=.27$ ), Leiter nonverbal IQ ( $p=.74$ ), or language ability as measured by the Expressive Vocabulary Test ( $p=.28$ ) and the Peabody Picture Vocabulary Test ( $p=.19$ ). Conclusions: While no associations were significant in this small sample, the data indicates that further research with a larger sample may find that social interaction style does affect language ability in males with FXS and autism such that those in the active-but-odd group have better language skills despite being considered more socially impaired than the passive group. Analysis of social interaction style and language ability may facilitate specialized treatment of autism symptoms depending on the individual's subtype.

**Caputo, Matthew**

**Mentor(s): Dr. Abigail Hogan**

**Investigating Childhood Social Anxiety in Fragile X Syndrome**

Fragile X syndrome (FXS) is a monogenic disorder caused by a mutation on the FMR1 gene on the X chromosome. This mutation results in atypical brain development and is the most common inherited cause of intellectual disability. Social anxiety is a common and debilitating problem in fragile X syndrome (FXS), with studies of adolescents and adults suggesting that 35-40% of individuals with FXS experience this anxiety subtype, compared to an estimated 5-10% of the general population (Cordeiro et al., 2011). However, there is scarce research on the formal diagnosis of social anxiety in young children, hindering early detection and access to appropriate treatments. This study compared the rates of social anxiety diagnoses and symptoms in children with FXS to those of typically-developing (TD) children. The average ages of the samples were approximately 51 months (FXS) and 50 months (TD). About 34% of the FXS sample met the diagnostic criteria for social phobia, compared to 25% of the control group. Additionally, the FXS sample demonstrated more severe symptoms of social anxiety and avoidance according to parent-report measures. This data corroborates results of similar studies on adults and suggests that social anxiety in individuals with FXS can be detected at a young age, warranting further investigation into early indicators of this anxiety subtype. Future directions for this work include analysis of physiological measures, such as heart rate variability, to identify potential mechanisms that may contribute to social anxiety symptoms. This research would provide critical insight into the underlying mechanisms of social anxiety in children with FXS and may contribute to early detection and treatment efforts.

**Carelock, Madison**

**Mentor(s): Dr. William Jackson**

**Measuring the viability effects and expression of a Vif-resistant A3G in a cell culture model**

The Human Immunodeficiency Virus (HIV) is a retrovirus that infects and destroys CD4+ T lymphocytes. The loss of these cells impairs the immune system and leads to Acquired Immunodeficiency Syndrome (AIDS). The HIV viral infectivity factor (Vif) induces a productive infection by inhibiting expression of the host anti-retroviral protein Apolipoprotein B mRNA Editing Enzyme Catalytic Subunit 3G (A3G). A3G is a cytosine deaminase that is normally packaged into progeny virions and activated following entry of the virion nucleocapsid into a new host cell. There it acts to induce G-to-A hypermutations in the (-) sense DNA strand during reverse transcription. However, in infected cells Vif triggers proteasomal degradation of A3G, allowing a productive infection to occur. Therefore, Vif is a potential target for antiviral therapies. To test this hypothesis, we obtained a Vif-resistant form of A3G, termed D128K, and cloned it into the vector pLHaATP(INS2)R. This project focuses on preliminary testing of pLHaATP(INS2)R to measure transgene expression and any effects on cell viability. A cell proliferation assay was performed in triplicate using HEK293T cells and showed no significant differences between cells expressing a non-mutant

A3G, the D128K A3G mutant, and mock transfected cells. To measure A3G transgenes expression, a qPCR assay was developed. Five sets of A3G primers were synthesized and their qPCR conditions were optimized for each. RT-qPCR will next be used to measure A3G mRNA expression levels in cells transfected with pLHaATP(INS2)R.

**Carney, Kylie**

**Mentor(s): Prof. Lisa Camp**

**Increasing Civic Engagement at UofSC**

Over the past year I have had the opportunity to serve on the Momentum Series Advisory Board and the Civic Leadership Education and Action Team (CLEAT) through the Leadership and Service Center, through which I have been afforded a platform to promote civic engagement across the UofSC campus. One of our first initiatives in Fall 2018 was a long-running voter registration and absentee ballot request drive. A partnership with TurboVote allowed us to efficiently register students and peers using an easy shareable link. Newly or already registered participants were then able to access state-by-state absentee ballot information and receive updates about the election process. Overall, I was able to increase voter participation and see firsthand how a small group of people with passion can have a positive impact on our democracy. Our drive was incredibly successful, and we were able to register over 1,200 peers and help request absentee ballots for hundreds of out-of-state students. While it is ultimately up to each individual to actually go out there and cast their ballot, we gave our community the tools to do so. By enabling more and more individuals to participate in our democracy, my efforts with Momentum and CLEAT support their mission of civic engagement and help set the stage for a better world.

**Carson, Kevin**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**The Wonderful Life of Kevin**

During the Summer of 2018, I had the opportunity to be an ambassador of the University of South Carolina-Sumter. Through this opportunity, Ambassadors are taught to be able to guide students through tours of the University's campus and answer any questions the students have. The reason I did the program, is to improve on my networking and social skills. This allowed me to improve upon my social skills and networking skills, as I interacted with the various new students. I did this, by improving on the basic ideas for the tours such as providing a little humor to improve the overall vibe of the tour. I also managed to have the tour be a little slower, to allow the students to soak up all of the information and ask all the questions they felt needed. Being an ambassador, allowed me to learn new things about myself that were rather significant. I learned that, I can lead a group of people as a leader and I learned that I can maintain a conversation with people without any trouble. This experience has lead me to the choice of attempting to be an ambassador at the next academic establishment I arrive at.

**Carter, Peyton**

**Mentor(s): Ms. Courtney Buzan, Ms. Carly Rice, Mrs. Stephanie Suarez, Ms. Lauren Haynes, Mrs.**

**Asheley Schryer**

**Work Worth Doing**

Homecoming Week has been on campus since 1978 and I had the privilege to carry on the traditions by serving as the Vice Commissioner of Marketing and Communications for the University of South Carolina's 2018 Homecoming Commission. I interviewed for the Homecoming executive board because my previous position, as sponsorship chair, left me with a greater purpose. I felt I owed it to myself and the university to continue working to make these events happen for students to enjoy. We had a team of fourteen passionate undergraduate students spend ten months organizing ten events across campus over

the course of one week to celebrate students, faculty, staff, and alumni returning to campus and beginning a new academic year. As Vice Commissioner, I led a team of six individuals that corresponded marketing and outreach across campus and the greater Columbia area. We collectively handled sponsorships, content designs, social media, and strategically focused our audience to on-campus organizations, incoming freshman, and faculty. The growth I have seen throughout my years on the Homecoming Commission has been immense and it is never too late in your collegiate career to get involved on campus and try something outside of your comfort zone. We tend to find ourselves when we are most vulnerable and that is what I have learned the most throughout this process. In the end, we had the largest applicant pool for Homecoming 2019 ever before seen and I truly believe that it is going to be a phenomenal success because of the passionate service-oriented leaders on the current commission.

**Cash, Otway**

**Mentor(s): Dr. Beth White**

**Work Experience**

The past two summers I worked at a Company called IFA Rotorion. This company produces driveshafts for automobiles companies like BMW, Mercedes, Ford, and GMC. During my time working there I saw how much safety impacts the work place. Safety is so key to preventing injuries to the employees and making the work cite safe for visitors. This inspired me to want to become a Health and Safety Engineer. Health and safety engineers develop procedures and design systems to prevent people from getting sick or injured and to keep property from being damaged. This insight involves my Environmental Health Science 321 course that I took here at the University of South Carolina. A concept that I applied outside of the classroom from this course are understanding basic principles, concepts, and terms of environmental health. While working there I attend many OSHA classes to get trained on how to be safe in this work environment. I used safety equipment every day to carry my daily task on the job. Some examples of things I use are steel toe boots, safety glasses, gloves, and ear plugs. I got hands on training on how to use this equipment to protect myself from injury and danger. We also went of safety procedures like walking in the proper walk way, storing chemicals in safe areas, hanging driveshafts properly. This will keep the insurance rates down for employees on the companies plan and injury numbers down. This relates back to the Environment course by identifying various hazards, knowing how they related to health, and preventing environment hazards. By taking this course it gave me experience in knowing what to expect in that environment. My plan after graduation is to get an entry level job as a Health and Safety Engineer Assistant. Through this entry level position, I hope to gain more experience about safety rules and regulations. I also will obtain key certifications in OSHA safety to ensure that I have all the knowledge I need to maintain a healthy and safe work environment.

**Cassidy, Sarah**

**Mentor(s): Prof. Jay Pou**

**Working with a Diverse Student Population**

As a Bachelor of Social Work student, for the last year and a half, I have worked at the University of South Carolina's International Student Services (ISS) office, specifically with the English Program for Internationals (EPI) as a student services intern for my field placement. This role has afforded me the opportunity to interact with students from all areas of the world and therefore, the chance to learn about a plethora of unique cultures which I had no previous knowledge of. A majority of my time at ISS involved managing the Conversation Partners and Buddies Beyond Borders programs. Each of these programs consisted of communicating with both domestic USC students as well as international students, including undergraduate level, graduate level, and EPI students. Managing these programs helped me to sharpen my communication skills, both written and oral, as well as more administrative-based skills such as time management and critical thinking. Because of my social work knowledge, I have been able to utilize skills

such as empathy and cultural humility when helping students to adjust to life in the United States. Because of this experience at ISS, I have greatly improved my skills in terms of working with a diverse population and overcoming language barriers through non-verbal based communication. After completing my degree, I plan to utilize the knowledge and skills I have gained through interning at ISS to work with youth who are aging-out of the foster care system.

**Cassidy, Devon**

**Mentor(s): Dr. Jeff Twiss**

**Stoichiometry of HuD to KHSRP: A key determinant for “go and stop” signaling in axon growth**

Development of the nervous system follows a sequential pattern of gene expression in a precise spatio-temporal manner. There are a number of transcriptional and post-transcriptional mechanisms that control these gene networks. Of particular importance is the mechanisms that modulates mRNA stability, since expression of many neuronal genes is controlled by changes in rates of mRNA decay. HuD and KHSRP, two AU-rich elements (ARE) RNA binding proteins, exert opposite effects on mRNA stability, with HuD stabilizing and KHSRP destabilizing bound mRNA. Ongoing work from our lab has implicated interactions of HuD and KHSRP with target mRNAs in regulating rates of axon outgrowth and dendritic spine formation. HuD is highly expressed in early development, while KHSRP expression is low early and rises later as HuD levels fall. Thus, we are asked if this switch from HuD to KHSRP predominance signals the neuron to stop growing its axon and form a synapse, and if this “stop signal” correlates with a fall in axonal levels of target mRNAs shared by HuD and KHSRP. The ratio of HuD to KHSRP in developing neurons is critical for controlling Gap-43 and Cdc42 mRNA levels, whose protein levels are critical for axon growth. The creation of artificial synapses utilizing a microfluidic system by transfecting HEK293 cells with Neuroigin (NL1) and coculturing these with neurons will allow for the determination of whether axonal levels of HuD/KHSRP target mRNAs are altered over the course of synaptogenesis. Uncovering the precise timing for the switch HuD:KHSRP stoichiometry in developing neurons will bring new knowledge for how mRNA-protein interactions impact normal and pathological brain development.

**Castaneda, Alison**

**Mentor(s): Mrs. Marianne Bickle**

**IT: Real World**

During the summer, I worked for FCPS as part of their Instructional Systems department (IS). IS builds web applications for clients, provides user testing, and deals with data. As an Integrated Information Technology major at the University of South Carolina, my internship provided me with real life experience in the IT field, especially with working with clients as part of a team. I had the opportunity to do user testing, build testing cases, run meetings, requirements gathering, and help with editing/creating web applications. Specifically, I was the lead in a project, which dealt with communication with the client daily, running meetings, and building mockups. I also worked as a lead on data entry for another project. Over the course of the summer, my internship allowed me to see what I would be doing in the IT field. It also gave me a direction in where I wanted to be, and what really spoke to me professionally. I hope to get accepted into the FBI’s co-op program, as a Data Analyst and continue my studies.

**Castaneda, Alison**

**Supervisor(s): Ashley Scheer, Cris Cannon**

**Mentor(s): Dr. Karen Patten**

**IIT Capstone SC - STEMersion Website**

As part of our Capstone course, we have been assigned to work alongside the SC - TREC Advisory Board and SC STEMersion committee to create a website for their needs. The website will help be useful and

easily accessible to educators, students, adult learners, parents, industries and the community at large. It will highlight pathways to employment in the SC - Tri County region. It will also display information regarding events and opportunities for the intended audiences and pertinent information guiding individuals to career pathways and employment options.

### **Castillo, Gabriel**

**Mentor(s): Dr. Kimberly Shorter**

#### **Does an MTHFR knockdown alongside a 2x folic acid treatment affect vesicle trafficking in SHSY5Y cells?**

Autism spectrum disorder (ASD) is an epigenetic developmental disorder that has increased in prevalence over the past decade. In ASD, changes in gene expression is caused by environmental factors. Dietary supplementation of the parent with folic acid has been associated with change in DNA expression in infants. Overconsumption of folic acid past the FDA recommended daily dose has been associated with developmental problems of the fetus. One enzyme involved in breakdown of folic acid is the methylenetetrahydrofolate reductase (MTHFR) enzyme. ASD patients tend to have mutated MTHFR meaning the enzyme does not work properly, and this may lead to accumulation of neurotoxic substances. Folic acid over supplementation may lead to several negative effects such as Tau hyperphosphorylation, amyloid aggregates of SNARE proteins, and disrupted neurotransmission. This project's objective is to observe vesicle trafficking in a human neuroblastoma (SHSY5Y) cell line after a knockdown in MTHFR and exposure to a 2x folic acid treatment. ASD is becoming more prevalent now among young children, so understanding the relationship between the environment and ASD is important.

### **Caudell, Chloe**

**Mentor(s): Dr. Abbi Lane-Cordova, Mr. Brett Gunn**

#### **Effect of a Central Nervous System Intervention on Cardiovascular Function in Individuals with Post-Concussion Syndrome**

Post-concussion syndrome (PCS) refers to ongoing concussive symptoms that reflect prolonged concussion pathophysiology, including central nervous system (CNS) dysfunction. The CNS contributes to cardiovascular dysfunction, as the cardiovascular control center is in the hypothalamus. Although there are no validated protocols for treating PCS, accumulating evidence suggests that progressive aerobic exercise and biofeedback can restore cardiac autonomic function. It is unknown whether behavioral CNS-targeted interventions also improve cardiovascular function in individuals with PCS. The purpose of this study is to determine the effects of a six-phase progressive aerobic exercise and biofeedback intervention on changes in cardiovascular function in individuals with PCS. Participants engaged in exercise four days per week within predetermined, age-adjusted heart rate ranges increasing in intensity throughout the intervention. On non-exercise days individuals would perform biofeedback digitally paced breathing exercises. Brachial arterial blood pressure was measured using an oscillometric cuff. Arterial tonometry was used to measure central (aortic) and end-systolic blood pressures. Paired T-tests were used to compare pre and post-intervention means. To date, five participants (mean age:  $22.6 \pm 3.2$  years) with PCS have completed this intervention. Prior to the intervention, participants had elevated systolic blood pressure (SBP) at baseline, mean systolic blood pressure =  $121 \pm 5$  mmHg. The intervention did not result in significant changes in peripheral brachial pressures, but the end-systolic pressure (ESP) (from  $88 \pm 6$  to  $83 \pm 6$  mmHg; mean difference  $-5.2 \pm 2.87$ ) and aortic systolic pressures (ASP) (from  $103 \pm 4$  to  $98 \pm 5$  mmHg; mean difference  $-4.8 \pm 2.96$ ) trended towards a decrease ( $p < 0.18$  for both ESP and ASP) in this pilot study. In conclusion, these preliminary results suggest that the CNS-targeted intervention may decrease ESP and ASP in individuals with PCS. We will continue to recruit more participants to complete this intervention to further evaluate the trend.

**Caughman, Samantha**

**Supervisor(s): Maura Glovins, Allison Krebs, Jaquan High, Kayla Christian**

**Mentor(s): Mrs. Hayley Ross, Mrs. Chelsea Fountain**

**Building a Sustainable Future Through Education**

Each semester, undergraduate interns within the Office of Sustainability's Sustainable Carolina Leadership Program are separated into teams to accomplish various goals. The mission of the K-12 Outreach Team is to educate students in Columbia, South Carolina about sustainable concepts, encourage eco-friendly habits, and empower personal sustainability. Currently, we work with AC Moore Elementary School's "Green Club" on a biweekly basis. Our lessons cover topics such as the pillars of sustainability, waste, and pollination. In addition to visiting the "Green Club," we also arrange field trips for the students to come to UofSC's campus for Sustainable Carolina events including the Earth Day Celebration and Reclaimed Runway. These events expose students to life on a college campus where sustainable living is encouraged, and hopefully, it helps them start to imagine themselves at UofSC one day. The main goal of our team is to expand our scope by attending other elementary, middle, and high schools in the area. In order to accomplish this, we are developing a curriculum with standard lesson plans for each level of education. These projects have helped us refine our communication skills, gain valuable knowledge about sustainability, and embrace diverse perspectives.

**Caughman, Alexander**

**Mentor(s): Dr. Michael Gower**

**Utilizing Microparticles to Induce Skeletal Muscle Hypertrophy**

There are a variety of signaling pathways that can lead to muscle growth, known as hypertrophy where skeletal muscle cells increase in diameter and increase protein production. In recent years, interest in the lactic acid pathway has increased. Lactic acid increases protein expression and induces hypertrophy in skeletal muscle through newly discovered pathways. Poly(lactic-co-glycolic acid), PLGA, is a polymer that degrades into glycolic acid and lactic acid under physiological conditions. Because PLGA produces lactic acid, we were motivated to study microparticles comprised of PLGA to determine the effects of long-term lactic acid exposure. These microparticles constantly release lactic acid into the extracellular environment while they degrade, which creates high localized concentrations of lactic acid with a relatively small overall quantity of lactic acid. This study aimed to determine the effects these microparticles have on skeletal muscle to determine if they promote muscle hypertrophy and exhibit similar effects to free lactic acid. If shown to encourage muscle growth, PLGA microparticles may have therapeutic potential to prevent muscle atrophy in immobilized patients.

**Cawthorne, Orrion**

**Mentor(s): Mr. David Deweil**

**What's in a Bauhinia?**

My sophomore year, I studied abroad on an exchange at the Chinese University of Hong Kong. I had been studying Mandarin since middle school and wanted to continue to do so in college. My interest Chinese language and culture is what spawned my decision to join the Darla Moore's International Business and Chinese Enterprise (IBCE) program. The program offered the opportunity to achieve fluency in Mandarin which had always been my ambition. But beyond just language study, Hong Kong served as a fitting backdrop for my study of international business considering its one of the major global finance centres of the world. I had hoped my experience would make me uniquely qualified to contribute to companies and enterprises in the global business arena, particularly in the Chinese environment. I believe it to have done just that but also so much more. Three semesters, I spent living in Hong Kong. It was the first time I had ever lived in a foreign country by myself and it was truly illuminating. Simply by living there, I learned and

familiarized myself with the societal issues that the people of Hong Kong face, from issues of nationalism to the dramatic lack of affordable housing. I had gone to Hong Kong in the hopes that would gain a greater competency in the language and business, but I also learned about the culture of Hong Kong and its people. And I think through this exchange, I have come to learn even more about myself as well.

**Chadwick, Grace**

**Mentor(s): Dr. Scott White**

**Forever To Thee Kids**

Throughout my collegiate career at the University of South Carolina, I was given the opportunity to take on leadership positions with multiple student-run organizations on campus. Although I am a member of many different organizations on campus, my membership with USC Dance Marathon has been the most impactful. I believe that my involvement with USCDM has shaped my collegiate career and has helped me discover what I am passionate about. I began my membership as a participant during the spring semester of my freshman year and slowly became more involved as the semesters went by. Now, during USCDM's 21st year on campus, I have the opportunity to serve as the Vice President of Community Relations. This role challenges me every day and gives me the chance to develop my leadership, interpersonal, communication, and organizational skills. My involvement with USCDM allowed me to discover that I thrive during interpersonal challenges and enjoy building strong relationships along the way. This presentation will showcase the insights I gained about my personal and professional skills as well as the impact USCDM had on my collegiate career.

**Charles, Mary**

**Supervisor(s): Howard Jolles, Stephanie Justice, Anjali Patel**

**Mentor(s): Dr. Carmen Maye**

**Internet Memes: Free-Speech Values and Challenges**

First Amendment theory suggests that the right of individuals to free speech serves multiple values and interests that benefit both society and the individuals operating within it. Scholars like Thomas I. Emerson, for example, outline four broad categories of values sought by society in protecting the right to freedom of expression. According to Emerson, the maintenance of free expression is necessary 1) to assure individual self-fulfillment, 2) as a means of attaining truth, 3) as a method of securing participation by society members in social, including political, decision-making, and 4) to maintain the balance between stability and change in the society.

Because of technological developments like social media, individuals operating within contemporary society have more ways to express themselves and contribute to public discourse than at any time in history. Few phenomena illustrate the values and challenges of individual free expression in contemporary society like the internet meme. Memes have become an essential tool for communicating and commenting upon matters of public concern. This research evaluates internet memes and the extent to which they serve appear to serve or undermine widely accepted First Amendment values.

**Chasney, Christopher**

**Mentor(s): Ms. Hilary Lichterman**

**Applying Cultural Lessons to Life at Home**

I studied abroad at the Universidad Nebrija in Madrid, Spain through an International Studies Abroad program. My experience in Spain taught me far more than just the Spanish language skills. Prior to studying abroad in Madrid, I had never traveled outside the United States, so it was a big step outside my comfort zone. However, I studied Spanish throughout high school and college, so I already had prior

exposure to the language. Spain provided me the opportunity to complete my Spanish minor, while also achieving many other academic and personal goals I set for myself. I learned an incredible amount about other culture, as well as a lot about myself. Through Universidad Nebrija afforded I was able to take three courses taught exclusively in Spanish in which I learned about the society, history, culture, and language first-hand. Additionally, I was able to complement my business courses at USC with two internationally-focused classes in marketing and management at Nebrija. However, the majority of my learning took place outside the classroom as I was able to travel to eleven different cities in different regions of Spain and other countries as well. I was able to fully immerse myself in the Spanish culture by interacting with locals, sampling cuisine, and visiting historical sites. As a future business leader, I believe that is important to have a certain level of cultural and global awareness to better communicate across borders in my profession. My self-confidence has improved significantly, because I have developed a better understanding of myself through my experience abroad. Therefore, I am certain that the lessons learned will continue to benefit me far into the future.

**Childs, Brianna**

**Mentor(s): Ms. Lisa Camp**

**Finding My Purpose Through Softdocs**

During my senior year of my college experience, I had the wonderful opportunity to work as a Creative Intern for Softdocs. Softdocs is located in Columbia, South Carolina and is labeled as a small software company who provides an online solution for schools and other educators to file student information and utilize forms that are provided for various uses. My role as a Creative Intern to complete graphic designs, video, photography, editing under the Creative Director. Tasks involve modifying email headers for external affairs, creating icons and graphics for posters in the marketing department, and editing headshots for the employees at Softdocs.

What I've learned over the year of working at Softdocs has surpassed all of my previous internships combined. Some advice my supervisor, Herbie Hollar, gave me to prepare for the field of choice is to study and learn the principles of design so they become natural. He says to pay attention to all the design and art around you each day, to see trends and gain inspiration. I must listen to what the client is asking but figure out what exactly it is they need. I also need to think before executing, whether sketching, writing way too many headline options, looking at hundreds of fonts, etc. He then says to create many more options than you think you need, because the better solution will emerge from the thinking going into each option. It really grew my experience and knowledge of a real-life design career, and it further solidified some personal goals that I had about the type of job I wanted to have. The best thing about a job is feeling like it's not work. That is the type of expectations I've built from creating design solutions for those who appreciate it the most.

**Cieslak, Alyssa**

**Mentor(s): Prof. Dan Freeman**

**Volunteering Changes You in Addition to Others**

Throughout my time as a student at USC, I have had ample time to spend volunteering in the medical field. I have done this through two different formats, all of which have given me different insights in the my future profession in the medical field. First, I volunteered at Palmetto Health Richland in the emergency room alongside Doctors, Nurses and medical technicians serving the Columbia community. The experiences I gained through this volunteer position allowed me to see first hand the fast paced lifestyle needed while working in the ER and also the struggles one goes through while working in these trying conditions. Having this experience to look back on will drive my a passion through my studies and into my career as a physician because I will always know that I will be helping people to the best of my abilities. My second

experience occurred when I had the opportunity to travel to Chinchina, Colombia as a part of a medical mission trip to serve alongside medical professionals helping underdeveloped areas receive medical care. This experience was one of the most encouraging yet heartbreaking times in my entire life, and I gained so much love for medicine throughout the two weeks I spent caring for others in South America. I got to witness monumental moments in strangers lives such as the birth of a child and the discovery of cancer, both of which impacted the way I see medicine and the way I will practice medicine in the future. These two volunteers positions were different yet both affected the way I want perform in my future career as a physician. Specifically, it changed the path I would like to pursue, the way I will advocate for my patients, the drive I will have behind the long hours and the story behind the smile I will wear at work everyday.

**Clapp, Matthew**

**Mentor(s): Dr. Kyle Dunovan, Dr. Catalina Vich, Dr. Timothy Verstynen, Dr. Jonathan Rubin**

**Reward-driven changes in striatal pathway competition shape evidence evaluation in decision-making**

Cortico-basal-ganglia-thalamic (CBGT) networks are critical for adaptive decision-making, yet how changes to circuit-level properties impact cognitive algorithms remains unclear. Here we explore how dopaminergic plasticity at corticostriatal synapses alters competition between striatal pathways, impacting the evidence accumulation process during decision-making. Spike-timing dependent plasticity simulations showed that dopaminergic feedback based on rewards modified the ratio of direct and indirect corticostriatal weights within opposing action channels. Using the learned weight ratios in a full spiking CBGT network model, we simulated neural dynamics and decision outcomes in a reward-driven decision task and fit them with a drift diffusion model. Fits revealed that the rate of evidence accumulation varied with inter-channel differences in direct pathway activity while boundary height varied with overall indirect pathway activity. This multi-level modeling approach demonstrates how complementary learning and decision computations can emerge from corticostriatal plasticity.

**Cockrell, Caroline**

**Mentor(s): Dr. William Jackson**

**Cloning of an anti-Vif shRNA 5111 into the pH1 Stuffer (-) Vector**

The Human Immunodeficiency Virus (HIV-1) is a lentivirus that infects and destroys CD4+ T Helper cells. The eventual loss of these cells results in a progressive inability of the immune system to protect against infections. The loss of immune protection and presence of opportunistic disease is considered Acquired Immunodeficiency Syndrome. Because current treatments cannot fully remove the virus from infected cells, there is a continued need to investigate methods to prevent virus replication. One of HIV's accessory proteins the viral infectivity factor (Vif) is essential for HIV infection and functions by binding to the human APOBEC3G gene, and targeting it for ubiquitination. One possible way to inhibit this pathway is through RNA interference. To test this hypothesis, a shRNA was designed to target HIV-1 Vif mRNA at nucleotide 5111 (Accession number M19921). The resulting shRNA was converted to double-stranded DNA, BglII and HindIII sites were added for cloning, and the two strands were synthesized. Following synthesis, the double-stranded shDNA was cloned into the shuttle vector, pH1(-).Stuffer generating an shRNA expression cassette driven by the RNA Polymerase III H1 promoter. Successful cloning of this plasmid, termed pH1.Vif5111 was verified by PCR and sequencing.

**Coffman, Colt**

**Mentor(s): Dr. Robert Moore, Mr. Jacob Kay**

**Association Between Concussion and Suicidality in Adolescents: A Population-Based Study**

Research indicates that behavioral changes such as impulsivity and lack of emotional control are common

following youth concussion (Moore et al., 2016; Kay et al., 2019). Additional evidence suggests that poor behavioral regulation may contribute to altered mood states that precede possible self-injury or fatality (Kontos et al., 2016). However, the relation between adolescent concussion and suicidal behaviors has yet to be explored on a national scale. Thus, the purpose of this study was to cross-sectionally examine the association between concussion history and suicidal behaviors in adolescents from the 2017 National Youth Risk Behavior Survey (YRBS). Data from 14,765 high school students were analyzed. Weighted multivariate logistic regressions were used to predict the adjusted odds ratios (AOR) and 95% confidence intervals (CI) of suicidal behaviors in students with and without a history of concussion. Age, sex, and alcohol use were controlled for in the regression model. Adolescents with a history of concussion were more likely to report: feeling sad or hopeless (AOR=1.34, 95% CI 1.15, 1.57), suicidal ideation (AOR=1.39, 95% CI 1.16, 1.65), suicide planning (AOR=1.34, 95% CI 1.14, 1.57), suicidal attempts (AOR=1.68, 95% CI 1.36, 2.09), and injurious suicidal attempts (AOR=2.42, 95% CI 1.82, 3.22). Moreover, females with a history of concussion were more likely to report poorer mental health than their male counterparts or controls ( $p$ 's <.05). In addition, individuals aged 16 years or older with a history of concussion had significantly greater odds of suicidality than controls; however, this association was not observed in younger adolescents ( $p$ 's <.05). Together, our findings indicate that adolescents who sustain a concussion have greater odds of suicidality than their uninjured counterparts. Further, suicidality was better predicted by concussion exposure in females than males, and in older students. Consequently, these results indicate the importance of examining mental health following youth concussion, and highlight the need for further longitudinal research.

**Cohan, Melanie**

**Mentor(s): Dr. Ambra Hiott**

**A Tale of Two Cities - A Study of the People of Prague and Paris**

In my time at USC, the most meaningful experiences I have had were my two semesters studying abroad. I spent my sophomore spring semester studying abroad in Prague where I took general education classes and worked to increase my knowledge about the region. During my junior spring semester, I studied abroad in Paris, taking core business classes for my major where I was able to learn American business practices from an international perspective. I came into college knowing I would study abroad because I wanted to take advantage of this opportunity to learn more about the world we live in and expand my global view. I wanted to use this experience to integrate myself in a culture different than what I was accustomed to. My eight months abroad were full of unique learning opportunities and I learned more about myself, my culture, and the world than I ever thought I would be able to. The biggest takeaway I had was learning how interconnected our world is and how important globalization is becoming to businesses today. I was able to learn about cultural differences and how they are important to a global company. I saw how different each country is in their own unique customs, specifically comparing my time in Prague and Paris. I also grew as a person and became more independent, open minded, and culturally aware during my time abroad, and these are the transformative skills the world needs in order for us to continue advancing forward.

**Cohen, Katherine**

**Mentor(s): Ms. Lisa Camp**

**Advocating for Women's Mental Health: An Act of Resistance**

Mental health concerns such as anxiety and depression disproportionately affect women. One proposed explanation of this imbalance is that women are often discouraged from appearing "emotional," especially when in positions of leadership. This discouragement reflects the bias that persists in our society that delegitimizes women's concerns and discourages them from speaking up about their struggles. In my presentation, I discuss how encouraging women to speak about their mental health and share their

experiences is an act of resistance against gender bias. I reflect on my experiences as the co-host of the “Hear Me Out” Podcast, where I interview women from diverse backgrounds about their mental health. I connect the content of my podcast with the material I learned in my “Women’s Health” course (WGST 113). Through hosting the “Hear Me Out” podcast and studying women’s health, I learned that in a society where women are constantly told to change something about themselves, live up to an impossible standard, and sacrifice their mental and physical health in order to appease the male gaze, advocating for women is an act of resistance. In the future, I hope to work as a mental health professional. By understanding the specific mental health needs of women and advocating for equity, I hope that I can help a generation of women to rise up and be confident, vulnerable, emotional, and powerful leaders.

**Cohen, Katherine**

**Mentor(s): Dr. Kimberly Becker**

**Absolutist Thinking and Depression**

Many cognitive therapy models include absolutist thinking as a marker for depression. Previous research has found support for the hypothesis that there is a positive correlation between higher degrees of depressive symptomology and increased use of words that denote absolutism in a naturalistic observational study design. This study seeks to further these findings and determine if this correlation exists when using an experimental study design. We analyze linguistic trends in essays that were written by individuals who exhibit moderate to severe depressive tendencies and individuals who exhibit little to no depressive tendencies.

**Colbourn, Aaron**

**Supervisor(s): Earle Oxner, Harrison Freeman**

**Mentor(s): Dr. Sanjay Ahire**

**Cummins Fall 2018: Operations and Supply Chain Center Project**

Project Title: CTP Machining Capacity Improvement

Client Organization: Cummins Turbo Technologies, Charleston, SC

Project Team: Jamie Morris, Earle Oxner, Aaron Colbourn, Harrison Freeman

Company Sponsor Team: Todd Dodson, Zach Fugate, Harshit Kikani

Faculty Mentor: Dr. Sanjay Ahire, Professor of Operations and Supply Chain Management

We conducted this project during Fall 2018 as a part of our Capstone Consulting Projects course (MGSC 497) through the USC Operations and Supply Chain Center. The project focused on a key machining line at Cummins Turbo Technologies at their Charleston Turbochargers plant.

Our project had two major goals: (1) To develop a comprehensive capacity planning tool for the Flex Shaft and Wheel machining line for running up to 100 parts, and (2) To recommend capacity improvement kaizens (focused improvement projects) across the Flex Shaft and Wheel machining line.

To achieve these goals, our team started with numerous site visits to collect primary data for cycle time studies and understand the process flow. Then we performed an in-depth analysis of cycle times and operator ergonomics to create kaizen improvements. Next, we began developing a Machining Line Capacity tool in Excel to show capacity per part number. After that, we created a Changeover Matrix tool in Excel for 65-part numbers to predict changeover times and aid in optimal part scheduling. Finally, our team developed a simulation of the part flow process to model the current state of the process and test multiple kaizens prior to implementation.

By the end of the semester we were able to give our clients both of our capacity planning tools used to understand implications of process inefficiencies and product mix on throughput. Additionally, we proposed six kaizens leading to a potential 26% increase in Flex Shaft and Wheel machining line throughput. The plant has implemented two of the six recommendations and have incorporated the capacity planning and

mixed model schedule logic into their planning processes.

**Cole, Breanna**

**Mentor(s): Prof. Katie Hopkins**

**Application of Physical Therapy Learning to Serve Others**

The summer after my junior year at USC I spent time observing and working with staff at USC Orthopedic Center at Palmetto Health Baptist Parkridge. This is an outpatient orthopedic center where I served in the physical therapy clinic. This hospital means a lot to me being that I was a patient here for my own injuries. Going from what appeared to be the height of my track and field career at USC to hip injuries that resulted in a hip arthroscopy surgery impacted my life more than I could have imagined. The experience of overcoming a major surgery made me grateful for a body I am able to move, and sparked my desire to help others overcome similar obstacles of their own. Taking the step to serve at Palmetto Health allowed me the opportunity to learn about physical therapy from this new perspective. I learned more about what rehabilitation looks like in this setting, which nudged me to want to assist in doing more to help patients that had similar injuries to my own. During my time there, I was able to work with my surgeon, the director of physical therapy in the clinic, and media staff to help create a hip rehabilitation video for patients to have following their own hip arthroscopy. With me serving as a mock patient in the film, we were able to have video clips of exercises to show them how to perform their home exercises instead of only having a piece of paper to refer back to. Having the opportunity to spend time learning in this clinic was significant in that it ultimately helped fuel my desire to make the most of my own healed injury by learning how to help others in similar circumstances. Being able to not only learn from your experiences, but challenging yourself to apply what you have learned to better the life of another is incredible. The next step for me in this journey is to attend graduate school this summer in order to become a physical therapist.

**Collis, Eleni**

**Mentor(s): Prof. Duncan Culbreth**

**It Takes a Village; The Team Behind Artist Development**

As a Sport and Entertainment Management major I have chosen to concentrate on entertainment, and plan to pursue a career within the music industry. Early on in my university career I was dead-set on pursuing artist management, as I saw this as the sole role impacting an artist's career growth. However, since then I have completed two internships that have shown me other sides of the industry, and through those experiences I have seen that it truly takes a village to help an artist grow in their craft. These internships were with Jeff McClusky & Associates (JMA) and Paradigm Talent Agency, respectively. With JMA, I learned about the importance of radio promotion as well as early-stage artist development, and developed my talent scouting skills by pitching a new artist each week and sharing ideas on how JMA could help them gain exposure. With Paradigm I saw firsthand how artist tours are built, the different deal structures of booking shows, and was tasked with creating mock-tours of my own. Through these internships I saw multiple careers vital to growing an artist, and while they are separate from management, these professionals use their specific expertise to grow those areas of an artist's career. While management is still of interest to me, I have learned about other areas of the industry where I can make an impact, and now see the full picture of an artist's team. This has influenced my direction as I currently search for jobs and post-grad internships, and given me a deeper perspective on where I want to work.

**Colvin, Madeline**

**Mentor(s): Mr. William Quinlan**

**Applying Educational Theories in a Middle School Classroom**

As a senior Middle Level Education major at the University of South Carolina, I am given the opportunity

to have an internship at a middle school. The internship is there to help prepare us for teaching middle schoolers and to learn how schools work in the real world. For four years we have been learning about theories, but now we can see the practice of those theories. I have been at a Montessori middle school in a combined humanities classroom. This means there are two teachers, an English/Language Arts and Social Studies teacher, and 50 students in two classrooms that have no wall in between. I teach around 100 students every day and help with everyday tasks such as attendance, creating lessons, making copies, attending professional development meetings, helping plan the weeks, and many other duties. This internship provided me with an opportunity to see how a real classroom worked and helped me find my own teaching style. I have had the ability to make connections with other educators and learn helpful lifelong tips for how to have an efficient classroom. This experience has given me new insight on how to encourage readers, create assessments, and strategies to use for classroom management. It also has reaffirmed my love for teaching middle school.

**Connor, Gabrielle**

**Mentor(s): Dr. Kenneth Roberts**

### **N- and C-Terminus Truncations of 2,4'-Dihydroxyacetophenone Dioxygenase (DAD)**

The iron-dependent 2,4'-dihydroxyacetophenone dioxygenase (DAD) performs a unique oxidative cleavage of the  $\alpha$ -hydroxyketo group of its substrate. In our initial expression and purification of DAD from *Burkholderia* sp. AZ11 (bDAD), the wild-type enzyme undergoes significant but discrete proteolysis during the purification process, losing 1–4 kDa, even in the presence of an inhibitor cocktail. Interestingly, the specific losses due to proteolysis coincide with N- and C-terminal residues either missing or putatively inessential for activity in the X-ray crystal structure of a close homolog {PDB 5BPX}. In an attempt to circumvent proteolysis without affecting activity, the *dad* gene from *B. sp.* AZ11 has been mutated to delete either the 23 or 30 N-terminal residues and/or the nine C-terminal residues of bDAD to give six variant truncates of similar size to those seen in our proteolyzed wild-type samples. These mutated genes were prepared by PCR amplification of the wild-type *dad* gene using custom primers including either wild-type or truncated start or stop codons in tandem with specific restriction sites. The amplified genes were cloned into the pET20b(+) expression vector and the new vectors transformed into *E. coli* BL21(DE3) cells for overexpression. The expressed and purified truncated proteins will be evaluated for proteolytic stability and homogeneity with isolated, pure proteins evaluated for activity by UV-Vis absorption assays.

**Conrady, Alisa**

**Mentor(s): Dr. Kenneth Barideaux, Jr.**

### **Exploring the Effects of Eyewitness Recall: Do Auditory Distractions Matter?**

A large body of research has provided evidence to suggest that memory is oftentimes unreliable after witnessing an important event. Studies within this area of research have largely focused on the interference that occurs between encoding the important event and having to retrieve details about the event after a delay. What about distractions or interference taking place during the event? In the current study, we were interested in investigating the effects of auditory distractions (e.g., environmental sounds, such as airplane or ambulance noise) on recall accuracy after viewing a series of 48 images depicting a car burglary. Additionally, we wanted to examine how an individual's level of mindfulness affects susceptibility to auditory distractions, and how it contributes to the ability to accurately recall important details of the crime scene. We expect to see poor recall for individuals exposed to distracting environmental sounds while viewing images depicting a car burglary. We also expect to see those with higher mindfulness scores to have higher recall accuracy, irrespective of the presence of auditory distractions. Implications from this study could inform future research and legal practice on the reliability and accuracy of eyewitness testimonials, which may ultimately impact judiciary decision making.

**Cook, Lauren**

**Mentor(s): Dr. Ryan Rykaczewski**

**Stage-based demographic matrix modeling as an exploratory tool of marine population sensitivity to environmental stress**

Factors driving variability in marine populations remain poorly resolved by fisheries scientists and marine ecologists. Improving our understanding of what causes these fluctuations can help us better manage exploited fish stocks. Recently a conceptual idea has been proposed, suggesting that individual populations respond to environmental variability that occurs at periods roughly matching the generation time of the species. This “linear tracking window” hypothesis offers potential insight into the sensitivity of marine populations to a spectrum of environmental stressors, but a quantitative approach has not yet been used to test such ideas. A generalized model of population demographics that can demonstrate the impact of environmental variability on populations of differing life history characteristics would not only quantify the effects of the linear tracking window hypothesis, but would also serve as a useful template for scientists to apply to species of interest. The ideal model to test this hypothesis is the Lefkovich matrix, which describes the demographic structure of a population in stages, such that an environmental stressor of any frequency (daily, seasonal, annual, interannual, etc.) could be applied, and the response of the population can be measured with sensitivity and elasticity analyses. This presentation will describe the model that is being parameterized to describe a broad range of taxa (primarily r- and k-selected populations) in order to understand the sensitivity of populations to environmental stress, including initial results from basic stress scenarios.

**Cook, Anna**

**Mentor(s): Dr. Rosemarie Booze**

**Effects of S-Equol on Norepinephrine and Dopamine Receptor mRNA Expression in the HIV-1 Transgenic Rat Prefrontal Cortex**

HIV-1 infection affects over 36 million people worldwide, and despite combination antiretroviral therapy, neurocognitive disorders such as mild cognitive impairment persist along the trajectory of the disease. HIV-1 is known to alter neurochemistry, however, there is no known treatment for this neurochemical disruption. Forming the gut-brain axis, gut microbiota acts through neurotransmitter systems and immune interactions to affect emotional and social behavior as well as cognitive processing. S-Equol is produced naturally by gut microbiota in most individuals, acting as a beta estrogen receptor agonist. It is thought to alter neurochemistry through the mesolimbic noradrenergic system and dopamine system, producing a neuroprotective effect. Previous studies have shown that S-Equol treatment is effective in promoting neurorecovery against Tat, an HIV-1 viral protein, as well as preventing HIV-1 Tat induced apoptosis. Testing the effectiveness of S-Equol on HIV-1 transgenic rats, treatment was given during a formative period of PD 28 through PD 90 at a dose of 0.2 mg/day. After a history of operant training, an innovative in situ hybridization assay (RNAScope) was used to label mRNA expression of the dopamine receptor, DrD1, and the norepinephrine receptor, NE $\alpha$ 2, in the prefrontal cortex. Preliminary results suggest a sex dependent shift towards higher cell scores in NE $\alpha$ 2 mRNA transcript levels in females, independent of genotype; an effect not observed in males. A sex and genotype dependent shift in DrD1 mRNA levels was also found, shifting the cell scores of the HIV-1 transgenic rats treated with S-Equol towards their placebo treated control counterparts. By examining the neural mechanism of S-Equol, potential therapeutic uses of this treatment may be identified.

**Cooper, Patricia**

**Mentor(s): Mrs. Katie Hopkins**

**What I Learned From Teaching Others**

The first two years of my undergraduate experience became about grounding myself. Moving away from home was a major transitional period in my life, and I used that time to steady my pace and firmly fit myself into life here at the University of South Carolina. The summer before my junior year I received a call that would change the trajectory of the rest of my days until graduation, I had been accepted as a Supplemental Instruction Leader under the Student Success Center at USC. My new title as a peer leader would give me direct contact with other undergraduates taking the same course I did only a few months earlier, Psychology 101, and through triweekly sessions I would guide them through what is considered a “historically challenging” course. I wanted to leave my mark on USC. Through my two years in this title I have supported 4 different sections of this class made up of over 1000 students. This leadership experience not only got me involved beyond the classroom, but it also influenced my decision to declare a Leadership Studies minor and pursue Graduation with Leadership Distinction. I would encourage others to find a path in life that challenges them, like this role does me. I hope to broaden my knowledge of what it means to be a leader not only through learning in the classroom, but in learning through real world experience that are presented to me through my career and whatever this life has next for me.

**Copley, Alyx**

**Mentor(s): Mr. Rico Reed**

**Tren Con Destino: Madrid**

I had always planned to study abroad in college- it all just came down to logistics. During Spring 2019, I had the opportunity to study abroad in Madrid, Spain at Universidad Carlos III. I wanted to study abroad somewhere that would challenge me. After narrowing it down, I decided to go to Spain in order to improve my high school-level Spanish, have close access to the rest of Europe for travel purposes, and benefit my supply chain major from international exposure. Carlos III offered all the business classes I needed in order to follow my initial plan to graduate in December 2018, so it was an immediate top choice of mine. Traveling internationally was nothing new to me, but being a local instead of a temporary tourist was a dramatic change. As an only child who had always lived in familiarity, moving to a different country brought experiences of failure and uneasiness, but in turn taught me how to embrace being alone and learn more about myself, my abilities, and my beliefs.

**Cox, Callie**

**Mentor(s): Mr. William Quinlan**

**Children Helping Children: Teaching Leadership by Example**

The Tamasee DAR School, a school in Tamasee, South Carolina, was founded in 1919 by the Daughters of the American Revolution to serve the underprivileged children of Appalachia. It now acts as a non-profit children’s home. The South Carolina Children of the American Revolution (C.A.R), in conjunction with the Daughters of the American Revolution, planned a fair event for the children that live on campus during the summer of 2018. As a college aged member, I was integral to the planning process. I created media content, scheduled a character to appear, and brainstormed game and prize ideas in the months before the event. The weekend of the event I led a leadership development workshop to help the C.A.R. members with public speaking as well as being inclusive and friendly to children that have had different upbringings. I was responsible for the character appearance and informing the volunteer photographer of the rules on photographing the Tamasee students. After, I assisted with cleanup.

Tamasee DAR School has inspired me to be more proactive in helping children since my first visit in elementary school. The experience working on an event with the school and children’s organization as a col-

lege student has reinforced my passion for working with impressionable youths. Community service as it applies to children's organizations revolves around instilling confidence and developing leadership skills. Beyond a literal workshop covering the topic, leading by example allows the child members to see how the projects and reports they give work with academics to create proactive role models in their communities. The Tamassee children got a day to forget any hardships. The children I talked to were so genuinely happy and, in the case of one who got me a prize with her game tickets, generous, that they served as role models for me as well.

Event planning and executing is difficult, but if the cause is worth it then so is the work. Seeing children's happiness encourages me to remain involved with Tamassee and to work on my plan to do children's literacy targeted community service.

**Crandall, Bradie**

**Mentor(s): Dr. Erdem Sasmaz, Dr. Benjamin Meekins**

**Uniquely Structured TiO<sub>2</sub> Based Yolk-Shell Photocatalysts for H<sub>2</sub> Production via Water Splitting**

Demand for CO<sub>2</sub> utilization through thermochemical conversion will grow as regulations for CO<sub>2</sub> emissions tighten globally under the looming threat of climate change. However, thermochemical CO<sub>2</sub> conversion requires a H<sub>2</sub> feedstock. Photocatalytic water splitting provides an effective means to produce H<sub>2</sub>, but the process must become more efficient for industrial scaling. To increase efficiency, novel materials must be investigated to promote the reaction. In this work, a TiO<sub>2</sub>@SiO<sub>2</sub> core-shell structured catalyst was synthesized by coating porous titania nanoparticles with SiO<sub>2</sub> under Stöber conditions to determine if the incorporation of the shell would impact hydrogen production efficiency. The purpose of the shell encapsulation is to prevent nanoparticle clustering, avoid corrosion via oxidation, and enable the catalyst to be placed on an organic support. A second, Ag/TiO<sub>2</sub>@SiO<sub>2</sub> catalyst was synthesized in a similar manner, but prior to introducing the SiO<sub>2</sub> coating, the TiO<sub>2</sub> was coupled with Ag particles to promote interparticle charge transfer and reduce the band gap. In addition to these two materials, Ag/TiO<sub>2</sub> was prepared via wet impregnation to serve as a baseline for structural effect comparison. The effect of the morphology was also investigated by tuning the nanocatalyst particle size and shell thickness. Ultra-violet visible spectroscopy analysis was conducted on all catalysts to determine their band gaps which are indicative of electrical conductivity. High electrical conductivity is critical because it translates to improved water splitting efficiency. The results suggested that the core-shell structure did not significantly impact the water splitting efficiency of the photocatalyst while providing an outer shell to promote dispersion and stability. The impact of the addition of Ag and other various metals into the core of the yolk-shell particle on the water splitting efficiency was also studied in this work.

**Crandall, Allison**

**Mentor(s): Dr. Joe Williams**

**The Components of a Successful Leader**

During my time at the University of South Carolina, I have had the opportunity to be a peer leader as an EcoRep and as one of the trumpet section leaders in the Mighty Sound of the Southeast Marching Band. It was through these experiences, and the courses I took for my management major, that I learned and was able to practice all the different components of being a successful and impactful leader. I found that the components of being a successful leader included being educated, being genuine, and being able to see the perspectives of others. As an EcoRep, it was important that I was educated about the current environmental issues so that I could teach fellow classmates about them and answer any questions they had. As a section leader, it was important that I was genuine because it created bonds leading to my section trusting me and being willing to compromise or agree with what I was instructing. In both roles as an EcoRep and a section leader, having the ability to see the perspectives of others created deeper connections and more meaningful conversations. Being educated, genuine, and being able to see the perspectives of others

created credibility in me as a leader. By understanding the importance of these components and being able to apply the different leadership styles and techniques that I learned through my courses to my peer leader positions, I have developed into the leader I am today.

**Crout, Townsend**

**Mentor(s): Dr. Matt Childs**

**Professional & Civic Engagement Abstract**

During college I have taken advantage of the opportunities to participate in some incredibly rewarding experiences. One of the most worthwhile of these experiences was my time as an intern with the South Carolina Office of the Attorney General. More specifically, my internship duties involved raising awareness about the Violence Against Women Act. The SC Office of the Attorney General utilized a multimedia approach in order to educate and bring attention to such important topics as human trafficking and domestic violence across the state. My specific duties included leading the development of publicity materials to be dispersed state-wide, including posters, digital content, brochures, and billboards. As an advertising major at the University of South Carolina with a minor in graphic design, this experience opened my eyes to marketing campaigns aimed at the general public to draw attention to societal problems, rather than just marketing with intent to sell a product. I acquired a detailed understanding of the problem of domestic violence and human trafficking across the state, as well as critical hands-on experience to address the issue creatively and professionally through publicity campaigns. Participating in this internship opened my eyes to the possibility of a future in marketing for non-profits or government agencies, which was something I had not previously considered. Through this experience, I hope to continue within this or a related field following my graduation in May.

**Curlee, Wade**

**Mentor(s): Dr. Ambra Hiott**

**Supplemental Instruction for Calculus: A Focus on Collaborative Learning**

As a supplemental instruction (SI) leader for three semesters I participated in lectures for calculus II classes and held three review sessions a week to help students learn the material. I became an SI leader because I love to teach. There is so much joy to be gained from helping someone go from a confused state to a knowledgeable state. By sitting in the classes I was able to see what the students are being taught and what the professor's style is. Next, I set apart time to create a unique lesson plan for each session so that each one is as helpful to the students as possible. During these sessions there is a strong emphasis on collaborative learning, which gets the students engaged on a higher level than is possible during traditional lectures. Some students have trouble learning just from a lecture and need more hands-on practice and I was able to provide that with the goal that eventually they will acquire all the studying skills necessary to do well on their own. In addition to helping others, SI has helped me by cementing my own academic knowledge and building my communication skills. Through this position I was able to improve myself while also getting an opportunity to help students make it through their most difficult classes in their college careers.

**Dadouris, Hayley**

**Mentor(s): Dr. Lara Lomicka Anderson**

**Greek Life's Impact on Personal Development**

Being a part of a Greek organization can both strengthen and define your college experience. When I joined the University of South Carolina's Zeta Tau Alpha chapter, I never thought that I would get all I have gotten out of it these past four years. I thought I would gain everlasting friendships and memories to last me post-graduation. As those are things I received, I gained so much more. I have a group of indi-

viduals that give me endless support, drive me to do my best and help me laugh along the way. Through my chapter I have been able to serve in multiple leadership positions that have made me into the leader, student and future nurse I am now. Through this presentation, I plan to show how this Greek organization made my time at Carolina one for the books. My organization made me strive to be a better student and member of the community. It pushed me to expand my learning outside of the classroom by attending conferences, studying abroad and pursuing my dream job. I will take my time in ZTA and show how this experience made all my studies, externships and beyond the classroom experiences connect and how they are what now defines my experience at Carolina and lead me to pursue Graduation with Leadership Distinction in Professional and Civic Engagement.

**D'Agostino, Gabriel**

**Mentor(s): Ms. Olivia Manley, Dr. Thomas Makris**

**Enzymology of Columbamide Biosynthesis**

Marine cyanobacteria represent a unique, underexplored reservoir of bioactive natural products. Recent genomic analysis and mass spectrometry studies have revealed a novel chlorinated compound known as columbamide from *Moorea bouillonii* PNG isolated off the coast of New Guinea. Mass spectrometry shows columbamide to be a dihalogenated compound with chlorine atoms appended to the C6 and C12 positions of a hydrocarbon chain that is thought to be constructed from dodecanoic acid. Genomic studies have proposed a pathway for columbamide biosynthesis but it has yet to be supported by in vitro studies. Of particular interest, the enzymes proposed to catalyze the halogenation reactions, ColD and ColE, are most homologous to dinuclear iron-dependent enzymes. Although diiron enzymes have been shown to have a great deal of functional diversity, halogenation is not amongst these reported activities. Our study seeks to characterize and reconstruct the early stages of the biosynthetic pathway by generating protein-tethered substrates for the halogenases ColD and ColE. ColC is believed to be an acyl-carrier protein for dodecanoic acid as well as a substrate of ColD/ColE. The first enzyme encoded by the gene cluster, ColA, is believed to attach dodecanoic acid to ColC. To investigate the biosynthetic pathway leading to halogenation, the role of ColA will be confirmed, and its enzymology characterized. Additionally, the well-characterized enzyme acyl-acyl carrier protein synthetase from the organism *Vibrio harveyi* has been used as an alternative way to efficiently generate large amounts of acylated-ColC with various fatty acids. Our study seeks to use this substrate-library in concert with various spectroscopic techniques (optical spectroscopy in combination with rapid kinetics, electron paramagnetic resonance (EPR), and Mossbauer) to characterize the structure and mechanism of these novel halogenases.

**Daneshvar, Nina**

**Mentor(s): Dr. Hippokratris Kiaris**

**Study of the promoter of the human and mouse gene encoding the chemokine CCL8**

The CCL8 chemokine is a member of a conserved chemokine cluster located in chromosome 11C in mice and 17q12 in humans and it is known to mediate the inflammatory response by attracting monocytes and lymphocytes. Our previous studies showed that CCL8 is produced by fibroblasts, is chemoattractive for breast cancer cells, eventually promotes their dissemination, and facilitates metastasis. In addition, when mouse and human fibroblasts were exposed to media of metastatic human triple negative breast cancer cells CCL8 was the only chemokine induced in both human and mouse fibroblasts. Understanding how CCL8 expression is regulated may contribute to our better understanding of breast cancer cell dissemination. Interference with the activity of CCL8 may provide novel opportunities for breast cancer management. In the present study, we studied the regulation of the CCL8 human and mouse promoter in order to identify regulatory regions that are responsible for the specific responsiveness to media from triple negative breast cancer cells. Specifically, the promoter region of CCL8 in both human and mouse genomes has been identified, amplified, cloned and inserted to a luciferase vector to generate a reporter construct.

This reporter construct was transfected to 293FT cancer cell line and luciferase activity was measured that corresponds to the transcriptional activity of CCL8. Our analysis showed the induction of both human and mouse CCL8 transcriptional activity in 293FT cells by the conditioned media of triple negative breast cancer cells that confirmed and extended our earlier analyses on mRNA expression levels. Noteworthy, we found that contrary to the human promoter that activated transcriptional activity of the reporter construct, the mouse promoter inhibited it and in the presence of breast cancer cells' conditioned media, activity was restored. Thus, differential regulation between the mouse and the human CCL8 promoter is possible which in turn dictates the characterization of the specific transcriptional regulators mediating these activities. The implication of these findings remained to be established.

This work was supported in part by the South Carolina Honors College Exploration (or SURF) Scholars Research Program (ND).

**Daniels, Ladarah**

**Mentor(s): Ms. Anna Oswald-Hensley**

**Ladarah's College Experience**

Ambassador

As an Ambassador I gave tours to incoming students, guided the students to their advisors, and assisted them with enrolling into the classes they need. I did these duties not only because it was my responsibility as an ambassador but also because I really enjoy helping people. I completed all these tasks by following simple guidelines that were given to me. After while I started to also use some tips that I learned while actually doing the tasks. For example I noticed that asking my group questions in between tour stops lightened the group's mood. Another thing I found out was once I opened up and told my group about myself they became more comfortable to ask me questions. To be an ambassador means adapting to multiple personalities in one group and becoming comfortable with speaking confidently to a large group of people.

National Honors Society

I joined the National Honors Society (NHS) club in my junior year of High School. I became a member of NHS because it was a great opportunity that I could not let slip away. To become an official member of this scholar club I had to follow the rules and regulations that came after being nominated. I had to get recommendation forms filled out by two different teachers that worked at my High School and I also had to pay a fee. Since joining this club I have found many community service projects to participate with. Being apart of National Honors Society does not only mean that you have to keep your excellent academic performance up but it also means that you have to be involved in helping better your community.

**Daniels, Charles**

**Mentor(s): Dr. Jason Bakos**

**A Review of FPGA-Oriented Network-on-Chip Routing Algorithms & Topographies**

As hardware architects continue to push the boundaries of high-performance processing architectures many-core acceleration solutions are becoming increasingly popular, and feature tens, hundreds, or even thousands of processing cores, such as general-purpose RISC-V cores, neural network focused tensor cores, video encoding or decoding cores, and more. As the number of different processing cores employed by these systems has increased, so too have the demands on core-to-core communication. Efficient, high-performance inter-core communication which can scale to the number of connected end-points required by modern acceleration architectures is currently an open problem, and the trade-offs made with different approaches to solve it have a significant impact on the performance of different computational workloads. In this work, we examine the performance trade-offs of various on-chip network topographies and routing algorithms, with respect to hardware cost, routing efficiency, throughput, and latency.

**Dautrich, Julie****Mentor(s): Ms. Maegan Gudridge****Lasting Impacts from Long Island**

During the summer of 2018, I had the pleasure of serving the membership of Maidstone Club in East Hampton, New York as a Food and Beverage Rotational Intern. Although my resume includes internships and jobs that extend well beyond this three month stay on Long Island, it has by far been my favorite and most enlightening on-the-job experience. This internship allowed me to utilize all the knowledge and skills I have gathered throughout my various experiences in order to excel and stand out in the eyes of my employer. I enjoyed serving the membership in a variety of front-of house positions, as well as taking the lead on the set-up of several functions, exercising my oral and written communication skills as concierge, and helping to plan and execute the “family fun run”, an annual club tradition. My favorite aspects of the club industry, connecting and building relationships with members and “getting my hands dirty” completing work on the front lines, were highlighted in this internship. Through this experience, I learned to thrive in a unique work environment with great diversity, incredibly fast pace, and high member and management expectations. This internship in particular made it apparent to me what is expected and necessary of you as a young manager in the club industry.

**Davis, Ashley****Mentor(s): Dr. Robert Thunell, Dr. Claudia Benitez-Nelson, Mr. Eric Tappa, Dr. Emily Osborne, Dr. Catherine Davis****Reconstructing Ocean Acidification Using Fossil Planktonic Foraminifera in the Cariaco Basin**

Anthropogenically mediated ocean acidification negatively impacts marine calcifiers by reducing their ability to build and maintain their calcium carbonate skeletons. Systematic measurements of seawater carbonate parameters are used to understand changes in seawater chemistry, however, these measurements have only been made over the last two to three decades. In order to improve future predictions of ocean acidity, it is critical to understand the natural variability inherent in the carbonate buffer system. This requires longer records. The Cariaco Basin, located along the coast of northern Venezuela, has been shown to reflect global-scale changes in  $\delta^{13}\text{C}$  values, which is a proxy for anthropogenic carbon, making it an excellent location to study seawater carbonate chemistry over the past millennia (Black et al. 2011). Using the area-density proxy developed by Marshall et al. (2013) for the planktonic foraminifer, *Globigerinoides ruber* (pink), a carbonate ion concentration record was generated in a sediment core spanning the last eight centuries from 1240-2008. Over 1014 area-density measurements were made and show a decline in carbonate ion concentration after Industrialization (1820-2008) of approximately  $56.8 \mu\text{mol}/\text{kg}$  which can be attributed to ocean acidification in the Cariaco Basin.

**De Guzman, GJ Khenneth****Mentor(s): Mrs. Asheley Schryer****Orientation: The First Step**

During the summer of 2016 and 2017, I worked with the Office of New Student Orientation (ONSO) as an Orientation Leader (OL) engaging with hundreds of students and their family members each session. ONSO hosts multiple orientation sessions throughout the summer that helps incoming students transition into undergraduate life by providing key insights about deadlines, academic majors, and campus climate. As a biological science major, this leadership position provided me the opportunity to interact with more than just my own scientific community and helped me develop my public speaking, communication, and leadership skills. Throughout my two years serving as an OL, I learned to adapt to a multitude of situations, ensuring that each session proceeded as planned and that the students left with passion and excitement.

ment for their future. I also had the opportunity to break stereotypes about the LGBT+ community and to engage students in having honest and open communication between one another. Due to this experience, I hope to pursue a career that will focus on both medicine and academia.

**De Guzman, GJ Khenneth**

**Mentor(s): Dr. Amit Almor, Mr. Peter Nelson**

**(In)animacy and (In)transitivity Bias in Sentence Processing**

Language provides a way for communication either through gestures or the combination and reorganization of words into sentences. Language processing then takes those sentences and analyzes how the sentence can be interpreted. With temporarily ambiguous sentences, readers are led to multiple competing interpretations which create for difficulty in resolving the ambiguity. This study aims to extend previous research on the tendency to (a) interpret animate nouns as the agent of the verb and (b) to expect the transitive form, rather than the intransitive structure, on the processing of temporarily ambiguous sentences. Using a word-by-word self-paced reading moving window paradigm, the study was divided into two phases: (1) testing animate or inanimate subject sentences with either optionally transitive and necessarily intransitive verbs, and (2) manipulating animacy of an object noun using the same verbs from (1). My contribution to the study involves the creation and tagging of language corpora, so we can control for and examine the effect of animate noun frequency for the verbs being studied. The results of the study align with the hypothesis that animate nouns coupled with both types of verb influence expectations for transitive constructions

Deal, Holly - Supervisor(s): Hannah Chumley Mentor(s): Dr. Carolyn Webber -- Bless her heart: Southern minority women's experiences of sexual harassment in the workplace -- This study will provide insight to how geographic region and gendered expectations of southern culture intersect with racial and ethnic identities to shape how professional women of color communicate instances of sexual harassment. Researchers on this project will conduct approximately 20 qualitative, in-depth interviews with professional women of color living in the Southeastern United States. Analysis will be guided by Standpoint theory to illuminate minority perspectives of culture, power, and identity. The project is a work in progress funded by the University of South Carolina Magellan Scholar Program and the Office of Sponsored Awards and Research Support (SARS) at USC Upstate.

**Dear, Emma**

**Mentor(s): Dr. Brie Turner-McGrievy**

**Comparing Food Recommendations in Top Diets**

The imminent threat of obesity is causing professionals and the health conscious to ask: which diet is best? Beyond weight loss benefits, the effect of these food recommendations is unknown. The goal of this project was to uncover differences in food groups across 40 diets as ranked by US News. Two reviewers categorized each diet by food group and divided them into one of four categories: 19 moderate (e.g., DASH diet), 9 plant-based (e.g., Ornish diet), 8 low carbohydrate (e.g., Atkins diet), and 4 meal replacement (e.g., Slim-fast). One-way ANOVA with Tukey's test for post-hoc comparisons was used to determine potential differences. Diets did not differ in vegetable servings/day (Moderate  $3.8 \pm 1.9$ , Plant-based  $3.7 \pm 1.9$ , Low-carbohydrate  $4.2 \pm 3.6$ , and Meal-replacement  $1.7 \pm 1.2$ ;  $p=0.34$ ), dairy servings per day (Moderate  $1.9 \pm 1.4$ , Plant-based  $1.3 \pm 2.1$ , Low-carbohydrate  $1.8 \pm 2.3$ , and Meal-replacement  $3.7 \pm 2.2$ ) or oils and fats (Moderate  $2.2 \pm 1.7$ , Plant-based  $1.4 \pm 1.1$ , Low-carbohydrate  $0 \pm 0$ , Meal-replacement  $1.4 \pm 1.4$ ). There were significant differences for fruit servings (Moderate  $2.4 \pm 1.4$ , Plant-based  $3.6 \pm 1.5$ , Low-carbohydrates  $1.1 \pm 1.3$ , Meal-replacement  $1.14 \pm .86$   $p=.003$ ), grains (Moderate  $4.2 \pm 2.6$ , Plant-based  $2.6 \pm 2.0$ , Low-carbohydrate  $.80 \pm .94$ , Meal-replacement  $1.9 \pm 1.9$ ,  $p=.009$ ), seafood (Moderate  $2.6 \pm 2.4$ , Plant-based  $.56 \pm 1.7$ , Low-carbohydrate  $6.4 \pm 6.7$ , Meal-replacement  $1.5 \pm 3$ ,  $p=.016$ ), meat and poultry (Moderate  $2.6 \pm 2.4$ , Plant-

based  $0\pm 0$ , Low-carbohydrate  $6.7\pm 3.3$ , Meal-replacement  $1.6\pm 1.8$ ,  $p<.001$ ), nuts/seeds (Moderate  $1.9\pm 1.5$ , Low-carbohydrate  $2.7\pm 3.2$ , Low-carbohydrate  $1.3\pm 1.5$ , Meal-replacement  $.13\pm .25$ ,  $p=.04$ ), and added sugars (Moderate  $.2\pm .5$ , Plant-based  $1.5\pm 2.1$ , Low-carbohydrate  $0\pm 0$ , Meal-replacement  $1.4\pm 1.4$ ,  $p=.008$ ). Plant-based diets contained significantly more fruit than the Low-carbohydrate or Meal replacement diets, significantly less seafood and meat/poultry than Low-carbohydrate diets, significantly more nuts/seeds than Meal-replacement diets, and significantly more added sugar than Low-carbohydrate or Moderate diets ( $P$ 's all  $<0.05$ ). Moderate diets also contained more grains and less meat/poultry than Low-carbohydrate diets ( $P$ 's all  $<0.05$ ). Meal-replacement diets contained less meat/poultry than Low-carbohydrate diets ( $p<0.01$ ). Beyond these potential standard recommendations found, we must consider their application. In the top ten diets as reported by USNWR, seven did not appear on our list of best diets. This distinction generates questions about general health education, how to help people make diet-related decisions, and the best way to promote healthy lifestyles that may allow these disparities to close that could be a starting point for further research.

**Dear, Emma**

**Mentor(s): Dr. Mark Macaуда, Dr. Lara Lomicka-Anderson**

**Women's Healthcare Disparities in Islamic Culture: Research Abroad in Morocco**

With a cultural context in mind, this research works to uncover the experience of women with healthcare in Morocco. Through literature review and interviews conducted during a study abroad trip to Morocco sponsored by Preston Residential College, I was able to identify the external circumstances that affect the treatment of women. Interview participants ranged in age from 16-55 and included five women and one male. Participants reflected on their experiences in the formal healthcare setting and potential improvements to be made. Their stories formed a clear narrative of a country undergoing a change in ideology that impacts medical issues. Moroccans have a unique culture, in which all aspects are influenced by the Islamic beliefs shared by nearly everyone in the country. In the past, interpretation of the Quran has been used to support the marginalization of women, but the religious text has also been cited by the feminist movement in support of women's liberation. The success of the women's feminist movement has paved the way for policies to support women's health and rights including the criminalization of sexual harassment, the right to divorce, and more career choice. Addressing the government-funded programs and health education issues will further liberate women and reduce health disparities. The continued efforts of the Moroccan government and the feminist movement will push for further change in opening even more opportunities for women in the future.

**Deese, Logan**

**Mentor(s): Prof. J. Lauren Thomas**

**Validation to Gain Confidence**

The Carolinian Creed states, "I will demonstrate concern for others, their feelings, and their need for the conditions which support their work and development." Being a Peer Advisor at the University of South Carolina Lancaster (PAL) comes along with many roles and responsibilities. One of the responsibilities of being a peer advisor is conducting freshman orientation. The success of this event is measured by how comfortable and confident new students are in their new environment as they begin this new chapter in their life. I was responsible for guiding incoming students to each session throughout the day. I noticed that incoming students were nervous about how to approach a place that seemed like a completely different world to them. While I guided the new students around their campus, I made it a priority that they were assured that resources are available on campus in order for them to succeed within and beyond the classroom. By both being in their shoes two years ago, and participating as a peer advisor, I learned that incoming freshman need to feel supported in their college environment if we want them to be successful during their college career, as well as their future endeavors. Valuing the needs of others is a critical

concept that is needed in order for our society to move towards a positive direction. This experience can directly translate towards my future career as a Physical Therapist, as I intend to help others recover from injury in order for them to become fully-functional once again. A correlation between my future career and my present experiences as a peer advisor is maintaining the feeling of empathy towards others (incoming college freshman and patients with injuries), so that they can feel validated, which can lead towards an increase in their confidence.

**Delia, Jolie**

**Mentor(s): Mr. William Quinlan**

**Impactful Leadership**

Over the last four years, the Greek community has helped me grow both individually and professionally. My involvement in Delta Zeta at the University of South Carolina has taught me about leadership, has given me many philanthropic opportunities, and has helped me become the woman I strive to be daily. Outside of Delta Zeta, the entire Greek community has offered me a network of support and encouragement that promotes self-growth and teaches me how to work in a cohesive community for a collective purpose. Being able to serve as a Pi Chi counselor for the 2017 sorority recruitment was one of my most rewarding and significant experiences throughout college. It allowed me to serve a community that has given so much to me, and it also gave me the opportunity to leave an impact on the women I was leading. The individual impact I've left on each of my potential new members still resonates with me today. For example, a few weeks ago, one of my potential new members reached out to tell me she was going to be a Pi Chi for this coming recruitment. Knowing I inspired someone to fill that role is one of my best accomplishments as a leader so far. My presentation will discuss the challenges I overcame during the process, the many different personalities I learned to work with, and how I grew as a leader throughout the experience. It will also discuss how I learned the importance of using leadership to leave an impact on a community and the people in it.

**DeLoughry, Emma Rose**

**Mentor(s): Dr. Geoff Scott**

**A Vulnerability Assessment of Land Based Pollution Sources In and Around Port Royal Sound with a Focus on Point and Nonpoint Source Pollution**

Port Royal Sound is located in Beaufort County, SC and is composed of multiple rivers including the Okaatie, Colleton, Chechessee and Broad River. This combination of brown water, black water and tidal rivers is part of what makes Port Royal Sound unique and gives it such a high salinity and biodiversity. According to DHEC, Port Royal Sound falls under the watershed 'Broad River- Port Royal Sound' which is a part of the Salkehatchie River Basin. The shape of the Port Royal Sound landscape has led to high tidal amplitude, and it is actually home the highest tides in the Southeast US, leading to an expansive salt marsh ecosystem. Salt marsh ecosystems support high biodiversity, and Port Royal Sound is no exception. It is home to many organisms such as multiple species of crabs, shrimp, fish, phytoplankton and zooplankton (<https://www.lowcountryinstitute.org/prs>).

In the last twenty years there has been major development in the areas surrounding Port Royal Sound. According to DHEC, the 'Broad River – Port Royal Sound' watershed has high growth potential, and towns surrounding the sound are "projected to continue experiencing residential and commercial growth." With this growth potential there is also a growing potential for contamination of the Port Royal Sound water system.

With this project I am looking to locate point and nonpoint sources of pollution in land areas around the sound to determine the vulnerability of areas. Point sources of pollution will include contaminants com-

ing from wastewater plants and land applied sewage. Nonpoint sources of pollution will include pesticides from golf courses and petroleum hydrocarbon runoff from urban areas. Using these results, I will correlate my vulnerability map to populations of grass shrimp throughout Port Royal sound in conjunction with Anna Barber's research to determine if there is a relationship between our results.

**Dennis, Nicole**

**Mentor(s): Prof. Stephen Thompson**

**Peer Leadership**

Serving as a Resident Mentor and a Peer Leader have had huge impacts on my time here at USC. A continuous reminder of mine is that I wouldn't be where I am today if it wasn't for the people around me helping me out. The positive influences and experiences that I had my freshman year were the biggest reasons that I decided to pursue similar positions. I have held the Resident Mentor position longer than the Peer Leader role, but the two are very similar in the responsibilities and the lessons that are taught and learned. As a Resident Mentor I assist freshman with their first- year transition, advise residents on personal and academic issues, and develop and implement programs to strengthen the community. In my Peer Leader role, I worked with an instructor to teach incoming freshman about the University. I was responsible for managing high priority projects, including weekly correspondence to students and grading of assignments. Besides the professional responsibilities of each role, I found myself forming healthy relationships on a personal level with each individual. These relationships were two-sided and helped me grow as a well-rounded student, teacher, and leader. All of the skills learned have proved to be beneficial in my other leadership roles and everyday life. For this reason, I am sure that these experiences will help me beyond my time at USC and in my future career path.

**Dering, Caroline**

**Mentor(s): Dr. Tracy Skipper**

**Professional and Civic Engagement - Director of Finance and Production**

During my time at the University of South Carolina I have been involved with Colleges Against Cancer, an that organization supports Relay For Life and raises money for the American Cancer Society. Relay For Life has been important to me for my whole life because far too many people I love have been affected by cancer. As Director of Finance and Production, I co-lead a group of 70 individuals. My responsibilities include managing our budget, working with our event vendors, meeting with campus recreation to secure the venue, and keeping our executive board members on track with their duties and responsibilities weekly. I am so grateful for the opportunity to spend time giving back to an organization that has given so much to me. This role has helped me discover myself as a leader and learn how to work with others. My presentation will focus on what I have learned in this position and how this experience has greatly enhanced my leadership capabilities and helped me grow as an individual. As I approach the end of my time here at UofSC, I am confident that my experience in this position will carry over into my career and help me lead teams successfully in the future.

**Desai, Akash**

**Mentor(s): Dr. Nicole Hair**

**Evaluating Legislative Policies and State Collaboration Policies Restricting Early-Term Elective Delivery**

Early term elective deliveries occur when labor is induced prior to 39 weeks of gestation, and these are very significant as they endanger not only the health of the mother, but also the health of the baby. While the health of the mother and newborn are endangered by these deliveries prior to 39 weeks, the financial implications are also very critical as they lead to increased health costs through increased need of care to

either the mother, the newborn or both in many cases. Individual states pursue different policy options including intervention by state Medicaid programs and state collaborative efforts. These two types of policies are the most common based on my findings. The goal of this research project is to identify the most effective type of early elective delivery policy. We have acquired data from Leapfrog containing the results of their annual hospital survey which includes information regarding early elective delivery rates among other information. I have created an exhaustive list containing early elective delivery policies across the United States, as well as all of the participating hospitals. The database of policies that I drafted along with the Leapfrog Hospital Survey data are going to allow us to take a look into just what types of policies are working, and also to what extent they are working. To our knowledge, there is not currently any comprehensive study regarding the relative effectiveness of these policies.

**Desch, Rachel**

**Mentor(s): Prof. Gabrielle Turner-McGrievy**

**The Use of Social Engagement in Relation to Self-Efficacy for Healthy Behaviors During Pregnancy: A Quantitative Approach**

**BACKGROUND:** Approximately half of pregnant women exceed the Institute of Medicine's (IOM) recommendations for healthy gestational weight gain (GWG).<sup>1-4</sup> Heightened depression, financial or environmental-related stress, and low social support impact the engagement of pregnant women in healthy eating behaviors.<sup>5</sup> This study aims to improve self-efficacy and healthy eating behaviors in pregnant women through group-based social networks. **METHODS:** Healthy Motivations for Moms-to-be is a remotely-delivered randomized mobile health study. Participants (n=142) used a mobile application (app) to receive health information, social support, and monitor weekly behavioral goals. The intervention group (n=67) received content related to healthy eating and physical activity (HEPA), while the comparison condition (n=75) targeted stress reduction and management. Online surveys were administered at baseline (<20 weeks gestation) and completion of the 12-week intervention. Measures included the Rapid Eating Assessment for Participants- Shortened Version<sup>6</sup>, Social Support and Eating Habits Survey<sup>7,8</sup>, and Eating Habits Confidence Survey<sup>9</sup> to examine self-reported improvements in diet-related factors. Repeated-measures ANOVA tests and regression models were conducted. **RESULTS:** Individuals who engaged in the HEPA intervention are more likely to experience higher levels of perceived social support and self-efficacy for healthy eating compared to the SRAM condition. **CONCLUSION:** Participation in a group-based online social network targeting nutrition and physical activity led to greater perceived self-efficacy for healthy eating behaviors. Future research should examine how group-based mobile health interventions for health behavior may improve the dietary practices of pregnant women.

**Desmond, Shelby**

**Mentor(s): Dr. Natalia Shustova, Mr. Corey Martin**

**Photophysics of Self-Assembled Photochromic Frameworks**

Adaptive materials which can be optically switched by incident irradiation (i.e., photochromic materials), are being utilized as "smart" windows and lenses, sensors, and erasable ink. Metal-organic frameworks (MOFs) are an emerging class of materials that combine high internal surface areas, porosity, crystallinity, and modularity which can be utilized in catalysis, drug delivery systems, and for gas or chemical separations. Combining the properties of photochromic materials with the porous nature of MOFs can provide the potential for new "smart" technologies. Two classes of photoswitches, spiropyran and diarylethene, are the focus of our studies. Both photoswitches photoisomerize in the presence of UV and return to their original states by irradiation with visible light or heat. However, diarylethene is known to rapidly photoisomerize in the solid state, whereas spiropyran typically exhibits slow, or even irreversible photoisomerization as a solid.

We synthesized spiropyran and diarylethene organic linkers with the terminal pyridyl or carboxyl necessary for MOF integration. The organic linkers were synthesized via a four- or six-step procedure and each step was characterized by a combination of mass spectrometry, infrared- and <sup>1</sup>H nuclear-magnetic resonance (NMR) spectroscopies. After confirming the final organic linkers, MOFs were synthesized by a solvothermal reaction with appropriate metal salts and additional secondary organic linkers. The MOFs were then comprehensively characterized with similar techniques, with the addition of single-crystal and powder X-ray diffraction.

The photoisomerization kinetics of the prepared frameworks, as well as the photoswitches in the solid-state and in solution, were determined by UV-vis and diffuse reflectance spectroscopies. We observed that coordinative immobilization of photoswitches in the MOF structures leads to a solution-like photoisomerization processes. Furthermore, we tested the possibility for the MOF to be utilized as a coating for optical detection of materials corrosion. The presented study shows that utilization of a porous MOF as a tool for photoswitch integration can increase the performance of photoswitches for a multitude of applications, which have the potential to significantly enhance the technological landscape.

**DeSpirito, Tara**

**Mentor(s): Dr. Guiren Wang**

**Dielectrophoresis as a Cancer Diagnostic Tool**

Cancer is considered metastatic when cells from the original tumor site detach and enter the bloodstream. Once in the blood, these circulating tumor cells (CTCs) are able to lodge in distant organs, proliferating the disease and greatly reducing survival rates. CTCs are present in low concentrations in the blood making them difficult to detect, thus, treatment usually occurs too late for a positive prognosis. A developing technology for the early detection of CTCs is a microfluidics chip that uses dielectrophoresis (DEP). DEP is a phenomena that causes dielectric particles, such as cells, to experience a force due to a non-uniform electric field. The DEP forces experienced by cells are highly specific, and at low frequencies the dielectric response varies depending on extracellular factors such as membrane-bound proteins, electric permittivity, and cell size. These factors vary between cell types, therefore at different frequencies, different cells will have drastically different responses, allowing for cell sorting.

The DEP sorter is a microfluidic chip containing two channels and two electrodes. The electrodes generate an electric field at the desired frequency, which is determined based on the characterizations of the cells. In order to isolate a specific cell type, that cell should experience a negative DEP force, opposite to the hydrodynamic forces that push the cells through the main channel. Once reaching the electrode, the selected-for cell type will flow into the side channel instead of the main channel due to these forces. The other cells experience negligible forces, and continue through the main channel. Once isolated, selected cells can be removed from the side channel for further testing. Our laboratory has successfully isolated breast cancer cells from blood macrophages, demonstrating the ability of the device to detect and isolate CTCs from blood, thus creating a highly specific cancer diagnostic tool. The entire device is relatively low cost, easy to use, and compact, while remaining highly sensitive compared to current cancer detection methods. The apparatus offers a novel solution to detecting cancer, potentially saving hundreds of thousands of lives per year by increasing detection and allowing earlier treatment.

**Dillon, Robert**

**Mentor(s): Dr. Tracy Skipper**

**Making a Better Community by Helping Veterans in Need**

After serving our nation, many veterans suffer from physical and mental disabilities, substance abuse, and homelessness. Former soldiers often feel forgotten about and left to struggle on their own with little support. I work with a local non-profit organization, The Warhorse Brotherhood, LLC, that benefits veterans

by giving quality emotional, financial, and counseling support.

In May of 2018, we were contacted by a local business about a veteran who was living in a dilapidated trailer. A committee was formed and after verifying his status, we evaluated his needs, listened to concerns, and developed a plan. With the help of local businesses, we created a fund raiser, raising enough money to purchase a new trailer, have it installed, remove the old one, clean his yard, and trim trees.

In another case, a medically retired, disabled veteran was in need of assistance in moving. He had been injured on a parachute jump, breaking his back, causing him to walk using a cane or walker permanently. He had limited financial means and was married with a small child. After being notified, we met with him and evaluated the situation. By organized several members of our group with personal trucks and trailers, we loaded, moved, and setup his household goods at his new house.

These are just a couple of cases we, as an organization of veterans and civilians, worked with the community to make veterans' lives better and let them know they are still in the hearts and minds of a grateful nation. As a disabled veteran, I know what it is like to not feel useful or part of society. As a group, we give emotional and financial support while helping to find resources and assistance for veterans. Our work helps bring the community closer while impacting friends, families, and future soldiers by showing people do care. These projects help both our members and those we help feel more a part of the community and a larger family, uniting people regardless of race, creed or religion, making our community and country a better place to live.

**Dimmery, Sydney**

**Mentor(s): Dr. Sarah Keeling**

**My Studies and Cultural Immersion Experience in Switzerland**

In the Spring 2018 semester, I studied at the Zurich University of Applied Sciences (ZHAW) in Switzerland. This study abroad experience was a part of my degree in International Business. I chose ZHAW because of their course variety. They had multiple international business electives such as International Negotiation, Intercultural Management, and Environmental Economics. The combination of electives and the setting of a financial center in Europe made ZHAW the perfect fit for my study abroad experience. The courses I took were mostly comprised of group projects. I was grouped with students from all over the world and I learned how to effectively communicate and learn from the varying cultures in my group. In addition to the course work, I also gained experience from staying with a host family. Living with a host family was the best way to immerse myself in Swiss culture and I learned so much over the five months I stayed in Switzerland. I believe that my study abroad experience has enhanced my international business degree and made me grow as a person. I learned how to communicate across cultures, how to listen, and how to adapt to new environments. The skills I learned abroad will help me in the years to come as a consultant.

**Dishart, Veronica**

**Mentor(s): Ms. Carly Zerr**

**Realizing Your Own Potential**

Having others believe in you when you don't believe in yourself is an amazing feeling, that's what it felt like my sophomore year of college when I was recommended for an internship with the Columbia Police Department. I struggled in a class with was directly related to criminal law so I doubted my ability to recognize crime and assist and intern with law enforcement. In my criminal justice classes though my professors did not see this and instead they saw my passion for justice and helped me succeed. My portfolio talks about the culmination of my journalism and psychology degree and how they worked together to

fuel my passion for criminal justice as well as help me to succeed in justice internships.

**Dispoto, Danielle**

**Mentor(s): Mrs. Asheley Schryer**

**Teaching Technology Across the Globe: My Internship at BD**

This past summer I worked with Becton, Dickinson & Company (BD) at their global headquarters in Franklin Lakes, NJ. BD is a Fortune-500 medical technology company that produces and sells medical devices and systems. I was an IT Intern on the Change Management and Technology Adoption team working with the company's current integration. My main responsibility included a three-month-long project that required disabling the WebEx accounts for 14,000 employees and transitioning them over to Skype for Business. Throughout the project, I had to keep continuous contact with our WebEx resource ensuring the accounts were prepared to be disabled on the specific date, while simultaneously training users around the world on how to use Skype for Business. The reason I chose to intern at BD was because of all the good the company does and the difference that they make. By producing numerous medical technologies they are able to solve daily problems that can be found in hospitals across the globe, saving the lives of many. They are constantly innovating the medical field and I knew that being a part of a company like that would be extremely rewarding. My internship experience at BD taught me that communication and patience are universal understandings. No matter which country they were working in, each user had the same end goal of learning the software. Just like with any new technology, there was confusion at first, but with patience from both ends, we were able to communicate back and forth answering all questions that they had. I am beyond excited to be returning to BD full-time beginning in June to continue "advancing the world of health" in their IT rotational program as an EDGE associate. I can't wait to see what future innovations BD brings, and the changes that they will make in people's lives all across the world.

**Dixon, Charlie**

**Supervisor(s): David Shchirov**

**Mentor(s): Dr. Joshua Ruppel**

**Synthesis of alkyl-chain linked carbohydrate-porphyrin conjugates**

Photodynamic therapy (PDT) utilizes a photosensitizer, which is typically a large aromatic molecule, to create a highly reactive singlet oxygen species upon activation by light. To explore porphyrins as potential candidates for PDT, a series of alkyl-chain linked carbohydrate-porphyrin conjugates were synthesized by means of palladium-catalyzed cross coupling reactions followed by 1,3-dipolar cycloaddition. A brominated porphyrin substrate was initially subjected to palladium-catalyzed cross coupling to a series of alkynylated alcohol linkers varying in alkyl-chain length. Upon optimization, palladium-catalyzed cross coupling reactions successfully installed the protected alkynyl moieties to the porphyrins with intermediate to high yields. The alkynylated porphyrins were subsequently conjugated to mono and disaccharides utilizing azide-alkyne 1,3-dipolar cycloaddition protocols. Specifically our research found that utilizing N,N-diisopropylethylamine, copper(II) iodide, and dimethylformamide lead to the desired glycoconjugation from moderate to high yields. This work has generated a library of alkyl-chain linked carbohydrate-porphyrin conjugates (CPCs) which could be utilized to explore the effect of the linker and carbohydrate moiety in binding affinity to receptors and to evaluate potential as a photosensitizer for PDT.

**Do, Stephanie**

**Mentor(s): Dr. Sarah Keeling**

**Improving Nonprofit Impact Through Tailored User Experiences**

The University of South Carolina's literacy outreach program, Cockey's Reading Express (CRE), serves children from four-year-old kindergarten (4k) to second grade. Volunteers, along with staff members

and Cocky, travel to Title I schools throughout the state to read to children and express the importance of reading. My volunteer experience with CRE demonstrates how tailoring content to the user can help a nonprofit achieve its mission. Mindful design improves the quality of products and messages without adding to overhead costs. During my time with CRE, I created a macro-enabled Excel workbook to manage, track, and present spending related to specific grants. Several features, including formulas and formatting rules, help users of all technical skill levels create consistent and accurate records. Thoughtful design was also applied when managing volunteers. Work productivity and efficiency improved after conventional message design logic was used to motivate volunteers. Content, in the form of graphic media, was tailored to promote different aspects of the organizations to various audiences. Trip flyers, designed to mimic concert tour posters, were created to attract the attention of potential volunteers and emphasize future opportunities in print and on social media. Infographics helped to improve awareness of the impact of donations. Application of classroom experiences shifted my mindset of utilizing convenient designs to creating effective content. Through my work with CRE, I have gained knowledge and skills to help other nonprofits achieve their mission.

**Dodge, Evan**

**Mentor(s): Mr. Ben Rex**

**Automation in South Carolina: How will Computerization effect the Future State Economy?**

The trend of automation and continued computerization of the workforce is projected to dramatically affect the U.S. labor market and South Carolinian state economy. This is primarily the result of machine learning and other advanced artificial intelligence techniques that allow non-routine tasks to be completed without oversight. Although automation is likely to result in large economic growth through increased productivity and increased opportunities for employment in engineering and technical services, industries including routine non-emotional service will be affected the most by job displacement. Industry adaption to the integration of Artificial Intelligence and automation is highly dependent on the availability of re-education and jobs training.

**Donahue, Jane**

**Mentor(s): Dr. Susan Courtney**

**Zip Code Media: Institutional Racism Through the Lens of Local and State Media Histories**

This project aims to investigate forgotten media artifacts created by state and local institutions in Columbia during and after the Jim Crow era, and how such overlooked artifacts can bring a new understanding to the ordinary yet consequential institutional practices that continue to shape pronounced racial and economic disparities in American life.

**Dornik, Sarah**

**Mentor(s): Dr. Jennifer Vendemia, Dr. Sheri Selfies**

**Brain Activation during Direct Musculoskeletal Sensory Stimulation to Regions of the Trunk: Design and Testing of a Novel Pneumatic System**

A sensory stimulation apparatus was developed to provide a direct stimulus to active sensory components of the lumbopelvic control system. Eighteen right hand dominant subjects (7 female: age=28±8 years) without back pain or injury laid in the supine position on a mat conforming to back curvature. The sensory stimulation system directed regulated air flow from an air pressure tank through 50 feet of tubing to one of twelve tactors (pressure stimulators) positioned in the mat, stimulating the upper (4), lower (4)-thoracic, or lumbar region (4). During the fMRI (3T), tactors within each region were activated across 3 randomly assigned runs. Image preprocessing was performed in FSL. First level whole brain analyses were performed in native space and registered to standard space prior to higher level analysis

for identification of active clusters during stimulation ( $z > 2.3$ ;  $p < .05$ ; corrected for multiple comparison). fMRI patterns of activation differentiated between anatomic regions of the back, and within each of these regions demonstrated clear differences between brain hemispheres. The testing apparatus and protocol were able to elicit relative activation of brain regions associated with the proprioceptive system, regional S1 processing of somatic stimuli, and localization of the stimuli on the body surface.

**Drew, Madison**

**Mentor(s): Mr. Duncan Culbreth**

**Broadened by Going Abroad: My Experiences in Europe**

In Spring 2018, I left the country for the first time and spent the next four months studying at Charles University in Prague, Czech Republic and traveling to eleven other countries in Europe. I decided to study abroad to enhance my college experience and experience the world through direct exposure. Leaving the country for the first time at the age of 20 was frightening but turned out to be a challenge that pushed me to grow as a person, a student, and as a business person. I have already started applying the lessons I have learned from the places and historical sights I have visited abroad to my life, in and out of the classroom. Telling my story to others has proved to encourage other people to study abroad and to learn more about history, other cultures, and the world. From having Czech classes to visiting Auschwitz to seeing Don Giovanni, I have learned an abundance about culture and history and the importance of using that knowledge to create a better future and better relationships. The knowledge I have gained has led me to become a better leader and will prove to be even more influential as I graduate and enter the “real” world.

**Drnek, Claire**

**Mentor(s): Dr. Austin Downey**

**Gait Analysis and Person Identification Using Human-Structure Interaction**

Gait analysis is the process of studying human locomotion for the purpose of further understanding body mechanics, muscle activity and medical applications. Currently, gait is analyzed using visual recordings or a “suit” of sensors worn by the subject. However, with growing concerns for privacy as well as the expensive nature of the sensors required, alternate approaches are being studied. One alternative to traditional gait analysis is to study the interaction humans have with a structure, such as the vibrations transmitted through the floor while walking. Since each person has a unique gait, their human-structure interaction will also be unique and can further studied for identification purposes.

This study aims to determine the unique characteristics of an individual’s gait and to utilize them in the process of human identification. Acceleration data from three subjects was collected using an accelerometer mounted on the floor. Computational analysis was performed to identify features that were extracted from both the time and frequency domain. These features were combined to create a profile for each subject.

Current results demonstrate that a person’s gait can be isolated through measurements of the structural system in which they are walking. Ongoing analysis of subject profiles examines possible means of identification and databasing. The results of this study will allow for compiling data on individuals, almost like an additional form of fingerprinting, without the need for privacy intruding video cameras or other forms of intrusive measurements.

**Duncan, Adam**

**Supervisor(s): Leon Davis, Donato Smith**

**Mentor(s): Dr. Karen Patten**

**IIT Capstone #3 Water Security Research Group**

The Water Security Research Group at U of SC has asked us to create a website for them that presents what their mission is, the faculty involved, and the different research projects. Putting all of this information in one place that is aesthetically pleasing was the main goal.

**Dymock, Rebecca**

**Mentor(s): Dr. Stephen Thompson**

**The Importance of Ethical Editing**

One of the most enlightening Film and Media Studies courses I took was FAMS 555 Documentary Studies, a course that dove into different forms of Documentaries. In this course we analyzed different models of documentaries and the strategies that filmmakers commonly use to create them. We discussed the common ethical issues that come up during the productions of projects and how filmmakers throughout history have approached them. One of the main conclusions that our coursework emphasized was the importance of trust and respect to all parties involved. I really enjoyed learning about this topic because I was taught to view editing decisions in a new way. As an intern with South Carolina Educational Television (SCETV) I was able to experience the process of ethical editing first hand. I interned in the Digital Media department where I created original web content featured on scetv.org. Throughout my internship I travelled around the state to interview South Carolinians and tell their stories. Many of the people I met had plenty to say and I had the responsibility of editing lengthy interviews down to cohesive 3 to 5-minute short videos that correctly and ethically told their stories. Throughout this process I found that it is very easy to cut out information and completely alter the effect that a person speaking on screen has. During the editing of my projects, I had to make decisions about what to leave in the story and what would be okay to take out. I had to decide how to order the videos so that the people telling their stories were conveyed accurately and cohesively. To do this, I remembered what I had learned in my Documentary Studies course and asked myself if the video I was making was as trustworthy and respectful as it could be. I drew on the lessons and examples I had learned from in my coursework to help me decipher the best ways to ethically edit my videos. In the end I was able to take what I learned from my class to create videos I was really proud of.

**Easterly, Carson**

**Mentor(s): Mrs. Asheley Schryer**

**The Importance of Arts and Science Nonprofits**

Over the past three summers, I have worked at The Franklin Institute, a science museum in Philadelphia. I initially pursued this internship because I was interested in exploring different career options within the museum and nonprofit industries. I had the opportunity to work with the Sales and Catering, External Affairs, and Research and Evaluation departments where I became particularly interested in fundraising and development and learning how museums and other nonprofits can effectively communicate their mission to their audience and inspire donors. I gained experience in areas such as event planning, fundraising, writing for museum publications, and researching and evaluating the museum's practices as well as those of similar institutions. Through this experience, I was able to see the enormous value of museums and cultural centers. By providing opportunities for members of the community and for people around the world to engage with science and the arts, museums can strengthen communities, as well as create a more educated and well-rounded society. My plan is to pursue a career in the nonprofit field, working for museums or in higher education. As an English major, with minors in Mass Communications

and Leadership Studies, I hope to use my communication skills and leadership abilities to support organizations and nonprofits that work to make arts and science engagement, as well as education opportunities, accessible to all.

**Eberl, Brandon**

**Mentor(s): Dr. Titan Paul**

**Effect of Nanoparticles Shape on Thermal Conductivity of Ionic Liquids Based Nanofluids**

Nowadays Concentrated Solar Power (CSP) energy systems become one of the prominent renewable energy system, where sunlight is concentrated in a single point from a large area by using mirrors or lenses and the heat is then collected by a thermal energy carrier known as a heat transfer fluid (HTF). In CSP systems, high thermal stability of HTFs is necessary in order to increase efficiency of the system. Ionic liquids (IL) are potentially ideal candidates for use as HTFs due to their high thermal stability. Using the concept of nanofluids, nanoparticles can be introduced into the base ILs in order to improve the thermo-physical property of the HTFs. Present studies report the nanoparticles' shape effect on thermal conductivity of ionic liquids based nanofluids. Three different shape (spherical, cylindrical, and needle) of Al<sub>2</sub>O<sub>3</sub> nanoparticles with 1 wt% has been investigated. Based on our analysis it was shown that there is a 5-7% enhancement in the T.C. of the nanofluids based on the specific temperature and nanoparticle shape used.

**Edwards, William**

**Mentor(s): Dr. Jason O'Kane**

**Planning with Unreliable Controllers**

State lattice-based planning has been used for motion planning in a wide variety of robots, including ground, water, and air vehicles. The State Lattice with Controllers (SLC) framework expands upon traditional methods by allowing planning with controllers, such as wall-following or visual servoing, in addition to metric motion primitives. This allows SLC to plan in environments where execution of metric motion primitives is unreliable, such as GPS-denied areas. However, the SLC framework assumes that each controller reliably navigates the robot to a single end state. In practice, it may be useful to reason about controllers which are unreliable (i.e. the robot may end up in one of many states after executing the controller). This work proposes an algorithm for planning with arbitrarily unreliable controllers. Preliminary experimental results evaluate the performance of the algorithm in simulation.

**Egan, Harleigh**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Harleigh's Vision**

I have been a member of the Opportunity Scholars Program (O.S.P) at USC Sumter, since Fall of 2017. Since Summer of 2018, I have become a Peer Coach. I get to mentor nine O.S.P college freshmen! They come to me, when they are having trouble or have any questions, and I give them advice on how to succeed as a student. I encourage my mentees to study, plan out their weeks, go to tutoring, and to attend O.S.P event/meetings. Through this job, I have learned that the college workload is very shocking for first time freshmen. I do not believe first time freshmen come to college prepared for the workload and difficulty. I think I do an important job, I help my mentees in any way I can. I encourage them to attend class and keep their heads above water when things start to get stressful. I have made wonderful friendships through this job and it has turned me into a social butterfly on campus. It has made an impact on myself and has helped me realize that having a peer coach can lessen college apprehension. I am hoping to get another chance to be a peer coach or become a student mentor, once attending the University of South Carolina in Columbia.

**Eisenhardt, Emma**

**Mentor(s): Mrs. Hayley Ross**

**Bringing Conversation to Urban Communities**

During the summer of 2018 I was an Education Intern at the Dupont Environmental Education Center through the Delaware Nature Society. I worked with children who came to our center to educate them on the local wildlife and ecological systems, and I led community outreach efforts to children in the local area. Through this experience I engaged children in activities that bettered their understanding of local wildlife and local conservation efforts. As a result, I learned about the discrepancies in experience between my own experiences to that of this urban community. I have always known that I wanted to pursue a career where I could help people. As a future physician assistant, it will be important for me to understand the discrepancies in the backgrounds and understandings of the people I will be treating which I have already started to learn as a result from this experience. My presentation will relate this experience to my future goals address how I plan to use what I have learned to better the lives of others.

**Eliasek, Jackson**

**Supervisor(s): Abigail Rasch, Caroline Zerhusen, Catherine Renzaglia, Joseph Alessie**

**Mentor(s): Mrs. Hayley Ross**

**Certifying Green Gamecocks**

How can one group of students promote sustainability among both faculty and staff when it is faced with the inherently difficult task of educating over 27,000 campus members in a nontraditional manner? In order to engage faculty and students in living more sustainably, my team and I have revamped the successful Green Office Certification (GOC) program and created a new Green Event Certification (GEC) program. Under the revamped GOC program, we helped streamline the overall process, created a one-day information and training session for new offices, and simplified the user handbook to make it more accessible for those not already involved in sustainability. The GEC program has taken off since its inception in November 2018, certifying Service Saturdays, Dance Marathon, The Big Event, and Reclaimed Runway. The GEC program strives to educate event participants and hopes to extend the reaches of sustainability further into the cultural fabric of South Carolina. As a result of forming, organizing, and running these programs, we have developed our project management planning, communication, networking, marketing, and organization skills.

**Ellis, Khrystal**

**Mentor(s): Prof. Jay Pou**

**Principles of Community Service**

Since before my time at the University of South Carolina, community service has had a significant impact on my character and influenced my decision to become a Biological Sciences major. Community service reaches far beyond what one may witness while they are participating in the activity; the impact is not always immediate, but is undeniably evident and long-lasting. A community runs off of the coexistence of each living being that resides within it; its health and wellness is dependent upon unity and teamwork. Living and working within a community that endures more hardships than most others experience may require certain key components that can simultaneously influence the growth of a person's character. Not only does community service build character, but it also has the ability to build well-rounded individuals; people who think and act with an open mind, are selfless, and express the desire to do for others before themselves. A person who exudes leadership, friendship, and service represents what I would call a "token" member of a community. People participate in community service daily, however, seldom truly understand the monumental influence they have had on those that the service will eventually affect. Understanding what it means to be a leader, a friend, and a being of service to others in their own realm then

intertwining each component together to form a well-rounded being of a community server is an important key to understanding how the influence of community service can not only benefit the receivers of service, but also those who give.

**Emmanuel, Khalisha**

**Supervisor(s): Joseph Pryor, Jeffshan John Ponnarasu**

**Mentor(s): Dr. Annette Golonka, Dr. Bettie Obi Johnson**

### **Determination of Linalool Concentration in Essential Oils**

The goal of this research was to develop a novel undergraduate analytical chemistry experiment involving the identification and quantification of linalool in several essential oils using the internal standard method with headspace Solid Phase Microextraction (SPME) and Gas Chromatography-Mass Spectrometry (GC-MS). In this experiment, students had the option of optimizing the method parameters including standard solution concentrations, equilibration times, SPME fiber exposure times, and GC-MS run parameters. Initial experiments demonstrated the effectiveness of the internal standard method, with the regression analysis of the standard calibration curve having excellent linearity ( $R^2=0.9988$ ). This method is applicable to any essential oil the student chooses, provided that the oil contains linalool and that the standards chosen bracket half of the expected concentration of linalool. When the concentration of linalool in lavender essential oil was quantified, it was found to be 23.1%, a -2.12% error from the value on the manufacturer's certificate of analysis of 23.6%. This experiment provides an introduction to test method development, SPME, GC-MS, and the internal standard method for sophomore and junior level students helping them to gain confidence with laboratory skills using inexpensive and widely available reagents. This study is relevant for analytical chemistry, organic chemistry, biochemistry, and biology students interested in reinforcing independent research skills.

**Emran, Alvina**

**Mentor(s): Dr. Michy Kelly**

### **The Effects of a M878V Inactivating Mutation on subcellular localization of PDE11A**

This study aims to look at effects of a PDE11A inactivating mutation as it relates to symptoms of mental illnesses like schizophrenia and Major Depressive Disorder. Specifically, we are studying the M878V PDE11A inactivating mutation that has been genetically linked with suicide. Literature suggests this mutation decreases the ability of PDE11A to hydrolyze cAMP and cGMP, but it is not yet clear if this is due to a direct effect on the catalytic activity of PDE11A or the subcellular localization of PDE11A (that is, by removing it from the pool of cAMP/cGMP it would normally degrade). This study examined how the M878V mutation potentially changes the subcellular localization of PDE11A. To study the M878V mutation, COS-1 cells were cultured and then transfected with plasmids expressing 1) a wild-type version of PDE11A, 2) the M878V mutation, 3) an S162D mutation (negative control for the assay), or 4) a 117D124D mutation (a positive control for the assay). We took pictures of the transfected cells using a fluorescent Leica microscope and digital camera. We used Photoshop, ImageJ software, and a drawing tablet to quantify the nature of PDE11A localization (i.e., distributed diffusely throughout the cytosol or aggregated in the nucleus, perinuclear space, or cytosolic puncta). We then conducted statistical analyses using Sigmaplot, and conducted literature searches to interpret these data.

This research could allow for more elucidation of the reason behind the decrease in the ability of M878V PDE11A to hydrolyze cAMP and cGMP, and could aid in further research to help reverse the effects the mutation causes.

**Enderle, Garrett**

**Mentor(s): Mr. Duncan Culbreth**

**How USMC Officer Candidate School shapes people into leaders**

United States Marine Corps Officer Candidate School is either a 10-week or two 6-week training for those aspiring to lead Marines. Their mission is to train, screen, and evaluate candidates for their potential to lead US Marines as company grade officers. I took the path of the two 6-week cycles. We were graded in three main areas: academics, physical fitness, and leadership. The focus was heavily weighted on leadership and we were tested strenuously each and every day. Putting us through harsh environments with little to eat, little to sleep, keeping us constantly sore, and having a lot going on at once was a daily routine there. They created these chaotic lifestyles for us and then we were evaluated on how well we reacted and lead our peers. Having an attrition rate of over 20%, out of the candidates who already were picked from the competitive application process and asked to attend, this place only wanted the best to graduate and go on to lead Marines and win our nation's battles. This was one of the worst and hardest things I have done in my life, but the reward in the end is worth it. I learned a lot about myself and how to lead others when times are tough. Going through this has shaped me as the person I am today, and I am thankful I had the opportunity to go through something like this.

**Errasti, Yamaisi**

**Mentor(s): Dr. Stephanie Milling**

**Lifting Up Communities of Color Through Economic Policy**

Growing up in Miami, Florida in a predominantly underserved Latinx community, I saw first-hand just how broken our system is and how communities of color are often at a disadvantage compared to many of their peers. Being a first-generation American, I knew that I was privileged to be in a position of power to make a difference and after becoming a sister of Kappa Delta Chi Sorority Inc., a Latina-founded sorority who prides itself in serving surrounding communities with an emphasis on the Hispanic/Latino population, I was able to use this as a platform for me to explore the value in social justice and engagement for communities that I cared deeply about. With my economics degree in mind and my growing desire to create change, my interest in policy began to grow and I was granted the opportunity to intern in Washington D.C. for Congresswoman Nanette Barragán, who serves one of the most diverse districts in the nation. I saw the impact that the policies her office was creating could have on communities of color who are often of lower socio-economic statuses. I observed just how some policies could allow opportunities to these communities that could change their lives. These experiences during my undergrad experience have influenced the goals that I have as I hope to continue to do work that lifts communities of colors up through economic policy.

**Eustis, Sarah**

**Mentor(s): Dr. Brie Turner-McGrievy**

**Researching Cognitive Transfer Effects of Diet on Physical Activity in Participants Randomly Assigned to Plant-Based or Omnivorous Diets**

**Purpose:** To examine the change in physical activity (PA) in African Americans randomized to either a plant-based or healthy omnivorous diet in the Nutritious Eating with Soul (NEW Soul) study given the same PA recommendations.

**Background:** Researching the interplay between diet and PA has significant implications for addressing obesity and chronic disease. Research has demonstrated the effect of PA on diet through cognitive transfer effects, but the reverse effect of diet on physical activity is not well understood. We hypothesized physical activity would increase in both groups, with larger increases observed in the vegan group due to

stronger cognitive transfer effects.

**Methodology:** Participants were randomized to either a plant-based or healthy omnivorous diet (n=65). Dietary interventions were held weekly. We recommended both groups do strength training twice per week and  $\geq 75$  min of vigorous or  $\geq 150$  min of moderate PA per week. The overall change in PA and the differences in PA between groups were analyzed with independent sample t-tests using SPSS software. The short-International Physical Activity Questionnaire was used to quantify PA in METS.

**Results:** Only those with complete data were analyzed (n=50). Paired t-tests revealed PA significantly increased from baseline ( $1408.6 \pm 1779.5$ ) to 6 months ( $2034.1 \pm 1967.79$  METS) with both groups combined (p=0.01). Although the plant-based group had higher mean increases in PA (n=23,  $+780.4 \pm 1886.4$  METS) than omni (n=27,  $+493.5 \pm 1441.2$  METS), no significant differences existed between the groups (t=-0.61, p=0.54).

**Conclusion:** Diet may play a role in increasing PA via cognitive transfer effects. Accompanying improvements in energy levels, sleep, and overall wellbeing facilitate positive change in other health-related behaviors, such as physical activity. Although not statistically significant, the direction of the findings supported our hypothesis that the vegan group would exhibit greater increased physical activity, and the overall change in PA was significant for both groups. Future research will examine objectively measured PA using a larger group of participants to ensure adequate statistical power.

**Fairey, Caroline**

**Mentor(s): Mr. Josh Dunn**

**Making Connections: Peer Leadership & Postgraduate Work**

At the end of my summer internship at Macmillan Learning, the developmental editor who hired me finally let me know why she'd picked my resume out of a pile of hundreds of applicants—one little term, “tutor,” was the difference between me and many other entry-level publishing hopefuls.

What about the experience of peer tutoring transfers so well to a professional editing position? In this presentation, I will connect each of my key takeaways from my peer leadership role to characteristics or skills that proved useful in my internship with a global educational publisher.

Training at the PWC emphasizes higher-order concerns (thesis, paragraph organization, idea expansion) over lower-order concerns (grammar, style, sentence fluency). In a professional editing position, prioritization is key to assisting authors with drafting.

The PWC teaches soft skills like empathy, listening, body language, and effective communication, attributes which are unspoken but necessary when sitting down with a good editor. Tutors need to understand the student's perception of their problems while also remaining cognizant of their own ideas about what the student needs to work on.

During a student's first semester as a tutor, they have to go through a Peer Leader Cohort which teaches current educational theory; tutors also discuss the practice of peer-teaching during bi-weekly staff meetings. Keeping up-to-date on the latest knowledge in the field of interpersonal education ensures that the tutor does not feel like they are the “expert” or “authority” in the situation. They, instead, can learn and grow along with the student, offering suggestions and feedback as an equal. Feeling humble and open to new avenues for editing is essential to keeping up in a constantly changing publishing environment.

Understanding the connection between peer leadership and success in post-graduation endeavors is vital

to understand and take advantage of before graduation in order to make the most of one's time at USC.

**Fant, Joe**

**Supervisor(s): Xavier Williams, Alexis Moore, Tavaris Sims, Herman Beard**

**Mentor(s): Dr. Karen Patten**

**IIT Capstone #11 - Boeing Streaming Machine Data Project**

Boeing Streaming Machine Data Project.

Farmer, Reagan - Mentor(s): Dr. Michy Kelly -- PDE2A mRNA expression is altered in select brain regions of patients with major depressive disorder, schizophrenia, or bipolar disorder -- Many studies implicate altered cyclic nucleotide signaling in the pathophysiology of major depressive disorder (MDD), schizophrenia (SCZ), and bipolar disorder (BPD). As such, our lab explores how the enzymes that break down cyclic nucleotides—namely, phosphodiesterases (PDEs)—may be exploited as either biomarkers or therapeutic targets. Using autoradiographic in situ hybridization on postmortem brain tissue from patients, we measured expression of PDE2A mRNA. We focused on brain regions implicated in the pathophysiology of MDD, SCZ, and BPD, including cingulate cortex, orbital frontal cortex (OFC), superior temporal gyrus, hippocampus, parahippocampal cortical regions, amygdala, and the striatum. PDE10A mRNA was also measured as a specificity control, as it is the most closely related PDE relative to PDE2A. Compared to controls, patients with schizophrenia showed a reduction of PDE2A mRNA in the OFC, the amygdala, and the cingulate. Patients with MDD saw a similar reduction of PDE2A mRNA in the OFC and the amygdala, but there was no change in the cingulate when compared to controls. Instead, patients with MDD showed a reduction of PDE2A mRNA in the caudal entorhinal cortex (CEC) when compared to controls. Patients with BPD also exhibited a decrease in PDE2A mRNA in the OFC, the amygdala, and the CEC when compared to controls. However, relative to controls, patients with BPD also showed a reduction in the hippocampus and had a unique increase in PDE2A mRNA expression in the caudate. This effect appears to be specific because there was no change in PDE10A mRNA expression in any disease group compared to controls. Thus, PDE2A mRNA expression changes in both a disorder- and brain region-specific manner, further implicating altered cyclic nucleotide signaling in the etiology of neuropsychiatric disease. In addition, these results may suggest that PDE2A could be harnessed as a biomarker to improve diagnostic accuracy or a potential therapeutic target for treatment of these disorders.

**Farrell, Katherine**

**Mentor(s): Dr. Nicole Hair**

**Mapping temporal and geographic patterns and evaluating sociodemographic and healthcare accessibility correlates of opioid abuse**

The continued rise in opioid deaths in the country and especially in the state of South Carolina begs the question: is Medication-Assisted Treatment (MAT) accessible to communities throughout the state and how does this access compare to other states. For my research, I intend to evaluate how the availability of MAT providers per county affects health outcomes using the GIS mapping system. Using this visual, I will evaluate the physical or economic barriers influencing the availability of treatment.

**Faulk, Lauren**

**Mentor(s): Dr. Joshua Stone**

**Ecology and Life History of *Craspedacusta sowerbii***

*Craspedacusta sowerbii* (Cnidaria: Hydrozoa) is a small gelatinous zooplankton native to rivers in China, and is one of the few species of freshwater jellyfish. Since its discovery, this species has been introduced to freshwater systems around the world, including many in the United States and South Carolina. Like

similar marine species, the *Craspedacusta* life cycle consists of a benthic, or bottom-dwelling, polyp stage that buds into a medusa, or bell-shape with tentacles, which ultimately forms gonads and sexually reproduces. In addition to the sexual reproduction of the medusae, the polyp stage can asexually reproduce into more polyps. Despite the fact that the *Craspedacusta* species is found worldwide, there is little known about environmental influences on their life cycle. To better understand the ecology and life history of *Craspedacusta*, submerged rocks were collected from a local freshwater system, Lake Keowee, and examined for polyp presence. This lake is of special interest due to the close proximity of a large power plant that uses the lake water as a cooling mechanism, making the location of the polyp collection unnaturally warmer than the rest of the lake. Once detected, polyps were carefully removed from the rocks and placed into petri dishes to be cultured. The growth and reproduction rates of the polyps were monitored daily. After several healthy colonies of *Craspedacusta* were established, the colonies were observed under several water temperature conditions and food regimes to explore their effects on the ecology of the organism.

**Feeney, Megan**

**Mentor(s): Mrs. Asheley Schryer**

**Interning in Paradise**

The summer after my sophomore year, I interned at the Grand Wailea, Waldorf Astoria Resort in Maui, Hawaii. I briefly shadowed in all departments but focused my training in housekeeping.

I wanted to intern in housekeeping in order to gain experience in a department that I did not know well. In addition, I wanted to expand my luxury hospitality experience to include a resort setting. I was fortunate enough to gain technical skills within housekeeping, rotate to other departments, and act as a supervisor and manager for the second half of the summer. I found that no matter what, teamwork and a mutual respect between managers and employees is essential in order to have a successful operation. To finalize my internship, I was put in charge of a large-scale project to create a database that the hotel can use to anticipate guest's needs, which is absolutely essential within the luxury sector of the hospitality industry. Throughout my internship experience, I found my true passion of bridging my two loves of guest interaction and employee relations. With that, I have accepted a post graduate position as a Manager-in-Training Program for Marriott International in downtown Chicago. Here, I will be exposed further to the hospitality industry, in both housekeeping and the front office. I hope to expand upon my knowledge and gain even more experience to forward my career.

**Feinberg, Allyssa**

**Mentor(s): Mr. William Quinlan**

**A Global Mindset**

During the spring of 2017, I completed a USC May-Mester in Japan and during the spring of 2018, I studied abroad on exchange in Rome, Italy at LUISS Guido Carli University. Of course, there were several practical reasons for me obtaining an international education, like gaining credits toward my major or being able to write this experience on my resume for future employers. All of which are admirable grounds to study abroad, and for some students that would be enough. But not for me. My goal was to take full advantage of the opportunity to study at a world class university and foster relationships with local people and students. In addition, I was looking to improve on my Italian language capabilities and ideally, study at an institution that matched this criterion. Luiss provided international networking opportunities with over 200 companies and offered classes in Italian that supplemented my coursework at USC. Learning and appreciating foreign languages unlike your own, has taught me a greater sense of multiculturalism and discipline. I have found that learning new languages has improved my ability to be open minded, to make new friendships, and to learn more efficiently and effectively. By the time I returned, I was able to demonstrate knowledge of global issues and process trends and systems within an international context.

This experience has enriched how I have gone forth in my studies with open eyes both at USC and beyond. I found that no matter how many classes I take or how many books I read, my short time in Italy and Japan showed me that my knowledge of worldly culture was limited at best and that learning never ends.

**Fellers, Ashley**

**Mentor(s): Dr. Timothy Mousseau**

**The Effects of Radiation and Commercial Nuclear Energy**

There are 60 commercially operating nuclear power plants with 98 nuclear reactors currently operating in the United States. They produce electricity and are commonly sold as a technological solution to the large carbon emissions destroying our environment. Unfortunately, they continuously release radiation in small doses and devastating accidents such as Chernobyl and Fukushima have released harmful levels of radiation into the environment. These accidents have resulted in immediate deaths, increased cancer rates, and both acute and chronic radiation syndrome. These harmful effects on both people and the environment have called into question the reliability and safety of nuclear energy. The purpose of this study is to review current literature and conduct interviews with experts in the field of radiation health safety to determine the potential harm of continuing to pursue nuclear energy as a source of clean energy. During the first phase, a literature review was conducted related to radiation health effects, environmental impacts, nuclear disarmament, and the history of the Chernobyl power plant. The second phase of this project included a series of interviews and conversations with seven experts in various fields surrounding nuclear energy to ask how their work had shaped their concerns about nuclear energy and radiation as a whole. Finally, the study compared the uses and benefits of nuclear energy to current issues and potential threats to determine the efficacy of continuing to rely on nuclear energy as a low CO<sub>2</sub> emitting source of power. Due to the lack of long term waste storage strategies, cost, and the health and environmental effects, nuclear energy appears to pose serious issues and may not be as cost-effective as other alternative energy sources in the long run. A preliminary review of the current literature suggested that pursuing wind, solar, and hydro power may be cleaner and safer than nuclear energy as a fuel source.

**Ferguson, Nicolas**

**Mentor(s): Ms. Jennifer Bess**

**Experiences Abroad as a Boren Scholar**

spring 2017 I was selected to study Mandarin Chinese in Hong Kong and Taipei as a Boren Scholar. The Boren Scholarship, an initiative of the National Security Education Program, provides up to \$20,000 for students to study less commonly taught languages in regions critical to U.S. interests. In exchange for funding, scholars signed a one-year service agreement to work for the federal government in the national security field after graduation.

As an Army ROTC Cadet and a member of the International Business & Chinese Enterprise Cohort, the Boren Scholarship was a perfect fit for my personal and academic interests. The application process involved several essays, developing a budget, an interview, and writing a detailed history of my language studies. Throughout this process, the Office of Fellowships and Scholar Programs proved to be an invaluable resource.

Shortly after the end of my freshman year, I arrived in Hong Kong to spend the summer studying at the Yale-China Chinese Language Centre. My summer program was followed by a weeklong trip with my cohort to study 2nd tier cities in Inner-Mongolia.

After returning to Hong Kong, I started classes at the Chinese University of Hong Kong. My schedule included a mix of both business and Chinese coursework. Throughout the year my cohort was provided many professional development opportunities and I had the opportunity to travel to a dozen different cities throughout China. The most memorable experience was spending Chinese New Year in my friend's rural village in Central China.

The summer after my year in Hong Kong, I studied at the National Normal Taiwan University in Taipei. I continued to foster my Chinese language skills while developing an appreciation for Taiwanese culture.

Not only were these experiences only possible because of the Boren Scholarship, but it has also opened many doors for new opportunities at home. The alumni benefits include an extensive alumni network and non-competitive hiring status for the government. I look forward to fulfilling my service agreement as a U.S. Army Officer.

### **Ferzley, Autumn**

**Mentor(s): Mrs. Anna Oswald-Hensley**

#### **My Club Leadership**

My name is Autumn Ferzley and I am earning my Associates in Science by the end of this Spring 2019 semester. I became president of the USC Sumter Game Club in 2017 to work with students around the campus. The club itself, was created to make a safe place for individuals that enjoy video games, board games, card games, and roleplaying games. We wanted Game Club to be a way for people coming into college, not knowing many people to meet other individuals, that have similar interests. As President, I had to take a stern leadership role, in which I was always trying to make sure members came to meetings and went to school events, as required to be a member. We also had events that involved the community, like helping set up a small ComicCon on Main street in Sumter, where the Game Club volunteered their time to help the Gaming community of Sumter and beyond.

### **Fife, Aalayah**

**Mentor(s): Dr. Tracey Skipper**

#### **A Student, A Mentor... A Leader**

As a college student, your first priority is to be the best student you can possibly be, ideally an A student. As a mentor, your goal is to serve as support and guidance for someone who is still navigating through an unfamiliar environment. As a leader, you use your platform to uplift and influence your community in a positive light. Here at the University of South Carolina, I was given the opportunity to serve in all three roles and doing so has greatly enhanced and shaped my college experience. As a Supplemental Instruction Leader, who's responsible for facilitating tri-weekly sessions where students work with peers and engage in collaborative learning, I've learned how to present material/course content in more meaningful ways so there is a higher level of comprehension. Being able to do so is keen to being successful. After serving as a SI Leader for 4 semesters, I expanded my role at the University and become a Mentor for new and returning SI Leaders. Doing so allowed me to share my experiences with others and guide them in their roles so they are operating at their fullest potential. Being a mentor has given me the skill of providing effective feedback and having positive communication skills, which are also very valuable in the professional world. Serving in both roles has given me the passion to create programs for first generation students, like myself, that teach similar skills and prepare students for leadership roles and other professional engagements. It is extremely important that our future leaders are equipped with the necessary tools to take on the real world and a program dedicated to developing upon leadership skills would be the first step.

### **Filipowski, Marin**

**Mentor(s): Ms. Hayley Ross**

#### **Challenging the Status Quo**

During the summer between my junior and senior years, I worked as an underwriting intern with a large insurance company on their Commercial Insurance team. As a Risk Management and Insurance major at the University of South Carolina, my internship gave me an in-depth look at the insurance concepts and business risks I had learned about in my classes. During my time as an intern, I was responsible for ana-

lyzing accounts not written by the team to better understand why the premium from those accounts was lost. These figures were taken to higher level management to explain the company's flaws and how they can improve. From this project we learned that pricing on some lines of business was not in line with our competitors' pricing. Learning this information helped me connect the pricing and regulatory concepts learned in my classes and how they apply to the real world. The company was trying to make pricing strategies flat like we had learned in class, when they needed to strategically rate and price business differently around the country. I learned that sometimes the rules and regulations can't just be accepted, and sometimes need to be questioned. This experience taught me to not just accept things as they are but look for ways to make the company I work for better.

**Fillmore, Dylan**

**Mentor(s): Dr. Joshua Cooper**

**Difficulty of a Sudoku Generalization**

We study the difficulty of sudoku puzzles by analyzing a natural generalization to graphs. A sudoku puzzle involves assigning each cell of a 9-by-9 board with labels from the list  $\{1,2,\dots,9\}$ , while respecting certain constraints based on which cells are not allowed to receive the same number. This has a natural generalization: a "puzzle" is a (combinatorial) graph, along with the assignment of a list of colors to each vertex. A puzzle is "fair" if there is a unique way to select colors for the vertices with the property that no two adjacent vertices receive the same color. Sometimes, sudoku cells are easy to solve, in the sense that in order to select a number for that cell, one only has to notice that all other possible numbers are represented among the cell's row, column, and block. Analogously, we say that a vertex in a puzzle is "pensolvable" if every color in the vertex's list except one is represented in the vertex's neighborhood (and so the vertex must be colored with the remaining color). A puzzle is pensolvable if the puzzle can be solved by sequentially pensolving vertices. We provide a sufficient condition for a puzzle to be pensolvable, and investigate measures of puzzle difficulty which begin with pensolvability.

**Fisher, Emily**

**Mentor(s): Dr. Suzanne Adlof**

**Orthographic and Phonological Processing in Beginning Readers**

In order to learn to "sound out" new words, children must have phonological awareness, the ability to reflect on and manipulate the sounds in words. However, in skilled readers, performance on phonological awareness tasks is influenced by orthographic awareness, the awareness of spelling patterns and constraints. The purpose of this study is to examine the relationship between orthographic and phonological knowledge in beginning readers. Two receptive tasks measuring phonological and orthographic knowledge are administered over a computer. Participants' eye movements are recorded as they complete the task, allowing us to examine their processing as well as their accuracy. Following eye-tracking measures, participants complete norm-referenced assessments of language and reading abilities. Data collecting is ongoing. Results will lead to better understanding of the relationship between phonological and orthographic processes in typical developing beginning readers and may help improve the understanding of reading problems associated with dyslexia.

**Fisher, Emily**

**Mentor(s): Ms. Sarah Gay**

**Serving as a Protective Factor for Children who Have Experienced Adverse Childhood Experiences**

I have spent the past three and a half years volunteering with at-risk children each week through the Waverly After School Program as a mentor and tutor. I have dedicated over two hundred hours to helping these children because I wanted to serve as a protective factor amidst all of the risk factors and adverse

childhood experiences these children have encountered. This work has taught me that in order to best serve the children with whom we interact, we must consider the context of children and approach our interactions through a framework of empathy, compassion, love, and mercy because these sentiments enable the development of relationships in which children feel safe and loved, and this in turn enables a child to thrive, succeed, and be happy. According to the National Center for Safe Supportive Learning Environments, caring relationships, high expectations, and opportunities for participation and contribution are all protective factors for students who are between the ages of five and twelve. Serving these children has guided me to a career path in which I will work with students who are at-risk and who have experienced trauma. When working with children who have had adverse childhood experiences, it is imperative to respond to children empathetically, patiently, and lovingly, and to validate their emotions and feelings in order to establish a relationship with them.

**Fisher, Claire**

**Mentor(s): Dr. Stacey Mumbower**

**Exploring music listening habits through interactive data visualizations**

This project uses data visualizations and interactive dashboards to explore the intersection of music listening habits and personal mood. During Fall semester 2018 I utilized a Spotify app extension, last.fm, to track my own music streaming habits and a free app, MoodTracker, to track my moods. After combining data collected from the two apps, I built a dashboard using data visualization software, Tableau, and displayed it as an interactive visualization. The visualization demonstrates my average mood for different genres of music listened to, as well as the number of streams per artist. The interactive features of the visualization allow the user to click, filter, and explore the data further.

**Fisher, Carolyn**

**Mentor(s): Dr. Stephen Thompson**

**Zoos and Human Society**

During the Fall of 2018, I spent a week as a Zoo Keeping Volunteer at Australia Zoo, in Beerwah, Queensland. I got involved with Australia Zoo because of my passion for veterinary medicine and interest in wildlife husbandry. Furthermore, I was eager to explore the role that zoos play in public education and conservation. During my time at the zoo, I assisted with animal husbandry by preparing diets, cleaning enclosures, and assisting with animal training. One of the highlights of my time with the zoo keepers was training a Brahminy kite. Additionally, I assisted with public education by answering questions and assisting with conservation presentations. From this experience, I gained a deeper understanding how zoos impact society. Prior to my time at Australia Zoo, I was skeptical that zoos are effective means of public education. However, I was astounded by the large number of guests, specifically children, who were genuinely engaged in the conservation talks and asked me insightful questions about the animals. This experience was particularly impactful for me, because I had collaborated with the Riverbanks Zoo to complete an assignment for my Proseminar in Nature Writing course (SCHC 354) at the University of South Carolina. The aim of this project was to create a BuzzFeed quiz to correct misconceptions that the millennial generation may have about zoos. After completing this assignment, I had a better understanding of the public perception of zoos and how these opinions impact how zoos relate to the public. Furthermore, volunteering at Australia Zoo spurred an interest in zoo ethics, which I investigated in my Animal Welfare and Ethics class at the University of Queensland by writing an ethical analysis of keeping elephants in zoos. Volunteering at Australia Zoo has strengthened my motivation for a career in veterinary medicine, as I now have a better understanding of the role that wildlife plays in ecology and human society.

**Fisher, Ellie**

**Mentor(s): Dr. Melissa Moss**

**Global Learning Begins by Entering the Unknown**

During the spring semester of my junior year, I studied abroad at University of Mannheim in Mannheim, Germany. As an International Business and Accounting major with a German minor, I wanted to study in Germany in order to improve my German fluency, study at one of the best business schools in Germany, and have the opportunity to get outside of my comfort zone in order to grow and learn more about myself. Even though I learned a lot through my courses at University of Mannheim, a majority of my learning came from the soft skills I gained through my experiences. My five months abroad were filled with many challenges and difficulties, but also with growth, understanding, and exploration. Through my experiences and travels abroad I gained a greater understanding of the German culture, but I also learned how to appreciate my own culture more. I learned how to prepare myself for unknown situations, became more aware of my cultural perceptions of myself and others, and learned to be more open-minded and view people in terms of their own culture, rather than my own. Not only are these skills valuable for me as a future international business leader, but these skills are also very important to students and professionals across the United States and even the world. One of my greatest realizations during my time abroad was that you have to be curious and willing to learn about a culture that may be different from your own. Once I came to this realization, my view on the world shifted and I was able to appreciate more of myself and others. Over the course of my college career as well as the five months I spent abroad, I made it a point to step outside of what I have always known, and in doing so, I began to discover new things about myself and others.

**Fitzgerald, Bryan**

**Mentor(s): Dr. Norma Frizzell**

**Investigating Protein Thiol Oxidation as a Consequence of Mitochondrial Complex I Inhibition**

The Krebs cycle intermediate fumarate can irreversibly modify protein cysteine residues to generate the stable adduct 2-succinocysteine (2SC), termed protein succination. This cysteine modification is favored by conditions that increase the NADH/NAD<sup>+</sup> ratio, which inhibits the NAD<sup>+</sup>-dependent Krebs cycle. A genetic model of mitochondrial Complex I deficiency that causes Leigh Syndrome, the loss of the NADH dehydrogenase component protein Ndufs4, is associated with this 'reductive' stress, and leads to increased succination. We hypothesized that the chemical inhibition of Complex I activity by rotenone, a pesticide used to model Parkinson's disease, would increase succination as NADH oxidation is also prevented. Surprisingly, in contrast to the Ndufs4 knockout model, rotenone did not increase succination in neurons in vitro. We proposed that rotenone inhibition of Complex I immediately promotes cysteine oxidation (oxidative stress); whereas Ndufs4 deficiency promotes cysteine succination via reductive stress. We further hypothesized that initial oxidative modification would prevent cysteine succination by fumarate. To test this hypothesis we used immunoblotting to examine the levels of cysteine sulfenylation (-SOH, oxidative marker) on glyceraldehyde-3-phosphate dehydrogenase (GAPDH) following variable exposure to hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) in vitro. Control and oxidized GAPDH were then incubated with fumarate and the levels of 2SC measured. We observed time and concentration dependent sulfenylation of GAPDH. Supporting our hypothesis, prior oxidation of GAPDH resulted in less succination after subsequent treatment with fumarate. This data suggests that cysteine sulfenylation competes with cysteine succination, partially explaining why different Complex I inhibition strategies may lead to either Leigh Syndrome or Parkinson's disease phenotypes.

**Fletcher, Kylie**

**Mentor(s): Dr. Caryn Outten**

**Iron Regulation in *S. pombe*: Characterizing the Transcriptional Repressor Fep1 and its Partners, Fra2 and Grx4**

Because of iron's role in many biological processes, it is an element necessary for almost all life. However, iron overload can be just as detrimental as iron deficiency. In the fission yeast *S. pombe*, Fep1 acts to repress iron uptake genes under high iron conditions. Previous *in vivo* studies show that the glutaredoxin Grx4 acts to inhibit Fep1 activity such that more iron can be brought into the cells. When Fra2 is absent in the cell, Fep1 is always bound to the DNA. This binding is independent of iron levels in the cell. It was also shown that Fra2, Fep1, and Grx4 form a complex *in vivo*. However, *in vitro* studies of each of the proteins have yet to be performed. This project seeks to further characterize Fra2, Fep1, and their complex *in vitro*.

**Flintom, Lauren**

**Mentor(s): Dr. Ambra Hiott**

**What 282 Freshmen Taught Me**

Two-hundred and eighty-two. That is the total number of residents that I have mentored in the Women in Leadership community at Women's Quad plus the number of participants that attended Pillars for Carolina in 2018. More importantly, 282 is the number of students I have worked with to help transform South Carolina into their new home.

This summer I served as the Director of Pillars, the extended orientation program on campus. Pillars welcomes first-year students to campus before the semester starts to instill confidence, learn traditions, and serve the community. Mostly, Pillars helps to facilitate a successful transition into college. Before my freshman year on campus, Pillars did just that. I was a nervous high school graduate with no friends at Carolina, but Pillars changed that for me. The week I spent on campus in July gave me a few best friends, lots of laughs, and countless memories so that when I came back in August, I was comfortable in my new home. When the opportunity presented itself to lead the program that gave me so much as a freshman, I didn't hesitate to say yes. Serving as the director improved my critical thinking, public speaking, and facilitation skills.

Additionally, I have worked as a Resident Mentor for the past three years. Freshman year my RM helped me with the awkward transition many freshmen go through, and I knew going forward, I wanted to help others with that transition by providing helpful resources and tools. I have watched 73 residents come in as awkward, shy new students and leave at the end of the year as incredible members and leaders on our campus. Working with these students has taught me a lot, but importantly, I have been able to develop my skills in interpersonal communication, crisis management, and mentorship, while building up my self-confidence so that upon graduation, I am able to face any task, conversation, or occupation with pose.

**Fonshell, Julia**

**Mentor(s): Mr. David DeWeil**

**Hakuna Matata: Lessons learned from a semester abroad in Kenya**

Spring Semester 2019, I studied abroad in Kisumu, Kenya. My program, coordinated through The School for International Training, was called "Kenya: urbanization, health and human rights." During this semester, I learned about issues of human rights and access inequality in relation to public health and growing urbanization in modern Kenya. I lived with host families both in the suburban town of Kisumu and the rural village of Semenya. I also studied Swahili, conducted an independent research project and took trips

to Nairobi, Rwanda and Uganda. I chose to study abroad in Kenya because as a political science major and public health minor I had often read about the unique governmental and public health concerns lower/middle income countries face. I was eager for the opportunity to make my textbook learning come to life and to get an immersive and hands on learning experience. The fact that I was able to live with host families truly enhanced my experience. I was also excited about the opportunity to conduct independent research and was able to combine my backgrounds in my major and minor by designing my study to measure governmental accountability and service delivery in Kisumu County. This experience has allowed me to gain a thorough appreciation of a culture very different from my own. I not only made new friends and family but I also gained experience working with a diverse group of colleagues, a skill that will serve me well in whatever field I enter.

**Fontaine, Anna**

**Mentor(s): Dr. Amber Fallucca**

**My Experience as a University 101 Peer Leader**

I served as a University 101 Peer Leader during the fall semester of my junior year, where I helped first-year college students transition smoothly into college. A Peer Leader is a mentor, facilitator, and a resource to freshmen students. I wanted to be a University 101 Peer Leader because I wanted to help students fall in love with the people and campus at Carolina. As a Peer Leader, I learned how to better communicate and facilitate activities and discussions. I also learned how to listen and to practice good patience skills. As a mentor to 18 people, it is so important to be a support system to them. My experience of being a Peer Leader will forever have an impact on me, and I am now a more confident leader. I now have skills I intend to apply to my professional career. The significance of guiding these first-year students is that they become people that you want to cheer on, and support through the amazing things they will achieve. I always told my class to do what they love and to pursue their dreams. This experience has allowed me to grow as a person, expand on my transferable skills, and create lasting relationships with wonderful people. I plan to use the skills I gained as a University 101 Peer Leader in my upcoming internship with Geico and beyond.

**Fordice, Emily**

**Mentor(s): Mrs. Asheley Schryer**

**Adopting French Culture**

In the spring semester of 2018, I studied abroad in Paris, France at the Université de Paris-Dauphine through the USC Global Partner Program for International Business. I lived there for five months and took classes in international business, marketing, economics, and art history in a mixture of English and French environments. Throughout my semester, I made it my mission to experience as many aspects of Parisian life as possible. I did not want to be a tourist living there for five months, but I wanted to be a proactive resident instead. I thoroughly explored Paris by venturing out daily to new spots and attractions. Art museums, history museums, churches, took tours, and new treasures consumed my weekends. I found new coffee shops every other week. I became a “regular” Parisian by opening a bank account, filing for insurance, signing up for a phone plan, grocery shopping at the farmers’ markets and Franprix, and cooking every day in my apartment. By studying abroad, I distanced myself from my typical everyday comforts and learned how to create my own new routine and found comfort in a new environment. I learned how to make new friends when mine were an ocean away. I learned how to embrace French culture and make it my own. I learned that travel was about more than seeing the sights and the museums, but it was about connecting with people and places around the world. I learned an uncountable number of lessons from my French hosts and international friends. I became a dedicated, lifelong traveler, and I am confident that I can make a home anywhere and challenge myself in the process.

**Fowler, Rayja**

**Mentor(s): Ms. Theresa Harrison**

**Mock Advocate, Real Confidence**

Professional based organizations are undoubtedly a great source for networking and cultivating success. Mock Trial is no exception. Maybe less obvious, however, is how much mock trial fosters personal growth and nurtures skills like public speaking, personal advocacy, and leadership. It is through my time in the SC Mock Trial Program that I was able to understand what confidence truly means and through my leadership positions that I learned how to instill confidence in others. In mock trial we examine a case packet provided by our governing body (The American Mock Trial Association) which includes statutes or law, legal documents like indictments and complaints, case law, affidavits and depositions, and exhibits of physical evidence. In order to make a good case and be an effective mock “advocate” for you “client”, it takes a great attention to detail, compiling those details into a larger picture, forming a legal argument from that big picture, and then presenting that legal argument as a convincing story. Throughout my four years in mock trial, it is become evident how much confidence plays into that. It is confidence in your work and confidence in yourself to demonstrate that work. My presentation will discuss what confidence looks like in a professional organization and leadership positions. Further, I will also demonstrate how leadership is a tool to instill confidence in others. The insights I gained through mock trial is what confidence looks like and how it shaped me, which subsequently shaped my college experience as a student in the class room and a member of the student body.

**Franklin, Brandon**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Foundations of Leadership**

Being an ambassador for my university means that, I am representation of my entire campus, but I am also a leader at all times toward everyone. My overall assigned task for being an ambassador, was to lead and assist each new freshman on campus tours, while helping with college transitions. During each orientation, I was able to inspire each new freshman through my life stories and testimonies. One of the most special things about an ambassador, is the ability to possess personal qualities, that helps inspire others. Just last summer, a freshman came up to me. He expressed, how inspired he was through my leadership role of the campus tour, while motivating aim to aim high for life goals. Being able to be a University Ambassador, prepares me for medical school while also reaffirming my passion and decision for pursuing a medical career, as U.S Air Force physician. This experience enhances my patient contact skills for future interaction in hospitals. Through being a university ambassador, I hope to continue to be the leader I am to others, while uplifting those around me with inspiration and motivation.

**Fryer, Lauren**

**Mentor(s): Dr. Robin Dawson, Dr. Cheryl Mele**

**The Knowledge and Perceptions of Nursing Students in Palliative Care**

Objective: To analyze the education of Upper Division (UD) Nursing students at USC in palliative care (PC)—in terms of how much material actually covers this aspect of care and how effectively it is being absorbed by the students.

Methods: A literature review was conducted to establish what research has previously been done in PC education, and the search resulted in no previous work done specific to the level of undergraduate student education. An initial round of surveys was distributed to Upper Division nursing students and interviews were conducted to gather data on the depth of education, knowledge, and general attitudes of PC. The College of Nursing’s course syllabi have been analyzed for content relating to PC. Finding an educational gap, the ELNEC-Undergraduate course is currently being evaluated for the feasibility of integrating

it into a course already in the UD curriculum. The ELNEC-Undergraduate modules will also be compared to the AACN guidelines to determine its relevance and importance in relation to the NCLEX.

Results: There is very little educational coverage of palliative care, and it is almost exclusively set in the context of older adults. There appears to be a need for more thorough education, in addition to a broader range of the subject in order to improve comfort and knowledge levels.

Conclusion: There is a need for integrating PC education into the curriculum with greater emphasis and broader scope of practice.

Future Directions: The formative data of these initial steps of the study will be used to determine the feasibility of implementing ELNEC into the curriculum, as well as the importance of including more PC for success on the NCLEX and in nursing practice.

**Gable, Caroline**

**Mentor(s): Dr. Jason Stewart, Ms. Stephanie Ackerson**

**Exploring the Effect of CST Depletion on DNA Damage Signaling**

Human CST (CTC1-STN1-TEN1) is a heterotrimeric protein complex with the ability to bind to single stranded DNA (ssDNA). Previous research has shown that the depletion of CTC1 or STN1, components of the CST complex, results in increased micronuclei and anaphase bridges, indicators of genomic instability. CST has also been shown to promote dormant origin firing to rescue stalled replication forks in response to replicative stress. Such findings suggest that CST may play a role in maintenance and stability of the genome. Previous work has shown that CTC1 knockout (KO) results in decreased cell proliferation in culture. However, it is unclear what underlying factors could be causing this phenotype. In order to better understand the role of CST in response to DNA damage, we utilized a conditional CTC1 (KO) cell line to explore the effect of CST depletion on cell cycle progression. We find that cell proliferation decreases in CTC1 KO cells. Furthermore, we determined, by flow cytometry, that this decrease in cell growth is due to a G2/M arrest. Using immunofluorescence analysis of the mitotic marker phosphorylation-histone H3, we were able to determine that the percentage of cells in mitosis was not changed, indicating CTC1 cells arrest in G2. Previous work has shown that G2 arrest of the cell cycle is often a result of the accumulation of DNA damage. DNA damage is recognized within the cell by three kinases (ATM, ATR, or DNA-PK), which can initiate repair of DNA and cause cell cycle arrest through p53. This allows the cell time to repair the DNA, in a process known as the DNA damage response (DDR). In the CTC1 KO cells, we observed increased levels of p53, and p21, a direct target of p53 activation. Furthermore, we find that ATM and ATR are not activated in the CTC1 KO cells and instead it appears that DNA-PK is activated. This suggests that, in the absence of CST, double strand breaks arise and lead to a G2 arrest. Overall, we conclude that CTC1 is important to prevent DNA damage and G2 arrest, which helps to preserve genome stability.

**Gable, Caroline**

**Mentor(s): Prof. Jay Pou**

**What makes a House a Home?**

During my time at the University of South Carolina, I have had the opportunity to serve in various leadership roles and immerse myself in many beyond the classroom experiences. Perhaps the most influential experience I have had during my college career was serving as the Vice President of Housing for my sorority, Pi Beta Phi. Having recolonized back on the USC campus in 2014, and moving into our sorority house in 2015, I served as the first full term Vice President of Housing for my sorority. In this role, I served as a liaison between the sorority, our National Housing Corporation, and the University. I was responsible for the 38 women living in our chapter facility, as well as maintaining the open and safe environment for 300 chapter members that utilized our chapter facility. This was an innovative experience for me because I had to think creatively as well as critically, and utilize my previous leadership experience as a Resident Mentor to support my role. I worked to develop how the role would be implemented by establishing pro-

cedures and setting rules for the women in my chapter to follow. I approached my role with novel mindset to effectively handle situations that arose. I worked to build community for the women living in our house and for my sorority as a whole. Serving in this position, I developed a new perspective of leadership, I learned how to effectively work and serve on an executive council, and how to mentor women in my role that served after me. My experience serving in this position has not only impacted me from a professional perspective, but it continues to support and shape my perspective of servant leadership.

**Garcia, Marco**

**Mentor(s): Dr. Gregorio Gomez**

**Morin potentiates FcεRI-induced cytokine production from human skin mast cells**

Background: Allergic disease is the 6th leading cause of chronic illness in the U.S. (cdc.gov). Mast cells cause allergic reactions and inflammation by releasing preformed mediators such as histamine and serine neutral proteases, biosynthesizing lipid mediators like prostaglandins and leukotrienes, and synthesizing new cytokines. Morin, [2-(2,4-dihydroxyphenyl)-3,5,7-trihydroxy-4H-1-benzo- pyran-4-one], is a flavonol that can be isolated from the leaves of the common guava (*Psidium guajava*). Flavonols, including Morin, are reported to have protective properties against many diseases, including allergic inflammation. Of particular interest was one study that reported that Morin could inhibit IgE-mediated passive cutaneous anaphylaxis in mice, and FcεRI-induced degranulation of mouse bone marrow-derived mast cells (BM-MCs). However, the effect of Morin on human primary mast cells has not been reported. Therefore, this study was initiated to determine the effect of Morin on the release of allergic mediators from human in situ-matured mast cells. Methods: Human in situ-matured mast cells were isolated from normal skin tissues and used as our experimental model. Viability was determined with MTT assay. Degranulation was determined by β-hexosaminidase release assay. Prostaglandin D2 (PGD2) was measured by enzyme immunoassay. TNF and GM-CSF were measured with enzyme linked immunosorbent assay (ELISA). Protein phosphorylation was determined by SDS polyacrylamide gel electrophoresis under reducing conditions and Western blotting with total and phosphorylation-specific antibodies. Results: Morin at 1, 10, and 100 μM had no significant effect on viability of human skin mast cells treated for up to 72 hours. Morin also had no significant effect on FcεRI-induced degranulation or PGD2 biosynthesis. Interestingly, Morin potentiated the production of TNF and GM-CSF in a dose-dependent manner. FcεRI-induced phosphorylation of p38 and p42/44 did not appear to be affected by Morin, whereas Akt phosphorylation was inhibited. Conclusion: In contrast to the reported effects on mouse in vitro-derived mast cells, Morin enhances IgE-dependent cytokine production from human skin mast cells. The findings suggest that Morin could promote, rather than inhibit, allergic inflammation in humans.

**Gatzulis, Rachel**

**Mentor(s): Dr. Scott White**

**How Urban Environments and the European Lifestyle Lead to Better Health Outcomes**

As a Public Health Major, I have spent my college career analyzing and trying to make sense of the troubling state of our country in terms of health. The United States seems to experience obesity, diabetes, and chronic disease at a level that other countries are not, regardless of how hugely pervasive Big Pharma, diet culture, and the fitness industry are in the daily lives of Americans. Spending a semester living in Prague, Czech Republic and travelling throughout Europe gave me an amazing opportunity to experience, first-hand, the culture and lifestyle of people who seem to have better health outcomes than Americans regardless of the fact that they spend far less time, energy, and money than Americans do trying to stay fit, fight obesity, and remain disease-free. In my Discovery Day presentation, I will be sharing, analyzing, and reflecting on this culture that I believe contributes greatly to the ease with which most Europeans can remain healthy.

**Gause, Anea**

**Mentor(s): Ms. Asheley Schryer**

**Finding Myself in Another Culture**

During the fall of 2018, I was enrolled in Islamic Economics and Finance. The course included a week-long expedition in Abu Dhabi and Dubai, both located in the United Arab Emirates. While there, I had the opportunity to visit Dar Al Sharia Legal & Financial Consultancy, embark on a desert safari, experience a traditional Arabic meal, and hear from women who were breaking gender barriers in the Middle East. What originally motivated me to go on the trip was my lack of education concerning other cultures and the desire to destroy stereotypes by partaking in first-hand experiences. One of the biggest stereotypes this experience dismantled was that the culture and the people are oppressed. Every place I visited I was greeted with a warm smile and a history lesson that spoke of liberation. In addition, after listening to the amazing women on a panel that discussed how women in the Middle Eastern North Africa region were being major contributors to the economy and technological space, I realized that I couldn't let barriers define what I did and who I became. Upon my return, I began putting myself in situations where I had to step outside of my comfort zone. Ultimately, these decisions will allow me to become the influential business woman I hope to be. I would like to encourage everyone no matter the gender, race, or education level to not let barriers define them.

**Gaylor, Melana**

**Mentor(s): Dr. Amber Fallucca**

**My Most Significant University Experience: Kappa Kappa Gamma**

Greek Organizations are a major part of student life at the University of South Carolina. Our university's students decide to partake in Greek organizations for the community, academic support, personal growth, lasting friendships and leadership cultivation. My most significant experience at the University of South Carolina has been my involvement in Greek life. Freshman year, I decided to become a member of the Epsilon Kappa chapter of Kappa Kappa Gamma (Kappa), and to this day it has been one of the best decisions for my personal, professional and collegiate experience. My time in my sorority, gave me my platform to contribute to the academic success of our University, by promoting academics in my chapter as Vice President of Academic Excellence. I ran for this position during my sophomore year in order to continue Kappa's academic legacy. However, during my time in this role, I learned much more than how to promote academics. I learned leadership skills, communication tactics, event management and interpersonal skills. This experience gave me my first real set of "business" abilities that I later applied in the internship positions I held my Junior year. The skills and experiences Kappa provided me also gave me confidence and a sense of self. I hope to share this experience and inspire other students and/ or faculty with the power of Greek Organizations, and the impact they can have on the students of this University.

**Geoghegan, Halle**

**Mentor(s): Dr. Toni Torres-McGehee**

**Relationship Between Low Energy Availability and Injury in USC Female Athletes**

Halle Geoghegan, Exercise Science; Dr. Toni Torres-McGehee, Athletic Training; Allison Smith, 2nd year Doctoral Student

Background: As one of the components of the Female Athlete Triad (Triad), low energy availability (LEA) can be a dominating force in causing negative health outcomes for athletic women in terms of lifestyle functioning and performance. The Female Athlete Triad is characterized by the interdependent interactions involving low energy availability with or without disordered eating, menstrual disturbances, and low bone mineral density (BMD) that is seen in physically active females. Energy availability is defined as

an input to the body's physiological systems by finding the difference between dietary energy intake and energy expended in exercise. The purpose of this retrospectively designed study is to examine low energy availability in NCAA Division 1 South Eastern Conference collegiate female athletes in the disciplines of equestrian, beach volleyball, indoor volleyball, softball, and ballet in order to determine a relationship between LEA with: 1) sport type, 2) injury type, and 3) frequency of injury. A database of NCAA Division 1 South Eastern Conference collegiate female athletes categorized as having low energy availability will be utilized.

**Methods:** After IRB approval, the participants medical records were reviewed from the electronic system Athena in order to obtain their medical history and injury information, including type and frequency. Injuries were categorized into one of the following themes: no mechanism, contact with another person, contact with an object, overuse, acute trauma, dislocation/subluxation, landing/pain during activity, previous history, or non-sports related. SPSS statistical software (Version 25; SPSS Inc, Chicago, IL) and alpha <0.05 was used for all analyses. Frequencies and proportions with 95% confidence intervals were calculated for categorical variables. Chi-square analyses were used to examine proportion of participants classified as "at risk" of low energy availability, injury frequency, injury type, and sport type.

**Results:** The results will be presented at Discovery Day USC. Data is currently being analyzed.

**Conclusions:** TBD

### **Germany, Tetandianocee**

**Mentor(s): Dr. C. Nathan Hancock, Dr. Clint Page**

#### **Testing DNA-Protein Interactions with Yeast-One Hybrid Assays**

The miniature inverted repeat transposable element (MITE) mPing is a highly active element in the rice genome. mPing is mobilized by two transposase proteins (ORF1 and TPase) from the larger Ping and Pong transposable elements. It is hypothesized that TPase excises the element while ORF1 binds to its terminal inverted repeats (TIRs) by way of a Myb-like DNA binding domain. We are employing yeast one-hybrid (Y1H) assays to determine if ORF1 binds to the TIRs of mmPing20, an improved form of mPing with identical TIRs. In the Y1H system, a prey protein binds to a DNA bait sequence, leading to transcription of a reporter gene, which allows yeast to grow on selective media. We created bait vectors containing full length mmPing20 or half of the mmPing20 element in the HIS3 reporter plasmid pMW2. These constructs were transformed into the yeast strain YM4271. Initial assays to detect false positive interactions were performed on selective media lacking histidine and containing several concentrations of the HIS3 competitive inhibitor 3-Amino-Triazole (3AT). We observed false positive interactions with the full length mmPing20-HIS3 reporter construct in the absence of transposase proteins, but the 5' half of mmPing20 did not display autoactivity. Prey vectors were transformed into YM4271 with the 5'mmPing20/HIS3 reporter construct to perform Y1H assays.

### **Giakas, Alec**

**Mentor(s): Dr. Ho-Jin Koh, Ms. Ran Hee Choi**

#### **Effect of AMPK on Exercise-induced Adipocyte Metabolism**

Over 70% of adult Americans are considered overweight, and the prevalence of obesity and diabetes exceed 25% of the American population. Regular physical activity is a recommended strategy to prevent obesity via increasing fatty acid metabolism. AMP-activated protein kinase (AMPK) has been associated with the activation of lipolysis in adipose tissue. Furthermore, it has been demonstrated that a single bout of exercise increases AMPK activity in adipocytes; however, the mechanism by which AMPK regulates exercise-induced adipocyte metabolism has yet to be determined. To examine the role of AMPK in

exercise-induced adipocyte metabolism, we utilized fat-specific AMPK alpha 1 and alpha 2 knockout mice (FKO). Wild type (WT) and FKO mice were divided into sedentary group (Sed) and exercise group (EX). The EX group was trained by daily 1h treadmill running for 5 days/week for 6 weeks. Results showed that there were no differences in body weight or food intake after 6 weeks of training. However, FKO mice showed significantly increased lean body mass and decreased fat compared to WT. Also, FKO mice improved glucose tolerance compared to WT after 6 weeks of training. For this experiment, we analyzed epididymal (Epi) fat. We confirmed that our FKO mice significantly decreased total AMPK $\alpha$ 1 expression compared to WT littermates. Moreover, the inhibition of AMPK activity was confirmed by decreased phosphorylation of ACC. To determine whether AMPK regulates exercise-induced lipolysis, we measured the phosphorylation of hormone-sensitive lipase (HSL) at Ser565, an AMPK phosphorylation site. The phosphorylation of HSL at Ser565 was significantly reduced in FKO mice. There was no significant change in PGC1- $\alpha$  mRNA and protein expression. Furthermore, we examined if AMPK affects exercise-induced beige fat formation in WAT, and found that UCP1 mRNA expression was not different between genotypes, while Cidea and PRDM16 mRNA expressions were significantly increased in FKO mice. In conclusion, our results demonstrate that manipulation of adipocyte AMPK may affect body fat composition, glucose homeostasis, lipolysis, and beige fat formation, suggesting its potential to serve as a therapeutic target for the treatment of various metabolic disorders.

**Gillespie, Madison**

**Mentor(s): Mrs. Sarah Gay**

**Lessons We Can Learn from Our Four-Legged Friends**

I have always been drawn to animals. This passion is what led me to seek out an animal rehabilitation center. In the summer of 2018, I had the privilege of interning at Carolina Wildlife Center (CWC) in Columbia, SC. CWC is a nonprofit organization that saves hundreds of native animals every year ranging from birds to reptiles to opossums. My main tasks included feeding and cleaning the birds and opossums, preparing meals, as well as general upkeep of the building. I was able to interact directly with the animals and witness firsthand the difference people were making at CWC. I learned so much about how to help these animals. For example, if you find a baby bird that appears to have fallen from its nest, you are to leave it be. It most likely is a fledgling and is learning to fly. Falling is a part of this process. This type of knowledge has enabled me to provide better care to all animals at the center and outside in nature. My passion to help rehabilitate injured wildlife has grown since interning at CWC. It is important to me that we treat animals and their homes with care and to respect their environment. I hope to expand my training with animal rehabilitation, and ultimately work with larger animals. I also would like to explore the connection between wildlife rehab and conservation. Combining these concepts will make a huge difference to the animals and the environments. Gaining more experience with rehabilitation will enable me to play an important role in educating the public about what each of us can do to help save this beautiful planet and all of its creatures.

**Gillette, Stephen**

**Mentor(s): Dr. Kevin Hull**

**How ESPN and its entities cover sports on Instagram**

ESPN has long been the primary source for sports news. They now bring coverage to over 200 countries through 40 worldwide offices. One of the largest entities of the conglomerate is Brazil's ESPN Mundo. Both ESPN and ESPN Mundo rely upon social media to build their brand and spread their message. While both networks serve the same purpose, they cater to different populations and markets. Therefore, the purpose of this study is to examine Instagram accounts of ESPN and ESPN Mundo.

Instagram posts from both @ESPN and @MundoESPN were collected from January 2019. This month was selected since it is traditionally a busy time for sports throughout the world. All the images from that

month were collected, totaling 736 for both networks: 214 for ESPN and 522 for ESPN Mundo. These posts were analyzed on a variety of factors, including which sports they feature, the nationality of the athletes, and where the sport is based.

The findings reveal that despite both being under the ESPN umbrella, the two networks showcase different sports and athletes. Simply put: ESPN's focus is very American, while ESPN Mundo takes more of a world view. Over 90% of ESPN's Instagram posts were of sports based in the U.S., compared to just 22.4% by ESPN Mundo. In contrast, ESPN dedicated none of their coverage to sports based outside of the U.S., compared to 66.1% by ESPN Mundo. Similarly, 77.1% of the athletes in ESPN's posts were American, while ESPN Mundo's posts were of non-American athletes 66.9% of the time. Additionally, while soccer may be considered "the world's game," you would not know it from the ESPN account. ESPN Mundo dedicated 65.7% of their posts to soccer, but ESPN posted about the sport just once for the entire month. These statistics show that there is a disproportionate amount of coverage dedicated to non-American sports and athletes by ESPN on Instagram. This finding is important because ESPN is often relied upon as being the main sports news source in the United States, and thus their coverage of sports is worthy of examination.

**Gimblet, Grayson**

**Supervisor(s): Tessa Posey**

**Mentor(s): Dr. Shani Egodawatte**

**Materials Discovery and Characterization of Luminescent and Scintillating Crystals by Flux Crystal Growth**

The synthesis of new materials has been a driving factor behind many recent technological advances. While there are a multitude of synthesis techniques associated with materials discovery, few offer the potential for success found with exploratory crystal growth. One of the most promising of these techniques is crystal growth from high-temperature solutions, also known as flux growth. Flux crystal growth allows for the synthesis of crystal structures from a selection of alkali metal halide fluxes. Of particular interest are crystals that exhibit the phenomena of luminescence and scintillation. Scintillation occurs when a material becomes excited with X-rays and emits radiation at specific energies corresponding to a visible wavelength of light in specific conditions. Crystals with scintillating and luminescent properties have found widespread use in the field of biomedicine through positron emission tomography (PET) and computer tomography (CT) scanners. In addition, scintillating crystals have been used more recently by homeland security as a component of large-scale radiation detectors used at ports and border crossings. In this study, the synthesis and characterization of novel crystalline structures exhibiting the phenomena of luminescence and scintillation are explored via flux crystal growth.

**Ginns, Ashley**

**Mentor(s): Ms. Tricia Kramer**

**Bridging the Cultural Gap through Study Abroad**

In Spring 2018, I spent the semester studying abroad in Paris, France. I lived right in the heart of Paris and got to experience all of the culture and activities that this history rich city has to offer. I had never left the country before and I was a little bit nervous but also excited.

I studied at the American Business School in Paris and got the opportunity to explore many different places in Europe. I had the privilege of visiting Ireland, Germany, England, Switzerland and many other regions of France. I enjoyed new cuisines and made new friends during my travels to new countries and around Paris.

I decided to study abroad because I wanted to give myself a chance to learn about and experience other cultures. I also wanted to grow in my confidence as a solo traveler and navigating in a country where I did not know the language. Paris is a place where many different cultures call home so I not only got to

experience French culture, but also the many cultures that gather in big cities like Paris. I learned so much about other parts of the world. I learned about their history, their pride and their traditions. I even got to participate in some of those traditions, such as Carnival.

Learning about these other cultures helped me to grow in my confidence and understanding. I gained confidence in being able to talk to people comfortably who came from a different background than I did and I grew in my understanding of other cultures.

I hope to use this confidence and understanding to continue to reach out to new cultures to learn more about them. I want to help bridge the gap between American culture and other cultures. I hope that education can ignite empathy that can lead to us want to help struggling countries grow and care more about each other.

**Gladden, Tymai**

**Mentor(s): Dr. Kimberly Becker**

**Molding Our Future While Helping to Mend Our Children**

How do you expect to raise a child in a world where children are often left behind? As a firm believer that children are the future, I feel it is partially my responsibility to adhere to needs of the children in our world. At USC, I was given the opportunity to intern and volunteer with children with disabilities. Helping our children develop skills that will help them advance in our world is vital – yet our community lacks the proper resources. To increase the outreach and production to the community, I have served as a mentor for at-risk teens in the Columbia area. During my presentation, you will be able to view the lessons I taught with students from both the Autism Academy and the alternative high school. I have included examples of their work and my weekly reports. Not only will you see the growth of my students, but also the growth of me as a mentor and individual. It is my goal to help children understand their purpose in society and understand that their disability or RAP sheet does not define who they are – because children are our future, no matter what course has been set for them or what road their actions may be leading them down.

**Glaeser, Noemi**

**Mentor(s): Dr. Joshua Cooper**

**A computational approach to the Shannon entropy of odd cycle graphs**

The entropy, also known as the Shannon capacity, of a graph is an important quantity in information theory, and can be used to study the capacity of a noisy communication channel to transmit information with no errors. This channel can be represented as a cycle graph  $G$  in which each vertex represents a transmitted symbol and each edge indicates indistinguishability between symbols. A cycle graph is a graph which consists of a single cycle, i.e. a series of vertices connected in a loop. For instance, the cycle graph  $C_5$  represents a communication channel with five distinct symbols in which adjacent symbols can be mistaken for each other due to noise in the channel. The question posed is to determine the most efficient communication schema to transmit data with no errors and maximize precious bandwidth, and this information density is encapsulated by the quantity known as graph entropy.

Due to their graph theoretic properties, the entropy of all even cycle graphs is known. The same quantity is far more elusive for odd cycle graphs, however. In 1979, Lovász famously determined the entropy of  $C_5$  to be  $\sqrt{5}$ . The entropy of  $C_p$ , for all odd  $p \geq 7$ , is unknown, however. In a 2017 paper, Mathew and Östergård used a stochastic search of independent sets guided by possible symmetries to establish the current best known bounds on the entropies of  $C_p$  for  $p = 7, 9, 11, 13$ , and  $15$ .

We build on this research with a computational approach and further analyze the properties of these graphs and their entropies. We verify the rigidity vector subspaces of each cycle graph power and of the maximal independent sets found by Mathew and Östergård. We also develop a codebase that takes advantage of graph sub-structures and uses the University of South Carolina's High Performance Computing

cluster to run quickly and in parallel. The large majority of this code has been released as an open source cycle graph package.

**Glovins, Maura**

**Mentor(s): Dr. Olaf Jensen**

**It's a Trap: A Look at Ecological Succession After the Construction of an Artificial Reef**

This study examines the succession of economically-important species on a Mid-Atlantic artificial reef. Understanding the colonization of new reefs can contribute to the discussion of whether reefs simply attract existing organisms or increase overall ecological production (Bohnsack, 1989). The Manasquan Inlet Reef (MI Reef) is the newest of New Jersey's 17 artificial reefs with its construction beginning in June 2017 (NJDEP, 2017). The MI Reef neighbors the Sea Girt Reef, a well-established artificial reef. Traps were deployed on both the MI and Sea Girt Reef before and after the MI Reef's construction. A Before-After-Control-Impact design was used to compare the two reefs and measure the ecological succession of the MI Reef. Difference in difference values were calculated for black sea bass CPUE, American lobster CPUE, black sea bass size, and diversity. Black sea bass CPUE increased after the construction of the MI Reef (DID= 1.07 fish per trap per day), while Lobster CPUE decreased (DID= -0.28 lobster per trap per day). These differences may have been due to lobster being more attracted to the traps before the reef was constructed, and less attracted to the traps the next 13 months, when the reef acted as an alternative structure. Black sea bass were more abundant in the traps after the construction of the reef, indicating that the MI Reef increased relative abundance of the black sea bass on the treatment site. Black sea bass size and community diversity showed small DID values and similar changes in trends between control and treatment groups conveying that the construction of the MI Reef had no detectable influence on size and diversity. Studying the succession of the MI Reef in years to come will be able to provide more robust data about its inhabitants.

**Goldberg, Scott**

**Supervisor(s): Victoria Adams, Noah Weathersby, Niko O'Day-Vasquez**

**Mentor(s): Dr. David Cardenas**

**The Impacts Tourism Has on the Sustainability of Charleston, South Carolina**

Sustainability is a concept that impacts everyone's lives, yet, is not something that everyone understands. When people first hear the word "sustainability," one of the most common responses is "I recycle!" That's great, but that doesn't even begin to scratch the surface of what it means to be sustainable. Sustainability has three components that constantly overlap and entangle with one another: social, environmental, and economic. For something to be truly sustainable, it must act in a manner that incorporates all three areas while promoting consistent, long-term use of resources without depleting them. Charleston, South Carolina has been chosen as the subject of this study. Using the lenses of local community, businesses, government, and tourists, this study will examine the impacts, both positive and negative, that tourism has on sustainability. The study will use different measures to determine impacts that occur, such as, number of tourists a year, amount of money made through accommodation and hospitality taxes, sources of leakage, total usage of public transportation, and increased traffic density. This list of measures, however, is not the only possible approach. Therefore, the study is likely to evolve and develop as new data is acquired. In this study, the goal is to determine which practices other cities can adopt based on Charleston's successes, and to discover improvements Charleston can make in the areas in which they may be underperforming. Tourism has been shown to be a powerful economic force, but doesn't always benefit the economic, social, and environmental spheres equally. This study is a way to analyze the inequality of benefits gained by the different spheres. Not only will this study determine whether these inequalities exist, but if they do, will also reveal potential solutions to minimize the benefits-gap of tourism, and will develop methods for tourism to become more sustainable.

**Goodwin, Catherine**

**Mentor(s): Dr. Tobias Heinrich**

**Gender and Partisan Cues Influence on Respondent Attitudes towards Foreign Aid Policy**

Literature suggests that there are “male-owned” and “female-owned” issues, or political issue areas that American voters perceive men to be more competent in, and those they perceive women to be more competent in. Literature also tells us that people are more likely to vote with their party. When those cues are competing, by having people of varying party and gender endorse policies, we may analyze how these two influencing factors compete to affect respondent attitudes towards the suggested policy.

**Gopal, Varsha**

**Mentor(s): Dr. John Weidner, Dr. Ben Meekins**

**Electrochemical activity of Pt/C and Au/C Catalysts for SO<sub>2</sub> oxidation in the Hybrid Sulfur Cycle**

The electrochemical activity of platinum on carbon (Pt/C) and gold on carbon (Au/C) for SO<sub>2</sub> oxidation were investigated using rotating disk electrodes (RDE). Historically, Pt catalysts are the most commonly used for this reaction, but recent work suggests that Au/C catalyst could be a viable alternative. The focus of this research was to characterize electrochemical activity of Au and Pt catalysts in various concentrations of sulfuric acid, which represent conditions of the hybrid sulfur cycle ranging from startup (low acid concentration) to steady-state (more acidic). The activity of catalysts can be affected by many variables, such as particle size and active electrode area. Particle size can influence the number of active sites on an electrode. With strong electrostatic adsorptions (SEA), the particle size is decreased, allowing for maximal utilization of the metal particles' surface. Layering smaller particles on the support decreases the volume of each particle, while increasing the active sites and minimizing the use of precious metal. A total of 4 different catalyst inks were tested (commercial Pt/C, commercial Au/C, SEA Pt/C, SEA Au/C) at 0.1M, 3.5M, 7M, and 9M concentrations of sulfuric acid. The results show that Au is, overall, a more active catalyst, as determined by having both a higher limiting current and a lower onset potential for oxidation of SO<sub>2</sub>. The SEA catalysts were found to perform even better than their commercial counterparts. This research is significant now as part of the effort, spurred on by the Savannah River National Laboratory, to meet the Department of Energy goal of producing 500 mA cm<sup>2</sup> at 0.6V of applied potential. Au catalysts could be used in conjunction with photocatalysis in the future to reach this goal and enhance energy production at a lower voltage.

**Gordon, Samantha**

**Supervisor(s): Kathryn Watson**

**Mentor(s): Dr. Stanley Dubinsky**

**Ataturk's Reformation of Turkey and its Continuing Impact on the Turkish Language**

The fall of the Ottoman Empire and birth of the Turkish Republic after World War I brought about significant linguistic changes to the region. Turkey's then president, Mustafa Kemal Pasha, known as Ataturk, initiated radical reforms to westernize and secularize the new nation. This presentation examines these reforms and their impact on the Turkish language, and discusses the resulting conflicts between Arabic and Turkish.

Islam and the Turkish language came to Anatolia with the invasion of the Seljuk Empire during the eleventh century. The language that ultimately became Ottoman Turkish was a Turkish language that borrowed heavily from Arabic and Persian. The expansion of the Ottoman Empire into Europe, Asia, and North Africa from 1300-1700 spread this language across a wide territory. Its gradual decline during the next two centuries, and its defeat in World War I, left the Turks in possession of Anatolia alone. The end of WWI brought about the rise to power of Ataturk, who sought to reform nearly every facet of the country,

and to create a post-Islamic Caliphate Turkish nation-state.

In addition to secularization, Ataturk placed an intense focus on language reformation, changing the alphabet and purging the lexicon of foreign words, especially those originating from Arabic and Persian. His language reforms entered the sphere of religion, where he tried to replace Arabic with Turkish as the language of religion within Turkey. By 1933, The Directorate of Religious Affairs announced that failure to adopt this new recitation would result in penalties. This reformation ultimately failed as Ataturk faced backlash from dissenters who considered the new legislation to be religious persecution, thus ensuing protests.

The lasting impact of Ataturk's reformation is still seen in modern-day Turkey, as modern Turks find Ottoman Turkish unreadable and still use Latin script. Recently, Turkish President Recep Erdogan has pushed for a revival of Ottoman Turkish, retreating from Ataturk's linguistic changes. For example, The National Education Council voted to make Ottoman Turkish and Arabic script courses mandatory in high school. Due to these policies, Turkey is undergoing more cultural and linguistic changes, something we will continue to explore further.

**Gorr, Alexander**

**Mentor(s): Dr. Scott White, Dr. Matthew Kimball, Mr. Kyle Houser, Dr. Erik Smith**

**Response of Intertidal Creeks to 20 Years of Change in North Inlet**

North Inlet is a small, ocean-dominated estuary located on the South Carolina coast that is minimally impacted by humans and protected under the North Inlet-Winyah Bay National Estuarine Research Reserve System. Within the estuary are numerous intertidal creeks, which are small streams that ocean tides cause to fill or drain. These creeks serve as important habitats within the estuary for nekton (free-swimming marine animals). Previous studies show that the geomorphology of a creek plays a role in its habitability. Therefore, it is important to understand how the geomorphology of intertidal creeks changes over time.

This study focuses on eight intertidal creeks that were mapped and measured in 1997. Approximately two decades later, we re-measured these same eight creeks using a combination of terrestrial laser scanning and drone photogrammetry. By comparing data from 1997 and 2016-2018 we were able to observe how the geomorphology of six of the creeks changed on a decadal time scale. Measurements of length, width at 1.5 meter intervals, depth, meander, and percent oyster bottom are compared over the 20 year interval, as well as a one year interval for three of the creeks. Additionally, this study focused on how each creek's substrate affected its rate of change. Three of the creeks had hard substrates composed partly of oyster shells, while the other three had soft substrates of mud. This project is the first to study how substrate affects geomorphological change in North Inlet.

**Granger, Kelsey**

**Mentor(s): Dr. Randy Lowell, Dr. Angela Neal**

**Readers' Perceptions of Sexual Conflict**

Each year, there are approximately 321,500 reported cases of sexual assault in the United States. Interest in addressing the problem of sexual violence has been revitalized by recent social movements that are working towards illuminating the full extent of the problem, beyond just assaults that are reported. When a person reads a survivor's account of an assault, there are many factors that can affect their recall of the account and their view of the validity of the attack. The purpose of this study is to examine the impact of a woman's race (black or white) and relationship status with an attacker (married, dating, or strangers) on reader perceptions of, and memory for, a first-person written account of sexual violence. Participants will be given 12 scenarios containing a written account of sexual violence that occurred with an attacker, alongside an image of the survivor. Each account will be assigned a pseudonym. Following the presentation of the vignettes and photos, participants will be given the pseudonyms corresponding to

each account and will be asked to recall information that they read. Eye movement data (collected with an EyeLink 1000 Plus) will be utilized to investigate how the woman's image and written account are perceived, and cued recall will yield text from participants to analyze for accuracy and valence/arousal of their recall. Giving us moment-by-moment insight into the interaction between the images and vignettes, eyetracking and verbal recall yield an implicit measure of the way relationship and race variables may impact the way sexual violence is perceived by a reader before their conscious filter has a chance to interrupt those processes. Data analysis features linear mixed effects regression in R Statistical Software in which the dependent variables will include eye movement measures on target words and regions of interest in the vignettes, as well as accuracy of recall (via Latent Semantic Analysis) and valence/arousal of the recall.

**Greenawalt, Elijah**

**Mentor(s): Dr. Ronda Hughes**

**Variation in Admission Assessments Among Nurses**

**Background:** Admission assessments and documentation among hospital nursing staff may vary despite procedures to ensure consistency. During an admission, nurses ask patients standardized questions, prompted within the electronic health record (EHR), and record patient responses.

**Objective:** To assess the hospital admission assessment process among admitting nurses before and after implementation of a new assessment tool.

**Method:** An observational study across multiple units at two campuses of a 6-hospital system in the Southeastern US was conducted as patients were being admitted to the hospital. Admission were observed one month before and after a new nurse discharge planning needs assessment tool was imbedded in the EHR. A 41-item form was developed and used to record key elements from observed admissions. The majority of items were coupled into 16 pairs to assess what information nurses asked and whether the information was recorded in the EHR. The other 9 items assessed the duration of the admission, the tone of the nurse and the response of the patient. No identifiers were recorded.

**Results:** The average admission time was 30.7 minutes (ranging from 13 to 73 minutes). Variation in admission times was associated with the type of nurse admitting the patient, the level of patient care and patient responsiveness. Nurses were not with the patient during the admission an average of 4.4 minutes (ranging between 0 to 27 minutes), and performed a physical assessment an average of 4.1 minutes (ranging from 0 to 21 minutes). Admitting nurses were 'fully engaged' or 'caring' 92.9% of the time, while 7.1% were 'disengaged' and 'talking to the computer.' Only 52.7% of the questions nurses asked were observed to have been recorded, 7.6% were not asked, but recorded and 7.1% were asked, but not recorded.

**Discussion:** Since less than half of patient responses to admission questions were recorded during the nurse's patient admission assessment, nurses may have documented some information after the conclusion of the admission assessment or were unable to record some information into discrete data fields. Modifications to how nursing admission assessments are prompted and recorded in EHRs may be warranted.

**Greene, Maddox**

**Mentor(s): Ms. Jennifer Bess**

**Self-discovery Through the Fellowship Application Process**

There is power in allowing yourself to be selfish for a short time in a world that seemingly forces us to think about everything but ourselves. Our responsibilities, others' expectations, and outside forces are often considered more important than taking the time to evaluate our own strengths. During my time as a peer mentor for the Office of Fellowships and Scholar Programs, I have learned that the office always emphasizes that even if an applicant does not receive an award, the application process is still highly rewarding. I believe I would have found this to be true if I had not won the Gilman scholarship as well because

applying forced me to critically assess what set me apart from other applicants — for an hour or so each day, nothing else mattered other than the future I wanted to see for myself. My presentation at Discover USC will not only highlight the amazing experiences the Gilman made possible for me to have across Southeast Asia but, perhaps more importantly, how it gave me the gift of self-discovery and the allowance to be wonderfully, professionally selfish for a while.

**Griffin, Jessica**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Jessica's Journey**

TRIO Upward Bound Peer Tutor:

During the Spring of 2018, I was approached by Lisa Rosdail, the Director of the Opportunity Scholars Program and Director of the new program, Upward Bound to become a Spanish and English tutor for their summer program. Becoming a tutor for Upward Bound, I was responsible for coming up with the lesson plans for Spanish and knowing what to teach for English. I had to figure out how to teach the students the information that they needed, in a way that they could understand. I have never taught a class before, so it was a learning experience for me. I had three classes each day that varied from about five to ten students. I learned to be assertive, confident, and how to speak up, so I can be heard. I am able to take the experiences that I have had as a tutor for Upward Bound and apply them to any thing that I do. In any thing that I do from this point on, I know now that I can be assertive, out-spoken and taken seriously if I believe in myself. This experience made me realize that if I didn't believe in myself, how could I have expected anyone else to believe in me.

**Griffith, Aaron**

**Supervisor(s): Rayana Childers, Chantell Williams, Richard Martinez**

**Mentor(s): Dr. Daniel Kiernan, Dr. Pearl Fernandes**

**Monitoring the Health of the Swan Lake Iris Gardens Ecosystem in Sumter, South Carolina**

Swan Lake Iris Gardens is a black water lake with an abundance of wildlife. It is the only public park in the United States to feature all eight swan species. Swan Lake was chosen as the study site due to its proximity to USC Sumter and as no known study of the plankton community at Swan Lake had been conducted. The high level of biodiversity in the park is an ideal location to learn about different plants and animals and studying the plankton community would serve as an indicator of the health of this lake ecosystem. The objectives of the study were to identify some common phytoplankton and zooplankton in Swan Lake Iris Gardens. Sampling at Swan Lake Iris Gardens was conducted in the summer of 2018 using 100 micron-8" mouth diameter plankton nets. The nets were rinsed, thrown out from the shore to an approximate distance of 15 meters and dragged in. Samples (1000 ml) of surface and depth water was collected. Plankton were identified under the microscope and counted. Some initial results indicate the following trend: Phytoplankton outnumbering zooplankton at the lake surface and zooplankton outnumbering the phytoplankton toward the bottom of the lake. Some of our initial results indicate possibility of vertical migration of the zooplankton. We plan to explore this trend further through long-term weekly and diurnal sampling.

**Grimm, Mia**

**Mentor(s): Mrs. Maegan Gudridge**

**Helping Students Connect to Opportunities Through Campus Communication**

Throughout my senior year, I've had the position of Student Editor at UofSC's Office of Communications and Public Affairs. For me, having this position is a major source of pride and finding it was fate. I interviewed for the public affairs internship within the same office, but afterward my interviewer suggested I

apply for my current position instead. I found that it was a better fit for me, and I accepted it once it was offered.

The main component of my position is to write and organize the university-wide student email that is sent out every Sunday night. I write the feature story that headlines the email and focus each email on a specific theme. I'm constantly trying to find ways to simultaneously combine the things that students want and need to know to achieve their greatest potential at the university. Particularly, I've focused on highlighting the incredible students, programs, and features that Columbia and the university have to offer so they gain greater attention from students. During my tenure, the office has seen increases in the open and click rate of the email, so I've been successful in achieving that goal.

Being the student editor, I've had the opportunity to expand upon my connections at the university, conduct research, and better my interview, writing, editing and photography skills. It's also helped me personally with time management and pre-planning story ideas. Through Google and MailChimp analytics, my team and I have been able to see what factors contribute to a highly-viewed story, and it's allowed us to really hone in on our audience and know what kind of stories to write in the future. This will allow for my replacement to know what stories work best and continue to build upon the success the email and my team have had in the past year.

**Gruber, Cody**

**Mentor(s): Dr. Carmela Gottesman**

**Memory load effects of verbal tasks and mental imagery tasks on boundary extension**

Boundary extension is a memory error in which people recall seeing more of a scene than was viewed. For example, when viewing pictures of scenes, people remember seeing a larger expanse as if they saw a more wide-angle version of the scene than they did. In the present study, we explored the working memory load effects of verbal tasks and mental imagery tasks on boundary extension. Participants were randomly assigned to one of three conditions: list condition, imagery condition, and control condition. Before starting the experiment, participants in all conditions were asked to write down a list of 6 of their favorite food items.

In Part 1 participants viewed a series of 30 images of scenes for 1.5 seconds each. Nine of the 30 images included people. Participants were asked to click each time they saw a scene with people in it to ensure they were focused on the image. The list condition was asked to recite items from their food list while performing the people search. The imagery condition was asked to visually describe items from their food list while performing the people search. The control condition did not perform any additional task.

In Part 2 of the experiment, images of the same scenes were presented again but the expanse of the scene shown was either larger or smaller (randomly). All participants were asked to replicate the images they saw in Part 1. Participants moved a slider to increase or decrease the percentage of the scene shown until it matched the expanse of the image they remembered.

Preliminary results for the control condition replicated prior research using other methods, showing a tendency to expand the boundaries of the image to show more of the scene than was originally presented. Results for the image condition are still unclear, requiring more data. However, the list condition obtained significantly less extension than the control group, suggesting that phonological loop working memory load interferes with the processes driving boundary extension.

**Grzywacz, Josiah**

**Mentor(s): Dr. Joshua Stone**

**Time series analysis of hydromedusae populations within a pristine estuarine system**

Authors: Josiah Grzywacz, Dr. Dennis Allen, Dr. Joshua Stone

Hydromedusae (Cnidaria: Hydrozoa) are a common but often overlooked group of marine and estuarine gelatinous zooplankton found globally. They can periodically become very abundant and have significant impacts on food webs within coastal ecosystems. However, their ecology and phenology in many of the world's estuaries is vastly understudied. In order to examine the ecological role of hydromedusae in the coastal waters of the Mid-Atlantic Bight, we identified and quantified hydromedusae in biweekly zooplankton tows taken with an epi-benthic sled fitted with 365 mm mesh from North Inlet Estuary, SC. We used a dissecting microscope to identify and quantify (individuals m<sup>-3</sup>) the hydromedusae present over two periods, from 1981-1985 and 2010-2014. Temperature, salinity, and dissolved oxygen data were also collected in conjunction with zooplankton net tows. We identified X species present in the samples across the 10 years analyzed. Some species showed seasonal changes in abundance, with some more abundant in warmer, summer months and others in spring or winter. There were also changes in phenology, as we observed variability in the timing of peak abundance between years. We also compared changes in salinity and water temperature to hydromedusae abundance to determine if there are potential environmental drivers of the inter-annual variability in hydromedusae abundance. Calculations of the predation impact that hydromedusae may place on lower trophic levels in the estuary are also discussed using data on the approximate copepod abundance in each sample because copepods are a primary prey item. We found that hydromedusae are a seasonally important predator in North Inlet and should be considered in food-web models of the region.

**Guinn, Shelby**

**Mentor(s): Mr. Duncan Culbreth**

**Engaging in Sexual Trauma Policy Practice**

Being able properly analyze a social policy is extremely important for advocating for targeted populations on a broader, macro-scale. For a social policy class one semester, I had the opportunity to focus on a singular target population, observe a policy that affects it, and interview a beneficiary of the policy. I chose to focus on sexual trauma survivors. In the United States of America, there are few policies in place that fully protect this population. The particular policy that I focused on for survivors is called the Violence Against Women Act [VAWA], an act drafted by Joe Biden [D-DW] and passed in 1994. It recognizes the issues of stalking, sexual violence, dating violence, and domestic violence, with the goals of gathering research and spreading awareness to end these crimes against women.

It is an issue that is a lot more common than most people think and it is something I am very glad that I had the opportunity to see in action during my time volunteering as an advocate for the Sexual Trauma Services of the Midlands. Sexual Trauma Services is a non-profit organization in the Midlands, and its sole purpose is to provide confidential and free care to sexual trauma survivors in the form of counselling, connections to shelters, and other vital resources. As an advocate, I spent 12 to 16-hour shifts on-call answering a 24-hour trauma hotline service, providing a listening ear to survivors in a sexual assault crisis. I also completed hospital advocacy visits to aid survivors with the process of getting rape kits and speaking to law enforcement. It was an enlightening experience, as it helped me apply the theoretical framework and policy learned in class in a real-life setting, while also gaining a fresh perspective on the effects that trauma leaves on an individual and a community.

**Gupta, Girik**

**Mentor(s): Dr. Daniel Freedman**

**Global Gamecock**

My study abroad experience at the University of South Carolina-Columbia has helped me develop professionally and personally. This decision to study abroad was very complex for an adolescent in the 10th grade but fortunately turned out to be a wonderful opportunity to learn in another culture. Not only did I obtain valuable knowledge as a business management major, but also learned more about the cultural values and economies of the United States through my hospitality minor. For me, these experiences enabled me to compare currencies and trends between India and United States, which allowed me to reflect on what I truly need vs. that for which I want. In summary, my experiences as a Gamecock have helped me understand the more of the nuances for being involved in international business.

**Guttman, Annie**

**Supervisor(s): Shelby Carr, Celina Komari**

**Mentor(s): Dr. Alan Waldman**

**The Effect of Progerin Expression on the Frequency and Stringency of Recombinational DNA Double-Strand Break Repair in Mammalian Cells.**

Hutchinson-Gilford Progeria Syndrome (HGPS) is a rare genetic disorder involving premature aging and an average life expectancy of fourteen years. The cause of HGPS is most commonly a point mutation in the LMNA gene that normally produces the protein lamin A, an essential component of the nuclear lamina. The mutated form of lamin A is known as progerin. Interestingly, small amounts of progerin are produced in healthy individuals by alternative splicing of RNA and these low levels of progerin have been implicated in the normal aging process. The aging process is believed to involve changes in DNA repair, and previous studies by others have indicated that progerin delays the repair of DNA double-strand breaks (DSBs). It has indeed been shown that the genomes of HGPS patients accumulate DSBs. Repair of DSBs may occur via the pathway of homologous recombination (HR), which is normally an accurate, templated form of repair, or via the intrinsically mutagenic pathway of non-homologous end joining (NHEJ). Our lab has developed model systems for studying HR and NHEJ in cultured human and mouse cells following artificial induction of a genomic DSB. In this project, we expressed progerin in cells to learn how progerin might alter DSB repair pathways. Earlier work in our lab suggested that progerin shifts DSB repair away from HR and toward the less accurate pathway of NHEJ. In our current work, we present evidence that the rate of spontaneous HR, occurring in the absence of artificial DSB induction, is increased in cells expressing elevated levels of progerin. This finding is consistent with a progerin-provoked accumulation of DSBs or other damage in the genomes of cells. We are taking several approaches to explore the possibility that progerin may reduce the stringency of HR and allow recombination between mismatched sequences, events which could destabilize the genome. We report on our progress on these studies. Collectively, our work aims to provide insight into the ways in which progerin may promote genomic instability and contribute to aging.

**Haddad, Michael**

**Mentor(s): Prof. Matthew Childs**

**Natural Gas Fueling Our World**

In the summer of 2017, I began interning in the natural gas industry. Natural gas is used as an energy source in the production of electricity and as a source of heat in industrial processes. An increasing amount of homeowners choose to have natural gas service installed in their residence. Similarly, industrial factories are using natural gas as a source of power rather than electrical transmission. My first natural gas internship was with Dominion Energy (formerly SCANA Corporation) at a large natural gas power

station nearby in Augusta, Georgia. I worked with the operations and maintenance operators, technicians, and engineers of the plant to develop a thorough understanding of the various mechanical components essential for large scale energy production. My internship tasks involved identifying plant maintenance needs such as broken valves or leaking pipes, designing new piping and chemical control systems, and calculating thermal efficiencies within the plant. Through my internship, I learned how igniting fuel gas can be used to boil water in the most efficient way to provide electricity for tens of thousands of people. The following summer I began working in with the natural gas station design team at SCANA's corporate headquarters in Cayce, South Carolina. We were responsible for designing measurement and regulating stations to service subdivisions and factories needing gas services. My major contribution was reducing drafting time by creating a database of station components so that myself and future engineers could easily create the fabrication details for new stations. This allows the projects to be completed more efficiently giving the customer a quicker turnaround and saving the company money at the same time. In addition, I worked as a cross functional resource between the fabrication and engineering teams to help guide the project to completion starting with the customer request to the final build of the station. Going forward, I plan to draw on these firsthand experiences to aid me in my search of a fulltime position in the energy industry.

**Hailat, Dania**

**Mentor(s): Dr. Nathan Hancock**

**Constructing a New Tol2 Transposase Activation Tagging Plasmid**

Tol2 is a transposable element originally found in Medaka fish (*Oryzias latipes*). Transposable elements are DNA sequences that moves in a "cut-and-paste" mechanism from one genomic location to another. To facilitate this movement, the transposase protein binds to inverted repeats on the end of the element and cuts the element from the genome. From there, the transposase protein is able to insert the element elsewhere in the genome by cleaving the target DNA. The Tol2 Transposase is currently used for inserting DNA sequences into zebrafish (*Danio rerio*) genome. If we were to make a more active version of Tol2 Transposase, we would be able to increase the integration efficiency. In order to test a version of the Transposase that lacks a nuclear export signal, we created a new expression construct. Using Gateway recombination, we combined four plasmids together that include a heat shock promoter, Tol2 TPase -NES, and a terminator into the destination vector p395. We checked whether this plasmid was made correctly by performing PCR and restriction enzyme digests. Both tests conducted were successful, confirming that the generated construct was indeed comprised of the desired components. Our next step is to inject the construct into zebrafish to determine if this altered version of Transposase can increase transposition.

**Hajji, Adam**

**Mentor(s): Mrs. Asheley Schryer**

**Blockchains for Supply Chains**

A blockchain can simply classified as a data file on a computer that stores information. The blockchain is a unique as information is duplicated along a series of computers. Each 'block' of information that is duplicated contains a link to the previous block. These links are encoded as to protect the integrity of the 'chain' that forms along multiple links. The blockchain in its entirety is viewable to anyone with permission or clearance. In recent news, blockchain has been considered revolutionary as a form to exchange currencies but can be used in several revolutionary ways. Using my skills gained from studying International Business and Supply Chain I will attempt to explain the importance of Blockchain technology in terms of transparency along the global supply chain. This interest in transparency began for me during the summer of 2016, when I studied at the Federal University of Santa Catarina in Florianopolis, Brazil. During my time abroad, I took many excursions- most were very scenic and awe-inspiring. One day, I was on a trip to Rio De Janeiro and had heard about an eye-opening trip to a poor community, called Rochi-

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na, situated on one of the largest divides of rich and poor in the world. Feeling the need to take a step away from the glamor of traveling, I took the half-day guided journey through the community. My life changed forever as my eyes truly opened to a whole new side of the world that was dark and not readily mentioned. Inequality was seen throughout the region and was due to grand and systemic corruption. I learned that a lack of transparency among public officials allowed for this corruption to ensue. A new passion burned in my heart to improve the lives of people harmed by a lack of transparency. At the Copenhagen Business School, the topic came up in my Global Supply Chain Management course when I was introduced to Blockchain in the supply chain. The solution was revolutionary, and the rest of the world needed to learn about it.

**Haley, Margaret**

**Mentor(s): Ms. Kayla Smith, Ms. Jenna Smith, Dr. Abigail Hogan, Dr. Jane Roberts**

**Physiological Regulation of Frustration and Externalizing Behaviors in Preschoolers with Autism Spectrum Disorder**

Approximately 70% of children diagnosed with autism spectrum disorder (ASD) also present with diagnostic criteria for at least one other psychological disorder. Among the most prevalent comorbid disorders diagnosed in children with ASD are anxiety disorders, attention-deficit/hyperactivity disorder, and oppositional defiant disorder. Previous research has indicated that externalizing behaviors in children can be used as a marker of future comorbid disorders as well as increased aggression in adulthood. Externalizing behaviors are a set of behavioral patterns, such as difficulties with conduct and control, antisocial behaviors, and hyperactivity, that stem from a child acting negatively on the external environment. This study aims to determine the relationship between physiological regulation in response to frustration and severity of externalizing behaviors in children with ASD and typically developing (TD) controls between the ages of 36 and 48 months. Frustration was elicited using the End of the Line task of the Laboratory Temperament Assessment Battery in which the parent places an attractive toy out of the child's reach (i.e., challenge period) after an initial period of engagement. After 30 seconds, the toy is returned (i.e., recovery period) and the child is allowed to resume play. Respiratory sinus arrhythmia (RSA), a measure of the variability in heart rate due to respiration, was measured using a heart rate monitor throughout the task. Physiological regulation will be calculated as the difference between the RSA during the recovery period and the RSA during the challenge period. The severity of externalizing behaviors will be assessed through the Externalizing Behavior subscale of the Child Behavior Checklist. Based on previous research, it is hypothesized that children who are less effective at regulating their RSA will have a greater severity of externalizing behaviors. Determining a predictive connection between these two variables could ultimately lead to earlier intervention for young children with ASD who exhibit externalizing behaviors.

**Hall, Triston**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Triston's Life in Real Time**

I originally took this position in the spring semester of 2018, because I needed a little extra money. After having been in this position for a little over a year now, I have discovered that I love to teach and tutor anything and everything from Math to studying skills, to French to Geography. Over the summer of 2018, this position really came into effect, when I was teaching Math and French to the high school students, that are apart of USC Sumter Upward Bound Program. I discovered my love for teaching, because of the look that students get on their face, when they finally grasp a concept is the best thing in the world. To me, this experience meant everything and even helped me to settle on a major.

**Hall, Bryan**

**Mentor(s): Ms. Maegan Gudridge**

**Restorative Justice in the American Legal System**

During the Summer of 2018, I interned at the Richland County Public Defender's Office in Columbia, South Carolina. Prior to the internship, I wanted to pursue a legal career in criminal prosecution. I chose to intern for the Public Defender's Office because I believe that as a Criminal Justice major, exposure to the practice and realities of our legal system was crucial for my education. I worked approximately 20 hours a week for two months on numerous cases ranging from minor traffic violations to murder. After my experience, I realized my preconceptions about our legal system were rooted in the normative ideas of our system and not the empirical realities. Our justice system is based on the ideas of due-process and equal protection for all without regards to a defendant's race, background, or mental state. I found that, in practice, there are institutional biases within our justice system which have very important implications for individuals. Many of the clients our office represented suffered from mental health issues or substance abuse. I found that our legal system focuses more on retributive and incapacitated justice for all, when it would be in the best interest of society to focus on restorative justice for these individuals. My experience at the Public Defender's Office can perhaps shed light onto some of the experiences and difficulties that many in our system are faced with and find new reformatory ways to seek justice for those who are left behind by a system sworn to protect and serve them.

**Halvorson, Olivia**

**Mentor(s): Dr. Ambra Hiott**

**Abundant Traveling, Abundantly Living**

One of my objectives throughout college was to understand more about humans and cultures in different parts of the world, so I have taken every opportunity I can to travel and join people from whom I can learn. I was lucky enough to visit 23 countries during my life, and I spent time in some of the richest and poorest places on Earth. During my trips to developing countries, I met people whose love was genuine, and I experienced life wherein everyone had to rely on each other for safety and support. In the spring of 2017, I went to both the Dominican Republic and Malawi with the Methodist Student Network. We managed a mobile eye clinic and distributed prescription eyeglasses to people living in local villages, and during spring break of 2019, we went to Ecuador to do it again. These people taught us how to love more deeply and live with more excitement. In developed countries, my takeaways were a little different. I learned about efficient ways to enact political policy and approaches to designing a society that worked differently but just as well as society in the United States. My semester studying abroad in Norway was one of the most transformative times in my life, and I was able to immerse myself in the rich, functioning, freezing culture that they created. Spending time with people from different places is one of the most wonderful ways we can experience abundant life.

**Hampton, Shekinah**

**Mentor(s): Dr. Nathan Hancock**

**Determining how often SNP rs4988235 can predict Lactose Intolerance**

Study by: Shekinah Hampton, Michela Treadway, Sophie King, and Dr. Charles Hancock

Lactose intolerance is a condition that affects many people; being most prominent in Asian, African, and Native American populations. Lactose Intolerance occurs when the small intestines do not produce enough of the digestive enzyme Lactase. Due to the improper digestion of lactose, various symptoms occur; such as, bloating, gas, and diarrhea. Previous research has suggested that a Single Nucleotide Polymerase (SNP) associated with the Lactase gene, SNP rs4988235, can be used to diagnose Lactose Intol-

erance. SNPs are variations of nucleotide sequences in the genome. My study is on whether rs4988235 is useful in diagnosing Lactose Intolerance in the University of South Carolina Aiken population of students and staff. Volunteers were asked to self-diagnose themselves; telling us whether they show symptoms of Lactose Intolerance. Participant's DNA was collected and rs4988235 was tested using a Taqman assay. After testing over 50 participants, we observed individuals with the expected match between the lactose intolerance alleles and their self-reported symptoms, but we also observed individuals where the rs4988235 alleles suggest they should be able to digest lactose, yet they report lactose intolerance symptoms. We are interested in understanding the mechanisms occurring in these individuals whose symptoms don't not correlate with their suspected genes.

**Hannah, Carly**

**Mentor(s): Dr. Irma Van Scoy**

**A Culture Built by an Ecosystem**

During the spring semester of 2018, I had the amazing opportunity to study abroad in Suva, Fiji at the University of the South Pacific. I knew I wanted to go to the south Pacific to study as I am a marine science major and hope to do my research on coral reef resource usage and conservation; an ecosystem that is heavily relied on in the south Pacific. I chose Fiji because they are an island nation that still practices much of their traditional culture, which impacts how they use their coastal resources. I wanted to learn about the sustainability of their practices and use this knowledge to develop a deeper understanding of how these practices can be implemented in other coastal towns globally. Through my classes and personal travels around the island I was able to gain hands on experience working on coral reefs and talk with the locals about the importance of their ocean resources. I realized how much even small changes and efforts can make a large difference in an ecosystem and a community. My understanding of people's reliance on our ocean resources, both globally and locally, is much deeper than before my travels and I feel much more confident in my knowledge and how I will apply all that I have learned in my career and research. Fiji brought an abstract idea of my passion for the ocean into a real-world understanding. In a world that is rapidly developing, with continued overexploitation of our natural resources, the people of Fiji understand the importance of a balance between preserving their resources and culture while still making an impact in a world that is rapidly globalizing; a concept everyone can learn from.

**Harman, Maggie**

**Mentor(s): Dr. Linda Shimizu, Mr. Dustin Goodlett**

**Benzophenone Macrocycles and their Application as Triplet Sensitizers**

Urea-tethered benzophenone linear analogs and macrocycles have been synthesized to investigate how urea-urea hydrogen bonding driven assembly effects benzophenone's behaviors once in the triplet excited state. Benzophenone is a known triplet sensitizer that, when excited, readily undergoes intersystem crossing into its triplet excited state. Once in the triplet state, in solution, benzophenone can abstract a hydrogen from the solvent to form a short-lived ketyl radical that typically reacts with the ketyl radical of another benzophenone molecule nearby thus generating benzopinacol. However, upon solid-state assembly, the ketyl radical is formed via hydrogen abstraction from a neighboring benzophenone molecule in the crystal thus generating a persistent triplet radical pair. We are currently investigating how replacing urea with new assembly directing moieties can create new crystal forms, which vary the types of hydrogens in close proximity to benzophenone's carbonyl oxygen, in order to gain a better understanding of persistent triplet radical pair generation. Another process that benzophenone can undergo is a triplet-triplet annihilation pathway with ground-state oxygen to generate the reactive oxygen species, singlet oxygen. Singlet oxygen can be produced chemically and by photochemical sensitization. When molecular oxygen is excited by UV radiation in the presence of a triplet sensitizer molecule—like benzophenone—it can efficiently generate a singlet oxygen. The benzophenone bis-urea macrocycle is a photosensitizer

with a large planar structure, and generating singlet oxygen in solution is generally favored over generating it in the solid-state. In the solid state, there is reduced generation due to aggregation-caused quenching (ACQ) with weak fluorescence and aggregates in  $\pi$ - $\pi$  stacking. Singlet oxygen is an efficient oxidant in many industrial fields and has the potential for application in a variety of areas including the photodynamic therapy (PDT) of cancers and wastewater treatment.

**Harmon, Andrea**

**Mentor(s): Dr. Elise Lewis**

**Interning at the South Carolina Center for Community Literacy (SCCCL): bringing together information science and professional engagement**

During the Spring 2019 semester, I worked as an intern for the South Carolina Center for Community Literacy. SCCCL is an innovative public library specializing in materials for children. SCCCL's collection and location serves several purposes: as a precisely curated collection of award-winning fiction and nonfiction books, as an inspection site for newly published children's materials, and as a site for UofSC's classes and community workshops. Additionally, The Linda Lucas Walling resource and materials collection highlights universal access and materials for children with disabilities. Cocky's Reading Express (CRE), UofSC's community outreach program which aims to strengthen literacy in Title 1 schools, has its headquarters at SCCCL.

During my internship, I gained hands-on experience working with SCCCL's new collection management system, Follett Destiny. I have applied the children's literature concepts from my coursework to assist in choosing appropriate reading and supplementary literacy materials to be included in CRE literacy kits and for populating book displays. Working from previous professional knowledge, I have supported the management and distribution of the finite resources available for the CRE program. I have curated photographic archives that have been utilized for the illustration of an interactive CRE location map. I have compiled book lists used as resources and for future literacy program applications. Drawing on my SLIS coursework, my previous library and management experience, and the skills I am learning at SCCCL, I will be better prepared for graduate school and for my future career as a youth services librarian.

**Harris, Chloe**

**Mentor(s): Mr. Ian Neville, Prof. Jay Pou**

**The Power Possessed in Understanding Business Metrics**

In the field of business, it is important to understand various quantifiable measures because these measures allow an individual to track and assess the status of a specific business process. In my pursuit to attaining GLD for Professional and Civic Engagement, I realized that I immersed myself into a rather strong leadership role with Amazon. My presentation will focus on a system known as Rodeo alongside other excel spreadsheets that are comprised of various metrics that allowed me to clear customer orders in a timely manner, monitor the headcount of associates and balance the overall workload for a particular shift. As a process guide, I was granted the opportunity to see how various metrics influenced operations throughout an entire fulfillment center. It exposed me to cross-departmental communications and dependencies. Observing and more importantly, aiding and actually being a part of the objectives of the management team, truly exposed me to the world of business operations. Within management meetings, hearing terms I thoroughly learned about in class (such as bottleneck and FIFO), enabled me to be vocal in, and not just listen to, the business conversation. When partnering with managers, I learned ways to motivate and engage associates. It provided me with a chance to break out of my introverted shell and get to know the associates I led on a nightly basis. This, consequently, heightened the likelihood of established benchmarks being met. Within any business model, if benchmarks (or objectives) are met, then success is attained.

**Harris, Brianna**

**Mentor(s): Dr. Stephen Thompson**

**Clean Eating in Regards to Athletes**

Spring semester of senior year, I was given the opportunity to work alongside registered dietician, Elizabeth Money, at APEX Athletic Performance to help with the NFL Combine and Pro Day Camp. APEX is a strength, conditioning, and physical therapy facility for middle and high school athletes, college athletes, and professional athletes. I interned at APEX during the fall of my senior year with the physical therapist and physical therapist aid because I have aspirations of becoming a sports physical therapist one day. After learning about my experience as a nutrition intern with the athletic department here at USC, Elizabeth asked me to come back and assist her with the NFL Combine and Pro Day Camp this semester. I help her every Monday and Friday with food order forms and snacks for each athlete that pays for the nutrition services. I order the athlete's lunch and dinner meals and prep their snack bags for the entire week, ensuring that their lunch, dinner, and snack bags amount to the total number of calories they need to consume each day. I also create infographics about healthy eating tips, clean eating, and eating disorders for marketing to post on social media. Creating infographics and working with professional athletes has really taught me more about the athlete diet and how most athletes eat too clean. The number of calories athletes consume depends on the athlete's body type and position in their respective sport. But often times, athletes do not consume enough calories to maintain bodily functions, causing them to have an eating disorder. Similar to EXSC 444, my practicum prep class, this experience has taught me how to cope effectively in unfamiliar situations and create an atmosphere conducive to positive relations. It has also helped me better understand the relationship between nutrition and physical therapy, and how prominent a role nutrition plays in preventing injury and or helping an individual recover from an injury. Understanding the true meaning of clean eating for an athlete has prepared me to better serve this population when I become a physical therapist.

**Hasanain, Shahd**

**Mentor(s): Dr. John Eberth**

**Designing and Fabricating a Perfusion Bioreactor for Recellularization of Decellularized Vascular Grafts**

Cardiovascular disease accounts for approximately 800,000 deaths in the US alone. Of those, the majority are related to coronary artery disease (CAD). While advances in the medical field have reduced the number of deaths caused by CAD in the past decade, it is still considered to be the leading cause of death in developed nations. A common therapy for severe CAD entails bypassing or replacing the diseased vessel with a vascular graft. In recent years, the development of tissue engineered blood vessels has achieved significant advancements towards long-term patent graft development with decellularized grafts providing one promising area of study. In prior and ongoing studies we've examined various decellularization methods to determine which method retains the healthiest extracellular matrix (ECM) for small diameter vascular grafts. Retaining a healthy ECM is crucial as it confers the natural biomechanical properties to the graft and enhances cell repopulation and differentiation within the scaffold to avoid occlusion and restenosis. However, in order to advance these grafts towards clinical implementation, endothelial and smooth muscle cell repopulation of the decellularized ECM must be achieved. Hence, to investigate and evaluate cellularity and cellular repopulation potential, a biomimetic perfusion reactor was designed, fabricated, and evaluated for this study. This bioreactor is capable of imaging and examining the recellularization process during a long-term culture. Observations and results contribute to the development of an effective graft material as an "off-the-shelf" option for replacement of small-diameter vessels.

**Hatfield, Sarah****Supervisor(s): Sarah Bradley, Steffi Marti, Michael Miah, Andrew Capirossi****Mentor(s): Dr. John Jensen****Logistics Operations Warehousing/Transportation Process Optimization**

CCBCC is experiencing resource contention within its warehousing and transportation operations resulting in waste that manifests itself as detention and assessorial charges, late pickups and deliveries, and out of stocks. The scope of our project is to provide process improvement suggestions, with the associated benefits through a DMAIC analysis of the current business practices for tendering, loading, picking up and delivering freight movements.

**Hayes, Monique****Mentor(s): Ms. Theresa Harrison****Global Learning in España**

During the Spring of 2018 I studied abroad through the International Business Exchange program in Madrid, Spain at IE University. I chose Madrid as my study abroad city because I've always loved Spanish culture and have been studying Spanish for over ten years. I chose IE University because it's ranked the third best business school in Europe, and I wanted to enhance my international business learning at a top business school. Furthermore, I wanted to study abroad to expand my understanding of cultures across the globe, and with a diverse group of students from all over the world, IE and Madrid were the perfect fit. The semester as a whole was a significant experience for me because it provided hands-on experience learning more about Spanish culture, challenged by own understanding of America in comparison to the United States, and allowed me to meet and foster friendships with an extremely diverse group of people. I was able to understand how my new friends reacted to various hot topics discussed in the U.S., such as immigration or the effects of Brexit on UK citizens and multinational companies. The semester I spent in Madrid made me more aware of my own biases and the importance of understanding other cultures, emphasized my desire to travel and explore new places, and the opportunity that I have to use what I've learned in my future plans to help others be more aware of the value in understanding and experiencing diverse cultures and ways of thinking.

**Heath, Lauren****Mentor(s): Prof. Rico Reed****Hands-on Experience Contributes to Professionalism**

During my time as an intern at Hurricane Junior Golf Tour, I learned a lot about what it means to be a leader, a professional, and a team member. During the junior golf events we ran each week, we were each given several tasks that pertained to the day. My own duties included preparing documents, setting up the golf course, starting and scoring players, interacting with parents and spectators, and staying in constant communication with my coworkers and manager. Being a part of these events and having a first-hand look at event management taught me how important each step of the process and each element and person is to the success of the organization. In addition to the physical work we did at each event, we also got the chance to hear from the executive managers of the company and get advice from them about various topics such as networking, interviewing, communicating professionally, and helping run a business. Through both the hands-on experience and interpersonal conversation, I was able to get a look into what it will be like when I enter the workforce and begin my professional career. I believe that this opportunity has helped prepare me for my future.

**Heck, MacKenzie**

**Mentor(s): Dr. Toni Torres-McGehee, Ms. Sam Weber**

**Contribution of Sport-Related Concussion and Injury on Mental Health of the Student-Athlete**

Mental health disorders like depression and anxiety are common in student-athletes who have encountered a concussion. The symptoms of depression and anxiety resemble those of concussive injuries and can include anger and low self-esteem. In addition to academic, athletic, and personal stressors, risk factors like low self-esteem and anger play a role in susceptibility to mental health disorders and recovery from injury. Understanding the prevalence of mental health disorders and risk factors after a concussion is important and necessary to provide recommendations for allied health professionals (e.g. athletic trainers).

**Purpose:** To estimate the overall prevalence of depression, anxiety, anger, and low self-esteem in collegiate student-athletes with previous concussions.

**Methods:** Collegiate student-athletes (n=206, females: n=172, males: n= 34; age: 17.8 ± 1.3 years, height: 169.9 ± 9.5 cm, weight: 66.3 ±10.75 kg, BMI: 22.7 ± 2.5 kg/m<sup>2</sup>) were recruited from a NCAA Division I Institution to complete an online survey via SurveyMonkey. The survey included demographic questions, previous concussion information, the Beck Depression Inventory II, the Beck Anxiety Inventory, Anger Index Self-Test, and the Rosenberg Self-Esteem Scale. Basic descriptive statistics and Chi-square analyses were used to examine significance and distribution for demographics, depression, anxiety, anger, and low self-esteem by previous concussion frequency.

**Results:** Results will be presented at Discovery Day 2019. Data is currently being analyzed.

**Conclusion:** TBD

**Heidari, Lilly**

**Mentor(s): Dr. Michael Dowdy**

**Documentary Poetry from the Great Depression to the Great Recession**

Documentary poetry emerged in the 1930s from the New Deal's documentary visual culture, blending documentary filmmaking and journalistic techniques with poetry. Writers explore the perspectives of the traditionally silenced, the ones not seen, the "other," giving voice to typically unheard stories and experiences. My research centered around reading and analyzing different documentary works, focusing on finding similar themes in this vast and developing genre. I read collections such as Solmaz Sharif's *Look*, C. D. Wright's *One Big Self*, and Natasha Trethewey's *Native Guard* and examined their modes of storytelling and voice-giving. I also researched allusions noted in their works to gain a more comprehensive knowledge of the work and what kinds of histories, politics, and mythologies these writers work with, incorporating many intricacies and implications in the language itself.

My work actually resulted in more questions related to voice; this research urged me to think about who has a voice in today's mainstream society. Who gets to speak and who is heard are groups people often don't question; documentary poetry points to these inequalities. My results include a more comprehensive knowledge of these problems and enhanced critical thinking skills about these issues, especially because of the connections I've drawn between works and genres. This research is important because of today's national and international politics; divisions, walls, and exclusion seem to abound in this era of voices talking over each other. Just as documentary poetry leads us to question power structures with enjambed syntax and surprising juxtapositions of images and statistics, so must we as citizens break down social implications of what it means to have a voice, to give voice to others without appropriating

their stories or cultures, and to operate as social beings concerned with equality. My research found that documentary poetry consistently leads us to question how we use language to talk about personal and collective experiences and which voices are louder than others.

**Heinichen, Abby**

**Supervisor(s): Catherine O'Byrne**

**Mentor(s): Dr. Abbi Lane-Cordova**

**Association of Mid-pregnancy and Current Exercise with Arterial Stiffness 6 Months-3 Years after Delivery in Women**

**Introduction:** Regular exercise is associated with lower cardiovascular disease (CVD) risk. Pregnancy influences longer-term CVD risk for women, regardless of their previous prenatal risk level.

**Purpose:** To assess whether prenatal and/or current physical exercise levels were associated with arterial stiffness in women 6 months-3 years after a singleton delivery.

**Methods:** We performed gold-standard measurement of central arterial stiffness (aortic pulse wave velocity; PWV) in 19 women (mean age=34±1 yrs; mean BMI=27.0±2 kg/m<sup>2</sup>; 15 white/3 black/1 Asian). Participants were asked to recall leisure-time exercise performed during mid-pregnancy, as well as current exercise habits, and reported both using a validated survey (Godin Leisure-time Exercise Questionnaire). We used linear regression to determine associations of mid-pregnancy and current exercise with PWV, adjusted for age.

**Results:** Average exercise units were 39±6 (mid-pregnancy) and 43±7 (current). Mean systolic and diastolic blood pressures were 111±3 and 70±2 mmHg, respectively; mean PWV was 6.4±0.3 m/s. Mid-pregnancy exercise score (b=-0.02±0.01, p=0.051), but not current exercise score (b=-0.01±0.01, p=0.24), was associated with PWV after adjustment for age.

**Conclusion:** Mid-pregnancy exercise levels were significantly associated with PWV 6 months-3 years after delivery. The findings suggest that exercise during pregnancy may be important for influencing longer-term maternal vascular function.

**Henderson, Cameron**

**Mentor(s): Dr. Susan Lang**

**Linking Nutrients to Microbial Metabolism in the Lost City Hydrothermal Vent System**

The Lost City Hydrothermal Vent Field is an area of exposed mantle crust on the mid-Atlantic Ridge that is driven by water-rock interactions and characterized by high temperature and high pH conditions. Lost City is an aphotic environment, making the dominant biological reactions chemosynthetic rather than photosynthetic. The water-rock interaction of serpentinization has the primary control over fluid chemistry, occurring when seawater percolates into the rocky subsurface and reacts with the exposed mantle rock (specifically peridotites), resulting in fluids rich in hydrogen, methane, and other reduced compounds. This hydrogen is then used in chemosynthetic organisms to form the basis of a complex food chain independent of photosynthesis. In the Fall of 2018, a 22-day research expedition AT42-01 "Return to Lost City" was conducted in a joint biological, chemical, and geological effort to discover more about serpentinization-driven environment and the microbes that dwell there.

The aim of this project is to identify the link between microbial-limiting nutrients and carbon utilizing metabolisms at Lost City. Hydrothermal fluid samples were collected from venting chimneys across the field and analyzed for silicate, nitrate, nitrite, phosphate and ammonium concentrations. In addition, formate incubation experiments were performed to determine if this compound, which is present in high

concentrations in Lost City fluids, is oxidized by microorganisms. Hydrothermal fluids were treated with various conditions (filtering, acidification, filtering + acidification, and no treatment) and spiked with  $^{13}\text{C}$ -labeled formate. The  $^{13}\text{C}$ - $\text{CO}_2$  content of these samples was then determined to identify formate oxidation. Finally, both data sets are compared to each other in order to identify any relationships between potential nutrient limitation and formate oxidation.

The incubation experiment demonstrated that the conversion of  $^{13}\text{C}$ -formate to  $^{13}\text{C}$ - $\text{CO}_2$  was higher in 'no treatment' and 'filtered' samples when compared to acidified treatments. Curiously, filtered and unfiltered non-acidified samples had similarly high levels of conversion, suggesting some of the activity may occur extracellularly. While the nutrient data is still being processed, the anticipated result is that extreme nutrient limitation may influence microbial activity and therefore, the rate of formate oxidation.

**Henderson, Cameron**

**Mentor(s): Dr. Susan Lang**

**The Application of Solid Phase Extraction for Dissolved Organic Carbon Isolation at Varying Volumes**

Solid Phase Extraction (SPE) is a technique in which water is passed over a polar stationary phase with the intent that solely organic molecules will attach to the phase while everything else, including salt, passes through. The organics are then removed from the phase with a solvent, creating an eluent ready to be analyzed by a variety of methods. The technique was popularized in the 60s, but has since seen a revitalization since the 90s, when scientists realized it was cheaper and, just as important, more flexible than techniques of similar nature. Because the technique has a broad array of applications, scientists have used SPE extracts for numerous analytical techniques. However, there has not been much research done on its application in determining its viability to measure the delta Carbon 13 ( $\delta^{13}\text{CDOC}$ ) of dissolved organic carbon (DOC) in sample water. DOC is the total amount of dissolved organic carbon, such as decomposed plant and animal residues, root exudates, living and dead microorganisms, soil biota, etc.  $\delta^{13}\text{CDOC}$  measures the ratio of carbon-12 to its isotopically heavier isotope carbon-13 against a standard. Both DOC and  $\delta^{13}\text{C}$  are integral in identifying and characterizing aquatic systems. The goals of this project were to test how much DOC is recovered at different volumes of sample water that were passed over an SPE phase and to identify how the  $\delta^{13}\text{C}$  signature is affected.

In this experiment we had recoveries (amount of DOC eluted from the SPE cartridge / amount of DOC passed over the SPE column) and  $\delta^{13}\text{CDOC}$  values changing depending on sample treatment. In contrast to our predictions, the recovery of DOC increased with the volume of river water passed over the phase. Simultaneously, the  $\delta^{13}\text{C}$  became more  $^{13}\text{C}$  enriched with larger volumes. These observations provide a compelling case to further investigate the effects SPE has on larger loading volumes. In addition, this experiment birthed the lab's first official protocol for SPE, allowing dozens of future undergraduate and graduate students alike to pursue this procedure.

This work was supported in part by the South Carolina Honors College Exploration (or SURF) Scholars Research Program

**Herbert, Austin**

**Mentor(s): Dr. Kristina Ramstad**

**Genomic population structure of American wood storks**

American wood storks (WOST, *Mycteria americana*) are large, non-migratory birds native to the southeast US, the Caribbean, Central America, and South America. They are the only stork species that nests in North America and are federally protected as threatened under the Endangered Species Act. WOST use thermals to soar; air uplifting off the surface of the earth allows them to travel distances over land, but infrequently over open water. Thus, gene flow (exchange of individuals between populations that subsequently produce chicks) is likely restricted between WOST colonies on opposite sides of the Caribbean

Sea and the Gulf of Mexico. In this study, we ask if there significant genetic divergence between WOST that nest at the extremes of their geographic distribution. We sequenced reduced representation libraries of US (n=19) and Brazilian (n=20) WOST and identified over 18 thousand single nucleotide polymorphisms (SNPs). Preliminary analysis of 3RAD data suggests significant but low genetic divergence between WOST that nest in the US and Brazil. Further capture and sequencing of WOST broadly will allow for the most powerful analysis of WOST genetic populations structure to date, which is critical for defining the proper scale of management for WOST, understanding dispersal and connectivity among nesting colonies, and assessing the susceptibility of individual colonies to local extinction.

**Hernandez, Sierra**

**Mentor(s): Dr. Nina Moreno**

**GLD, Study Abroad, and A Religious World**

During the spring semester of 2018, I went on exchange to study abroad at the Chinese University of Hong Kong. I am an International Business and Marketing major, and all International Business majors have to apply to study abroad and pick a ranking of 11 schools. I did not know which school I was going to end up with when I applied, but I received my second choice, which was in Hong Kong. Even though I ended up going to my school of second choice, I was relieved because I knew going to Asia, that I would learn so much more about the world and myself than I would have going to Europe. I took four classes while abroad, they were all business courses, but they all touched upon Chinese culture in some aspect. I aspire to have an international career that will take me to foreign places where I have to learn about local culture and people. This study abroad has helped me take those first steps, it has helped me learn to observe, respect, and connect deeper with different local cultures, traditions, and people. I went out and explored sites and experiences that helped me learn about the ways of life of the people of China and Southeast Asia. The five-month journey was significant because I have never been exposed to Asian and Southeastern Asian countries, and this experience has helped me become more well-rounded. I will talk about the exploration of different religions abroad and the importance of stepping outside one's comfort zone.

**Hernandez, Anna Rose**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Anna Rose's College Experience**

In USC Sumter, I joined my LGBTQ club (IRIS) in the fall of 2018. The club was to make people feel safe, accepted, welcomed, and have a supportive environment. My friend and I were at club day and decided to sign up to the club. Although I am straight, I joined the club to support a friend of mine who had trouble coming out. I found that people were very accepting there, and it even made me feel comfortable to be in the club. They even accepted someone who was straight. It is a small club, but we all support each other, and we all go through it together.

**Hester, Miles**

**Mentor(s): Mrs. Sarah Gay**

**SI Peer Leadership from a Technical Perspective**

The summer before my last year at USC, I was searching for ways that I could give back to the university that had given me so many great experiences. After careful consideration I decided to apply to become a SI Leader for Computer Science. The Supplemental Instruction Peer Leader program in the Student Success Center offers students the opportunity to engage with their peers and promote academic success while giving the peer leader the chance to grow personally and professionally. My most significant contribution to the University of South Carolina has been my service in the role of a SI Peer Leader for the Algorithmic Design II (CSC 146) course. Becoming an SI Leader has allowed me to gain several insights

into how I can be a better student and leader. These insights include how to convey complex topics across disciplines, how to collaborate and work as a team, and the necessity for constant learning and self-improvement. Serving in this role has also impacted me by helping me grow professionally, develop critical thinking and leadership skills, and practice effective communication techniques. In my presentation I will discuss the insights I gained concerning my leadership skills as well as the impact that being an SI Leader has had on both me as an individual and my overall college experience. In the future, I hope to apply the insights and skills I've developed from my experiences as an undergrad to emerge as a leader in my career and strengthen my relationships with others both professionally and personally.

**Hill, Gabby**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Trip Down G.Hill Lane**

During the spring semester of 2018, I was asked to become an ambassador for the USC Sumter campus. As an ambassador, I have roles and responsibilities, because I am a representative of the University. One of the main events on campus the ambassadors are responsible for is volunteering at S.O.A.R., also known as Student Orientation and Registration. There are usually four S.O.A.R. events that are held over the summer for incoming freshman. As an ambassador, I help students find the auditorium and answer any questions before the day begins, I give the new students tours of the campus, I introduce them to their advisors, and I help them register for classes. I also have the responsibility to volunteer at University of Opportunities, a program for middle schoolers in the area to tour the campus and participate in activities with some professors on campus. Becoming a University Ambassador was one of the best decisions I have ever made. I have made new friends on campus that I may have not met otherwise, I have learned leadership skills, and I have gained new experiences, all because I became a University of South Carolina Sumter Ambassador.

**Hill, Kathleen**

**Mentor(s): Dr. Gabrielle Turner-McGrievy**

**Diet dispute: Comparing nutrient differences among popular weight loss diets**

As the obesity epidemic continues to threaten the health of many Americans, individuals look for ways to lose weight and live healthier lifestyles. Popular diets are a common method individuals turn to lose weight and prevent further weight gain. There are numerous popular diets on the market that offer promises of weight loss, but it is unclear how these diets differ in terms of nutrient content. Significant differences in nutrient intake could impact an individual's health far beyond just the surface level of weight loss. A total of 40 best diets were rated by the USNWR each including a one-day sample meal plan along with the breakdown of nutritional content. Diets were categorized into four groups based on macronutrient content and foods allowed: (1) Moderate (e.g., Weight Watchers), (2) Plant-based (e.g. Ornish), (3), Low-carbohydrate (e.g., Atkins), and (4) Meal replacements (e.g., Slim-fast). One-way ANOVA with Tukey's post-hoc analyses were conducted to examine differences in the nutrients among the four groups. There were no significant differences in kcals ( $p=0.20$ ); or % energy from saturated fat ( $p=0.11$ ), trans fat ( $p=0.79$ ), carbohydrates ( $p=0.34$ ), or sugars ( $p=0.85$ ); or any of the micronutrients ( $p$ 's all  $>0.05$ ) with the exception of vitamin D. Significant differences among the four diets were observed for % energy from total fat ( $27.5\pm 8.2\%$  Moderate,  $29.1\pm 8.4\%$  Plant-based,  $42.1\pm 17.1\%$  Low-carbohydrate,  $20.0\pm 4.3\%$  Meal replacements,  $p=0.04$ ) with the low-carbohydrate diets having significantly more fat than the Moderate diets ( $p=0.01$ ). Fiber (g) approached significance ( $p=0.055$ ) among the four diets (Moderate  $31.8\pm 6.7$  g, Plant-based  $41.7\pm 12.7$  g, Low-carbohydrate  $28.7\pm 17.7$  g, and Meal replacements  $26.6\pm 8.7$  g). Vitamin D content differed among the four diets ( $p=0.01$ ), with meal replacement diets containing significantly more vitamin D ( $52.5\pm 22.6$  mcg), than Moderate ( $9.9\pm 6.3$  mcg;  $p=0.01$ ), Plant-based ( $8.3\pm 11.3$ ,  $p=0.01$ ), or Low-carbohydrate ( $9.3\pm 15.6$ ,  $p=0.02$ ) diets. Due to the similarities measured among all four different diet

types, it can be concluded that there is a standard accepted range for these nutrients in diets. However, the differences in total fat, fiber, and Vitamin D content indicate that there is a disagreement between the four diet types over what is considered optimal intake.

**Hill, Colby**

**Supervisor(s): Blake Edwards**

**Mentor(s): Dr. Homayoun Valafar**

**Recognizing Smoking Gestures and Habits with Smartwatch Technology**

Smoking is currently the leading cause of preventable death in the world. Previous research on smoking in context relies on self-reporting however, smartwatch technology may produce more natural and precise smoking behavior by automating detection using machine learning. This research focuses on improving the expediency of smartwatch smoking detection by refining neural network responses, and optimizing critical processes on the smartwatch surrounding data communication and accelerometer collection. Also, this research focuses on comparing the effectiveness of automatic logging of smoking to other collection methods such as self-reporting.

**Hill, Victoria**

**Supervisor(s): Dayne Tanis**

**Mentor(s): Mrs. Hayley Ross**

**Growing Carolina: Permaculture on a College Campus**

The Sustainable Carolina Garden is a one-acre, permaculture-based alternative garden on campus that was established in 2007. The garden is run by Garden Guides who maintain GAP certification and lead groups of volunteers. Through these efforts, the garden provides local produce to students while creating an open environment for those eager to learn about gardening, hydroponics, and permaculture. Our experiences have taught us sustainable farming techniques, the interconnectedness of natural processes, the significance of alternative food growing techniques, and to appreciate local food. Many people live in areas known as food deserts, without access to local and healthy food options. The garden provides an example of what an organic garden can produce on a small scale. We practice crop stacking and pairing, which gives us the ability to grow more than a traditional monocrop farm. We want others to become more conscious about where their food comes from and the effort that goes into growing. Too often, individuals view fruits and vegetables as something that they pick up at a grocery store at a moments notice and fail to see the value of effort and time it took to get that food there. We hope to continue to expand our outreach on campus through the education of permaculture practices and gardening principles and to continue expanding our garden and hydroponics system in a way that enhances the UofSC and Columbia community.

**Hils, Michael**

**Mentor(s): Dr. Bert Ely**

**Plant-Related Bacteria And The Viruses That Infect Them**

For a number of years, Dr. Ely's lab has been a leading research center on members of the *Caulobacter* genus and their competitors. *Caulobacters* have been found to promote growth in plant root tissue and are archetypes for studying the developmental stages of bacterial cell growth. They have been found in roots, soil, and water sources and are reported to grow well in nutrient-poor environments. Through a root rinse process, I have isolated a strain of bacteria from the roots of a weed and identified it as a member of the genus *Brevundimonas*, a close genetic relative of *Caulobacter* that was associated with the roots of a weed. *Brevundimonas* has been found to survive in extreme environments. I selected for a streptomycin-resistant version of this *brevundimonad*, designated as BRV5, and used it to isolate two bacterio-

phages, one from Granby Park and the other from the nearby Congaree River. From EM photographs, both isolates appear icosahedral, though only one of the two appears to have a tail. Based on pulsed field gel electrophoresis comparisons, the genomes of both isolates are approximately 40 kilobase pairs in length. Experiments are in progress to determine the genome sequences of these bacteriophages so that they can be compared to each other and to genome sequences of similar phages.

### **Hilton, Amanda**

**Mentor(s): Mr. Billy Quinlan**

#### **Canvassing Around Columbia**

During the Fall of 2018 semester I interned with the Dick Harpootlian South Carolina Senate District 20 Campaign. While I participated in this campaign I learned how to reach a democratic voice within a republican dominated state. I reached those voices by knocking on over 800 doors across district 20 through canvassing. While canvassing I learned about the issues that local residents had within the district, and how politics can affect local communities. As an AFAM and Political Science major at the University of South Carolina, my internship provided me a hands on learning experience about politics and campaigning. I had the opportunity to listen to the issues that voters had within District 20, see different political viewpoints, and meet notable political figures within Columbia, South Carolina. I also had the opportunity to not only canvass but work the voting polls where I learned how poll numbers are generated. Participating in this internship has reaffirmed my decision to pursue my dream of politics and my dream of becoming a civil right attorney.

### **Hinson, Audrey**

**Mentor(s): Mrs. Asheley Schryer**

#### **You Are Your Own Catalyst**

During the summer, I worked with Horry Telephone Cooperative (HTC). Founded in 1952, HTC provides high-speed internet, digital cable, security, wireless systems, home phone, and advanced business solutions services to South Carolina's Horry and Georgetown counties. As an accounting and marketing dual major at the University of South Carolina, my internship offered me direct marketing experience within the nation's largest telecommunications cooperative. I had the opportunity to research various topics, analyze market trends, and generate materials to communicate my findings to superior colleagues within the cooperative. I also had the opportunity to be involved with HTC's 18th Annual REEL Kids Event and the Annual Membership Meeting held at Coastal Carolina University. Participating in this internship motivated me to pursue studies in marketing as I had only been studying accounting beforehand. The internship expanded not only my marketing skills but also the personal insights of equality, cooperation, and appreciation of both success and failure. By enacting upon those personal insights, I enriched both my personal character and professionalism, thus enhancing my quality of life. After graduating with my B.S.B.A. in December 2019, I anticipate pursuing a professional career that utilizes both the marketing and accounting skills I have attained during my time at the University of South Carolina.

### **Hoang, Thao**

**Mentor(s): Dr. William Jones**

#### **Cultural, Ethics, and Food Insecurity in Medicine**

Community services has played a major role in shaping who I have become. Over the years, I have volunteered at different organizations however, it was not until I was in college did I realize how every volunteer experience is connected to public health issues. Due to this, I decided to pursue Graduation with Leadership Distinction (GLD) to help me reflect on my experiences and learn about the different ways in which I can continue to help/reduce these public health issues.

The main ideas that I focused my e-portfolio for GLD on are health disparities and culture. In one of my key insights, I wrote about my experience volunteering at Harvest Hope, and how food insecurity is a health disparity that can affect a community of people. In the other key insights, I explained how cultural differences can cause health disparities such as language barriers and cultural competence. I was able to connect these issues back to volunteering because they are problems that I have noticed while volunteering in the hospital and in different student organizations on campus.

**Hoff, Caroline**

**Mentor(s): Ms. Carrie Van Haren**

**Practicing Public Relations through Non-Profit Work**

During my junior and senior years, I interned with March of Dimes in Columbia. March of Dimes is a non-profit organization that funds the mission to fight for healthy moms and strong babies. The organization educates medical professionals and the public, supports research, and provides comfort for families with babies in the NICU. My responsibilities at March of Dimes included writing pitches, proposals, press releases, media alerts, and creating advertisements. In addition, I was able to volunteer during events outside of the office and see firsthand how the work I was doing benefitted the community. My favorite part of the internship was going into the NICU to visit with families and see the babies during Prematurity Awareness Month. Other events that the March of Dimes puts on include the Signature Chefs Auction and March for Babies. As a public relations major at the University of South Carolina, it was invaluable for me to strengthen my skills through my internship.

**Hoffman, Thomas**

**Mentor(s): Dr. Rebekah Siceloff**

**School Climate as a Potential Moderator of the Link between ADHD and Depression among Middle and High School Students**

Depression is a behavioral health disorder characterized by feelings of sadness or a depressed mood, loss of interest or pleasure in everyday activities, trouble sleeping, and suicidal thoughts or tendencies. Studies have shown that the risk of developing depression increases dramatically during adolescence. Additionally, previous research has found adolescents with ADHD to be at higher risk of depression. It is, therefore, important to understand factors that may help to explain the association between ADHD and depression in adolescents. School climate, including sense of school membership, has been found to be associated with depression in previous studies. The purpose of the present study is to examine students' sense of school membership as a potential moderator of the association between ADHD and depression. Study variables were assessed in adolescents enrolled in middle schools and high schools in a South Carolina school district (N=252, mean Mage=13.75, SD=1.92; 46.8% female). Depression and sense of school membership were assessed using validated self-report measures. ADHD symptoms were assessed using a structured, diagnostic parent interview. A hierarchical regression revealed a significant ADHD symptoms school membership interaction, indicating that the association between ADHD symptoms and depression differed across levels of sense of school membership. Among students with low sense of school membership, depression was high irrespective of ADHD symptom level. Having high levels of sense of school membership was associated with low levels of depression, but only among students with low ADHD symptoms. Results of the study support the importance of sense of school membership in moderating levels of depression in adolescents. However, the potential benefits of having a high sense of school membership were not present among student with high levels of ADHD symptoms. More research is needed, therefore, in order to identify modifiable factors that may reduce depression in adolescents with ADHD.

**Hoffner, Nicole**

**Supervisor(s): Paige Wilbanks**

**Mentor(s): Dr. Abbi Lane-Cordova**

**Relation of Pregnancy Physical Activity and Sedentary Behavior with Gestational Weight Gain**

Introduction: Pregnancy is an influential time for shaping longer-term maternal health. Physical activity is associated with less excessive gestational weight gain, but little is known about the relationship between sedentary behavior during pregnancy and gestational weight gain. The purpose was to determine whether self-reported prenatal physical activity and sedentary behavior were correlated with gestational weight gain. We also determined whether prenatal physical activity levels were correlated with physical activity levels 6 months-3 years after delivery.

Methods: 19 women were studied: average age = 34 +/- 1 years; average BMI = 27.0 +/- 1.7. There were 15 White women, 3 Black women, and 1 Asian woman. Surveys were used to measure physical activity, sedentary behavior, gestational weight gain, and demographic information. After confirming distribution, we assessed relationships using Pearson correlations.

Results: Prenatal physical activity was inversely associated with gestational weight gain,  $r = -0.47$ ,  $P < 0.05$ . However, prenatal sedentary behavior was not associated with gestational weight gain,  $r = 0.1698$ ,  $P > 0.48$ . Pregnancy and current physical activity levels were correlated with an R-value of 0.7558, and P-value of 0.0002.

Discussion: We found prenatal physical activity, but not sedentary behavior, is related to less gestational weight gain and that prenatal physical activity is related physical activity in the years immediately after delivery. Results suggest that interventions to improve physical activity during pregnancy might benefit short and long-term maternal health.

**Hogan, Courtney**

**Mentor(s): Ms. Lisa Camp**

**Cultivating Leadership Potential**

One of my most impactful Beyond-the-Classroom activities at USC has been serving as Chapter President for my sorority, Pi Beta Phi. The role of the Chapter President is to oversee all Chapter operations, serve as a liaison between the Chapter and the University, Regional Team, and Headquarters, and to advance the well-being of the Chapter and members. I was elected in November 2016, and performed these duties for the duration of my term through December 2017. I took on the role to serve my Chapter and my organization at-large as best as I could and to contribute all that I had to something so important to me. This position helped me to grow in ways I couldn't have imagined and taught me more about leadership than I could have expected. Executive Council faced several challenges, but by working as a team, overcame every obstacle in our way to bring our Chapter to higher and higher standards. We were awarded the Chapter of the Year Award for our council at Carolina and improved our national standing tremendously as well. I will forever be grateful for this experience and the opportunity it gave me to serve, to form lifelong connections, and to gain professional experience. I gained practical experience not only in management but also in communication and presentation skills, the ability to represent a decision whether I made it personally or not, and in navigating the difficult task of leading a large group of peers. All of these qualities will benefit me in my future career as an attorney and in daily life post-graduation.

**Holey, Lauren**

**Supervisor(s): Abigail Bangs, Vikash Movva, Caroline Morey, Gregory Miller**

**Mentor(s): Dr. Sanjay Ahire**

**Warehouse Slotting Strategy for Sequenced Parts at Cummins Charleston Turbo Plant**

We worked with Cummins Turbo Technologies Charleston (SC) Turbo Plant to improve the stocking strategy for the consignment warehouse attached to their manufacturing plant. Specifically, we were tasked with optimizing the warehouse slotting strategy for parts that are sequenced and transported in sequenced carts from the warehouse to the manufacturing plant assembly lines to be used directly on the manufacturing lines. The goal was to assign optimum slotting locations for each of the 600 SKUs in scope so that the total time to put away the total SKU quantity from the inbound truck docks to the slotting location and to pick and transport the SKU to the cart assembly staging area in quantities needed to form sequencing carts to be supplied to the manufacturing plant was minimized. Based on actual consumption data for one quarter, we have designed an Excel-based Slotting Optimization Tool that accomplishes these goals. Each SKU is assigned an optimum location (one or more adjacent slots – each slot corresponding to one pallet of SKU) through a series of worksheets and computations that derive the total horizontal and vertical distance traveled and time to flow the SKUs from inbound staging to slotting locations for storage and from these locations to cart assembly staging area. Alternative warehouse slotting strategies were evaluated and management given options to choose from. The project resulted in substantial savings on labor and material handling costs for the warehouse while improving the speeds of assembly carts compilation. The slotting tool, accompanied by detailed user manual will be used by Cummins Logistics Team to develop slotting strategies to improve efficiencies at other locations in the Cummins network.

**Holroyd, Kendall**

**Mentor(s): Ms. Lisa Camp**

**Learning the Ins and Outs of Orthopedic Medicine and It's Impact on My Future Education**

In December 2018, I was offered the opportunity to be an intern at Palmetto Health- USC Medical Group in their Orthopedic Sport's Medicine specialty as a part of their newly founded program designed to give students opportunities to gain perspective of the medical field and the variety of professions that make a healthcare facility successful in caring for and treating patients. I have learned a variety of skills such as drawing up injections, removing staples and sutures, taking vitals and taking patient history. Along with being able to do all of these skills individually, I have the opportunity to shadow a physician assistant every workday. This allows me to discover what my future profession will be like along with the ability to observe and follow orthopedic cases from pre-operative assessments to post-operative checkups. My presentation will give more information about my internship, how my education at South Carolina has prepared me for such an opportunity, and how I have changed as an individual to become a future medical professional.

**Horovitz, David**

**Mentor(s): Dr. Shannon Davis**

**Does a conserved enhancer region within the 1.7 mb linked domain contain the mutation known as the dominant spot?**

Neural crest cells are a vertebrate-specific embryonic cells that are responsible for the formation of melanocytes, the peripheral nervous system, the enteric nervous system, the adrenal cortex, and craniofacial cartilage and bone. Neurocristopathies are diseases caused by defects in the neural crest, which cause a variety of syndromes, including some with distinctive pigmentation defects. These pigmentation defects are observed in the distinctive spotting patterns of Dalmatian dogs and the American Paint Horse. Some people with a forehead spotting mutation, known as Waardenburg syndrome, can also have deafness or

the formation of a megacolon. A similar forehead spotting mutation, dominant spot, occurs in *Peromyscus maniculatus*, the North American deer mouse. The dominant spot phenotype occurs in heterozygous animals (S/+), while homozygotes (S/S) are embryonic lethal. Using a candidate gene approach, 20 genes, including Sox10, which are known to cause similar pigmentation defects in humans and laboratory mice, were tested for connection to dominant spot, utilizing a genetic technique known as linkage analysis. We determined that a 1.7 mbp linked region containing Sox10 is linked to the dominant spot phenotype. No other viable candidate genes are contained in the linked region. The exons of Sox10 were sequenced and no non-synonymous changes were identified. Preliminary data demonstrates that Sox10 expression was altered suggesting that the mutation causes changes in transcriptional regulation and, therefore, may reside in a Sox10 enhancer region. Nine different conserved enhancer regions are known to regulate Sox10 expression. We hypothesized that the S mutation is located within one of the nine conserved enhancers, but an on-going sequencing analysis has not identified any sequence variants in the six enhancers tested so far. We utilized a VISTA plot to compare the upstream intergenic sequence between *P. maniculatus* and other mammalian species and identified 10 additional conserved sequences that might contain novel enhancer elements. These regions will serve as additional sequences of interest, if we do not identify sequence variants in the remaining three known enhancer regions.

**Horton, Madisyn**

**Mentor(s): Ms. Beth Renninger**

**Creating a Legacy**

In the fall of 2017, I founded the Carolina Sales Club (CSC) as the first student sales organization at the University of South Carolina. In CSC meetings, students learn about career opportunities, interact with corporate executives, practice sales roleplays, develop their networking and presentation skills, and form great friendships with other students. The CSC also competes at the national level in collegiate sales competitions across the country. From internal events, competitions, and networking socials, students gain an incredible and unique experience to prepare them for any role in sales after graduation. My greatest accomplishment as a member and leader of the club is being the first student from USC to win a trophy at an international sales competition. As a result of my success at this competition, I used my experience to coach a team of students at another competition, where our team brought home USC's second trophy. As a founder, former President, and current Vice President of Competition, I have learned how to lead a diverse group of people, empower my peers to make impactful change, and take powerful steps to create a legacy for our school and program. My membership in the Carolina Sales Club has bettered my life in many ways, and I cannot wait to continue contributing as an alumni to its success and growth. In my presentation, I will highlight the development of the Carolina Sales Club, the insights I gained as its leader, and the positive impact it has had on its members.

**Hughes, Karastin**

**Mentor(s): Ms. Lashawna Wright, Ms. Caren Van Haren**

**Women in Arms**

Trying to discover how you can make your mark at a university with over 30,000 students can cause a large feeling of self doubt. As a minority woman here at the University of South Carolina, there were times during my undergraduate career when I struggled with understanding who I was and how to make an impact here on campus. After joining SAVVY, a multicultural women's organization, I was able to gain confidence in myself, my purpose as a student, and hone my leadership skills. One of the largest contributions that I feel I've made to the university is being heavily committed and involved in SAVVY. After becoming a member my freshman year, I became more involved by acquiring an executive board position as the PR & Marketing chair in both my sophomore and junior years. As a senior I've had the honor and privilege of being the organization's president. Being able to guide minority women in their paths as USC students

has given me a large sense of joy and empowerment. We've been able to educate these women on mental health, physical health, current issues within the U.S. and a host of other things. Not only that, but we've been able to continue an open community where unbreakable bonds have been created. My presentation will discuss the leadership skills that I have gained while being a part of SAVVY, along with the large impact that this organization has made on my life and undergraduate career.

**Hulwe, Eman**

**Mentor(s): Ms. Sarah Gay**

**Community Service in a Local High School**

My field placement for my undergraduate education was done with Communities In Schools (CIS) of the Midlands at Columbia High School. CIS is a dropout prevention program that follows an evidence-based model of assessment, planning, integrated student supports, monitoring and adjusting, and evaluating. CIS is an outside agency in schools that assists in keeping kids in school. It does this by addressing the many barriers that kids face in their lives and that affect them as students. For some students, the barriers to learning are their basic needs that are not being met, which naturally shifts their focus to getting those needs met as opposed to doing well in school, or even showing up to school. For others, the barriers to education stem from their views about the education system, which often include skeptical perspectives about how it could benefit them. CIS addresses these barriers in a variety of ways that include connecting students to basic resources, alleviating their food and clothing insecurities, and by holding groups about college and career readiness. I participated in this placement because I intend to become a school social worker. I had a caseload of fifteen students that I worked with following the CIS model, which allowed me to build therapeutic relationships; this experience has served as a foundation for my MSW field placement. I also started a second type of group about understanding the structures that make the world that they live in, based on the needs that I saw in students. The mindsets of the students are very much day-to-day oriented, leading them to engage in high risk activities and fail to see and reach their potential. This group allowed for the validation of their shared experiences, and for them to build and maintain a sense of self, which ultimately put them on the path for being leaders and advocates for their own communities. From this experience, I learned how to implement the interpersonal skills that I learned in the classroom as well as have direct contact with clients and their problems that I had previously only heard of.

**Humphries, Amanda**

**Mentor(s): Prof. Dmitry Peryshkov, Mrs. Gayathri Gange**

**Metal-Free Bond Activation by Carborane-Based Compounds.**

Catalytic bond activation reactions are important in organic synthesis in many research fields such as synthesis of pharmaceuticals, dyes and plastics. A diverse range of catalysts that are based on precious metals such as palladium, rhodium, iridium, and platinum have been explored. These metal complexes have demonstrated great efficiency due to their ability to reversibly lose and accept pairs of electrons.

Despite high efficiency of precious metal complexes as catalysts, they possess some inherent disadvantages such as major issues like high cost, toxicity and very low abundance. Thus, in recent years, bond activation by metal-free catalysts has attracted increasing attention because of its fundamental scientific interest and its potential to address catalyst sustainability issues.

In our research on boron cluster chemistry, we discovered the novel type of metal-free activation of strong bonds that is driven by the unusual electronic structure and rearrangement of boron cages (carboranes). The unique electronic structure of carborane cages allows them to reversibly accept two-electrons which is analogous to transition metal reactivity. We utilized this ability of carboranes for the cage-driven activation of strong bonds at exohedral reaction centers. In this presentation, metal-free activation of a

range of substrates including alkynes and boranes by carborane-based compounds will be discussed. The flexibility of boron cage contraction/expansion and its influence on the reactivity of an exohedral substituent represent a new approach to cluster-induced organic transformations.

**Hurt, Shelby**

**Mentor(s): Ms. Lara Anderson**

**Graduate with Leadership Distinction: Work-Based Experience**

I chose to participate in GLD to set myself apart from other graduates entering the workforce at the same time as me. I chose my pathway, professional and civic engagement, because my full-time job at HireRight provided me with many opportunities to fulfill GLD requirements. GIS processes pre-employment background checks. My job was to read criminal court dockets. Then transfer identifying information and any relevant criminal offenses to our database. During my time at HireRight I learned how to interact and thrive in a professional office setting. GLD has taught me how to turn this life experience into key insights through critical thought.

I took advantage of each opportunity at HireRight through learning new skills from other departments and training new associates. Combined with the critical thinking that is required of a GLD student and my professional engagements at HireRight; I was able to understand the crucial nature of communication in a professional setting. This has given me a deeper understanding on how to be a better leader when I have a team of my own one day. Knowing how to deeply reflect on my work experiences and channel them into effective leadership is a skill given to me by the GLD program that I will carry for the rest of my leadership career.

**Hyatt, Miranda**

**Mentor(s): Dr. Shannon Davis**

**Determining the plane of cell division in pituitary progenitor cells.**

The pituitary gland is a vital endocrine organ that contains multiple hormone secreting cell types. These hormones regulate many aspects of our physiology, including growth, reproduction, and metabolism. The hormone cell types that are generated during embryogenesis form from pituitary progenitor cells in Rathke's pouch, which is the precursor of the pituitary anterior lobe. The epithelium of Rathke's pouch, where the pituitary progenitors reside, is similar in structure to the epithelium of the neural tube. Within the neural tube, the plane of cell division for the neural progenitors determines whether the daughter cells will produce more progenitor cells or daughter cells that will begin the differentiation process. Currently, it is not known if the plane of division of pituitary progenitor cells is associated with the differentiation process of the hormone cell types. To begin addressing this question, we are conducting a study to determine the plane of cell division for pituitary progenitor cells. Wild type mouse embryos at embryonic development day 11.5 (e11.5), e12.5, e13.5 and e14.5, when the pituitary progenitors are highly proliferative, were sectioned and immunostained for phospho-Histone H3, Aurora Kinase A and CDK5RAP2, to identify mitotic pituitary progenitors and determine their plane of cell division.

**Hyduke, Noah**

**Mentor(s): Dr. Maksymilian Chruszcz, Ms. Brenda Kapingidza**

**Structural, Molecular, and Immunologic Characterization of Timothy-Grass Pollen Profilin**

About one-third of the world's population suffer from allergies. These allergies are elicited by various allergenic proteins, including profilins. Profilins are small, 12-15 kDa, ubiquitous proteins that are involved in cell signaling pathways by binding phosphatidylinositol-4,5-bisphosphate and poly-L-proline (PLP); they also regulate the actin cytoskeleton. Profilins share high sequence identity and similarity, as well as, extremely conserved three-dimensional structures, with plant profilins having amino acid sequence

identity as high as 75%. Among other allergenic proteins like polcalcins, profilins are regarded as panallergens—minor allergens widespread in nature and responsible for immunoglobulin E cross-reactivity. Phl p 12, a profilin from *Phleum pratense* (Timothy-grass) is a minor allergen, but with very interesting allergenic properties. Not only does it share high sequence identity with a major melon allergen, Cuc m 2, but it also displays comparable T cell response prevalence and strength with Phl p 1, a major allergen from *Phleum pratense*. Since IgE binding epitopes are conformational, the high sequence identity, especially of surface residues, can result in substantial IgE cross-reactivity. Due to this high sequence identity to Cuc m 2, Phl p 12 might also be an important allergen involved in the so-called pollen-food syndrome. Understanding the immunogenic, molecular, and structural properties of Phl p 12 will help explain the clinical importance of this profilin and elucidate on the role of Phl p 12 in Timothy grass pollen allergies. Therefore, Phl p 12 was cloned and expressed in *Escherichia coli*. The protein was purified to very high purity using Immobilized Metal Affinity Chromatography and gel filtration. The IgE binding characteristics of the recombinant allergen were analyzed by ELISA using blood sera from seasonal allergic rhinitis patients. Mass Spectroscopy and Differential Scanning Fluorimetry were used to study the molecular properties and thermal stability of Phl p 12. X-ray crystallography will be used to determine the 3-D structural features of the protein. These immunologic, molecular, and structural studies will help elaborate on the molecular basis of the immune response observed for Phl p 12 despite being classified as a minor allergen. This research will also facilitate future immunotherapy design and component-resolved allergen diagnostics.

**Hynes, Ryan**

**Mentor(s): Dr. Timothy Mousseau, Mrs. Melissa Groleau**

**Impact of Ionizing Radiation on Mammalian Abundance in Fukushima**

As the development of nuclear energy as an alternative power source is on the rise, the risk of radioactive contamination will rise as a result. The impact that radiation exposure has on humans has been well studied, but its' ecological impacts has not been thoroughly investigated. Using Fukushima, the site of a nuclear power plant meltdown in March of 2011, the impact that long-term exposure has had on the nearby environment will be studied. Previous studies on Barn Swallows (*Hirundo rustica*) in Chernobyl conducted by Dr. Timothy Mousseau, radiation was documented to have a significant impact on age distribution and longevity. However, more rigorous studies are required to analyze the impact that chronic radiation exposure has had on mammalian populations. The purpose of this project is to gain a baseline understanding on how radiation has impacted the population dynamics of mammal populations living in Fukushima. In order to determine how the population dynamics has been impacted, we will analyze the relationship between radiation levels and mammal abundance, the existence of a juvenile-skewed trend in areas of high radiation, and whether the longevity of mammals is significantly impacted in areas of higher radiation. To answer these questions, approximately 60 motion-activated camera traps have been placed throughout the radiation gradient in Fukushima. These cameras allow for the collect of large amounts of data at a relatively low cost. These cameras will also allow for the proper sample size needed to analyze the impact that chronic radiation exposure has had on mammalian population dynamics.

**Iftime, JanLuke**

**Mentor(s): Dr. Bridget Miller**

**The Dream Retirement for Some, the Reality for Others**

Retirement. A dream for some, a reality for others. The goal is to turn the dream into a reality and retire happily. Being a Finance major at the University of South Carolina, I have been able to gain knowledge regarding financial analysis, financial assets, and portfolio management. Additionally, I have been able to intern at Preservation Specialists, a retirement wealth management firm, and apply the knowledge I have gained from my studies to assist the advisors and clients of the firm. During my experience at Pres-

ervation Specialists, I focused extensively on financial research, analysis, and modelling. I would compare risk factors and return profiles of various assets in order to identify optimal investments, model portfolio performance to calculate total returns, and analyze market conditions and exposure to market events in order to determine risk levels. This is significant because clients would invest their nest egg, a large sum that is vital to support them throughout retirement, with us and expect to receive income through dividends. Therefore, the research and analysis of investable assets is of great importance since any losses could have a severe impact on the quality of life for the client. Since nothing ever goes as planned in life, modelling portfolio performance is vital as well, in order to examine the gains and losses on investments and reevaluate certain positions in the portfolio. Evidently, the knowledge gained from my studies at the University of South Carolina greatly enriched my financial skills and allowed me to assist with retirement planning and having a positive impact on a client's life.

**Ikahihifo-Bender, Jade**

**Mentor(s): Dr. Caryn Outten, Mrs. Evan Talib**

**Expression and Purification of Iron-Responsive Transcription Factor Aft1 from *C. glabrata***

Due to its unique ability to serve as both an electron donor and acceptor, iron is utilized as a co-factor for many biological processes, including electron transfer, oxygen binding, and vitamin synthesis. However, excess iron can lead to formation of reactive oxygen species that damage intracellular components. Thus, regulation of iron metabolism to maintain adequate, non-toxic levels is critical for almost all organisms. Our lab uses single-celled yeast as model systems to study the structure, function, and subcellular localization of iron binding proteins that play important roles in iron trafficking and regulation. We have recently started examining iron regulation in pathogenic yeast such as *Candida glabrata* to better understand iron regulation proteins that are essential for virulence and cell survival. This study seeks to understand the structure and functional interactions of the primary iron-responsive transcription factor in *C. glabrata*, namely Aft1. Our goal is to recombinantly express and purify Aft1 from *E. coli* overexpression strains in order to characterize its structure and iron and DNA binding properties. Furthermore, we will test whether *C. glabrata* Aft1 interacts with two potential binding partners, the monothiol glutaredoxin Grx4 and BolA-like protein Bol2, which have been implicated in iron metabolism in other yeast models and human cells. Our results demonstrate that *C. glabrata* Aft1 expression in *E. coli* is optimized by induction with 0.25 mM IPTG and subsequent growth for 6 hours at 20 °C. Future experiments will use these conditions to purify this transcription factor in the presence or absence of Grx4 and Bol2 in order to characterize their molecular interactions via structural and spectroscopic approaches. This information may be useful in the development of anti-fungal agents that target essential iron-dependent pathways in this pathogen.

**Iniguez, Noemie**

**Mentor(s): Dr. Scott White**

**The Impact of One Person's Work**

During the summers of 2017 and 2018, I worked at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland as an engineering intern in the Fluidic Systems / CO<sub>2</sub> Cooling and Gas Section. In 2017, I worked to provide them with a new spare parts management system; in 2018, I designed integration pipelines for a new detector-cooling system. During those eight months, I dedicated over 1200 hours in total to these projects and gave regular updates to the section engineers in the form of bilingual presentations. Through daily consultation with my supervisors, weekly collaboration with engineers, and monthly presentations to the section, I learned that an engineer must not only be skilled and knowledgeable in her trade but also in effective communication. I confronted my fear of public speaking, both in large groups and one-on-one scenarios, and was immensely rewarded with a newfound confidence in the impact and value of my work. In addition to my personal growth, at CERN I joined a strong network of

professionals who support my education and career development in engineering.

**Ishibashi, Yui**

**Mentor(s): Prof. Rico Reed**

**What is Idiopathic Parkinson's Disease?**

This past semester I had the opportunity to intern at the Palmetto Health Physical Therapy Specialist clinic. The Palmetto Health Physical Therapy Specialist provides physical, occupational, and speech therapy through various specialty programs. As an Exercise Science major who is interested in Physical therapy, this opportunity opened my eyes to the true purpose of physical therapy. I learned treatment techniques of Neurotherapy and Orthopedic therapy, tested the therapeutic simulation technology, and the operational aspects of the clinic. The clinic treated many patients with various injuries (ex. stroke, traumatic brain injuries, Parkinson's disease, etc.). The poster displays a description of Parkinson's disease, treatment methods, and various patient resources. All the therapist had the abundance of knowledge which influenced the patients to reach their personal goals to regain independence and confidence. During each treatment, it was not only to strengthen the patient physically but to also educate the patient to have the resources to continue exercising outside of the clinic setting. The therapist provided local and national program resources for the patients to have a better understanding of their diagnosis. From this experience, my passion for physical therapy and aiding patients has grown immensely. I look forward to my future professional to make a large impact on each patient just as the therapist did at the Palmetto Health Physical Therapy Specialist.

**Islam, Fariha**

**Mentor(s): Dr. Parastoo Hashemi, Mr. Colby Witt**

**Neuromodulator Regulation: A Voltammetric Study of Basal Dopamine Oscillations**

Communication in the brain is facilitated by chemicals released by neurons called neuromodulators. A disruption in neuromodulator levels is known to be a cause of various psychological disorders. To better understand the functions of neuromodulators, the field of electrochemistry is constantly improving methods to measure in vivo extracellular levels of neurochemicals in real time. In particular, the Hashemi lab investigates dopamine (DA) and serotonin (5-HT) regulation using the electroanalytical method of Fast-Scan Controlled-Adsorption Voltammetry (FSCAV). This method measures basal neurotransmitter levels every few seconds at carbon fiber microelectrode surfaces. Previously, the Hashemi lab has investigated in vivo extracellular 5-HT levels using FSCAV in anesthetized animals. New, preliminary data revealed that there are oscillations in in vivo 5-HT levels that are not present in in vitro (beaker) experiments. We hypothesize here that these oscillations are a result of cell signaling and reveal information about the mechanisms that regulate 5-HT. Since neuromodulators function in a common system that is hypothesized to be regulated by auto-receptor proteins, we suspect that basal DA levels fluctuate similarly to 5-HT. However, because DA is less tightly regulated than 5-HT due to DA's tendency towards repackaging and synthesize, the amplitude and frequency of the oscillations are expected to increase. These unique DA oscillations could indicate fundamental information about regulation mechanisms. As a result, a voltammetric study of DA using FSCAV was required to recognize the role of basal oscillations on the regulatory mechanism of DA. The oscillations of ambient levels of dopamine were investigated through FSCAV in in vivo and in vitro experiments, alongside a comparison to ambient serotonin oscillations in anesthetized animals, to verify that extracellular DA oscillations are a product of cellular communication rather than an artifact of FSCAV measurements of DA.

**Ismail, Briahna**

**Mentor(s): Dr. Ambra Hiott**

**The True Meaning of ‘Diversity and Inclusion’**

Diversity and Inclusion” is a phrase constantly drilled into the mindset of students, but what does this really represent? While addressing the need for an inclusive learning environment and a diverse group of learners and leaders, this can potentially come off as cliché or as a check-box that needs to be completed. Through participation in a three-semester Social Justice Program run through the Office of Multicultural Student Affairs, I became more deeply entrenched in learning about the struggles of vulnerable populations here on campus. As a black female, I am very aware of the black student experience at a predominantly white university. However, I did not have much knowledge about most other student populations, such as students that fall within the LGBTQ+ spectrum, are of low socioeconomic status, or have a disability. The coursework, readings, and discussions through the program dramatically increased my knowledge base and taught me how to be a meaningful advocate. Following this program, I created a presentation about the value in having student leaders that represent minority identities, and how it can play in those students’ favors through increasing the knowledge base of their peers and creating representation for incoming students that hold diverse identities. I hope my experiences with learning and growing into my own identities will inspire others to want to do something similar, whether that be on a small or large scale. Even if appreciation of diversity is not a predominant value in one’s life, we all need knowledge of diverse perspectives in order to thrive in a world where variable identities are present everywhere.

**Jabber, Olivia**

**Mentor(s): Dr. William Jones**

**Sometimes it Feels Like Home**

My time at the University of South Carolina has taught me so much about both diversity and social advocacy. About how you can have one without the other, and how inclusion is intermingled between the two. To me, diversity on a college campus would mean that the institutional student body has a demographic that is reflective of the racial demographic within the United States. While I believe the University of South Carolina has does a fairly decent job at diversifying the student body, I fear they are lacking in both social advocacy and inclusion. Advancing the interest of the marginalized groups on this campus has been taken up by many different students on many different occasions. The 2020 Vision Walk, for example, occurred my freshman year. This walk occurred because minor issues kept happening until things boiled over. Typically after the hype and uproar of a socially advocating movement dies down, the University of South Carolina has failed to maintain efforts or continue pursuing methods that would improve inclusion on campus. Also, the students asking for these changes stopped checking to make sure USC was fulfilling them. Over the past four years I have been immersed in a community of people that have helped me to feel like I was living at a home away from home. Unfortunately, though I felt at home when I was in this community and around my friends, I have always felt like my Blackness was an afterthought when it came to programs, policy, and accessibility. Because of this, I have explored ways that could potentially improve the feeling of inclusion for minorities on USC’s campus.

**Jabbour, Gabrielle**

**Mentor(s): Mr. Duncan Culbreth**

**The Gamecock Effect: How One Choice Can Alter the College Experience**

The butterfly effect theory speculates how the flapping wings of a butterfly can consequently result in a sandstorm several weeks later, miles away from the initial movement of the insect. Originally, this theory evolved because of weather pattern research, but it essentially boils down to a much more universal message: small causes and choices may have large effects weeks, months, years, or decades later. As a

soon-to-be graduate of the University of South Carolina, I have spent a generous amount of time reflecting on my experiences throughout the four years of undergraduate academia that have shaped my college life. After all this contemplation, I understood that my graduation in the spring will be the culmination of the butterfly effect, or as I like to call it, the Gamecock Effect. As a student at the Darla Moore School of Business, the importance of internships and resume-building activities were highly emphasized from day one. It was this push that encouraged me to join organizations and offices I was passionate about, leading me into the roles of an Orientation Leader, a Vice President of the USC Women's Club Volleyball team, and an Alternative Break Leader for the Leadership and Service Center. And during my junior year, this push helped land a Distributions internship with Target for the summer of 2018. This internship paved way to accepting my first official, post-graduation, "big girl" job, in the Rotational Retail Supply Chain Program with Belk. The Gamecock Effect is a shared experience between all students at the University of South Carolina, as our stories are all intertwined, but the decisions I made my freshman year resulted in my own academic, civic, and professional growth. They lead to discovering new passions, interacting with the diverse population in Columbia, and finding my future path. Just like a butterfly, I ruffled my feathers as a newly initiated Gamecock, and the results and insights have been as impactful as a sandstorm in the desert.

**Jackson, Benjamin**

**Supervisor(s): Stella Masucci**

**Mentor(s): Dr. Stanley Dubinsky, Dr. Micheal Gavin**

**The Ryukyuan/Okinawan-Japanese Language Conflict**

The Ryūkyūan people are the indigenous peoples of the Ryūkyū Islands, a string of 55 islands stretching from southern Japan to Taiwan. Our research intended to create an encyclopedia entry about the Ryūkyūan-Japanese language conflict for the online "Encyclopedia of Global Ethnolinguistic Conflicts," which is designed to provide the general public, academics, and students with access to information on language conflict that is currently not readily accessible online. To construct our entry, we primarily relied on online sources including research journals and existing encyclopedias. Our work is divided into 5 different sections: synopsis, linguistic background, historical background, timeline, and stories (things that we found to be interesting in our research or that we thought deserved further explanation). Our mentors for the research were Dr. Stanley Dubinsky and Dr. Micheal Gavin.

Shortly after the Japanese annexation of the Ryūkyū Islands in 1879, the Japanese government began to enact policies designed to eliminate usage of the Ryūkyūan languages in favor of the Japanese language. Ryūkyūan languages were banned in schools and workplaces, and the Japanese government was highly successful in eliminating them in favor of standard Japanese. Today, elderly people are usually the only fluent speakers of Ryūkyūan languages. Our research into this language conflict has made us aware of the intense Ryūkyūan language suppression campaign by the Japanese government.

**Jackson, Amber**

**Mentor(s): Prof. Denise Wellman**

**Build Relationships to Expand Your Network**

During the summer, I interned with BMW in Greer, SC and served as their corporate communications intern. The communications department was responsible for six key sectors: community relations and events, media and international press, fleet management, museum operations, public affairs/government relations, and visual management/corporate compliance. While working on projects in all of those sectors, I took the initiative to start a new program that did not fall under any of those sectors. I observed a lack of effective communication between interns/co-ops and management across departments; we bonded over the first two days of orientation and then never had the opportunity to further develop those relationships. The other communications intern and I drafted up a plan to instill a monthly networking

program event paired with a monthly intern/co-op newsletter. We presented the idea to our supervisor and she asked us to present our idea to talent programs in the human resources department. After our meeting, they approved the program and implemented it into the overall intern/co-op program. After noticing the lack of interaction between interns, outside of lunch, we wondered how they were really getting the most out of their experience. I found that through this program, many interns appreciated being able to connect with distinguished BMW professionals and fellow interns. I learned that having the opportunity to gain mentors and colleagues from various fields, helped young professionals broaden their network and learn more about topics outside of their expertise. They were able to learn more about the company by interacting with associates across plant sites and departments. Frequent social interactions with others diversifies our knowledge base and expands our reach of resources; this allows us to thrive as professionals in society today.

**Jackson, Kristin**

**Supervisor(s): Oneil Clemenson, Brian Morrison**

**Mentor(s): Dr. Karen Patten**

**IIT Capstone # 2 - Screening Audiometer Hybrid App**

An audiometry assessment is a painless hearing test that evaluates a person's ability to hear different sounds, pitches, or frequencies. Our mission is to provide a comprehensive hearing screening practice program for graduate students to test their abilities and knowledge while getting their hours. This hybrid screening app will allow a practice environment for graduate students, testing users on knowledge, and an application that is easily accessible to students in remote location. We will use Visual Basics (VB) to create to and design hearing screen testing. VB is a graphical end user interface that requires detailed coding in order for the application to work properly. The application will allow the end user to select frequency, volume, and record patient responses.

**Jacobs, Delaney**

**Mentor(s): Mrs. Katie Hopkins**

**Becoming a Leader**

After declaring Risk Management and Insurance as my major, I became very passionate about learning as much as possible about the insurance industry. I soon joined the organization 'Gamma Iota Sigma' which is the University's Risk Management and Insurance and Actuarial Science Collegiate Fraternity. During my senior year, I became the organization's President and served as the liaison between the insurance industry and our members. As President, I was able to significantly expand my own knowledge by attending industry-related conferences and by continuously working alongside different professionals within the industry. At the same time, I had the opportunity to provide our members with the right tools and resources to help them advance their professional careers as well. I have connected our members to various networking events, full-time and internship opportunities, and academic scholarships. Throughout this experience, I have learned what it takes to be a strong leader and how to successfully work with others to achieve common goals. I have become more experienced in an industry that I hope to continue building a long-lasting career in.

**James, RoseCatherine**

**Mentor(s): Ms. Maegan Gudridge**

**Student Journalist Tuned News Director**

As the news director of WUSC, I am responsible for producing a triweekly half-hour show called "Cock-a-doodle-News." "Cock-a-doodle-News" is the new news show at WUSC. The main component of production is creating and executing a rundown for the show. Every show has a rundown, which includes up to three

additional reporters and their stories, weather, and current USC events. Producing the news show is not only my job as an executive member of WUSC but also helps me gain experience and build my resume for when I enter the job market. Producing “Cock-a-doodle-News” has allowed me to push the norms at the station by changing the news format. “Cock-a-doodle-News” has also helped me learn how to effectively recruit and train reporters and develop my skills as a DJ by aiding my new news team in their first semester on air. “Cock-a-doodle-News” has allowed me to focus my career goals and practice in my field before I have an internship or employment opportunity. Now that “Cock-a-doodle-News” has had a semester to find its fit in the station I hope to train a new news director to take over when I graduate to keep the news program running at the station.

**James, Judson**

**Mentor(s): Dr. Nina Moreno**

**From the Classroom to the Real World**

When I first began my journey at the University of South Carolina, I was expecting to go in and simply get my degree before going into the real world to get a job. It wasn't until I got involved with my peers and student organizations that I was able to develop my communication and professional skills with my peers, professors, and employers. I have served many roles while at the University of South Carolina. I played a large role in the Carolina Gamers Club, a student organization devoted to the casual gaming community, serving many roles such as Treasurer and President. Soon after starting my classes, I began to enjoy my coursework and decided that I wanted to help my peers that were struggling in the course work. Because of this, I became a Supplemental Instruction (SI) Leader my sophomore year, helping students in the introductory computer science classes. After two years of working with students, I was approached by another professor who wanted me to work with a colleague of his, the head of a robotics company. Upon his recommendation, I was hired by Van Robotics, a robotics company that designs educational robotic tutors, where I was able to apply the knowledge I learned in my classes to real-world problems. I have used these experiences to shape my professional attitude and become a more confident, proficient, and communicating computer engineer.

**Jeanty, Mia**

**Mentor(s): Dr. Ambra Hiott**

**Medical Mission Trip to Nicaragua**

During the spring semester of my freshmen year, I participated in a medical mission trip to Nicaragua with the Capstone Scholars program during spring break. I dreamed of travelling to a developing country to serve their communities, and this trip gave me that fulfillment. In Nicaragua, I helped set up medical clinics in small villages around the capital, Masaya. In these clinics, we set up areas where we, the students, could take the patient's vital signs and histories and introduce the patient to the physician, who would talk through and teach us each case. We also had a pharmacy set up that I rotated through to provide the prescribed medications to the patients. I also went door-to-door taking health assessments to determine the state of the community as well as to let them know we set up a free clinic. I found that there was an extreme lack of healthcare and many people had diseases that could have been prevented with medical knowledge and care. For example, preventable parasites were very common due to the living conditions and how they stored their water. Even though medical care is free in Nicaragua, many of their citizens can't afford to travel to hospitals and clinics and depend on those who volunteer to bring a clinic closer to them. I also spent some time in a local hospital which had extremely low funding and was run down. Countless amounts of people lined up down the street in anticipation of being seen. I plan on becoming a physician to provide my services in South America and Africa in areas that are in urgent need of healthcare. Healthcare is a privilege that not all receive. My goal is to make it a right.

**Jiang, Xiangxiang**

**Mentor(s): Dr. Kevin Lu**

**The Unintended Consequences of High-deductible Health Insurance Plans on Cost-related Medication Nonadherence among Cancer Survivors in the U.S.**

**Objectives:** High-deductible health insurance plans (HDHP) have higher deductibles and lower premiums compared to traditional health plans. However, no studies have evaluated the impact of HDHP on patients' cost-related medication nonadherence (CRN), which leads to poorer outcomes for patients with costly diseases or conditions (e.g., cancer). The objectives of this study are 1) to examine the trend in High-Deductible Health Plan (HDHP) enrollment and the associated cost-related medication nonadherence (CRN) from 2011 to 2017; 2) to investigate the impact of HDHP on cost-related medication nonadherence; and, 3) to evaluate the impact of HDHP on racial/ethnicity disparities in cost-related medication nonadherence among cancer survivors.

**Methods:** A retrospective, pooled cross-sectional study was designed using data from the National Health Interview Survey (NHIS), a nationally representative database administered by the Centers for Disease Control and Prevention (CDC), 2011-2017. Cost-related medication nonadherence was determined by individuals' "yes" response to any of the following 3 questions: "skipping medication", "taking less medication", or "delaying filling medication" to save money in the previous year. Multivariable logistic regressions were used to assess the impact of HDHP on CRN and the associated racial/ethnicity disparities, controlling for demographics, financial factors, and comorbidities.

**Results:** A total of 8,930 cancer survivors were identified out of 705,669 respondents during 2011-2017. A trend of increasing enrollment of HDHP was observed between 2011 and 2017. Cancer survivors with HDHP were more likely to report cost-related medication nonadherence than those without HDHP (OR=1.40, 95% CI:1.17-1.67, P<0.001). The impact of HDHP on cost-related medication nonadherence of non-Hispanic whites was significant (OR=1.39, 95% CI: 1.15-1.69, P= 0.001). Non-Hispanic black survivors, lower income survivors, those with worse health status, and those with greater comorbidities reported nonadherence more often than their counterparts.

**Conclusions:** We found that cancer survivors with HDHP had an increased cost-related medication nonadherence compared to those without HDHP, and that cost-related medication nonadherence for non-Hispanic whites are more likely to be adversely affected by the current HDHP design. Employers and insurance policy makers should take this into consideration when launching new health insurance plans or refining existing programs.

**Jimenez, Chelsea**

**Mentor(s): Dr. Susi Long**

**Translation, Not Correction: Teaching Young Children (K-1st grade) the Benefits of Bilingualism as Speakers of African American Language and Standardized English**

African American Language (AAL) is one of the least understood language systems in the U.S. Bias against it is rampant even though it is recognized by the Linguistic Society of America. Children speaking AAL are often looked at as less intelligent when they actually possess impressive cognitive and social skills as they learn to translate across languages as they read, write, and speak. In addition, little is taught to young children about the rich African roots of AAL, its connection to African Diaspora languages, and its literary use. A culture of correction is firmly anchored in schools and society meaning that the language of African heritage is seen as "bad English." This research will provide demonstrations for teachers about the impact of lessons that support African American students navigating AAL and Standardized English (SE) and that celebrate AAL history and heritage for the benefit of children from every demographic. Because SE is the

normative language in American school systems, students need demonstrate proficiency in it. However, understanding AAL as an important linguistic system can free students to use both languages and reduce bias that arises from lack of knowledge about language structures and history.

**Johnson, Macey**

**Mentor(s): Dr. Norma Frizzell**

### **Evaluating the Effects of Adipose Tissue Fumarase Knockout in the Development of Diabetes**

We have shown that conditions that favor the accumulation of fumarate, an intermediate of the Krebs cycle, occur in the adipocyte during diabetes, and this is associated with impaired protein function. The elevation in fumarate results in the chemical modification of cysteine residues, known as protein succination. In order to examine the significance of this modification, we proposed to generate an adipose specific conditional fumarase knockout mouse. This project aimed to examine if fumarate loss contributed to selective adipose accumulation of succination, both in white adipose tissue (WAT) and brown adipose tissue (BAT). Mice were administered Tamoxifen to induce gene knockout or corn oil (controls) and studied for 9 weeks feeding on either a regular diet or a high fat diet, which we hypothesized would exacerbate the effects of the fumarase knockout. In addition, the mice were incubated at 30°C, preventing mice with compromised adipose tissue function to undergo ‘shivering thermogenesis.’ Nine weeks post-tamoxifen injection we observed low levels of fumarase, and high levels of protein succination, occurring in the knockout mice compared to the controls. We observed that the knockout mice had elevated protein succination versus controls, but this was not significantly altered by a high fat diet. Remarkably, while the high fat diet led to impaired glucose disposal in control mice, the knockout mice showed enhanced glucose disposal on both diets. Future investigations will examine if alterations in adipose tissue secretory hormones (adipokines) are associated with the unexpected improvement in whole body glucose homeostasis.

**Jonczyk, Emily**

**Mentor(s): Dr. Matthew Childs**

### **Delta Zeta’s Role in Developing Professional and Leadership Skills**

Greek organizations provide leadership, networking, philanthropic, academic, and social opportunities for their members. In my capacity as Vice President of New Member Education and Chapter President of my chapter of Delta Zeta sorority, I developed the “soft skills” of public speaking, problem solving, delegating tasks, coordinating group collaboration, and adaptability that will carry over to my professional career in the medical field. I discovered a variety of service activities that I remain involved with today such as Dance Marathon, The Free Medical Clinic of Columbia, and Brennan Elementary. The academic tools offered to me through tutoring and study hours helped to excel in some of my most difficult classes. Serving as both Vice President of New Member Education and Chapter President opened my mind and allowed me to broaden my perspective because of the diversity of opinions and perspectives on life in my chapter. For a long time, I had no intention of being a leader, but through others encouraging me and identifying my leadership skills I then decided to be an active leader in my chapter. I learned to solve problems quickly, interact with professionals in my national organization, and the importance of having confidence while leading. Through the many obstacles that come with being a leader such as balancing the needs of members and the chapter’s overall wellbeing, I learned that confidence and communication are the keys to success. Being able to understand that each member has their own outlook on a situation while also ensuring you are confident in making the best decision for the chapter is where this becomes essential. Serving as President of Delta Zeta sorority has enhanced my college experience and allowed me to discover my potential to grow and develop as an individual. My presentation will show the positive impact Delta Zeta has on its members, the university and the community along with the wide array of opportunities which lead to future success in a career path.

**Jones, Peyton**

**Mentor(s): Prof. Jay Pou**

**Bringing Home a Trip Around the World**

In the Spring Semester of my Junior year I traveled to Rome, Italy to further my college education. I picked Rome because of its rich history and modern progressivity. I wanted to study abroad in a European Union country, particularly, for its connectivity and ease of travel. I picked an American university abroad on its extensive list of political science classes, not offered at home, in hopes to finish out my minor. I took multiple international political based classes as well as business oriented classes. These classes not only taught me a lot about the content but also about learning in a different country. During my five months in Europe I visited over six major countries and many cities and towns. I pushed myself to try new things, experience different cultures, delve in the history, and make friends along the way. While every country and city I visited was different in a new way there was always something similar and familiar. At times I felt lost and overwhelmed but when I was able to find little glimpses of home or make connections with what I had learned in previous years I knew I was where I was supposed to be at that time. Through this global experience I was able to piece together ideas I didn't even think I needed to piece together, while also learning to respect and immerse myself in another culture.

**Jones, Anna**

**Mentor(s): Dr. Robbie Ross**

**Self-Perception of Self-Regulation Ability in Early Childhood**

Self-control, or self-regulation, is an important skill that has been linked to significant short-term and long-term outcomes, beginning in early childhood. Those with high self-regulation skills have been found to avoid temptation, choose less distracting work environments, and chose friends who are likely to help one reach his/her goals (Ent, Baumeister, & Tice, 2014); poor self-regulation skills in kindergarteners have predicted high school non-completion rates (Vitaro & Larose, 2005); longitudinal studies following children from birth to adulthood have found that self-control in early childhood predicts physical health (cardiovascular, respiratory, dental, and sexual), substance dependence, personal finances, and criminal offending outcomes (Moffitt, 2011). Self-regulation is a stable personality trait that, if possessed, can lead to positive outcomes in a person's life.

Additionally, one's self-perception of their ability has implications for performance. Research on implicit theories shows that students who hold the idea that intelligence is malleable (incremental theory) saw improvements to school achievement, while those with idea that intelligence is fixed (entity theory) saw no improvement (Blackwell, Trzesniewski, & Dweck, 2007). Students endorsing an incremental theory of intelligence were found to endorse stronger learning goals, hold more positive beliefs about effort, make less "helpless" attributions, and choose more positive strategies in response to failure (Blackwell, Trzesniewski, & Dweck, 2007). It has also been found that students with higher self-efficacy monitor impulses and face difficulties with persistence, allowing for higher academic achievement (Komarraju & Nadler, 2013). Students' self-perceptions and implicit theories toward intelligence can drive self-regulated learning behaviors.

Our research examines early childhood students' awareness of their own self-control. We seek to discover if children have an accurate self-perception of their self-regulatory abilities. Our study investigates a relationship between children's self-perception of their self-regulation and behavioral measures of self-regulation. Children were interviewed using the Berkeley Puppet Interview method, which allows children to respond to questionnaire items in developmentally appropriate ways (Measelle, 2005). This interview method was developed in response to less reliable, forced-choice means of questioning children. The results of our study will determine if children accurately perceive and report their self-regulatory ability

based on their behavior in real contexts.

**Jones, Nancy**

**Mentor(s): Dr. Stanley Dubinsky**

**Global Ethnolinguistic Conflict: An Online Research Encyclopedia Project**

As an international business and economics major studying both German and Spanish, I am interested in a wide range of topics, and all of these intersect in the research project I am currently working on: "Global Ethnolinguistic Conflict: An Online Research Encyclopedia". Led by Dr. Stanley Dubinsky and Dr. Michael Gavin, a team of researchers and I are working to build the world's first online encyclopedia detailing cases where minority languages are oppressed by majority languages. The encyclopedia will accurately document the history of the conflicts and the long-term effects the conflicts have on the oppressed people's economic and political enfranchisement, culture, and identity. The idea for this project stemmed from Dr. Dubinsky's book, "Language Conflict and Language Rights"; we are using the 14 cases mentioned in the book as the basis for the development of our primary entries before expanding outward. As a student researcher who works to compile case information and write entries for the encyclopedia, I have completed the full entry on African American English and I am currently partnering with two other researchers to complete entries on Puerto Ricans in the United States and Roma in Europe. I am also on the web design team, creating the pages of the site and ensuring the website is interactive and intuitive for all users. The project aims to raise awareness of language conflict as a class of global conflict and disseminate information previously known mostly only to linguists to a wide and varied audience around the world.

**Jones, Thomas**

**Mentor(s): Dr. Elise Lewis**

**Independent Project: Working as an Editor and an Advisor to help improve Historical Conquest**

For my research project, I am going to work as the Editor of the Historical Conquest e-magazine, as well as an advisor to the owner over any issues he brings to me. I chose this project because I enjoy doing research about games for games and working as the editor for the e-magazine as well as an advisor will give me experience in this, which will help me in future careers, as well as develop useful skills. I will be going over the previous methods employed by the original editor and trying to determine new ways to do things as well as creating new resources such as databases to help with the work and aid any other employees who need quick access to this information. I will also be advising him on ways to improve the game, both via my own experience and research and from other players' input. By using these, I can suggest ways to improve on the game that will make it more enjoyable for them. I theorize that my changes and advice will be a great help to the company and the game and will show improvements both to player enjoyment and employee resources.

**Jordan, Emma**

**Supervisor(s): Caroline Hannon, Lauren Davis, Daniel Caplan, Andrew Ngai**

**Mentor(s): Dr. Sean Handley**

**MGSC 497 – Contract Escalation and Indices Impact Forecasting**

This semester as part of the Capstone Consulting Project for the Operations and Supply Chain program, we worked as a team with a major global aerospace supplier. The challenge was to work together, with assistance from a faculty mentor, to develop a robust model to help the client successfully obtain savings and mitigate losses (headwinds) in their supplier contracts. Specifically, we worked with the Engineered Items commodity throughout the project. As a team this allowed us to not only build a tool but improve the entire process that the commodity group undertakes when awarding a contract with a supplier, from writing the contract, to estimating costs, and then finally calculating the formulas needed in each contract

to adjust for economic conditions in the future.

To gain a better understanding of the current state process, we interviewed 15 subject matter experts on the clients' contracting process. We were able to design a matrix that coded how often the interviewees mentioned different aspects of the contract writing process, data collection, parties involved, and how their division can currently standardize or at least run a routine contract establishment operation. Additionally, we were able to code current issues as well as what each interviewee would like to see in our future state tool.

At the same time, we analyzed 64 contracts that the client is currently engaged in with a supplier. From here, we were able to tabulate information on how many contracts use a fixed price costing method or specific formulas, as well as adjustments based on statistics from material or labor indices (BLS, for example). From this master spreadsheet, we noticed common themes within the contracts that led us to start to draw conclusions about what our tool should capture.

The tool that we are currently developing is one aspect of this project. More importantly, we are striving to help our client improve a process (in this case creating and executing client contracts). We have also developed a process map and upon completion will create documentation for the standard work of the entire contract creation procedure.

**Jordan, Emma**

**Mentor(s): Dr. Elise Lewis**

**Finding Authentic Experiences Abroad**

Over the course of my junior year, I studied abroad in Buenos Aires, Argentina for the Fall 2017 semester and in Prague, Czech Republic for the Spring 2018 semester. I chose these places because I wanted to improve my language skills in Spanish and learn the basics of a new language. Additionally, I wanted to learn more about cultures I knew little about before living there. When I traveled, I would look to try activities and foods unique to the culture because I wanted an authentic experience that allowed me to learn as much as possible about where I was. For example, I went to an estancia, or ranch, in Argentina since ranching is a big part of the culture and is something that Argentina is known for. I also went to a tango show to learn more about the traditional Argentine dance. By participating in these activities, I was able to connect with the culture. Learning more about the cultures I was living in helped me to connect some of the ideas and concepts I learned about in my classes from USC and abroad. These experiences abroad also encouraged me to pursue activities with an international focus when I returned to USC. I achieved this by becoming a Peer Advisor for the USC Study Abroad Office, writing for the Maxcy College Blog (the international college at South Carolina) and being an Alumni Ambassador for CEA Study Abroad (the study abroad program I traveled with during my year abroad). By participating in these different organizations, I can help other students at USC who are looking to go abroad and have authentic experiences of their own. After graduating, I would like to move abroad or work with people from other nations, so studying abroad has helped me to be open to learning about new cultures and to connect with people from all over the world.

**Kamanga, Maureen**

**Mentor(s): Dr. April DeLaurier**

**Understanding the role of hdac4 in zebrafish craniofacial development**

Neural crest cells (NCS) migrate to the pharyngeal arches and are the precursors to skeletogenic cells that are responsible for craniofacial development. Prior research has shown that hdac4 plays a role in the migration of neural crest cells in zebrafish. A loss of hdac4 causes facial shortening, loss of cartilage in the ethmoid plate, and clefting of the palatal skeleton. In zebrafish, maternal hdac4 is required for ossification of the craniofacial skeleton. Mutants had increased bone at the midshaft of the ceratohyal with irregular borders. A subset of maternal-zygotic larvae showed missing skeletal elements of the first pharyngeal

arch, including the Meckel's cartilage, the anterior half of the palatoquadrate cartilage, and the anterior portion of the neurocranium. This study aims to investigate the role of *hdac4* in neural crest cells patterning of the craniofacial skeleton in zebrafish. We hypothesize that loss of maternal *hdac4* in zebrafish causes loss of a population of neural crest cells that form the anterior portion of the face. We predict that the analysis of markers of neural crest will indicate a loss of neural crest cells in maternal-zygotic mutants or defects in markers associated with cell migration.

This project will start by identifying carriers of the *hdac4* mutant allele, including homozygous mutants, heterozygotes, and wildtype zebrafish using PCR genotyping. Next, maternal-zygotic mutants will be in-crossed with heterozygous males to generate mutant and heterozygote larvae. The larvae will be harvested and stained using Alizarin Red and Alcian Blue to score the anterior craniofacial defect and fixed. These embryos will be used for mRNA in situ hybridization where we will use probes to label neural crest cells (*foxd3* and *sox10*) and a marker that labels migratory neural crest cells *fascin1a*. We predict that these markers will tell us whether neural crest cells are being specified, the migratory patterns of neural crest cells, and their precise locations during craniofacial development in maternal-zygotic mutants. These larvae will be compared with wild-type larvae from a different cross.

### **Kapp, Nicholas**

**Mentor(s): Mrs. Katie Hopkins**

**Pillars for Carolina: My Leadership Foundation**

The topic of leadership has been an integral part of my time at the University of South Carolina. My first major leadership experience was with the program Pillars for Carolina. Pillars is an extended orientation program where incoming freshman come on campus, for a week the summer, before their first year at USC. They become acclimated to different aspects of the college experience and participate in various activities about diversity, teamwork, health/wellness, and values. I was an extended orientation mentor during the week where I co-lead a group of 15 freshman with a partner and facilitated activities, lead small group discussions, and fostered the formation of relationships. I decided to become a peer leader because I felt my extroverted, enthusiastic personality would work well with my desire to help others have an amazing first year experience. I also wanted to expand my network and meet amazing leaders on campus. Through this experience, I was able to discover the impact of leadership and how necessary it is to creating a cohesive team. I will be using my experiences from this program to motivate and engage people in my professional life to better handle difficult situations and tasks.

### **Kartzmark, Gabrielle**

**Mentor(s): Dr. Sean Norman, Dr. Nicole Berge, Mr. Mirza Isanovic**

**Using Hydrothermal Carbonization as a Means of Decreasing Antibiotic Resistance Genes in Treated Municipal Sewage Sludge**

Wastewater treatment plants have been identified as critical hotspots for spreading antibiotic resistant bacteria. Municipal sewage usually undergoes five major processes that result in disinfected wastewater and dewatered solids, the byproduct. During these processes, bacteria consume the organic materials that are prevalent in sewage before the final treated water is released into surrounding environments. During the bacterial breakdown of the organics, they also encounter numerous other chemicals and pharmaceuticals, such as antibiotics. The exposure of the bacteria to low concentrations of antibiotics during this process provides the selective pressure for the selection and propagation of antibiotic resistant genes that are easily transferred through the community by vertical and/or horizontal gene transfer. By the end of the treatment process most of the bacteria (antibiotic resistant and non-resistant phenotypes) accumulate in the biomass, also called sludge, which is either used as fertilizer for agriculture and livestock feed or is disposed of in a landfill. Given that the final treated solids may contain high levels of antibiotic resistance genes, alterations to the wastewater treatment plant process could reduce the spread of these genes

before they are deposited into landfills or used in other applications. Hydrothermal carbonization (HTC) is a thermal treatment process that can operate at various temperatures under autogenous pressure to convert biomass carbon into hydrochar and liquid rich in organic compounds. Therefore, HTC is a potential process that can convert sludge into high-density solid fuel while also degrading DNA. Complete DNA degradation implies elimination of bacteria and the accompanying antibiotic resistant genes. We examined the survivability of DNA throughout the HTC process at three treatment temperatures (150°C, 200°C, 250°C) and at four treatment times (2, 4, 6, and 24 hours).

**Kassel, Riley**

**Mentor(s): Dr. Marianne Bickle**

**Creating a Platform for Mental Health Advocacy**

The topic of mental health is becoming more and more trendy in main-stream society, but as a psychology major who plans to center a career around improving mental health, it is much more than just a trend. Mental health is crucial to every individual's well-being and unfortunately there is a great deal of negative stigma and false information that surrounds it. For this reason, I have dedicated my college career to educating myself and others on the subject of mental health and have been an advocate every step of the way. My greatest pride and success in these efforts has been creating a Mental Health Awareness Committee within my sorority. The Greek system often prides itself on helping members to be the best version of themselves and most chapters provide avenues for academic success, philanthropic engagement, religious connections, social support and physical health. While these are all wonderful, I noticed a lacking of support for members' mental health and have worked very hard over the last few years to fill this void. As the head of this Mental Health Awareness committee, I helped to organize and facilitate guest speakers, mental health trainings, the creation of an online resource bank, participation in community and campus-wide mental health events, as well as many member events in the chapter house. In order to create and maintain this committee, I was able to draw from my many other experiences working with mental health awareness and advocacy and have continuously been able to use and add to this skillset. Now serving as a member of this committee, after having passed on the role of committee head to my successor, I am proud to still be able to contribute to its success, as well as to see my legacy be carried on.

**Kassel, Riley**

**Supervisor(s): Addyson Haage**

**Mentor(s): Dr. Matthew Irvin, Dr. Eric Goff**

**STEM Teens**

Reports have noted a disconnect between STEM (Science Technology Engineering and Mathematics) learning in the formal classroom and its applications to daily life. Helping children make these connections can not only improve their academic performance but can also increase their level of interest in STEM topics. As part of this study, we are investigating young visitor learning in informal science centers and how these learning outcomes can differ based on interaction with educators. Data was collected via survey and video recording at three separate informal learning centers in the United States as well as 3 sites in the United Kingdom. To investigate the role of educator age in informal STEM learning for young visitors, we collected data across three conditions: adult educator leading interactions with the exhibit, youth educator leading interactions with the exhibit, or no educator present to lead exhibit interactions. Survey measures focused on demographics, topic interest and engagement, stereotype acceptance and welcoming data and learning data. Results suggest that young visitors who interact with youth educators have higher perceived competence in exhibit content, as well as higher recall of exhibit related content than young visitors who interacted either with adult educators or no educators at all. The implications of this study highlight the importance of youth educator programs and youth educators in the learning process of young visitors to informal science centers.

**Katchen, Moshe**

**Mentor(s): Dr. Matt Childs**

### **Comparing and Contrasting a Global Business Education: Four Countries, Four Universities**

Throughout my college experience, I have had the incredible opportunity to live and learn on three different countries for a semester each – visiting over 30 countries across four continents in two years. This entire experience was coordinated by the first ever International Business Education Alliance cohort, giving me the chance to study with the same group of 37 internationals at their respective business schools around the world. Growing up in the sleepy, rural town of Galesburg, Illinois, I have always been driven to travel beyond my relatively insular community and understand first-hand the politics, culture, and society of Asia or Europe. Professionally, I also knew that if I wanted to go into a multi-national consultancy a deep understanding of cultures and people would be critical to having empathy for clients, a useful perspective on consumers, and an important aspect of being a well-rounded professional. The years studying abroad both contradicted and complimented my learning inside and outside the classroom. For example, breaking biases and reinforcing language skills helped me to understand the idiosyncrasies of the German language while gaining perspective on “Ostalgie” (the longing for East Germany). Whereas learning how different business cultures affect every day work life has deepened my overall business insight by experiencing a “high” Power Distance culture and what that hierarchical relationship truly looks like and how it functions at say Google Singapore or DHL Asia. After graduation, my career plan will be to take this transnational mindset lessons with me as I start my career as a management consultant working for a global partnership.

**Keen, Deborah**

**Mentor(s): Dr. Hyunsan Cho**

### **Community Perception of the HIV Vaccine in Western Kenya**

Human Immunodeficiency Virus (HIV) suppresses the immune system by attacking T cells, leading to the development of acquired immunodeficiency syndrome (AIDS). HIV affects over 30 million people around the world and 1.6 million people in Kenya. On August 18, 1987, the FDA sanctioned the first human testing of a candidate vaccine for HIV. Currently, multiple HIV vaccines—projected to be on the market in five to ten years—are being tested for efficacy and safety. The goal of this study was to explore opinions related to the HIV vaccine so that there is a guide for future policy development in Western Kenya. This study included a survey and focus groups taken from a convenience sample at various locations within Kisumu in Kisumu County and Sidindi in Siaya County. The study found that most participants would get vaccinated if the HIV vaccine became available (87.7%), and the majority of participants support a compulsory vaccination campaign for children (81.18%).

Keen, Deanna - Mentor(s): Dr. Parastoo Hashemi -- Buffer Optimization for Voltammetric Serotonin Measurements in Human Stem Cells -- Stem cell derived neurons provide the very exciting first step towards personalized medicine. Over the past decade fast-scan cyclic voltammetry (FSCV) has been applied to in vivo models to measure serotonin which has greatly advanced our understanding of the neurotransmitter's role in mood disorders. However, the use of primarily rodent models to address human disease raises issues of translatability. Therefore, for the first time we have employed FSCV for successfully measuring serotonin in stem cell derived serotonergic neurons. Performing in vitro FSCV measurements in induced pluripotent stem cells (iPSC) requires overcoming the challenge of the cell media environment. We confronted these challenges via a systematic analytical optimization of the cell buffer environment, and report the fouling effects of various matrix components. We determined that the optimal cell analysis buffer was comprised of 2.5 mM glucose, 130 mM NaCl, 5 mM CaCl<sub>2</sub>, and 30 mM HEPES. In the future, FSCV analysis of serotonin in iPSC-derived serotonergic neurons can be employed in translational studies to measure individualized pharmaceutical effects.

**Keen, Deanna**

**Mentor(s): Dr. Parastoo Hashemi**

**Improving the Sensitivity of Microelectrodes for In Vivo Neurotransmitter Detection**

Fast-scan cyclic voltammetry (FSCV) at carbon fiber microelectrodes (CFMs) is a powerful electroanalytical method that measures the real time dynamics of neurotransmitters. The excellent analytical capabilities of FSCV makes this method uniquely qualified to study the roles of neurotransmitters in neurological disorders. Measurements of the modulator serotonin in vivo are made difficult by the low concentrations of this analyte in the brain and further complicated by fouling of the electrode surface by serotonin metabolites. To counteract these issues, the CFM is electroplated with Nafion, a polymer that rejects serotonin's metabolites. This modification enables serotonin measurements, at, or near the limit of detection thus experiments remain technically challenging. Therefore, we were motivated to improve the sensitivity of CFMs to serotonin and thereby improving the success rate of measurements. This work compares CFM surface modifications that resist fouling effects to the electrode surface and increase signal strength. This improved sensor will allow for the study of brain regions previously thought to be unreachable because of low serotonin concentrations, and the exciting possibility of detecting spontaneous, low amplitude serotonin transients.

**Keller, Michael**

**Supervisor(s): Alyssa Hill**

**Mentor(s): Dr. Melanie Palomares**

**Evaluating the Effect of Exercise on Cognitive Control**

The long-term benefits of exercise have been lauded in popular media and in the scientific community. This undergraduate research project aims to understand the short-term effects of exercise on cognitive control as a function of exercise intensity. As the intensity of exercise is associated with physiological changes such that moderate exercise is considered aerobic (i.e. with oxygen) and intense exercise is considered anaerobic (i.e. without oxygen). We hypothesize that moderate aerobic exercise will improve executive functioning and overall cognition more in comparison to high intensity anaerobic exercise. We will examine how aerobic and anaerobic exercise might improve or hinder performance on three measures: (1) attention in a "go-no-go" task, (2) nutrition choices (3) risky or impulsive behaviors. Results from this study could inform professions with high-stress and high-intensity physical activities about the need to investigate alternative training methods to properly train personnel to overcome the cognitive effects of anaerobic exercise and anaerobic exercise-like events.

**Keller, Katherine**

**Mentor(s): Dr. David Deweil**

**Personal Development through Studying Abroad**

The Spring Semester of 2018, I studied abroad at the Otto-Friedrich Universität in Bamberg, Germany. I decided on Germany as one of my three majors is German, and I thought that increased exposure to the culture and local accents would be beneficial to my general understanding of the language. Bamberg also offers many different English literature courses, taught in English, that helped me gain additional required credits. Additionally, I wanted to challenge myself to live in a new environment and culture for a long period of time and work through any difficulties that may arise – the primary one being language, since I am not entirely fluent. This experience is important to me, as it taught me a lot about myself and my own beliefs, and opened my eyes to various problematic areas, both in my own life and in general American society which I had previously overlooked, including education access, our own nationalistic pride, and diversity. This trip abroad helped to broaden my horizons and mold me into a more open-minded indi-

vidual, while also improving upon my language skills needed in my current classes, and hopefully, in my future career.

**Kelley, Ben**

**Supervisor(s): Jack Wallace**

**Mentor(s): Dr. David F. Stodden, Dr. J. Megan Irwin, Dr. An De Meeste**

**Impact of sports participation on perceived motor competence, actual motor competence, and health-related fitness.**

**Purpose:** The purpose of this study was to investigate the extent to which participation in sports impacts perceived motor skill competency, actual motor skill competency, and health-related fitness in youth. **Methods:** A total of 234 (123 boys) children and adolescents (aged 10-18 years) participated in this study. Perceived motor skill competence (PMC) was assessed using the sport/athletic competence subscale of the Self-Perception Profile for Children (Harter, 1986). Actual motor skill competence (MSC) was evaluated through six tasks assessing object control, locomotor and balance/stability. Individual task scores were converted to standardized scores separately for boys and girls and combined into a composite factor (Luz et al., 2016). Health-related fitness (HRF) was assessed through percent body fat, grip strength, and VO<sub>2</sub> max estimated from performance on the Fitnessgram 20m PACER test. Performances on fitness variables were converted to standardized scores and combined to create a composite HRF score. Sports participation was assessed through a self-report of current participation in sports (up to three current sports). A one-way ANOVA was conducted to examine differences in PMC scores related to number of sports in which individuals participated. Hierarchical multiple regressions were conducted to determine how much variance observed in MSC and HRF can be attributed to sports participation above and beyond additional predictors of age, sex, MSC (for HRF), and PMC and HRF (for MSC). **Results:** ANOVA results indicate that athletes had higher PMC scores than individuals who did not participate in sports  $F(3,230) = 9.26, p < .001$ . Regression results indicated the number of sports played explained 19.2% of the variance in motor skill competence above and beyond sex, age, PMC, and HRF ( $R^2$  change = .058,  $F(1, 225) = 16.03, p < .001$ ). The number of sports played also explained 15.9% of the variance in HRF above and beyond sex, age, and MSC ( $R^2$  change = .026,  $F(1, 229) = 7.04, p < .001$ ). **Conclusion:** Taken together, these findings advocate for participation in sports throughout childhood to promote skill competence, health-related fitness and perceived competence in youth.

**Kelly, Jordan**

**Mentor(s): Dr. Nina Moreno**

**Food Is Culture**

My name is Jordan Kelly, and I am an International Business major here at the University of South Carolina. This has given me many diverse perspectives to view the world from. I have experienced many different perspectives from my semester abroad in Vienna, Austria. One such experience was visiting a Concentration Camp from World War II. I learned a lot about my adopted country through that experience. I also was able to find an unlikely connection from this experience in Vienna to an Italian class that I took for my minor back in South Carolina. The bond that people share over their food travels across borders and unites us all. I learned about the Slow Food movement in this Italian class, and how its founder of the movement, Carlo Petrini, saw the bonds that all of us share with our food. I learned how Petrini's ideas can help our society bond through meals with our loved ones, as well as bond over the actual food that we eat. I saw this exact thing through a Jewish market in Vienna. Going through Graduation with Leadership Distinction has allowed me the opportunity to make this connection from within and beyond the classroom in my education, as well as many more.

**Kelly, Madison****Mentor(s): Mrs. Anna Oswald-Hensley****Madison's College Experience**

During the Fall 2018 and Spring 2019 semesters, I was/am the President of a club called IRIS, which stands for Individuals Respecting Identities and Sexualities. As President, my duties include regularly meeting with the adviser, planning and running meetings, and recruiting new members. Things I learned from this experience include confidence in my speaking and communication and further learning how to lead things. I had been bullied for my sexuality in the past and so my motivation for starting up this club was to help others feel like they matter and belong. The impact of this club has made myself a better person in the sense of becoming a better leader and helping others at the same time. I want others to take from this experience and know that you can be a leader and still pursue things that are meaningful to you. The next thing lined up for this organization is to start an annual campus color war in efforts to raise awareness for inclusion of the LGBT community.

**Kenekham, Ketsana****Mentor(s): Dr. Ginny Webb, Mrs. Kathleen Ferris****Efficacy of Chemical Disinfectant Wipes on Children's Books**

Gudakova et al. discovered that children's book covers sampled from three upstate South Carolina outpatient pediatric healthcare facilities were found to contain significantly high levels of microbial contamination. Our research is a follow-up study which suggests the implementation of a wiping procedure during the disinfection process in order to efficiently limit microbial burden on children's book covers. Commercially available single-use disinfectant wipes containing various active ingredients such as isopropyl alcohol, quaternary ammonium compounds, sodium hypochlorite, and hydrogen peroxide were tested against bacteria commonly associated with nosocomial, or hospital-acquired, infections such as *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Enterococcus faecalis*. The book covers were individually inoculated with each bacteria and efficacy of each wipe paired with a controlled wiping method was tested. On average, all wipes were able to remove at least 99% of the total bacterial load. Our results show that all disinfectant wipes used in the experiment are effective in disinfecting children's book covers and disinfection protocols using single-use disinfectant wipes may help limit contamination and disease transmission within healthcare facilities.

**Kennedy, Aisha****Mentor(s): Dr. Kristina Ramstad, Mr. Mark Pavlosky, Mr. James Garabedian****Post-translocation inbreeding and fitness in Red-cockaded woodpeckers**

Red-cockaded woodpeckers (RCW; *Picoides borealis*) are small, endangered, cooperatively breeding birds found in old pine forests throughout the Southeastern US. RCWs form social units comprised of a single breeding pair and up to four nonbreeding adult males that help the breeding pair raise their young. Social groups inhabit permanent territories where they build and defend nest cavities in mature, live pine trees and breeding pairs are thought to be monogamous. Since 1970, RCWs have received protection under the Endangered Species Act due to environment degradation. Restoration programs have since increase the number of active RCW colonies via translocation and the founding of new populations. To date, however, there has been no genetic monitoring of recently translocated RCWs. Thus, departures from monogamy, the potential for inbreeding, and variance in reproductive success have not been assessed in newly established RCW populations. Hitchcock Woods (HW) is a 2100 acre old pine forest located in Aiken, South Carolina. Between 2016 and 2018, 27 adult RCWs were translocated from Francis Marion State Forest to HW in the hopes of establishing a new population. In Spring of 2018, 12 chicks hatched in the first breeding season of HW RCWs. For this project, we obtained DNA from buccal swabs collected from RCW chicks

and founding adults in HW and genotyped them at six microsatellite loci. We are currently estimating relatedness among chicks found in the same nest, between chicks and their presumed parents, and between the male and female of each breeding pair. This will allow us to (1) test if there are extra-pair fertilizations occurring among these assumed monogamous birds, (2) determine if birds in breeding pairs are closely related, and (3) determine the reproductive success of founding birds. The resulting data will determine if genetic threats are a concern for the RCWs of HW and provide genetic management recommendations for this population.

**Kibler, Krystyn**

**Mentor(s): Prof. James Pinckney**

**Development of models for phytoplankton-nutrient responses in support of numeric nutrient criteria for estuarine waters**

Nitrogen (N) is usually the essential nutrient responsible for marine phytoplankton in coastal/estuarine waters. The objective of this study was to predict the magnitude of growth response of total phytoplankton abundance's to a range of N-loading conditions with a goal to create a series of growth curves in order to identify negative 'tipping points.' This study was performed in two locations: North inlet and Winyah Bay estuary, Georgetown, South Carolina. Within this experiment three trends were identified in the phytoplankton group responses.

**Kibler, Jessica**

**Mentor(s): Ms. Stephanie Suarez**

**Improving the Non-Profit Organization Volunteerism Experience**

In August of 2017, I was accepted into the Leadership and Service Center's community ambassador program at the USC. This program partnered me with Sexual Trauma Service of the Midlands, where I would be spending over 800 hours over two years. I started off as an office volunteer; completing clerical work for a few months and was eventually asked to train to be an advocate which involved providing hospital accompaniment for survivors and answering the crisis hotline. The next step in my volunteer career was working in reforming the volunteer experience by creating a community between the volunteers, affirming how impactful their work has been for the organization and enhancing the training program. I was able to develop changes to improve the experience of the volunteers by listening to their suggestions and input to increase their likelihood of volunteering more consistently. Another development was with outreach and community partnerships to potentially reach new demographics for volunteers and for those in need of services. Creating an environment where the volunteers feel appreciated and that their time has made an impact to society, has proven to increase their participation and satisfaction within the organization which is vital for these non-profits to function.

**Kindig, Collin**

**Mentor(s): Dr. William Jones**

**Influences on Culture**

Through pursuing the Global Learning pathway for Graduation in Leadership Distinction, I have sought out the opportunity to study abroad twice in Santiago, Chile and Prague, Czech Republic. Throughout my travels I took notice of the abstract ideas that shape our culture and perception of ourselves and others throughout the world. Symbolism is essential in creating and shaping a national narrative among citizens to achieve a country-wide goal. In addition, I found the more inclusive the leadership then the dynamics of a group would work more efficiently and successfully. I would have the opportunity to test these concepts in a business environment working for the Pennsylvania Department of Community & Economic Development, Office of International Business Development. There I would interact with executives and business

leaders of many different nationalities and cultures. In addition, I would compliment my experiences with my studies in International Business and minor in Spanish. I would discover how these abstract ideas would influence their goals and perception.

**King, Reese**

**Mentor(s): Dr. C. Nathan Hancock**

**Determining if Arabidopsis-Produced Phage Proteins Can Inhibit Erwinia Amylovora**

Fire blight is a devastating disease known to affect a host of fruit trees across Europe and North America. This bacterial infection, caused by *Erwinia amylovora*, affects many important species, including apple, cherry, plum, pear, and rose. Our overall strategy was to use lytic proteins from *Erwinia*-killing bacteriophage to kill blight-causing bacteria. Our intention was to generate recombinant DNA coding for lytic transglycosylase proteins and express them in *Arabidopsis*. These bacteriophage-derived enzymes induce fatal lysis of cells and are bacteria specific because they function by breaking down specific types of peptidoglycan. We hypothesized that expression of viable lytic proteins in plants is possible and could allow inexpensive production of large volumes of protein. We also predict that if blight-susceptible species produced their own bacteria-fighting proteins, they would become blight resistant. This could potentially open many opportunities for producing crops and trees with the ability to flourish in previously “unusable” environments (out of range), opening many acres of land up for food production. If orchards must be planted with high tree density, trees producing bacteria-fighting proteins will be critical for success. We have successfully synthesized two bacteriophage constructs and transformed them into *Escherichia coli*. One of these constructs has been transformed into *Arabidopsis*. We are in the process of PCR-verifying the transformed plants, and upon verification of plasmid integration will perform assays to test the ability of plant-produced lytic proteins to inhibit the growth of *Erwinia amylovora*. At this point, our results suggest that bacteriophage sequences can be transformed into *Arabidopsis*.

**King, Charlotte**

**Mentor(s): Dr. Kristina Ramstad, Dr. Tracey Tuberville**

**Patterns of mercury bioaccumulation in alligators from former nuclear cooling reservoirs on the Savannah River site, SC**

Mercury (Hg) is a widespread contaminant that can cause detrimental effects to wildlife and enter aquatic ecosystems through both natural and anthropogenic processes (eg, atmospheric deposition, industrial activities). Mercury can be converted into methylmercury in aquatic sediments through the metabolism of anaerobic bacteria. Methylmercury is the most toxic form of Hg because it easily passes through membranes and can bioaccumulate in the tissues of organisms. In mammals, mercury bioaccumulation can affect the central nervous system and cause sensory and motor deficits. However, little is known about the effects of methylmercury exposure in reptiles, many of which are long-lived and feed at high trophic levels. We investigated blood Hg levels in American alligators (which have a lifespan of 40-70 yrs) from a former nuclear cooling reservoir on the Savannah River Site (SRS) in South Carolina. Water was drawn from the Savannah River to cool the P and R nuclear reactors before being released into Par Pond. We captured 44 alligators during between 2010 and 2014, measured their total length (cm), and collected whole blood samples for Hg quantification on the Direct Mercury Analyzer. Blood Hg levels ranged from 0.27 – 12.59 mg/kg (dry weight) and increased with alligator body size. Eighty percent of the variation in blood Hg levels of alligators was explained by body size. As a long-lived apex predator, alligators have the potential to bioaccumulate high levels of mercury in their body. Because they are also a game species with the potential to travel between habitats, including off the SRS, consumption of alligators provides a potential route of exposure to mercury in humans.

**Knight, Erin**

**Mentor(s): Ms. Sarah Gay**

**How Barcelona Changed My Perspective**

During the Spring of 2018, I studied abroad at the Unviersitat Autònoma de Barcelona in Barcelona, Spain. My semester in Barcelona not only enhanced my knowledge, but changed my life. Throughout the semester I visited eight countries and 13 cities. Previously, I never travelled outside of the country and rarely left southeast United States. When I set off for Barcelona I wanted to travel to Europe and expose myself to many diverse cultures to expand my knowledge and understanding of international communications. I had no idea I would learn that and much more. At UAB, I was introduced to many concepts related to international business and communications functions. I plan to practice international communications for a financial institution as my career and engaged in courses of International Marketing, International Communication, Communication and Gender, and Political Globalization. By learning how to communicate with individuals from different backgrounds and experience firsthand what it is like to travel and interact with people from around the world I feel prepared to begin that adventure. Studying abroad also introduced me to a new version of myself. I gained a newfound sense of independence, self-awareness, and appreciation that I did not previously have. Europe opened my eyes to a new way of life; free from judgments, stereotypes, and assumptions. It taught me there are multiple walks of life and one way of living is not better than the other. It is my wish that when people hear about my time in Barcelona, they understand the importance of intercultural competence and take pause the next time they cast judgments on those from other walks of life. The semester taught me to appreciate the differences in the world and encouraged me to continue exploring. I hope to share my experiences with the world and educate others about the wonders of experiencing places and people that are different from themselves.

**Kocis, Courtney**

**Mentor(s): Mr. Rico Reed**

**Understanding Business and Other Cultures: A Global Learning Pathway**

During my four years at the University of South Carolina, there have been many different study abroad opportunities for students to choose from. As an International Business and Marketing major in the Darla Moore School of Business, I have been able to take advantage of two of these opportunities: a short-term study abroad program visiting various cities in Japan, and a semester-long program at Fudan University in Shanghai, China. Through these experiences, I was able to tour and meet with Japanese companies to learn about Japanese business culture, take business and Chinese language classes at Fudan University, and explore various places in China such as Shanghai, Inner Mongolia, and Guilin. This poster is a reflection of my experiences in China and Japan as well as my four years at USC. My poster focuses on how my dad's former coworkers taught me the importance of relationships in Chinese culture, how a line from a Japanese proverb allowed me to understand the difference between individual and collective cultures in the workplace, and what being an active global citizen means to me. My journey at USC has allowed me to take advantage of amazing opportunities as well as grow and develop personally and professionally, and for that I will be forever grateful.

**Kock, Laura**

**Mentor(s): Mr. Rico Reed**

**My Dushi Bida at USC**

I am an international student here at USC and have been here since my freshman year. I am from Aruba and have had this extended study abroad here in the U.S. It has been a very good experience with its highs and also its lows and something that I had wanted to do for a long time. In high school in Aruba I knew I wanted to go to college in the U.S but it was like a far away and unattainable dream. From the point I was

accepted to now so close to graduation I am a pretty different person. I have grown and found myself in these four years in a foreign country. I would like to live in the U.S. after I graduate so being here and bettering my English and learning the culture has been very beneficial for my future endeavors. On my poster I tried to highlight some of the things that I have experienced over these past few years that have had the biggest impact on the person who is standing in front of you today. Bear in mind that by no means is this an extensive or exhaustive picture of my career here at USC but just a snit bit. From learning about my love for community service through different opportunities to never losing touch with my culture and heritage by introducing it to American students through Thinking Globally, I have experienced the process of being formed and finding yourself that can only happen once you let go of things you have known your whole life and completely step out of your comfort zone and into college, in a different country in my case. As I explore this journey, which will hopefully serve as an example for youth getting ready for college, I hope you will join me and see just what a dushi bida (good life) I have had here at USC.

**Kothandaraman, Venkatraman**

**Mentor(s): Dr. Jim Burch**

**The Effectiveness of LINE-1 Methylation as a biomarker for Colorectal Cancer**

Although colorectal cancer (CRC) is preventable through the use of colonoscopies, many patients put them off. Therefore, a method of stratifying patients on risk using less invasive procedures can help patients make more informed decisions. This project investigated the usefulness of LINE-1 DNA methylation as a potential biomarker of colorectal adenoma formation using blood, adenoma and normal gastrointestinal (GI) tissue samples. Adenomas are CRC precursors. Samples were obtained from patients undergoing a screening colonoscopy with either no adenoma (controls) or with at least one confirmed adenoma (cases). Within this case-control design, LINE-1 methylation was measured in white blood cell DNA (22 cases vs. 22 controls). LINE-1 methylation also was compared between adenoma and normal GI tissues within the cases. Pyrosequencing was used to quantify LINE-1 methylation. Within the blood samples, the mean level of LINE-1 methylation in the cases was  $74.50 \pm 1.87$  and in the controls was  $74.95 \pm 1.78$  ( $p = 0.41$ ). The mean level of LINE-1 methylation in adenoma tissue was  $65.93 \pm 5.10$  and in the normal GI tissue was  $70.64 \pm 2.26$  ( $p < 0.01$ ). There also was a significant difference in LINE-1 methylation between the adenoma tissue samples and the blood samples within the cases ( $p < 0.01$ ). Furthermore, sex was identified as a significant predictor of LINE-1 methylation in blood samples ( $p < 0.01$ ). These results suggest that although adenomatous polyp tissues have decreased LINE-1 methylation, this result was not reflected in blood samples. LINE-1 DNA methylation in circulation may not be a viable early biomarker for adenoma detection.

**Krueger, Kelly**

**Mentor(s): Dr. William Jones**

**Studying Abroad: Exploring Other Cultures while Discovering Yourself**

During the Fall 2015 semester, I studied abroad on exchange at the University of Limerick in Limerick, Ireland. At the time, I wasn't happy with the major I had declared and I had a lot of Carolina Core classes left to take so I decided to study in Ireland. The five months that I spent there was filled with exploring other countries but also exploring myself. Even though English is spoken in Ireland, I realized I still had a language barrier. I didn't know how to speak to people from different cultures. It was a challenge but I broke out of my shell and made relationships with people from all around the world. I had the opportunity to travel to Italy and Scotland with a group of people. Scotland was towards the end of my time in Europe and something happened there that I never would have imagined. I went to dinner by myself. This sounds trivial but going out alone in a country that I had never been to, without any technology to help me get around, was a big deal to me. I learned a lot about myself during that trip which gave me the confidence to explore on my own. Even now back at Carolina, I know that I can do anything that I put my

mind to. If I was capable to wander in a foreign country and find a way back, then I can achieve whatever I want. I heard that studying abroad changes a person but I assumed that only happened when a person studied abroad in a third world country. Contrary to my belief, I changed tremendously to where I found out who I really was and the person that I wanted to be.

**Kudre, Praniti**

**Mentor(s): Ms. Christine Weber, Dr. Douglas Wedell, Dr. Svetlana Shinkareva**

**Developing a Set of Music for Evaluative Conditioning of Consumer Preference**

Our preferences for different items can vary from liked to disliked and may change depending on the context in which they are encountered. One way to change preferences is through evaluative conditioning which pairs positive and negative valence music with neutral products. Prior work in our lab found that music that evoked negative and positive states had strong effects on evaluative conditioning states but inconsistent results on conditioning consumer preference. Therefore, the goal of this research was to develop a stimulus set of liked and disliked music to be used to determine if valence attitude rather than valence state is critical to consistently shifting consumer preferences. Across two studies, we investigated preferences for music and created a set of liked and disliked music clips that may serve useful in shifting preferences for other stimuli in future experiments. In the first study, participants (n = 48) were presented with a list of 200 song titles and artists and rated each song on liking and familiarity. The songs were chosen by selecting the top songs from each year of the Billboard Hot 100 charts from 2009-2018. Based on these behavioral ratings, we identified 20 highly liked and familiar songs. However, we did not find any songs that were consistently disliked. In the second study, the twenty most liked songs from the previous study were combined with a new set of twenty potentially disliked songs, which were selected from the iTunes Top Heavy Metal chart based on previous literature showing general dislike for this genre. For each song, two 4-second clips were chosen from the chorus. Participants listened to each clip and rated both their liking and their affective response in two separate blocks. Using the ratings from this second study, we will select consistently liked and disliked music for use in future conditioning experiments where the music will be paired with products to study the effect of the music on product preferences.

**Kunselman, Lauren**

**Mentor(s): Dr. Dan Speiser**

**Visual Neurobiology of the Florida Fighting Conch *Strombus alatus***

Members of phylum Mollusca have visual systems that span the spectrum of simple and easily understood structures to highly complex and specialized organization. By comparing these different visual systems, researchers can better understand relationships between the structure and function of eyes and nervous systems. Conch (Gastropoda: Strombidae) possess strikingly large and complex eyes for a gastropod mollusk, suggesting that the neural structures associated with visual processing in conch may also be more complex than those observed in other gastropods, which tend to have relatively small eyes or no eyes at all. In this study, we used optomotor behavioral experiments to determine if the Florida fighting conch (*Strombus alatus*) has spatial vision. We also investigated the underlying neural structures of the conch's complex eye by performing an ethyl gallate neurohistological stain on the cerebral and pleural ganglia in addition to immunolabelling of G Proteins in the retina. *S. alatus* demonstrate an optomotor response, providing evidence for spatial vision. The ganglia of *S. alatus* have cell bodies positioned on the most superficial layer of the ganglia, with dense neuropil projecting inwards towards the center of the ganglia. G protein expression was also detected in the retina of *S. alatus*. These characterizations of the visual and nervous system of *S. alatus* will be foundational for further studies regarding structure-function relationships between visual systems and the nervous system in conch.

**Kutner, Anna**

**Mentor(s): Ms. Sarah Keeling**

**Combating Political Apathy through University 101**

University 101 (U101) is a course that is primarily offered to freshman in their first semester to help foster student success by assisting with the transition into college life at USC. For the last two years of my undergraduate career, I have served as a Peer Leader for this program. My background as a Political Science major who participated in the South Carolina Washington Semester Internship Program as a sophomore inspired the idea of incorporating my love for political activism into U101 courses. As of the 2016 election, only 44.8% of eligible voters in the 18-to-21 age range turned out to vote, in direct comparison to the 75.4% of voters who were over the age of 50. This indicates that age has a direct correlation with voting. Considering U101 has influence on over more than 5,500 USC students who directly fall in the 18-21 age range that desperately lacks political involvement, I developed a plan to pair this issue with a program that could only benefit it. This presentation will showcase some of my most impactful undergraduate experiences and how I believe politics and peer leadership can be combined for the benefit of USC students and voter turnout rates.

**LaChance, Tomi**

**Mentor(s): Dr. Randy Lowell**

**Personality and Social Media**

Narcissism has been shown to predict aggression in offline environments (Rasmussen et al. 2016; Twenge & Campbell, 2003), particularly when the threat is visible to others (Ferriday, Oshin, & Mandel, 2011). Social media sites are a relatively new social and technological phenomenon, that have seen rapid increases in recent years. With over a billion users worldwide, Facebook is one of the most popular of these sites. Narcissism has been found to be related to more online activity on social media sites (Buffardi & Campbell, 2008; Mehidizadeh, 2010; Ong et al. 2011). However, little investigation has been done regarding how more narcissistic individuals respond socially within these sites. Given that the most maladaptive forms of narcissism typically coincide with low self-esteem and low empathy (Barry et al., 2014; Watson et al., 1992), we anticipate that higher narcissism, lower self-esteem, and lower empathy rates will predict more aggressive responses in response to negative feedback on Facebook.

USC Union students get either 1) positive feedback in the researcher-generated response post to the original post they create, or 2) negative feedback. Demographic and online activity information, as well as inventory questions assessing personality are administered via Google Forms on a secure computer in the lab. Narcissism is assessed using the Narcissistic Personality Inventory (Raskin & Hall, 1981). Empathy is assessed using the interpersonal reactivity index (Davis, 1980). Self-esteem is assessed using the Rosenberg self-esteem scale (Rosenburg, 1979). The researcher then informs them they will be randomly paired with another anonymous peer that the researcher will relay communication with via email. Each participant then composes a realistic 'post' based on a chosen hypothetical scenario, after having read a series of 4 narratives while seated at the eye tracker. Finally, they are asked to follow-up from home by responding to the comment left by the 'peer' on their own post, which is emailed to them by the researcher. Preliminary findings include a positive relationship between self-esteem and narcissism, and between self-esteem and use of first-person perspective-taking within social media postings, as well as a negative correlation between perspective-taking and social media use.

**Lagnese, Claudia**

**Mentor(s): Mrs. Hayley Ross**

**Food for Thought**

The Food Systems team in Sustainable Carolina is working to bring awareness and education about sustainable eating practices to the University of South Carolina and the greater Columbia community. Through a partnership with Transitions Homeless Shelter, we teach a group of individuals ages 17-21 how to integrate sustainable habits into their lifestyle. Our team also focuses on creating awareness of food waste in our on-campus dining facilities. In conjunction with Aramark, we participate in a week-long event called "Weigh the Waste," where our team members collect data on how much food waste is generated by visitors to our on-campus dining locations. These projects have helped us develop our project management, group facilitation, organization, and public speaking skills.

**Lambdin, Mary**

**Mentor(s): Dr. Suzanne Swan, Ms. Nicole White**

**Comparison of the Rates of Stalking Perpetration and Differentiation of Self in Heterosexual and Sexual Minority Women**

Stalking, defined as "repeated and unwanted pursuit and invasion of one's sense of physical or symbolic privacy by another person...who desires and/or presumes an intimate relationship" (Cupach & Spitzberg, 2000), affects many people. For example, one study of 2,159 people measured multiple types of stalking, and found that the least common type (the stalker hurting someone close to the victim) was reported by 13% of the respondents, and the most common (leaving unwanted messages such as text messages) was endorsed by 49% of the participants (Nobles, Cramer, Zottola, Desmarais, Gembering, Holley, & Wright, 2018). The same study found that the most commonly reported identity of the stalker was an ex-boyfriend or girlfriend. Sexual minority individuals (i.e., homosexual or bisexual), in particular, are more likely to be victims of stalking (Edwards, K. M., et al., 2015). One study found that 36% of bisexual women vs. 15% of heterosexual women have been stalked (Walters, 2013). Other research has found that 53.1% of sexual minority college students and 36.0% of non-sexual minority college students report stalking (Edwards, 2015). While these studies have provided valuable information about stalking victimization, little is known about stalking from the perspective of the perpetrator. This study fills a gap in the research literature by examining stalking perpetration among heterosexual and sexual minority women. It is important to understand predictors of stalking perpetration to be able to develop effective prevention and intervention strategies. This study proposes that a factor that may help to explain the higher rates of stalking seen among sexual minority women is differentiation. Differentiation consists of an ability to "maintain connections with others while achieving an autonomous self" (Skowron & Schmitt, 2003). Some studies suggest that a lack of differentiation of self, also called "fusion" or "merging" in intimate relationships may occur more commonly among lesbian relationships as compared to other relationships (Peplau, Cochran, Rook, & Pedesky, 1978). With the current study, I aim to discover if the higher rates of stalking found among sexual minority women may be due to higher rates of fusion in these relationships.

**Lancaster, Carly**

**Mentor(s): Dr. Mythreye Karthikeyan**

**Defining Roles of Chondroitin Sulfate Chains on T RIII/Betaglycan in Wnt signaling and Ovarian Cancer**

The Transforming Growth Factor TGF- B Type III receptor/betaglycan is a transmembrane proteoglycan that can exist in cells with or without heparan sulfate (HS) and/or chondroitin sulfate (CS) glycosaminoglycan (GAG) sugar chains on its extracellular domain[2]. The significance of this co-receptor is underscored in mice, where loss of betaglycan leads to embryonic lethality and in humans where betaglycan

expression is altered in multiple cancer types[3- 10]. Notably, we previously demonstrated Fibroblast Growth Factor (FGF) glycoprotein interaction with betaglycan's GAG chains that leads to tumor suppression, indicating that betaglycan's GAG chains can modulate cell signaling via interactions with growth factors[10]. Recently, we also demonstrated that the Wnt family of glycoproteins also interact with betaglycan's GAG chains[11]. Specifically, HS modified betaglycan ([11] and Fig. 1, dotted chains) suppressed Wnt signaling in ovarian and breast cancer cells[11]. Given that betaglycan can exist as a CS modified and/or HS modified cell surface proteoglycan, the goal of my research is to determine the specific role of betaglycan's CS chains in Wnt signaling and ovarian cancer cell behavior.

**Landwehr, Farrell**

**Mentor(s): Mr. Jacob J. M. Kay, Dr. Jeffrey Holloway, Dr. Robert Davis Moore**

**Acute Autonomic Dysfunction Predicts Long-Term Cognitive Function Following Pediatric Concussive Brain Injury**

Landwehr, F.1; Kay, J.J.M.1,2; Holloway, J.2; & Moore, R.D.1

Department of Exercise Science<sup>1</sup>; Department of Pediatrics-School of Medicine<sup>2</sup>  
University of South Carolina, Columbia, SC, USA

Concussive injuries are increasingly prevalent among children. Although classified as mild, these injuries can result in serious alterations in brain and behavioral health. More recently, the physiological stress induced by concussion has been linked with dysfunction of the autonomic nervous system (ANS). Researchers suggest that heart rate variability (HRV, an index of autonomic function) may serve as an important bio-marker for diagnosing concussion and tracking recovery (Dong, 2016; Hutchison et al., 2017). Further, cross-sectional studies show that reduced HRV following concussion may be associated with poorer cognitive outcomes in adults (Mu et al., 2019; Paniccia et al., 2018; Thayer et al., 2009). However, no study has longitudinally examined the relation between concussion, HRV, and cognitive function in a pediatric population. Thus, the purpose of our investigation is to examine the association between acute alterations in HRV and long-term cognitive outcomes following pediatric concussion. We hypothesize that decreased HRV at 2 weeks post-injury will predict poorer cognitive performance at 5 weeks post-injury. This study will include 40 participants (11-17 years), being medically treated at a local pediatric concussion clinic. We will measure heart rate in participants using emWave Pro Plus sensors (HeartMath, LLC) and we will process HRV data using Kubios HRV Standard software. Cognition will be measured using a modified CogState Brain Injury Test Battery. Multiple linear regression will be used to analyze the associations between acute HRV indices and long-term changes in cognitive function, if any. Important demographic (sex, age, and BMI) and injury characteristics (number of prior concussions, time since injury, loss of consciousness, and amnesia) will be controlled for in the regression model. Results from this study will not only serve to expand our understanding of HRV as a prognosticator of concussion outcomes, but will also provide important information regarding the clinical management of pediatric concussion.

**Langley, Samantha**

**Mentor(s): Dr. Susan Ruppel, Dr. Scott Meek**

**Evaluating the Roles of Lexical and Prosodic Cues on the Perception of Written Sarcasm**

Previous research has shown that lexical factors (e.g., interjections, adjectives and adverbs, and punctuation) tend to be associated with higher ratings of sarcasm. This is especially true when these factors are combined. It has also been shown that prosodic cues, otherwise known as patterns of vocal stress, tempo, intonation, and rhythm, are important for recognizing and interpreting sarcasm. This raises an important question, can lexical factors and written prosodic cues, when used together, increase the recognition of sarcasm; or is it the case that these cues function independently? The current study examines the impact

of lexical and written prosodic cues on sarcasm perception. Participants were asked to read scenarios that consisted of a three-sentence dialogue with varying lexical factors and written prosodic cues or dialogue with varying lexical factors only. Following this, participants were asked to indicate the level of sarcasm within the last statement of the scenario. It was hypothesized that there would be a main effect of lexical factors, with participants rating the level of sarcasm higher when there are more lexical factors present. It was also hypothesized that there would be a main effect of prosodic cues, with participants ratings the level of sarcasm higher when prosodic cues are present. Additionally, it was hypothesized that there would be an interaction of prosodic cues and lexical factors, with sarcasm ratings being highest when prosodic cues and multiple lexical factors are present. Results indicate that lexical factors do impact sarcasm perception. Higher ratings of sarcasm were present with the addition of lexical factors; however, no significant differences were found between the presence of one lexical factor and multiple factors. There was also a significant main effect of prosodic cues; scenarios that contained prosodic cues were rated as significantly more sarcastic. Lastly, there was no interaction of prosody and lexical factors, as the presence of multiple lexical factors and prosody was not rated as significantly more sarcastic than other conditions.

**Laramee, Nicholas**

**Mentor(s): Mrs. Hayley Ross**

**Czech It Out: Global Learning in the Czech Republic**

Traveling and living in another country has always been a dream of mine that I was set on achieving from a very young age. During the 2018 spring semester, I studied abroad in Prague, Czech Republic for four months. I went through the global partner program with University Study Abroad Consortium (USAC), where I studied at Charles University in Prague. This program helped me learn more about the history and culture of the Czech Republic, while focusing on my psychology minor. I had always wanted to travel to other countries and experience different cultures, but I never had the opportunity. As a future global health professional, I felt that it was necessary to gain substantial international experience during my time in college. It was personally significant to me, because I learned valuable skills that I can take with me in everyday life and during my future career. During those four months, I grew as an individual and learned many problem-solving skills that I could not learn anywhere else. I also learned how to thrive in a country that spoke little English and was vastly different from the culture I had been a part of for the past 20 years. A memorable experience that I had while abroad was learning about the different view that the Czech Republic has on public health topics compared to the United States. I strongly believe that this global experience was life changing and changed my mindset on the world, which will lead to me to become a better health professional in the future.

**Lateef, Azalfa**

**Mentor(s): Dr. Jessica Klusek**

**Heart Activity and Anti-Saccade Performance in Women with the Autism Broad Phenotype**

Background: Executive functioning skills are comprised of working memory, planning, flexibility, and inhibition. We zeroed in on inhibition control as a way to study executive function in mothers of children with autism, who may show features of the broad autism phenotype. To measure inhibition control, this study used the antisaccade task. Some prior studies suggest that poor inhibition control is linked to suboptimal physiological regulation. Research Question: (1) Do mothers with children who have autism, when compared to control women, show impairments in inhibitory control, as assessed by the antisaccade task? (2) Does the antisaccade performance of the women with autism relate to respiratory sinus arrhythmia (RSA), a measure of physiological function? Methods: Participants included 18 mothers of children with autism and 19 neurotypical control women, similarly aged 26-65 years ( $p = 0.165$ ). First a block of 60 prosaccade tasks were performed, followed by a block of 40 antisaccade tasks, with a minute break in between. A difference score for average latency and percent correct was computed. Heart activity

was recorded during the antisaccade task, and mean RSA and heart rate in each condition was estimated, in addition to a change score reflecting flexible the parasympathetic system is in response to environmental stressors. Results: The latency difference between the groups was significantly different [ $F(1,37) = 4.51, (p = 0.041)$ ]. The mothers of children with autism took longer to inhibit the prepotent response, yielding higher change scores. A significant interaction between group and heart rate change was detected in predicating the latency change score [ $F(1,37) = 4.21, (p < 0.0420)$ ]. RSA change predicted both the latency change score [ $F(1,37) = 5.02, (p < 0.0329)$ ], and percent correct change score [ $F(1,37) = 9.87, (p < 0.0039)$ ] across both groups. Conclusion: The broad autism phenotype may be associated with inhibition deficits, as indicated by longer latency to inhibit a prepotent response. The relationship between physiological regulation and inhibition performance also differed across mothers of children with ASD and control mothers, suggesting that the broad autism phenotype may be characterized by difficulties with arousal modulation that could be linked inhibition deficits.

**Lateef, Almeera**

**Mentor(s): Dr. Rosemarie Booze**

**Behavioral analysis of escitalopram treatment in the HIV-1 transgenic rat**

As of 2015, 37 million people worldwide are living with HIV-1, with nearly forty-thousand new cases of HIV-1 infection occurring in the United States alone. Despite the relative success of combination antiretroviral therapy (cART) in treating the illness, roughly half of all individuals suffering from HIV-1 infection will experience comorbid depression. The present study seeks to examine the effects of chronic exposure to escitalopram (14.76 mg pellet) upon behavioral markers of depression and apathy in the HIV-1 transgenic (Tg) rat. Escitalopram is a selective serotonin reuptake inhibitor (SSRI) that is commonly prescribed for depression and is recognized as a safe addition to cART treatment. In order to evaluate depressive symptoms in HIV-1, a battery of behavioral tests were administered to adult male and female HIV-1 Tg and F344/N control rats. To evaluate startle response, prepulse inhibition of the acoustic and visual startle was employed. Apathy, a core component of depression was evaluated using a five-bottle sucrose preference test. Both a modified hole board test and an elevated plus maze test was used to evaluate exploratory behaviors. Consistent with our previous reports, significant prepulse inhibition deficits were found in HIV-1 Tg, relative to F344/N control rats. Escitalopram had limited effectiveness in attenuating this deficit. Sex differences were observed in exploratory behaviors, but escitalopram did not appear to modify exploratory behaviors in either HIV-1 Tg or F344/N control rats. Finally, although escitalopram treatment did not appear to shift sucrose preference in HIV-1 Tg or F344/N control rats, a curvilinear dose-response shift across sucrose concentration was observed in the HIV-1 Tg rats, suggesting motivational alterations. Collectively, these findings show that escitalopram may have limited effectiveness in mitigating behavioral markers of depression in the HIV-1 Tg rat.

**Laws, Alena**

**Mentor(s): Dr. Troy Herter**

**Reexamining Influences of Implicit Bias on Visual Search And Motor Learning**

Visual search (voluntary eye movements that actively gather visual information) is used to successfully perform many daily activities. Visual search is implicitly biased by the likelihood objects will appear in certain locations, but it remains unknown how implicitly biasing visual search affects motor performance. We hypothesized that implicitly biasing visual search will bias limb movements to improve task performance. We conducted a previous study to address this issue, but our task failed to provide a clear result. Here we reexamine this issue using methods that overcome the previous limitations. Ten subjects will use a robotic device to perform three variants of a visuomotor task within a virtual environment. In each trial, 100 Objects comprised of six geometric shapes move along 10 parallel paths (five on each side of the workspace) towards subjects, who use virtual paddles to hit away two Targets ( $n=50$ ) while avoiding

four Distractors (n=50). In two variants (Right Bias, Left Bias), Targets are subtly biased to the right or left side of the workspace. In the third variant (Uniform), Targets and Distractors are uniformly distributed to each side. Subjects perform blocks Right Bias or Left Bias trials followed by Uniform trials, which are used to probe the effects of the visuospatial bias on visual search and visuomotor performance. To overcome previous limitations, we altered the haptic feedback, object speed, and number of objects in each trial. If successful, this study will resolve whether implicitly biasing visual search influences motor performance.

**Laymon, Jared**

**Mentor(s): Dr. Daniel Fogerty**

**The Relationship between Entrainment in Motor Skills and Speech Production**

Entrainment is the rhythmic alignment of a behavior or physiological event to a perceived environmental stimulus. Regardless of stimulus modality, synchrony of entrainment tasks tends to gravitate towards the phase of the stimulus as frequency increases. This trend across entrainment tasks indicates the possibility of a shared mental processing pathway. Furthermore, speech entrainment and speech recognition are both dependent on temporal information encoded in slow changing amplitude modulations of speech. The purpose of this research was to explore the relationship between types of entrainment and test the efficacy of entrainment as a predictor of speech intelligibility in noise. Three entrainment tasks were administered. The first task involved entraining speech to speech stimuli. This data was analyzed with multiple metrics in an effort to accurately account for the complexity of the speech signal. For the second task, participants entrained tapping, a simple motor skill, to a non-speech auditory stimulus; deviation from the target was used as to measure the level of entrainment. For the final entrainment task, participants were instructed to rotate a joystick in phase with a visual stimulus; the difference in average angular speed between the target and participant and the variance in the participants' angular speed were measured. These tasks were correlated to each other and the participants' performance in two speech tasks that presented speech in babble. Preliminary data suggests that speech entrainment may be predictive of speech intelligibility in noise when contextual clues are limited. This research will explore the relationship between entrainment and speech intelligibility in order to better understand these processes.

**Lech, Melissa**

**Supervisor(s): Jessica Cuadra**

**Mentor(s): Dr. Joshua Ruppel**

**Developing methods for the synthesis of bacteriochlorin-glycoconjugates**

Photodynamic therapy (PDT) is a cancer treatment inspired by the photosensitive qualities of large aromatic molecules in the tetrapyrrole family. Currently, porphyrins, such as Photofrin, are the most widely used PDT photosensitizer for cancer treatment, though the structure of the molecule creates limitations in its clinical use. Bacteriochlorins have been explored as possible photosensitizers for PDT since they more closely meet the desired traits of an optimal PDT agent, such as deeper tissue penetration, lower photosensitivity, and intense absorption in the near infrared wavelength range. However, a drawback of using bacteriochlorins is that, relative to porphyrins, the synthesis is lengthy and complicated. Thus, one focus of our research was to evaluate several published methods for alkynylated bacteriochlorin synthesis; the most successful of which was utilized in our subsequent research. The ultimate goal of our research was the synthesis of an azido-carbohydrate glycoconjugated bacteriochlorin via a 1,3-dipolar cycloaddition reaction, otherwise known as a "click reaction". Click reactions lead to the formation of an aromatic triazole ring, which could shift the absorbance wavelength of the bacteriochlorin to a higher, even more desirable wavelength in the near infrared. In the end, glycoconjugated bacteriochlorins with mono- and di-saccharides were successfully synthesized and characterized.

**Lee, Jessica**

**Mentor(s): Dr. Jan Eberth, Dr. Whitney Zhand**

**Financial Toxicity Among Rural Cancer Patients in South Carolina**

**Background:** The diagnosis of cancer in the United States can cause extreme financial distress. According to the Agency for Healthcare Research and Quality, rural patients are poorer, sicker, and have higher rates of uninsurance than their urban counterparts.

**Objective:** The goal of this study was to describe the financial distress experienced by rural cancer patients and related programs to reduce financial distress.

**Methods:** We recruited health care professionals (e.g., social workers, patient navigators) who provided financial counseling to cancer patients from three medical centers in South Carolina. Interviews were conducted by phone using a semi-structured interview guide. Questions focused on patients' cancer-related financial distress, supportive programs available within and outside the organization, and related gaps. All interviews were transcribed by Verballnk. The transcripts were reviewed by the study team to identify key themes within the interview material.

**Findings:** Our current findings follow two major themes. First, most rural patients who receive oncology care have major financial distress related to transportation and housing cost. While oncology clinics do have some resources available to help alleviate these costs, they often reach out to private organizations to subsidize patients' needs. Another major theme is that it is not uninsured patients, but insured patients who face the most financial toxicity. They often face larger medical bills, qualify for fewer financial relief programs, and have a harder time getting insurance to cover items.

**Conclusion:** Health care professionals report that transportation and housing costs are major financial strains among rural cancer patients. Another finding was that most oncology clinics must reach outside their organization to find relief programs for their patients needing financial assistance. Additional funding may be necessary to support programs for smaller cancer centers serving a large proportion of rural cancer patients.

**Lesesne, Grace**

**Mentor(s): Ms. Katie Hopkins**

**Going Greek: The Recruitment Counselor Experience and Leadership Development**

The Greek community at the University of South Carolina is indubitably a major pillar supporting the University's achievements of academics, philanthropy, and leadership, and one that has impacted my collegiate experience tremendously. My involvement as a Pi Chi Recruitment Counselor during 2017 Sorority Recruitment marked my transformation as a leader by immersing me in a role requiring discipline, effective communication, structured organization, and emotional understanding. This mentor-like position allowed me to connect with a group of women that would continue to influence me beyond the boundaries of a small group, and that would award me a passionate belief in the importance of the Greek organizations on campus and their cultivation of academic, philanthropic, and personal growth among members. The presentation of the insights regarding both my classroom learning and my role as a Pi Chi will define the tremendous influence of this experience, and exhibit that the leadership capabilities I obtained through my position as a Pi Chi will continue to aid me in my pursuit of a law degree after graduation.

**Letki, Magdalena**

**Mentor(s): Prof. Sarah Keeling, Mr. Michael Crowley**

**The Impact of Being a Changing Carolina Peer Leader**

The Changing Carolina Peer Leaders are a group of Bacchus National Certified Peer Educators that are dedicated to promoting health topics on our USC campus. We educate students in the topics of General Wellness, Sex & Relationships, and Mental Health. We do so by presenting to freshman in University 101 classes, but also try to reach the entire campus by holding outreach and tabling events around campus. After two years as a CCPL, I ran for and was elected to be the General Wellness Special Interest Group Chair. This gave me the opportunity to lead a diverse group of students who had the common goal of educating the student body in topics falling under General Wellness. I learned how to effectively lead a group of students in event planning from the brainstorming phase to the building and execution phase. I realized the importance of being open-minded and approachable to allow ideas to cultivate within a comfortable group setting. As an Exercise Science major in The Arnold School of Public Health I was able to connect my knowledge in health with educating others through a Public Health lens. It was an incredibly impactful experience to not only lead students towards a common goal, but also see students on the campus that I love be given tools to become healthier and happier through the events that my group created. As an aspiring Physical Therapist, I believe that I now have the tools to treat patients holistically by health education and promotion.

**Levine, Frederick**

**Mentor(s): Prof. Elise Lewis**

**Exploring the Opportunities of an Internship in the Insurance Industry from an Information Science Perspective**

I have transitioned from working a standard minimum wage job in the retail industry, to taking a leap into a professional work environment as an intern with AssuredPartners since June of 2018. I have developed skills to help transform my understanding and progression in a professional work environment. In my current position I am performing the role of a commercial lines intern. My role includes assisting account coordinators, managers, and executives by completing administrative task in a promptly matter to provide service for the insured companies. The task tends to vary from data entry, code calling, and extensive research to gain knowledge on existing as well as potential clients. This role has given me an understanding not only of the insurance industry, but a foundational base in the working world in the transition to adulthood. I felt as if an internship would be the stepping stone to gaining a slight advantage towards the goal of achieving success by assisting others along the way. For the future this job will help lead into a full-time offer with the company as well as a foundation to build upon if I were to seek an opportunity elsewhere.

**Lewis, Briana**

**Mentor(s): Dr. Hexin Chen**

**The Effects of Pramlintide on the Proliferation and Signaling of Breast Cancer Cells**

A cell line is a cell culture in which the proliferation of one individual cell is used in place of primary cells to study biological processes.<sup>1</sup> There are trillions of different types of cells in the world and each individual cell strain constitutes as its own "line". In particular, we studied cell lines of breast cancer and a few various strains of breast cancer. These cell lines include T47D, MDA-MB-468, MCF7 and BT474. The original objective of this project was to utilize these various cell lines to study and observe the effect of Pramlintide on breast cancer cell proliferation and signaling. Pramlintide is a drug that is used as a treatment for Type I and Type II diabetic patients and is identified as the synthetic analog of amylin.<sup>2</sup> Pramlintide requires calcitonin receptor (CALCR) to function and exert its effects. With CALCR being regulated by

estrogen receptors, we were able to hypothesize that estrogen receptor positive cells with higher expression in CALCR will be more sensitive to the effects of Pramlintide. The cell line T47D is an ER positive cell and expressed high levels of CALCR and more sensitivity to the treatment. The cell line 468 was ER-negative and expressed a decrease in CALCR which directly correlated to less sensitivity to the effects of the treatment. Upon this discovery, we then treated MCF7 WT cell line because that cell line is ER-positive and expresses high levels of CALCR. Pramlintide had only a mild effect on the MCF7 WT cell line leading to the belief that p53 mutation is necessary for pramlintide to take its effect. We then tested ER+ve p53 mutant BT474 cell lines, but no difference in effect was seen in BT474. We also examined if pramlintide inhibits transcription activity of estrogen receptor and found no effect on estrogen induced gene expression. Therefore, further investigation is required to decipher the mechanism(s) responsible for its effect in T47D cell line.

**Lin, Steven**

**Mentor(s): Dr. Jun Zhu**

### **Determination of the specific binding pocket of HIV-1 Tat on the Norepinephrine Transporter**

The introduction of combination antiretroviral therapy (cART) in 1996 allowed Human Immunodeficiency Virus (HIV) – infected patients to live longer and marked the transition of HIV from a terminal to a chronic illness. However, antiretroviral regimens have restricted entry into the brain; whereas, HIV can cross the blood-brain barrier and synthesize viral proteins. Despite the advent of cART, over 50% of HIV-infected patients develop HIV-associated neurocognitive disorder (HAND) which includes: cognitive dysfunction, behavioral changes, motor deficits, and dementia. The cause of HAND may be due to dopamine (DA) dysregulation. In the pre-frontal cortex, which plays a critical role in cognitive functions associated with HAND symptoms, the norepinephrine transporter (NET) is critical for the reuptake of DA and for controlling DA homeostasis. Our laboratory has determined the HIV viral protein Tat directly interacts with the NET, inhibiting its function. Preliminary data shows that NET reuptake of DA can be inhibited in vitro through incubation with Tat. A potential mechanism underlying the inhibition of NET reuptake of DA could be via allosteric binding of Tat to the specific binding pocket on NET. Through integrated computational modeling and experimental validation, key residues involved in Tat – NET binding have been identified. Utilizing PC-12 cells expressing mutated NET at the identified residues, the project aimed to identify and experimentally validate the specific binding pocket on NET involved in Tat interaction with NET. Vital information yielded from the determination of the specific binding pocket on NET may lead to the development of novel compounds that can prevent HIV-infected patients from developing DA dysregulation associated with HAND.

**Lin, Simon**

**Mentor(s): Dr. Anwar Merchant**

### **Disparities in Oral Health Seeking Behavior among Childbearing-Aged Women**

**Background:** Regular dental check-ups are recommended to maintain proper oral health. Hormonal changes in pregnancy induce gingival inflammation, and may affect between 60 and 70% of pregnant women, but just 65% of pregnant women in the US visit a dentist at least once a year. Minority women and those lacking insurance are less likely to visit a dentist. The goals of this study were to determine demographic and social predictors of visits to the dentist and other health care providers among US childbearing aged women.

**Methods:** To do this we analyzed publicly available data from the CDC's Behavioral Risk Factor Surveillance Survey (BRFSS) from 2012, 2014, and 2016. BRFSS is a national survey that is continuously conducted in all 50 states, to collect information on health-related risk behaviors, chronic health conditions, and use of preventive services. Oral health related behaviors are assessed every other year.

**Results:** Our study population consisted of women between the ages of 18 and 44 years, excluding those

who reported that they had a hysterectomy (N=169,543). Of the pregnant females, 52% were white, 59% had at least some college education, and 66% were married or had a partner. Approximately 88 had insurance, 65% saw a dentist, and 76% saw a doctor within the last year. Annual dental visits in pregnant women were less likely if they were black, Odds Ratio (OR) = 0.62, 95% confidence interval (CI) 0.47 to 0.81, or Hispanic OR=0.65, 95% CI 0.59 to 0.65 compared to whites, and more likely if they were married or had a partner OR=1.46, 95% CI 1.22 to 1.74.

Conclusions: Annual dental visits among pregnant women are influenced by social and demographic factors.

**Livingston, Kristen**

**Mentor(s): Dr. Stephen Morgan**

**Statistical Modeling of Fibers for Forensic Use**

This study will classify fibers, their dyes, and other additives identify all chemical characteristics of fibers. The modern statistical approach we have selected will illuminate similarities and differences between known fibers in comparison to unknown fibers. Sparse linear regression methods, such as Lasso, can perform variable selection for a large number of predictors (wavelengths) to identify significant features of a data set. Identification of discriminating peaks in spectra that will improve on the forensic scientist's trained eye.

**Looney, Lev**

**Mentor(s): Dr. Ryan Rykaczewski, Dr. Ben Hamlington**

**Patterns of Variability in Wind-driven Upwelling**

Upwelling ecosystems are some of the most biologically productive regions of the world's oceans. Economically, upwelling systems account for roughly 20% of the global fish catch, yet compose less than 1% of oceans' area. Coastal upwelling is primarily driven by wind. The intensity, seasonality, and location of upwelling-favorable winds are critical factors influencing ecosystem processes. Anomalies in these winds can have devastating economic impacts and have been associated with different modes of natural variability. Here, we used Cyclostationary Empirical Orthogonal Functions to investigate how different climate patterns might influence these winds in different regions. We compare our results with those of earlier researchers who have taken different analytical approaches. An advantage of our technique is the ability to look at the spatiotemporal anomalies in winds throughout the seasonal cycle. In general, our findings are consistent with previous analyses, but this approach offers new perspectives. In the North Pacific, both El Niño-Southern Oscillation events and lower-frequency atmospheric patterns are correlated with modifications in upwelling. Our study suggests that climate variability results in alterations to the seasonal cycle, intensity, and location of winds. Understanding the relationships between climate processes and upwelling-favorable winds is crucial to accurately forecast the responses of these important economic and biological communities to an ever-changing climate.

**Lopez, Cesar**

**Mentor(s): Dr. Kimberly Shorter**

**Does excess folic acid affect vesicle trafficking in a human neuronal cell line?**

Autism Spectrum Disorders (ASD) is currently estimated to affect 1 in 59 children and the incidence has continued to rise since the mid 1990s. Fortification of grains with folic acid (FA) began to increase around the same time ASD began to increase in the US. ASD has been linked to abnormal processes in the biology of the synaptic vesicle (SV) since synaptic communication is crucial for neuronal communication. This study was undertaken to determine if excess FA affects vesicle trafficking in a human neuronal cell line. This will be accomplished by determining whether a 2x FA treatment will affect tau phosphorylation levels

as well as dynein and kinesin protein levels. Furthermore, I will determine if the 2x FA treatment affects the ability of dynein to perform retrograde transport and kinesin to perform anterograde transport. Cell culturing and treatment model has been done using SHSY5Y cells (ATCC) as a human neuronal cell model. Currently, data suggests dynein expression at the mRNA level is significantly decreased ( $p=0.016$ ) in 2x folic acid treated SHSY5Y cells. I have performed protein isolation and will be performing Western Blots shortly. Then I will use cell staining methods to track vesicle movement.

**Lopez, Christina**

**Mentor(s): Dr. Shana Harrington**

**The Psychological Impact of ACL Tear, Reconstruction, and Recovery**

Many athletes never return to sport even after receiving clearance from their physician following successful anterior cruciate ligament (ACL) reconstructions. Only up to 65-70% of athletes return to their previous levels of sport. A fear of re-injury is one of the most prevalent reasons why some athletes never return to sport. ACL recovery lacks necessary psychological intervention and as a result athletes struggle psychologically and mentally after tearing their ACL. Majority of the focus lies in the physical recovery and timeline and young/college-aged female athletes can face many struggles in their attempt to return to sport. The goal of this study is to gain further understanding of the psychological impact of the ACL tear, reconstruction, and recovery experience. Limited data exists regarding the benefit of psychological intervention for ACL recovery. Six female students were interviewed regarding their ACL tear and recovery experience for this study. These interviews have been supplemented with research that has been completed regarding the psychological aspects of ACL recovery. Initial findings from the research have determined the extent of the lack of psychological intervention as well as the prevalence of the fear of re-tearing the ACL, the psychological struggles faced as a result of tearing the ACL, and possible interventions that could be implemented in order to address these problems. These findings support the concept that psychological intervention may be beneficial for ACL recovery among young female athletes, however, more study is needed.

**Lopez, Hector**

**Mentor(s): Dr. Adam Pazda**

**Perception and Political Affiliation**

This study examines how people interpret information disseminated by well-known, politically-biased news networks (FOX and CNN). Importantly, this study uses experimental methods, such that the information disseminated is identical across conditions, with only the source of the information varying along ideological lines. If my hypothesis is supported, it allows causal inferences to be made regarding how individual political ideology and news source bias impact information processing.

**Lott, Dominique**

**Mentor(s): Dr. Lukasz Pawelek**

**(Mis) Representation of Afro-Latinos in Television**

Afro-Latino is a term used to describe people who are of both Latin American and African descent. Celia Cruz and former MLB player, Sammy Sosa, brought the term to attention within the (Afro)Latino community during their prime time. Nowadays, BuzzFeed producer Julissa Calderon and Harvard graduate Gabi Thorne are once again raising awareness for the Afro-Latino community. Despite the recent rise of activism, Afro-Latinos still experience unjust treat. This research paper investigates how European colonization altered the standard of beauty in Latin America, which lead to inequity of Afro-Latino people whose features strongly reflected those of their African ancestors, and today is one of the reasons why some Afro-Latinos are underrepresented in the media (Jha 2015). Furthermore, I conducted a survey at the uni-

versity campus. The collected Data provides supplemental insight as how people of different ethnicities view beauty standards and how they perceive Afro-Latinos/as. Theoretically, this paper is supported by Jones (2017) and Rodriguez (2000) and explores representation of Afro-Latinos in television such as CW series Jane the Virgin and USA series Queen of the South.

**Lowe, Elizabeth**

**Mentor(s): Ms. Kayla Smith, Dr. Abigail Hogan, Dr. Jane Roberts**

**Infant Baseline Physiology as a Marker of Anxiety in Children with Fragile X Syndrome**

Fragile X syndrome (FXS) is a genetic condition caused by a trinucleotide repeat expansion of over 200 CGG repeats in the FMR1 gene of the X chromosome. Children with FXS are at an increased risk of experiencing clinical levels of comorbid anxiety. Given the long-term impairment associated with anxiety disorders, the identification of physiological markers (e.g., respiratory sinus arrhythmia, RSA) earlier in development is paramount to early detection and intervention. Previous research has shown that RSA, a measure of heart rate variability in relation to respiration, is dysregulated in children with FXS. RSA is indicative of cardiac vagal function, or how well the parasympathetic nervous system regulates physiological responses. In other words, children with higher baseline RSA may experience less anxiety symptomology because they are better able to tend to a given task and regulate their RSA accordingly. This study aims to understand if infant baseline RSA correlates with anxiety symptom severity in preschool children with FXS. Baseline RSA data was measured via a heart monitor while 12-month-old infants watched a three-minute Baby Einstein video, while preschool anxiety levels were assessed using the Anxiety Depression and Mood Scale (ADAMS). Based on previous research, it is expected that children with FXS with lower RSA during infancy will experience higher anxiety symptomology as preschoolers. Using infants' baseline RSA values as a predictor of anxiety symptom severity at preschool age could aid in the early identification of anxious tendencies, allowing for earlier intervention and the alleviation of future symptoms.

**Lowery, Francis**

**Mentor(s): Ms. Lisa Camp**

**Presidency of NASHI**

I am the president of club the Nippon Anime Society of Heavenly Imagery (NASHI). What NASHI does; is study Japanese culture through an art form best known as anime, which in short is Japanese animated shows. As President I facilitate meetings, make the final decision on club issues, and maintain our relations outside of the club such as with the Leadership and Service Center and other clubs. My original motivation was to keep the club from dying as it was losing members to the point of being in danger. I liked what the club was about and wanted it to survive. From this experience, I have gained better public speaking skills and organizational skills. This position has also boosted my confidence, my ability to improvise in situations, and my ability to solve issues between people. What I want people to get from my experience is that sometimes you just have to leap into situations and do what has to be done if you want to save something. After my presidency, I will pass the role along to someone as well as what they need to know to perform the duties that encompass the role. I would like to prevent the mistake of my predecessors by making sure my successor knows what they are doing, thus avoiding a repeat of the club's former decline.

**Lu, Wan**

**Mentor(s): Ms. Maegan Gudridge**

**Global Learning, Diversity, and Professionalism**

My entire college life in USC is a journey of studying abroad. When I was young, I always wanted to study in a different environment, and studying at an international high school enhanced my desire to study

abroad in the US; because the US is a multicultural country that constitutes an environment of equality, openness, and freedom, which is conducive to the integration of students, this raised my desire to develop myself in this environment. During the four years in USC, I participated in a wide range of organizational opportunities and campus activities in addition to excelling academically. To pursue my career goal of developing marketing strategies to persuade and inspire people worldwide managing their assets through effective financial services, my experience serving in the International Student Association helped me explore the idea of diversity, multiculturalism, cultural awareness, and globalization from people with a variety of cultural and linguistic backgrounds. This experience had significant impact on both my global learning and my career development, which elevates me to the next step of professionalism in the financial industry.

**Lundy, Taylor**

**Mentor(s): Dr. Jessica Bradshaw**

**Methods for Ensuring Diverse Participant Samples in Psychological Research**

Despite the racial and ethnic diversity of the United States, academic human research continues to struggle with recruiting diverse sample pools. The majority of participants in human research are described as white, middle-class, and college-educated. However, research with such a narrow sample of participants interferes with generalizability of results. If we want to conduct high-quality, generalizable research, we need to have a diverse sample pool. Participants from different racial and ethnic backgrounds, socio-economic classes, and genders are needed to prevent our data from being skewed. As a research assistant with the Early Social Development and Intervention (ESDI) Lab, I am currently working to identify different processes to ensure we are recruiting from a diverse population. Specifically, we are working on a study aimed at identifying early indicators of autism spectrum disorder in infants. We use measures of attention, heart rate, neurological functioning, motor skills, and overall development longitudinally over a period of the first three years of life. The ESDI Lab began recruiting for this study last semester and we are still actively recruiting participants. In order to identify the most appropriate diverse sampling methods, I explored previous psychological research in a targeted literature review. I also analyzed census data in Columbia, South Carolina and examined demographics of previous autism research. Based on these findings, I identified appropriate local community organizations to target for recruitment.

**Lynch, Margaret**

**Mentor(s): Dr. Daniel Freedman**

**My Time Abroad**

During the spring semester of my Junior year, I studied abroad at the University of Queensland in Brisbane, Queensland, Australia for 6 months. I had wanted to go to Australia for years and study abroad was an incredible opportunity to do so. I had previously completed a Maymester to Chile through USC, which was a wonderful opportunity so I am an advocate for study abroad opportunities. I spent my time in Australia traveling as much as possible, truly making the most of my time in the country and embracing the culture. As I reflect on my time studying abroad, I realize what a monumental impact it had on me as a person and towards my time here at USC-Columbia. Study abroad has given me a unique opportunity to make my college experience diverse and well-rounded. Studying abroad has also helped me shape ideals for myself as a teacher as my plans following graduate school are to join the Peace Corps, then teach in the Middle East and Asia. My time studying abroad has enlightened me on 3 key insights: understanding leads to respect, access to education and educational opportunities is a basic human right, and the importance of creating community. As a function of my study abroad experience, I feel I know myself so much better than I did before, and I am better prepared and excited for my future.

**ynch, John**

**Mentor(s): Dr. Ashley Smuder, Mr. Ryan Montalvo**

**The Effect of Endurance Exercise Training on Cardiac Expression of Solute Carrier Proteins**

Doxorubicin (DOX) is an effective chemotherapeutic agent used in cancer treatment. However, its clinical use is limited due to the development of irreversible and dose-dependent cardiomyopathy. Specifically, DOX accumulates in the heart and promotes cardiac dysfunction through the generation of reactive oxygen species, and subsequent induction of myocardial apoptosis. Currently, no clinical countermeasures exist to combat DOX-induced cardiac dysfunction. However, it has been demonstrated that endurance exercise training reduces the accumulation of DOX within the heart and provides protection against DOX-induced cardiotoxicity. Although the mechanisms responsible for exercise-induced cardioprotection against DOX toxicity are unknown, we hypothesize that exercise training depresses the expression of solute carrier proteins (SLCs) required for DOX cardiac import. We tested this hypothesis by separating Sprague-Dawley rats into four groups: 1) sedentary, saline treatment; 2) sedentary, DOX treatment; 3) exercise, saline treatment; 4) exercise, DOX treatment. Exercise training included 5 days of treadmill habituation then 10 days of running for 60 min/day (30 m/min; 0% grade). Twenty-four hours following the completion of the sedentary or exercise intervention, animals in groups 2 and 4 were injected with DOX (20 mg/kg; i.p.), while groups 1 and 3 were injected with saline (DOX vehicle control). Forty-eight hours following DOX or saline injection, hearts were removed and myocardial SLC content was assessed. Our results indicate that exercise training effectively reduces the expression of specific SLC family members. Therefore, the exercise-induced decrease in cardiac DOX accumulation may occur due to a reduction in SLC-mediated DOX cardiac import.

**MacKenzie, Morgan**

**Supervisor(s): Sarah Nichols, Annika Dahlgren, Awa Dia, Skylar Smith**

**Mentor(s): Prof. Ernest Grigg**

**Commit2Connect**

Over the past year, our team has researched diversity and inclusion efforts and initiatives in the state of South Carolina. Our findings indicated that professionals and organizations want to be more diverse and inclusive but do not know where to start. Commit2Connect is an initiative launched by students at the 2019 Bateman Team from the University of South Carolina to increase and raise awareness of diversity and inclusivity efforts among communications and public relations professionals in the state of South Carolina. We created a toolkit with insights and concrete steps organizations can use to create a more diverse and inclusive environment. The program also aims to build a pipeline of diverse young professionals prepared to succeed at the highest levels. To facilitate this pipeline, we hosted a networking and panel event for students and professionals across the state.

**Mackert, Halle**

**Mentor(s): Mr. Duncan Culbreth**

**One Can at a Time - Fighting Food Insecurity on Campus**

From starting out early in college as a weekly volunteer, to being a director my senior year, my experiences with the Gamecock Pantry have greatly enhanced my time at U of SC. As an underclassman, I wanted to get involved with an organization that would allow me to make an immediate impact on campus. Before starting senior year, I wanted to get more involved with the Pantry by taking on a bigger leadership role, so I could learn more about the logistics and behind-the-scenes action. While volunteering at the Pantry, I have spread awareness about food insecurity on college campuses, as well as helped to decrease the stigma attached to it. I've planned donation drives, along with starting and running monthly service events with various organizations on campus. I've tried to create a welcoming environment for our clients

by being a friendly face and person to talk to. Also, I've registered new clients, updated inventory documents, generated external reports, and created handouts posted throughout the Pantry. The number of people the Pantry has served has grown significantly; we helped nearly 1,000 Gamecocks in the Fall 2018 semester alone. The greatest things I have gained from volunteering at the Pantry are new connections and friendships. I also feel like I've developed a greater understanding of different cultures by befriending students from all around the country and globe. However, I've also come to know some of the challenges that people on our campus face. I've learned that many Gamecocks are in situations where paying for necessities is difficult—there is a large need for the Pantry's services. I truly love my love my school; however, we need to support one another more, especially those who are struggling. Not having enough to eat can greatly hinder one from succeeding. I am so happy I became involved with the Gamecock Pantry when I did, and I hope to continue to fight against food insecurity, because every Gamecock (and person) shouldn't have to worry about where their next meal is coming from.

**Madormo, Victor**

**Mentor(s): Ms. Jennifer Bess**

**From NSF Fellow to Goldwater Scholar: My Research Story**

Through a great deal of help from the Office of Fellowships and Scholar Programs (OFSP), I had the opportunity to apply for the Barry Goldwater Fellowship and also complete a National Science Foundation Research Experience for Undergraduates (NSF REU). Entering as a freshman, I had no idea what path in the sciences I looked to take in my professional career: was it research, academia, or industry? Thus, to learn more about what a career in each would look like, I engaged in research my freshman year. Since then, I had many research experiences at USC and other campuses, such as the REU. Initially, my experiences felt unconnected and scattered, an unfocused student looking to merely experience as much as possible. Through the application for the Goldwater, I was forced to reflect deeply on my research experience, and refine what they meant to me. The short application allowed me to see trends in the experiences I chose and how I creatively addressed the challenges, which allowed me to build a story. Once selected for the nomination, scholars got to work closely with wonderful faculty that heavily improved my personal statements and scientific writing. What I learned through the coaching, defining my professional goals and aspirations, and crafting a personal story, was invaluable for my personal development and for my next applications. A vital lesson I learned is the importance of engaging in research as soon as possible, and meeting with OFSP as soon as possible. Research demonstrates academic curiosity, competency in scientific inquiry, and intellectual rigor, all of which are invaluable in whatever profession a student is looking to go into. Further, the OFSP can provide coaching on how to become a competitive applicant for Fellowships and Scholarships, and the sooner can receive this coaching to start engaging in the correct activities, the stronger the advantage. Even the application process alone taught me a great deal, and allowed me to reflect upon tying together my University experiences, all of which I will use on future applications and take with me on my next step.

**Madormo, Victor**

**Mentor(s): Dr. Yangguang Ou**

**What Determines Caffeine in Coffee: Brewing the Perfect Cup of Coffee**

Caffeinated beverages, most commonly in the form of coffee, are consumed in every single country in the world. The stimulant has had a place in society for centuries, and is the most popular way people combat work day exhaustion. Recently, it has also gained attention as a neurological enhancer. At a dose of 200mg, caffeine has been proven to enhance memory consolidation, cognitive execution, and clarity of thought. Consistent administration of this dosage has also enhanced neural proliferation in mice. However, doses under 200mg do not offer the same benefits, and doses over 200mg cause unpleasant side effects such as headaches, anxiety, and nausea. Despite extensive information on the ideal dosage of caf-

feine, very little data has been observed on the specific caffeine content of common beverages. Although companies such as Starbucks list estimations of their drinks' caffeine content, it is merely an estimate and varies widely depending on brewing temperature, time, and other factors. Thus, although we know the proper caffeine content the ideal cup of coffee contains, we do not know how to make it. This study explores the effect of different brewing conditions on caffeine diffusion, in order to more accurately estimate the caffeine content of a cup of coffee, to allow for anyone to brew the perfect cup of coffee in their home and know the caffeine content in their daily morning cup of coffee. Thus, brewing conditions are changed in a control environment, and the resultant caffeine in the coffee is extracted using liquid phase-phase extraction with chloroform. The extractant is then run through high performance liquid chromatography to remove the caffeine from the matrix, and UV-Vis spectrometric methods are used to determine the standard caffeine amount. The caffeine content is then plotted against each individual brewing factor to illustrate the influence each brewing factor has the amount of caffeine soaked out of the coffee bean. Further interesting insights on the brewing factors in common household utilities (such as a Keurig and coffee machines), purchasing guide for buying coffee, and how to make drinkable, wildly caffeinated beverages are elaborated upon.

**Magnuson, Ethan**

**Mentor(s): Dr. Todd Shaw**

### **The Effects of the Built Environment on the Social Capital of Public Housing Tenants**

This study addresses questions about urban public housing that have arisen from recent literature positing that there is a positive relationship between social capital and those built environments that provide greater levels of causal and comfortable social interaction between neighbors. We examined public housing in Atlanta in the 1970s because of the historical importance of Atlanta in the public housing debate. This study aimed to contribute to a fuller understanding of communities living in public housing by looking at how they were affected by the architecture and location of their complexes. In order to investigate this, the study's objectives were to 1) create a profile for each building regarding the social capital of its tenants using their survey responses and 2) to compare those profiles to the architectural and locational data of each building. By coding a random sample of a 1973 Atlanta Housing Authority survey of more than 1,000 residents in eleven complexes, the proposed study will investigate if and how public housing's built environment affected the social capital of its residents. Drawing from the Helen Bullard collection in Emory's MARBL, we photographed a sample of 300 surveys as well as a variety of contextual documents. Each survey includes questions about subject, family background information, the responsiveness of the housing authority, the range of social services provided, and involvement in tenant associations. Our measures of social capital include "structural social capital", or how well-networked the resident appears to be in order to take advantage of various social services, and civic engagement, using participation in the tenant association. Our measures of the built environment will combine tenant self-reports of the amenities in their complexes and a variety of data from historical maps to build a model of each project's built environment. We will use STATA to analyze the relationship between various aspects of our model and the social capital of each project's tenants. Based on the literature, we believe that we will find at least a limited correlation between the complexes' built environment and the social capital of its tenants.

**Mai, Le**

**Mentor(s): Ms. Carrie Van Haren**

### **Developing Leadership Qualities Through Interaction with Incoming Students**

New Student Orientation is the first interaction that newly admitted students have with the University of South Carolina. Being an Orientation Leader was easily the best experience of my college career because it fostered the development of my leadership skills, while also making Carolina feel like home. From leading small groups, to facilitating discussion and giving advice, I learned to capitalize on my strengths and

embrace my weaknesses to effectively establish a positive environment for the incoming students and their families. Orientation pushed me to my limits and demanded that I adjust to the varying situations I encountered every day. I was able to develop relationships with other Orientation Leaders, who have positively influenced my experience at USC with their constant support. Being an Orientation Leader encouraged me to continue to build upon my social and professional skills in other college opportunities. I hope to use the values and leadership skills that I gained from this experience in my future professional goals in medicine.

**Main, Kevin**

**Supervisor(s): Daniel McDaniel**

**Mentor(s): Dr. Titan Paul**

**Nanoparticles Size Effect on Rheological Behavior of Ionic Liquids Based Nanofluids**

Ionic liquids (ILs) are considered a potential candidate for a Heat Transfer Fluid (HTF) in Concentrated Solar Power (CSP) applications. Emerging interest into researching Ionic Liquids and their use in nanofluids is being rigorously studied for its thermophysical properties. There are already many CSP sites in operation throughout the world. These complex energy systems use various subsystems such as mirrors and lenses to concentrate solar energy onto a central collector. These CSP sites rely on having a stable HTF in order maintain high energy storage capacity and to reduce costs. This research seeks to develop a robust set of workable data that can used to better understand the size effect of nanoparticles on rheological behavior of ILs based nanofluids. Five different ILs based nanofluids were prepared and are differentiated from each other by the size and shape the Al<sub>2</sub>O<sub>3</sub> nanoparticle used. These IL based nanofluids are formed with a dispersion of 1 wt% nanoparticles. In addition, the particle-fluid interaction displays evidence of slight evidence of non-Newtonian shear thinning behavior.

**Malette, Margaret**

**Mentor(s): Dr. Scott White**

**Experiences Abroad Contextualize Future at Home**

In choosing a University to attend, I knew that a priority for me was at least some distance from home. I'd hoped that in my undergraduate years, I would be able to re-identify myself through the lens of a group of people, and a place, that knew nothing of me. After just one semester at the University of South Carolina, I knew I'd found a great place for that, but that I also wanted to expand these boundaries as well. I studied abroad in Spain for one summer, and in Costa Rica for a semester. In both of these places, I was able to re-contextualize myself and my learning, such that my backgrounds in both psychology and religious studies became more applicable and relevant to day-to-day life. In these experiences, I was fascinated by differences in culture and beliefs, and intrigued by the common ties that bind as well. Empathic listening crosses cultural lines on all levels, while cultural differences like religious preferences and gender norms can create dividing lines, if not understood properly. My classes at the University of South Carolina have solidified this learning, and I hope to explain some of the key concepts that have defined my experiences both on campus and abroad. These experiences will be critical stepping stones for my career in church work after graduation.

**Mancino, Anna**

**Mentor(s): Prof. Elise Lewis**

**The Power of the Citizen in an International Context**

Citizens hold more power in their country than they believe. In the United States, where voting is voluntary and few citizens truly know the political issues of their community, state, or country, many voters believe that their political opinion does not matter. However, citizens abroad show that the population's ac-

tions do matter. In French legislation, the people's right to strike, originally intended to prevent poor and unfair labor practices, is now used by French workers to increase their work benefits, even if they have no complaints about their working conditions or treatment. France also has a strict separation of church and state; however, the French citizens' interpretation of it allows aspects of Christianity to go unnoticed. As a member of USC's Political Science and International Studies Department, I study nations' political phenomena, such as their elections and legislation proposals, in order to predict future international political trends. Citizens' interpretations are an important variable in political research. How citizens follow legislation have to possibility to cause unintended political consequences. After graduation, I would like to enter the field of foreign diplomacy. I want to draft effective domestic and international legislation that leads to specific outcomes. In order to ensure my policies' desired outcomes, I need to understand how legislation is implemented by constituents. While studying abroad in Cannes, France, I observed how the right to protest and the separation of church and state were interpreted and used by the citizenry. Past incidents have showcased how citizens' interpretation of these pieces of legislation promote the citizens' individual goals. Citizens hold more power than they believe, both in their words and in their actions.

**Manning, Tykiera**

**Mentor(s): Mrs. Elise Lewis**

**Leadership - Think Different: What Qualities Create A Great Leader?**

Opportunity Scholars Program Lead Team Marketing Coordinator

I frequently use my new-found knowledge from beyond the classroom as an Opportunity Scholars Program Lead Team Marketing Coordinator. The Opportunity Scholars Program Lead Team is defined on having a diverse understanding to represent their peers through adapting to new and upcoming social events and communicating in a professional manner. This position enables me to apply my skills I learned as a Marketing and Finance major. My year as a leader in a multicultural program has enabled me to be culturally aware when working with students of various backgrounds and understanding their perspective on life. As the Marketing Coordinator, advertisements are directly created for the benefits of the students to encourage engagement on campus through cultural events. This beyond the classroom leadership position demonstrated the skills needed when working in groups and developing solutions to real-world situations when working with a diverse group of individuals. I learned how to adapt to unfamiliar territory, because of my drive to become a diverse leader. A business person who plans to become a well-rounded leader should not narrow their career by solely considering a certain market group. These educational experiences that are socially active, contextual, and engaging produces a higher-level of thinking and self-management by incorporating some form of diversity.

Discover the Unexpected of Going Beyond

During the summer after my Freshman year, my study abroad experience in Costa Rica was a catalysis to setting a strong foundation for my understanding of what it meant to be a culturally diverse leader. I was able to complete daily tasks in a foreign country (making money transactions with the National Bank), speak professionally when discussing the economic position of Costa Rica, and I meet the Costa Rican President randomly at a festival. Nothing screams professional diversity until an individual randomly meets the President of a foreign country and discuss their reasons for wanting to study there. This experience alone created the perfect scenario in applying professionalism when unexpected and adapting to a foreign environment with the knowledge of understanding the importance of diversity.

**Manning, Tykiera**

**Mentor(s): Mrs. Elise Lewis**

**Community Service - Empowering People.**

Be The Change You Want To See

My views on leadership and teamwork has evolved over my time here at the University of South Carolina. I have experienced the benefits of leadership and being a team player through community service opportunities on and off campus. I participated in food drives, fundraisers, and other service projects. As a student member of the Opportunity Scholars Program and Vice-president of the American Marketing Association I have volunteered for multiple service projects like Toy drives during the holidays and volunteer positions within organizational events and collaborations. Along with other University organizations, I participated in volunteer work such as Adopt-A-Highway projects to have a cleaner environment and collected water for the Columbia community when natural disasters hit.

#### **Driven By Advocacy Abroad**

As a Darla Moore School of Business student, I not only studied abroad, but used my platform to encourage other minority groups to try to do the same. During my four years at the University of South Carolina, I served as a Study Abroad Advocate after the summer before my sophomore year began. As a Study Abroad Advocate, I participated in the Study Abroad Fairs discussing my time abroad and how it impacted or enhanced my learning process. During that time, I used my persuasive skills to encourage other student to do the same and explore what opportunities are available in his or her field of study and financially. Although I was providing a service for my fellow peers, I noticed that my personal character had improved. I became more optimistic, confident, and overall more self-aware. I had a hunger to utilize my voice to not only encourage all students to study abroad but specifically to encourage more minority groups to gain that experience as well.

#### **Marryat, Jane**

**Mentor(s): Dr. Terika Smith**

#### **Peripheral Axotomy and its Effects on the Translational Capacity of Centrally Projecting Axons of Sensory Neurons**

When peripherally-projecting axons of sensory neurons are injured, regeneration is triggered in part through retrograde signaling to the cell body, which prompts an increase in the transport and local translation of mRNAs associated with growth in the injured axons. Previous research has suggested that damage to the peripheral projections of sensory axons may result in additional sprouting growth in the central projections of these axons. In this study, we examined various mRNAs in centrally-projecting axons in order to determine if injury to the peripheral branches of these axons affected the transcriptomes of their centrally-projecting counterparts. Using RT-ddPCR, we are able to show that the levels of mRNAs associated with growth and injury increased in centrally-projecting axons after peripheral axotomy, which suggests an increase in the growth capacity of the central axons.

#### **Marshall, Hayli**

**Mentor(s): Dr. Spencer Moore, Ms. Jennifer Mandelbaum**

#### **Effects of Parental Social Networks and Dopamine Reception on Children's Nutritional Habits**

Background: The social environment influences dietary habits through several mechanisms, including modeling, social support, and reinforcement. As the primary food providers within a household and the main role model for eating behaviors, parents often have the strongest influence on their children's nutritional habits. Research has also examined the role of genetic factors on nutrition. The presence of the 7-repeat (7R) allele of the DRD4 gene has been shown to affect impulsivity and addictive behaviors, and it may affect feelings of pleasure following meal consumption. Little research, however, has examined if dopamine reception also affects the interaction between the social environment and nutrition. This study examined how parental social networks and dopamine reception influence children's dietary habits.

Methods: Data came from the Brain-to-Society Study, a cross-sectional study examining factors contribut-

ing to childhood obesity among children ages 6-12 in Montreal. The sample included parent-child dyads (n=144) with data from (1) a household survey measuring parental social networks, (2) a 24-hour dietary recall, and (3) genetic information collected through children's saliva samples. The association between parental social network characteristics and dietary outcomes was analyzed using linear regression, with the presence of the 7R allele included in the model as a potential moderator.

Results: Differences in educational attainment, residence locale, and parental status within parental social networks were significantly associated with children's dietary habits. The presence of 7R allele moderated the association between parental social network composition and children's dietary habits. Children carrying the 7R allele exhibited healthier dietary habits than non-carriers as the percentage of men within their parent's social network increased. The opposite effect was seen with an increased proportion of women in the parent's social network.

Conclusions: Findings suggest that children's genetic makeup may play a role in how environmental factors, such as the gender composition of their parent's social networks, influence dietary habits. Future research might examine the mechanisms through which the gene-environment interaction affects children's health and how to utilize these interactions within interventions aiming to improve healthy eating among children.

**Martin, Nathan**

**Supervisor(s): Edward Acevedo Mentor(s): Dr. Salvador Macias**  
**Scientific literacy advantages for psychology students**

For this study the goal is to investigate the acquisition of scientific literacy between students who have taken college classes in psychology, general science, and students with no science classes. Surveys were distributed in psychology and political science classes and included questions about college science credit and items evaluating scientific literacy. Scientific literacy concerns non-discipline specific knowledge about how scientific knowledge is gathered (e.g., what a theory is, the importance of variability, control, falsifiability, etc.). Previous studies showed a large difference in scientific literacy content in introductory science textbooks (Macias & Macias, 2009) with psychology texts, on the average, dedicating about 20 pages, biology texts about 7 pages, and physics and chemistry texts about 2 pages. We collected 347 useable surveys (150 students with psychology credits, 138 with only general science credits, and 59 students with no science credits). The psychology students scored an average of 66.4% on the literacy test; general science students 59.6% and no science students scored 50.1%. An analysis of variance showed this to be a significant effect ( $F(2, 344) = 8.7; p < .001$ ). A Scheffe' post hoc pair-wise comparison showed a significant effect between the psychology students and the general science students, and between the psychology students and the no-science students ( $p < .01$  for both), but no significant difference between the general science and the no-science students. We conclude that psychology courses are more likely to generate the acquisition of non-discipline specific scientific literacy than do general science courses.

**Martin, Logan**

**Mentor(s): Dr. Ambra Hiott**  
**Leadership Is for Everyone**

When we think about leadership, we often jump to the likes of Mahatma Gandhi, Martin Luther King, Jr., or Nelson Mandela, men who have done great things for many people. In South Carolina, we might think of Joe Riley or Nikki Haley. We look up to leaders and aspire to be like them one day. When I began the Professional and Civic Engagement pathway, I shared these thoughts. I had role models, and while I admired their influence, I thought to myself that I would be like them some day, when I get older. To a degree, that's why I decided to take this pathway: to learn what it means to be a leader. But through my

college career, I have met people in my classes and my activities who have inspired me more than the world's greatest minds and most famous personalities. They have done great work on campus and in the community, and they ask for nothing in return but that the people they touch promise to pay forward the care they have received. I have gone to state and national conventions for College Democrats, interned for the South Carolina House Democratic Caucus, and worked on numerous election campaigns. I have also taken CPLT 302: Great Books of the Western World II and POLI 391: The Presidential Election and Nomination Process, both of which gave me great insight into leadership, one at the national political level, the other at the global intellectual level. As I have progressed through my academic and extracurricular work, I began to realize that leaders are not the antithesis of followers. A good leader does not make decisions at will and by fiat; a leader should apply his or her talents for the good and with the consent of the organization he or she is running. I also became aware that leadership is not defined by reputation and honor, but by action and good will. Leadership is not something to strive for; it is something to live, each and every day.

**Martin, Shannon**

**Mentor(s): Ms. Theresa Harrison**

**Fáilte to Shannon**

I spent the spring 2017 semester as an exchange student at the University of Limerick in Ireland. From my first semester at USC, I knew I wanted to study abroad. I chose the University of Limerick because I was interested in learning more about my Irish heritage and I found out that the tuition cost for Exchange programs are the same as in-state tuition at USC. During my time abroad, I learned a lot about Irish culture and education from immersing myself in the University and surrounding community. Even though we were all speaking English, it was very different to communicate across cultures. Surprisingly, I also learned about how the United States is perceived and how American politics influences other countries. I was often out of my comfort zone, which resulted in major growth. I've become more independent and aware of diverse perspectives. Once I returned to the U.S., I started advocating for everyone to study abroad if given the opportunity. Last semester, I was the Marketing & Outreach Intern in the Study Abroad Office, where I helped bring awareness of study abroad programs to USC students. With an increasingly globalized world, I will continue to encourage others to study or work abroad at some point during their life.

**Martins, Ingrid**

**Supervisor(s): James Deer, Michael Khushf**

**Mentor(s): Dr. Karen Patten**

**NJIT Structured Conflict Database**

We are working with NJIT to build a structured database for the eventual purpose of modeling data pertaining to controlled conflict experiments.

**Matthews, Tillman**

**Supervisor(s): Christopher Moloney, Makenzie Myers**

**Mentor(s): Dr. Steve McAnally**

**Pipeline Repair and Water Purification in El Cedro, Ecuador**

Engineers Without Borders (EWB) works to design sustainable solutions to problems in developing communities. The University of South Carolina EWB Chapter is working in El Cedro, Ecuador to repair the town's water pipeline, which is their only source of potable drinking water. On this trip, we implemented designs for hanging and eroded sections of the pipeline, performed water testing, and introduced a filtration system. We worked in conjunction with the town and provided additional supplies, so they may

continue making repairs until our next trip. While in El Cedro, we also conducted a survey to determine the town's future needs for their water system. The next phase of this project is to increase water storage capacity and expand the filtration system to point-of-use systems at each home.

**Mayo, Lauren**

**Mentor(s): Dr. Amanda Wangwright**

**Boston Children's Hospital Trust**

During the summer I worked with the Boston Children's Hospital Trust Department. I specifically worked in their Children's Miracle Network team and Dance Marathon/Extra Life team. Boston Children's Hospital Trust uses various fundraising techniques to raise money for the hospital and the various programs within it, which benefit the patients. The trust works with a variety of donors such as corporations, universities, sports teams and individual donors. As a Hospitality Management major at the University of South Carolina, my internship allowed me to explore a path less talked about in the hospitality industry, the fundraising path. I had the opportunity to plan and help with fundraising events, work on long-term donor projects such as the annual Miracle Treat Day, Eversource Walk For Kids, Corporate Cup, and many more. Participating in this internship presented me with another less obvious avenue that I could go down to use my Hospitality Management skills. Through this internship, I hope to pursue a career at a non-profit organization, helping to raise money and cultivate relationships with donors.

**McAllister, Kathryn**

**Mentor(s): Ms. Sarah Gay**

**Katie McAllister Global Learning at USC**

Throughout my time at USC, I have taken advantage of opportunities to combine my passion for travelling with my academic goals. In the summer of 2017, I went to Argentina and Chile on a Darla Moore School of Business Maymester with twenty other students to study international business in South America and during spring semester of 2018, I studied abroad on exchange at the University of Strathclyde in Glasgow, Scotland. Both programs I chose because of their unique cultural experiences and diversity in ways of learning. In Argentina and Chile, we visited steel manufacturers, banks, and even a candy company as a hands-on learning experience and rode horses through the Andes Mountains. I chose to study for an entire semester at Strathclyde because of their globally recognized international business program and the course offerings of Spanish and Managing Across Cultural Borders aligned with my academic and professional goals. The courses I took in Scotland and one I took in South America directly corresponded with my Spanish minor and International Business degree I am pursuing at USC and all the cities - Glasgow, Buenos Aires and Santiago - offered new experiences and opportunities for personal growth. When I enter the business world in just a few months as a consultant, the many trips and cultural challenges I had during the spring semester will be especially pertinent due to the volume and significance of trips I took. The five months I spent exploring Europe (and even Africa!) taught me independence, widened my perspectives and gave me lifelong friends. Though these studies abroad, I have improved to a more advanced level of Spanish, discovered places small and large I had no idea existed and created lasting connections with people all over the world. I am more confident in my decision making capabilities and can accurately convey the value of understanding other cultures to others.

**McCall, William**

**Mentor(s): Dr. Alexander Ogden**

**Malanka: You Only Celebrate New Year's Eve Twice**

You Only Celebrate New Year's Eve Twice, William McCall (Russian)

Malanka, a celebration of the traditional New Year on January 13th, is relatively unknown even in aca-

demic circles in the Western world. Taking place in the southern portion of the Ukraine, as well as the regions of Bukovina and Northern Bessarabia, both located in northern areas of Romania and Moldova, the celebration is comprised of mumming and masked performance, as well as ritual songs and dances performed by townsmen. The purpose of my recent expedition to Ocnița, Moldova and the surrounding villages was two-fold. During the first part of the trip, I assisted the estimable Dr. Svetlana Sorokina, of the Gorky Institute of World Literature in Russia, to record and transcribe all of the festivities leading up to and including Malanka. The second part was to use these recordings and my own research to determine a possible origin for the celebration, an approximate year of creation, and which specific festivals, if any, the celebration drew from historically. Through this research and postulating, and with the help of my mentor, Dr Ogden, I aim to complete a formal research paper on the subject of Malanka both to inform the academic community of its existence and to present my findings of it as a primary source of information, having taken part in the celebration itself as a direct observer.

**McClain, Samantha**

**Mentor(s): Dr. Jennifer Pournelle**

**Creating a Grassroots Recycling Campaign at the University of Basrah**

Due to recent war, waste management in Iraq has degenerated to most non-compostable waste being dumped into the Iraqi desert. The plastic which is dumped is then blown by the wind to the coast where it exists indefinitely in the water ways. While government initiatives have been taken to try and combat this issue, they are disjointed with the reality of many Iraqi citizens. Additionally, with the country developmentally lagging, many of its citizens lack reliable income. In partnership with the University of Basrah, a community recycling campaign will be launched which will give the local community economic incentives to recycle PET plastic. The program will separate PET plastic from other types of plastic, bail the plastic, and freight forward into near-by recycling industries. If successful, the program could benefit the local economy and the local environment in the city of Basra.

**McComas, Michaela**

**Mentor(s): Dr. Daniel Freedman**

**The Masters Experience**

The Masters is a tradition unlike any other. One of the most famed golf tournaments in the world, it's steeped in an excellence that's been perfected over many decades. The tournament itself represents a quality of distinction second to none. For just a few days, the top golfers in the world come together to compete on a magnificent course in hopes of winning the famed Green Jacket. Though viewed by millions through a screen, the secrets of the Masters and Augusta National Golf Course are only experienced by a select few each year. No one knows the exact number and no one knows quite what goes on inside the gates, except for that it's one of the greatest protected secrets in the sporting world.

Over the past three years, I have had the honor of working three Masters tournaments. Even from an employee's perspective, the Master's is amazing experience. My first tournament, I had no idea what I was walking into, I was simply giddy with excitement and anticipation. And I was not disappointed. Never had I worked so hard in one week. The days were long, filled with the hustle of patrons, the hectic restaurant floor and the bustling kitchen. Being on site was like being in another world; where flowers bloomed to perfection, food appeared at tables as if from nowhere, and no request was left unattended. Throughout my work experience, I have gained valuable insights and learned many lessons. My presentation will cover the experience that is the Masters.

**McCreary, Jennifer**

**Mentor(s): Ms. Tricia Kramer**

**Traveling to Understand**

During the spring semester of 2018, I studied abroad through an exchange program in Milan, Italy and took four semester-long business courses at Bocconi University. In addition to my courses, I traveled both around the city of Milan and in other countries in Europe to be able to learn as much as I could about the cultures of different countries. I studied abroad through the International Business program as a requirement for the major. This helps students better understand being truly 'international' rather than just learning about it in our classes, but actually going out and experiencing it and learning about how other countries interact and learn. Through this, I learned that every culture and country is going to be a little different and have their own ways of thinking and learning, but this is extremely important to be able to not only respect others, but to learn from them. This is putting yourself in someone else's shoes, understanding their culture and also your own culture better in the process. I caught myself doing a lot of comparing and contrasting while there with my own way of living and learned that there's so many different ways to do things, but it truly depends on what your culture values as a whole. In the future, I plan on taking what I learned while abroad and keeping that in the back of my mind when I'm going about my daily life, but most importantly as I continue with my International Business and Marketing paths in learning and after I graduate. Having this background knowledge will help in my future career by knowing that there are so many different perspectives out there that you can learn from.

**McFall, Adam**

**Mentor(s): Dr. Kristina Ramstad, Dr. Stacey Lance, Ms. Julie Ziemba**

**Effects of the herbicide triclopyr on the performance and corticosterone levels of juvenile Cuban tree frogs**

Amphibians are highly susceptible to anthropogenic stressors. The application of herbicides to amphibian habitat has been shown to cause mortality and sublethal effects on the behavior and physiology of many amphibian species. Most ecotoxicology studies of amphibians focus on aquatic contaminants encountered by larvae. very few studies have examined the effects of contaminants on juveniles though juvenile amphibians are sensitive to anthropogenic stressors and the survival rate of the juvenile life stage is linked to population persistence. Triclopyr is an herbicide used in forestry to control woody plants and broad-leaf weeds via ground and aerial spray. Although triclopyr is commonly applied to upland habitat used by amphibians and can persist in the soil for up to 90 days, no studies have examined the effects of triclopyr on terrestrial amphibians. In this study, we examined the behavioral and physiological effects of triclopyr on juvenile Cuban tree frogs, (*Osteopilus septentrionalis*). Juvenile frogs were exposed to an ecologically relevant concentration of triclopyr (60  $\mu$ L of Garlon® 4 Ultra, based on manufacturer-recommended 6 qt/acre concentration) applied to a soil substrate for 48 hours. To evaluate the effects of triclopyr exposure on juvenile performance, we conducted feeding and hopping trials. Additionally, we used a non-invasive water-borne assay to compare stress hormone (corticosterone) levels before and after exposure to triclopyr. We found no evidence that exposure to triclopyr affected feeding performance. However, we did find that triclopyr-exposed individuals had significantly shorter average sprint distances than control individuals. We are currently in the process of analyzing the corticosterone data. For many vulnerable amphibians, impaired juvenile hopping performance following triclopyr exposure could translate to a reduced ability to avoid predators and migrate to suitable overwintering habitat, which may have negative population-level consequences.

**McGinniss, Marcus**

**Mentor(s): Mr. Duncan Culbreth**

**Growing Roots**

In my spring semester of junior year, I was fortunate enough to study abroad through the International Business program in The Netherlands at Tilburg University. I have been studying International Business since being accepted into the IB program here at USC, and since then, I have focused my studies toward west-European business. Having the opportunity to study in The Netherlands has furthered my knowledge in the region's business and culture, and also helped in reaffirming my dream of eventually working overseas in Europe. Through first-hand experiences in traveling to over 10 different countries and making friends from all over the world, I have broadened my global-mindset in the best ways possible. This experience meant so much to me because I have always considered travel and cultural experiences invaluable in terms of building myself to become more suited for a position in international business. Traveling to Europe for the first time, I was able to completely separate myself from the cultural nuances of the United States and put myself in situations I had never experienced before. Having the opportunity to travel to Germany for the first time also tested my abilities in the language after having studied it in high school and as my minor at USC. Having been to big cities and small villages in Germany, I've become even more confident in my abilities with the language, and I hope to be able to use this skill as I pursue an opportunity in Europe. I truly believe the entire experience has made me a more well-rounded person, open to learning and embracing the different cultures around the world. I hope to be able to continue pursuing my dream of seeing the world and its beauty through the lenses of different cultures around the world because my study-abroad has changed me in ways I could have never imagined.

**McLean, Callie**

**Mentor(s): Dr. Gabrielle Turner-McGrievy, Dr. Michael Wirth, Mr. Anthony Crimarco**

**The Impact of Nutritional Changes on Dietary Inflammatory Index: NEWSoul**

Background: Historically, a soul food diet consisted of mainly plant-based foods in West Africa and evolved to a mostly meat-based diet in the Southeastern United States, which often exceeds the recommended dietary guidelines for saturated fats and cholesterol and leads to a high risk for cardiovascular diseases. The Dietary Inflammatory Index (DII) is a valid instrument that researchers developed to measure the inflammatory potential of a diet.

Objective: To investigate how changes in diet at six months can impact DII scores and how changes in DII scores are related to changes in body weight among participants in the Nutritious Eating with Soul (NEWSoul) study.

Design: Six-month, randomized 2-arm intervention

Methods: A total of 66 participants were randomized to either a plant-based vegan diet (n=32) or a low-fat omnivorous diet (n=34) in a culturally-tailored dietary intervention with weekly classes. Participants had diet and body weight assessed at baseline and six months and different food parameters were used to calculate DII scores. Independent sample t tests were used to examine differences in DII change scores between groups and a Pearson correlation was conducted to examine the relationship between change in DII and weight loss.

Results: At the six months, the DII score of the entire sample significantly decreased (i.e. indicating a more anti-inflammatory diet) by  $-1.7 \pm 2.1$  points ( $p < 0.001$ ). The differences between the changes in DII scores between the omnivorous ( $-1.6 \pm 2.5$ ) and vegan ( $-1.9 \pm 1.7$ ) groups was not significant ( $p = 0.69$ ). The correlation between changes in DII score and change in body weight also was not significant ( $r = 0.19$  and

p=0.17).

Conclusion: These results suggest that both intervention diets have a higher anti-inflammatory potential than the typical soul food diet participants consumed before the intervention. The DII score data do not appear to favor one diet over the other, but do indicate that consuming more plant-based foods, which both diets recommended, could potentially have positive impacts on health. The data suggested that there was not a strong correlation between weight change and DII. Future research should examine if health-related outcomes, other than weight loss, are associated with improvements in the DII among this population.

**McLean, Veronica**

**Mentor(s): Dr. Jessica Klusek**

**Spontaneous narrative discourse in women with the FMR1 premutation**

Impairments in narrative discourse have been identified in parents of children with autism spectrum disorder and are thought to mark genetic risk for autism. Parents of children with fragile X syndrome, who are carriers of the FMR1 premutation, share many similarities in social and language deficits with parents of ASD children, although narrative skills in this group have not yet been studied. This study attempts to determine narrative discourse and speech ability in mothers of children with fragile X with the FMR1 premutation. This study is important as it could help provide markers other than biological to determine if women have the FMR1 premutation. Participants included 59 mothers of children with fragile X syndrome who were carriers of the FMR1 premutation and 25 control mothers of typically developing children. A spontaneous narrative discourse sample was collected by having participants tell a story with a beginning, middle, and end after being shown a simple black and white image. This test was conducted twice with two different images. The verbal narratives were then transcribed using SALT conventions and coded using Karen Le's Narrative Episode Manual. The samples were first coded on the basis of story grammar elements (Initiating Events, Attempts, Direct Consequences, and no score) and were then further coded into partial, complete, or no episodes. This study is not yet complete, but we expect to find more partial episodes and fewer complete episodes (less episodic structure overall) in participants with the FMR1 premutation than in control mothers. Results will be ready for presentation at Discover USC and could provide valuable information about the speech disfluencies of women with the FMR1 premutation.

**McMann, Joy**

**Mentor(s): Dr. William Jones**

**My College Experience**

College is a time of self-discovery, growth, and resume building. During this unique time in our lives we are given the opportunity to uncover who we are in phenomenal ways. Throughout this experience we often engage in some form of community service. We are all (hopefully) being taught that it is our responsibility to make a difference in the world and college is the prime time to get started. Often in the midst of serving others we find ourselves gaining just as much from the program as those we are serving. We consider it to be a win-win situation because it lifts our spirits and teaches us more about the world and ourselves all the while helping those we view as less fortunate than us; but what if this is not the case? Have we perhaps gotten so consumed in the resume building that we forget to consider the long-term effects of our community service? My collegiate experience has consisted of more moments of humbling growth than I can count. There have been numerous times when I found myself shamefully confronting my own inward assumptions about what it means to serve those around me. My time here at the University of South Carolina has provided me with incomparable experiences both in and out of the classroom that have transformed my worldview for the better. Community service is indeed a vital part of communi-

ty building, but I am no longer ignorant to the fact that there is an incorrect way to help others. Injustice plagues our globe and we must all be aware of our role in enabling these injustices to continue in our own communities. When done in a way that is culturally competent, sustainable, and empowering, community service has the ability to facilitate the change our world so desperately needs on a local, state, national, and global scale. College is a time when we have the ability to spend our time in a multitude of ways, and it is my hope that at some point we all realize the impact our choice can have on those around us.

**McManus, Cynthia**

**Supervisor(s): Khalisha Emmanuel**

**Mentor(s): Dr. Li Cai**

**Studying Caffeine Content in Different Chinese Teas**

While investigating caffeine content in various Chinese tea types it was evident that the amount of caffeine present varied drastically. In this summer research during our freshman year, we used techniques adapted from one of our future organic chemistry experiments, such as refluxing, filtration, liquid-liquid extraction, and thin-layer chromatography. Our work represents a combination of student lab experiment and independent research. This experience of early exposure to research greatly enhanced our problem-solving skills and allows us to become more confident in a lab and future studies.

**McMurray, Keileigh**

**Mentor(s): Dr. William Jackson**

**Designing and Cloning an anti-Vif shRNA to target HIV infection**

The Human Immunodeficiency Virus (HIV-1) is a lentivirus that infects and destroys CD4+ T Helper cells. The eventual loss of these cells results in a progressive inability of the immune system to protect against infections. The complete loss of immune protection is a hallmark of the Acquired Immunodeficiency Syndrome. (AIDS). Because current treatments cannot fully remove the virus from infected cells, there is a continued need to investigate methods to prevent virus replication. One way to target HIV-1 is through the viral infectivity factor (Vif). Vif functions by targeting a host anti-retroviral gene termed Apolipoprotein B mRNA Editing Enzyme Catalytic Subunit 3G (A3G) for poly-ubiquitination leading to degradation of A3G and generation of a productive infection. One way to inhibit Vif function may be through the use of RNA Interference by expression of a short hairpin RNA (shRNA) targeted to Vif mRNA. Therefore, the goal of this project was to design and clone an anti-Vif shRNA to downregulate HIV-1 infection. An anti-Vif shRNA was designed to bind at nucleotide 5551 of the HIV-1 genomic clone NL43 (Accession number M19921). The resulting sequence, termed Vifsh5551 was converted to dsDNA, synthesized, and cloned into pH1.Stuffer (-). One of the resulting clones was confirmed by PCR to contain the shRNA sequence. The resulting plasmid, termed pH1.Vifsh5551, was sequenced to confirm correct cloning. Current work is underway to move the H1 promoter/Vifsh5551 expression cassette into the retroviral vector, pLGN and test the anti-Vif activity of the shRNA.

**McNutt, Ryan**

**Mentor(s): Dr. Troy Herter, Dr. Jay Ginsberg**

**Task-Dependent Modulation of Arousal and Heart-Rate Variability in Combat Veterans**

Post-traumatic stress disorder (PTSD) is a psychophysiological disorder characterized by four symptoms, including hyperarousal. PTSD is also associated with dysfunction of the autonomic nervous system, which regulates physiological processes. Heart-rate variability (HRV) is a valid measure of autonomic function obtained from natural variations in the inter-beat-interval that separates individual heartbeats. The autonomic nervous system normally modulates levels of arousal over time during behavioral tasks. However, hyperarousal may prevent normal modulation of arousal in Veterans with PTSD, suggesting that

measuring changes in HRV during behavioral tasks known to modulate arousal may be used as an objective biomarker of PTSD. The aim of the current study was to compare modulation of HRV between combat veterans and healthy controls who performed a novel task designed to elicit different levels of arousal. We hypothesized that combat veterans will exhibit less modulation of HRV compared to healthy controls due to their constant state of hyperarousal. To test our hypothesis, we will examine HRV in ten combat veterans who will perform Action Cascade using an upper-limb robotic device and virtual environment. In this task, subjects are instructed to respond by moving their hand as quickly as possible to a “frowning face” that’s presented in the virtual environment and withhold any movement to a “smiling face” that’s presented in the virtual environment. Before presenting the face, each trial starts with a 12-18 second rest phase (low arousal), followed by a 10-14 second warning phase (medium arousal), and a 8-12 second vigilance phase (high arousal). If our hypothesis is correct, average HRV will be highest during the rest phase, moderate during the warning phase, and lowest during the vigilance phase. Preliminary results from healthy normal controls shows decreased heart rate variability upon entering the vigilance stage and increased HRV as the target response phase approaches. Successful completion of this study will describe changes in HRV among combat veterans when experiencing different levels of arousal and possibly serve as a descriptive tool PTSD.

**McWaters, Ainsley**

**Mentor(s): Dr. Michael Gavin**

**Walt Whitman: Told By His Time**

Walt Whitman: Told By His Time is a project in the digital humanities that aims to demonstrate principles of the discipline by analyzing trends of shifting perceptions of Walt Whitman’s life, work, and persona by analyzing reviews of his work that were published during his lifetime.

**Meadows, Taylor**

**Mentor(s): Dr. Elizabeth Easley, Dr. Sarah Sellhorst**

**Differences in Health Indicators Based on Biological Attractiveness in Women**

Purpose: To determine if differences existed in body mass index (BMI), body fat percentage (BF%) and handgrip strength (HGS) between biologically attractive (BA) women and less biologically attractive (LBA) women. Methods: 46 female, traditional college-age, full-time students were recruited. Height (cm, portable stadiometer Seca Model 213) and weight (kg, TANITA DC-430U Frequency Total Body Composition Analyzer) were measured. The women were divided into two groups based on BA defined by WHR. BF% was measured using the tetra-polar bioelectrical impedance analyzer (Qauntum-X). HGS was measured using a handgrip dynamometer (Jamar). Statistical analysis was performed using a MANOVA. Results: The MANOVA determined there were significant differences between groups based on BA, Wilks lambda = .563,  $F(3, 42) = 10.864$ ,  $p < .001$ . Univariate results demonstrated significant differences between groups in BMI,  $F(1, 44) = 28.273$ ,  $p < .001$  with BA ( $n = 30$ ,  $22.5 \pm 4.2\text{kg/m}^2$ ) and LBA ( $n = 16$ ,  $32.5 \pm 8.6\text{kg/m}^2$ ) and BF%,  $F(1, 44) = 12.564$ ,  $p < .001$  BA ( $n = 30$ ,  $31.8 \pm 8.6\%$ ) and LBA ( $n = 16$ ,  $41.6 \pm 9.4\%$ ). There were no significant differences in HGS between groups  $F(1, 44) = 1.138$ ,  $p < .001$  with BA ( $n = 30$ ,  $66.4 \pm 11.4$  lbs) and LBA ( $n = 16$ ,  $70.5 \pm 14.6$  lbs). Discussion: The differences in BMI and BF% indicate, there is need for awareness regarding the risk of having excess body fat, despite outward appearance. Given that there was no difference in handgrip this further strengthens this conclusion.

**Melton, Chandler**

**Mentor(s): Dr. Robert Davis Moore, Mr. Jacob Kay, Dr. Jeffrey Holloway**

**Examining the Influence of Socioeconomic Status on Concussion Recovery in a Pediatric Population**

Concussion is a form of mild traumatic brain injury that can result in a variety of somatic, affective and cognitive symptoms. There are well defined moderators of concussion recovery including age, sex, and prior history of concussion. An additional less studied factor is socioeconomic status. Socioeconomic status is a term that refers to social standing based on aspects of income, education, and occupation. Currently, our understanding of how SES moderates pediatric concussion is equivocal, as some investigations indicate that lower SES may negatively affect recovery (Taylor et al., 2010), while others indicate that higher SES is associated with greater symptom burden (Yeates et al., 2012). Furthermore, few studies have gone beyond clinical symptom scales to evaluate critical aspects of functioning such as cognition and mental health. Accordingly, the purpose of this study is to provide clarity regarding the role of SES in pediatric concussion outcomes, by longitudinally comparing low and high SES patients recovery profiles in terms of clinical symptoms, mental health and cognition. We will examine 100 participants seeking treatment at a local pediatric concussion clinic, who will be bifurcated into low and high SES groups. We will measure clinical symptoms via the Rivermead Post-Concussion Symptom Questionnaire (RPQ), mental health via the Beck Youth Inventory-Depression (BYI-D), and cognitive function via a modified CogState Brain Injury Battery. Outcome measures will be statistically analyzed while controlling for key injury characteristics such as: time since injury, prior history of concussion, loss of consciousness, and amnesia. Results from this study will serve to advance the understanding of how SES influences pediatric concussion outcomes and help guide future clinical practices.

**Melville, Alex**

**Mentor(s): Dr. Aaron Vannucci**

**Electrochemical Synthesis of Benzylic Hydrocarbons for Pharmaceutical Development**

This study explores the implications of utilizing electrochemical methods to activate molecules for pharmaceutical synthesis. The products of these organic reactions are biologically and pharmaceutically important chemicals. The goal of this study is to design a new technique of synthesizing an “anion pool”, or a suspension of negatively charged ions in a stable solution environment. These newly created anions can then react with other molecules to make chemicals important for drug discovery. This new approach will allow for more effective and efficient transformation of compounds into industrially important chemical products. If successful, this study had long-term implications of decreasing the cost of prescription drugs and making healthcare more available to a wider range of people.

**Messina, Gianna**

**Mentor(s): Ms. Theresa Harrison**

**Building Relationships and Creating Opportunities from Philadelphia, PA to Tampa, FL**

When I committed to attending the University of South Carolina, I didn't know anyone from my hometown, so it was extremely important for me to get involved on campus. Through the organization fair, I discovered and became involved in a Sport and Entertainment Management Fraternity, Sigma Psi Mu, a brand-new organization. Three years later, we have fourteen board positions and over ninety-five members. My career interests are in event planning; therefore, the role of travel chair felt natural to me. I was voted in to this position in April of 2018 and to this day continue to strive in building up this organization to the best of my abilities. As the travel chair, I am fortunate to provide our members with educational and professional experiences to expand their network within this industry. My responsibilities include selecting cities with sport and entertainment activities; book hotels, when necessary; contact venues for tours;

organize transportation; and schedule panels with executives and managers. This board position gave me a chance to give back to the organization that provided me with countless friendships and limitless opportunities. Through this experience I found that I have become comfortable contacting individuals and working with deadlines. However, I have also discovered that I struggle to delegate assignments to my committee members instead doing it all myself. This is something I have been working to improve on as in this industry teamwork is crucial to the success of events! My presentation will dive deeper into what I have learned and what I have been able to accomplish through this leadership position.

**Mewborn, Paige**

**Mentor(s): Ms. Katie Hopkins**

**Resident Mentor**

During my sophomore and junior years, I worked with University Housing here at USC as a Resident Mentor. A Resident Mentor (RM) is someone that closely helps first-year students get acclimated to the university. RMs will have answers to questions, they will plan and host events to promote inclusivity, and they will make their community a trusting and caring one. As an RM, I mentored 24 beautiful ladies that lived in Women's Quad their first-year. I planned events, met with them several times a semester, and was there for them when they needed it. I answered phone calls for other residents who needed help and met weekly with members of staff to reflect on the past week and to discuss the coming weeks. I did this to strengthen my skills as a leader, which was something I struggled with growing up. It was hard for me to find my voice and be an advocate, but being an RM changed the way I do things and it changed my perspective on what being a leader truly means. I learned that there will be hardships, but I will get through them. I grew stronger, gained confidence in myself and others, and learned to be a part of a team. I learned to carry my own weight, as well as carrying others' weight when they could not. From my experience as an RM, I know that I am a completely changed person. I went from being shy and quiet, to outgoing and a risk-taker when it comes to creating a positive environment. I've become the leader I always knew I could be. Following graduation, I know that, as an educator, I will be a role model for many young learners and that they will look up to me. I look forward to implementing the lessons learned from my time as an RM into my future career so that I can be the best leader possible for my students.

**Meyer, Erin**

**Mentor(s): Dr. Amber Fallucca**

**My Internship at Michelin**

The last 2 summers I had the opportunity to intern at Michelin in the upstate region of South Carolina at one of their raw materials facilities. This past summer was one where I feel I learned the most because I took a slight turn with my intern role, trying out the area of Industrial Engineering (IE) as opposed to my previous internship in Supply Chain which very easily correlated with my major. After my first summer in Supply Chain I realized my interests lay more in internal processes rather than outbound logistics but those were managed and improved upon by the IE department. When my recruiter asked if I would like to return for a second internship, I said yes but asked to switch roles. I explained to him the similarities between my Operations & Supply Chain degree here at USC and a traditional IE degree which the university actually doesn't offer. I knew the overall concepts would be similar but I was not prepared for the degree of technical detail that is required of Industrial Engineers at Michelin. I was able to apply my coursework from the OSC degree as well as from other courses I had taken during my semester abroad to complete a successful internship. Working in this role confirmed my decision to switch career pathways as well as furthered my interest in working internationally. It also made me realize that the name of my degree is not the be all, end all of my career. This summer I will begin working full time as an Industrial Engineer at Michelin and hope to integrate what I learned at USC, what I will learn through my role as a full time IE, and my previous international experiences to start a successful and fulfilling international career with

possibilities to learn and change at every opportunity I choose.

**Meyerl, Emily**

**Mentor(s): Dr. Scott White**

**Saving Lives One Class at a time- Internship at Camp Woodward**

A requirement of the athletic training program at USC is each student must complete 300+ hours of hands on work in the clinical setting which prepares students to be successful after graduation. In addition to my required clinical work, I was accepted to complete an internship during the summer of 2018 at Camp Woodward in PA. Woodward is an extreme action sports camp for youth who participate in gymnastics, cheerleading, skateboarding, BMX, scootering, Parkour, and power tumbling. The four weeks that I spent at Camp allowed me to utilize the skills I have already learned through my clinical rotations at USC while also treating a diverse patient population which I was not familiar with. During this time multiple emergency situations that occurred which I had never seen before. Through classes such as ATEP 310 and 310L (Emergency Medical Response) and ATEP 392 (Clinical III) I had learned how to splint, check vital signs, and perform CPR when necessary but I had never had to use any these skills until I interned at Camp Woodward. This internship provided me extra opportunity to practice what I had been taught in the classroom in a real-life situation and with a different patient population then anything I had worked with before. This opportunity allowed me to grow on my confidence in the athletic training room talking to patients and their parents while developing my emergency medicine, evaluation, and decision making skills. I have taken the skills and lessons I learned at USC and incorporated at Camp Woodward continue to influence my clinical practice today.

**Miles, John**

**Mentor(s): Dr. Amanda Dalola**

**Était or a été? Study Abroad and the Acquisition of Aspect in French Past Tense Verbs**

Students wishing to improve their second-language (L2) skills often choose to study abroad as a means of total immersion. For anglophone learners of French, there are several linguistic aspects that require extended practice, such as the articulation of marked segments like [ʁ] and the mastery of complex verbal morphology. One feature in particular that presents difficulty is verbal aspect, or the completion status of an action. In French, there are two aspects to differentiate: perfective—events that are completed by the moment of description; and imperfective—events that are ongoing or repeated. In the past tense, this parameter is operationalized in French via the *passé composé* (simple past: perfective) and the *imparfait* (imperfect past: imperfective). Previous research on study abroad and the acquisition of verbal morphology has reported a significant increase in the correct usage of inflection in participants who have studied abroad versus those studying in a domestic academic setting (Herschensohn, 2001). However, no previous study has examined the extent to which the length of study abroad affects this mastery, nor has one targeted this particular high-frequency feature of the grammar. This study seeks to examine the role of length of study abroad on L2 students' ability to differentiate perfective and imperfective aspect in French past tense verbs.

30 L1 English learners of French who had studied abroad in a Francophone country and had returned for ≤ 6 months participated in a multiple-choice and free response storytelling task targeting 36 French verbs of varying lexical frequencies. Binary responses of correct-incorrect were submitted to a logistic mixed-model regression in R (R Core Team, 2017) with lexical frequency, months abroad and months since return as independent variables. Results suggest that the longer a student has studied abroad and the more recently they have returned from a French-speaking country, the more likely they are to correctly distinguish between perfective and imperfective aspect when using the past tense. Additionally, the higher the lexical frequency of the verb, the more likely learners are to correctly assign aspect. This study

highlights the importance of immersive study abroad experiences in mastering even common components of a second language.

**Miles, John**

**Mentor(s): Dr. Sarah Keeling**

**Pushing Limits on a Global Scale**

During spring 2018, I studied abroad in Arras, France, and summer of 2016, I studied abroad in Tours, France. I had studied French in high school, wanting to become bilingual and utilize French in an international career for myself with international law. In addition, I had become interested in being exposed to other languages and the field of linguistics. I desired to learn more about French culture as well as seriously test my skills in speaking and writing French. In Arras, I lived in an apartment where I took 11 French-spoken courses a week, including papers, assignments, and tests that were equivalent in difficulty for native French speakers. In Tours, I had courses designed to teach French to non-native speakers and had weekly classes and assignments. I was allowed both times to explore Europe and visit numerous countries and cities, make new friends and visit old ones, and enhance my foundations of what I believed and knew about the world. I grew as a person, traveled, and lived on my own. These experiences helped me demonstrate my ability to using a second language that I had only started learning a few years earlier. I learned not only how diverse the world really is, but I became much more confident in day-to-day tasks and learned to very quickly adapt to new and unexpected situations. My limits were not only tested but expanded, and I came back to the United States much more enlightened, confident, and well rounded as a result.

**Millar, Emma**

**Mentor(s): Dr. Matthew Childs**

**The Domino Effect of Total Immersion**

Since 2015 Omega Phi Alpha (OPhiA), a national service sorority on campus at the University of South Carolina, has been my home away from home for the past four years. From fostering lasting friendships, developing strong leadership qualities, and cultivating a commitment to serving others, OPhiA has nurtured my growth in so many ways. After quickly falling in love with the sorority and embracing the core principles of friendship, leadership, and service, I knew that I wanted to serve as one the Membership Directors. This executive position appealed to me because it plans and executes the entire recruitment process for the semester, our sisterhood retreat, and most importantly mentors the new pledge class during their journey. I wanted to encourage other girls to ignite their passion for service in the supportive and energetic community that I had found. After holding several chair positions, I was elected a Membership Director. In this position, I strengthened my teamwork skills, learned how to plan several multi-day events, and developed my leadership and communication abilities. The most valuable takeaway lessons from this position were the knowledge that I imparted to pledges and the ability to positively shape the new members' experiences like me. The values, rituals and traditions that I instilled and passed along will have a domino effect for years to come. My involvement with OPhiA is just one way in which I've learned the importance of connecting and immersing into a community, especially while in college. As my future is full of possibilities, I hope to carry this lesson into the journeys ahead of me, whether it is teaching in a classroom of my own or entering the world of novel writers.

**Miller, S. Kailey**

**Mentor(s): Dr. Elizabeth Easley, Dr. Sarah Sellhorst**

**Significance of BMI and Body Fat Percentage differences between Biologically Attractive Men and Less Biologically Attractive Men**

Background: Both body mass index (BMI) and body fat percentage (BF%) are used as health indicators. There has been much research on biologically attractive women but less is known about biologically attractive men. Biological attractiveness (BA) is a psychological construct that is associated with fertility, health, youthfulness, and the ability to provide. Purpose: The purpose of this study was to determine if statistically significant differences in BMI and BF% existed based on BA. Methods: 22 male, traditional college aged, full time students participated in this study. Anthropometric data were recorded and BF% was measured (Tetrapolar, Quantum-X). Waist and shoulder circumferences were measured using standard tape measures with tensiometers. The men were divided into two groups with biologically attractive (BA) men defined as a waist shoulder ratio (WSR) of .55-.65 and the remaining men were classified as less biologically attractive (LBA). Independent sample T-tests were used to determine if differences existed between groups. Results: There were no statistically significant differences in BMI between groups (BA= 23.20 +/- 3.08 vs. LBA= 28.02.59 +/- 9.56 kg/m<sup>2</sup>, p = .167). Additionally, there were no statistically significant differences in BF% between groups (BA= 21.01 +/- 3.71 vs. LBA= 25.58 +/- 7.95%, p = .212) Discussion: The lack of statistical significance between groups may be due to the small sample size from a preliminary data set. This study demonstrated that those who were considered BA in comparison to those who were considered LBA were healthier as indicated by both the healthy BMI and healthy BF%. These findings were anticipated and help expand previous research on biological attractiveness.

**Miller, Gregory**

**Mentor(s): Mrs. Hilary Lichterman**

**Communication Enabled Business Processes in the Financial Services**

Communication is a vital aspect to the operations of any business in the world today. In my two years of work at BB&T, I have been able to see the disadvantages non-English speaking clients face when interacting with employees of the commercial banking industry. I hope to utilize my classroom, study abroad, and work experience to better position those who speak foreign languages in comprehending bank policies, procedures and products. With my Finance major, I have been able to develop a strong understanding of financial ratios, conducting investment portfolios, and performing stock valuations. These skills, along with my experience as a University 101 Peer Leader, have prepared me to educate those around me on key aspects of the banking industry. From group presentations to independent research abroad in Spain, I have built confidence in my use of foreign languages in professional settings. The ability to effectively communicate with Hispanic clients at BB&T has allowed me to develop strong connections with diverse groups of people that help better position individuals and families for financial stability, and long-term success. With my Operations & Supply Chain major, I understand processes both when they are effective and when they are inefficient. Courses at the University of South Carolina in Management Science have taught me various lean-six techniques, which strive to reduce waste and maximize value in processes. By combining this classwork and my experience as a Consulting Analyst with Cummins Inc., I believe I am able to greatly improve current processes of communication efforts for non-English speaking clients in the commercial banking industry. Achieving a high level of customer service for all clients will build more meaningful relationships within the financial services. From here, trust can be established and the proper use of knowledge and applied experience will allow everyone the opportunity to better position themselves for the future.

**Milz, Emily**

**Mentor(s): Dr. Kim Creek**

**P53 Polymorphisms in Spheroid Forming and Spheroid Non-Forming Human Keratinocyte Strains**

Certain individuals require longer to clear HPV infections, therefore increasing their risk of developing HPV-mediated cancers. This study examines natural genetic variations, or polymorphisms, located in the human tumor suppressor p53 gene in African-American and European-American keratinocyte samples. Trends among genotype, race, and the ability of cells to proliferate into small, compact spheroids are presented as potential clues to HPV clearance rate discrepancies. These findings are discussed through the lens of our social context and its effects on HPV vaccination, education, and future prevention efforts.

**Mishoe, Lacie**

**Mentor(s): Dr. April DeLaurier**

**Determining how phf21aa affects craniofacial development in zebrafish**

In humans, mutations in the transcriptional repressor PHF21a causes Potocki-Shaffer syndrome which is associated with craniofacial defects. Previously, it was observed that knockdown of phf21aa in zebrafish caused defects to larval craniofacial cartilage. It is therefore hypothesized that phf21aa functions in zebrafish similarly to how it functions in humans, and thus we can use zebrafish to understand the physiology of Potocki-Shaffer syndrome. In our lab, we generated lines of zebrafish with insertions and deletions phf21aa using CRISPR-Cas9. An F0 line was outcrossed to create an F1 generation. F1 generation was genotyped to identify heterozygotes. Identified heterozygotes were outcrossed to wild-type fish to create an F2 generation. The F2 generation was genotyped and heterozygotes were identified. F1 and F2 heterozygotes were identified using PCR and T7 endonuclease digest. PCR produces a product which is gel extracted. The product of gel extraction is then heated and slowly cooled, producing mismatches between wild-type and mutant DNA. T7 endonuclease digest of mismatched products results in digestion of the product into two fragments. If a fish is heterozygous for a mutant allele, the T7 assay will reveal two bands on a gel which equals the size of the original PCR product. For phf21aa heterozygotes, the PCR product is 995 base pairs and the T7 endonuclease digest products are 720 and 275 base pairs. Recently we developed PCR primers that can identify heterozygote and wild-type fish based on shifts in band size. In this case, the wild-type PCR product is 641bp and the heterozygote product contains a 641bp band and a lower band of unknown size representing a deletion. The F3 generation was in-crossed and resulted in roughly 25% homozygous mutants and was sequenced to identify the mutation which turned out to be a 7 bp deletion. My next step will be to label the bone and cartilage with dyes. Using a dissecting microscope, the mutant zebrafish will be screened for evidence of skeletal patterning defects. Studying how disruptions to phf21aa affect skeletal development in zebrafish can help understand the normal functions of these genes in craniofacial development and how mutations cause Potocki-Shaffer syndrome defects.

**Mitchell, Nicholas**

**Mentor(s): Dr. David Barbeau**

**Sedimentary Record of Late Cretaceous to Eocene Laramide Uplift in the Cañon City Embayment, CO, USA.**

This project aims to constrain the timeframe for the onset of the Laramide orogeny in south-central Colorado through sediment provenance analysis of sedimentary rock samples acquired from the Cañon City Embayment. The Laramide orogeny is a poorly understood mountain-building event that impacted the western interior of North America in the Late Cretaceous and Paleogene periods (ca. 90 to 30 million years ago). Understanding the geological history of this region is significant because it provides precise context about the development of the North American continent, which in turn allows us to assess modern geological features. An understanding of the orogeny will be developed through the comparison of

the ages of individual sediment grains acquired from sedimentary basin deposits adjacent to the uplift zone, to be collected by laser-ablation inductively coupled plasma mass-spectrometry at the USC Center for Elemental Mass Spectrometry. By applying U-Pb detrital-zircon geochronology to the samples, each zircon grain can be categorized as having been derived from the Cordilleran (i.e., pre-Laramide) or Laramide provenances when cross-referenced with sources and known age distributions. Of the original ten samples collected from mid-Cretaceous through Paleocene strata exposed in the Cañon City Embayment a provenance shift to locally derived sediment was determined to occur in a 15 Ma time window. In more precisely narrowing where the shift happens, we should be able to construct the geological timeframe for the mountain uplift. Additional samples taken from between the narrowed window will allow further restrictions to be placed on the spatiotemporal zone studied.

**Moloney, Christopher**

**Mentor(s): Dr. Steve McAnally**

**Pipeline Repair and Water Purification in El Cedro, Ecuador**

Engineers Without Borders (EWB) works to design sustainable solutions to problems in developing communities. The University of South Carolina EWB Chapter is working in El Cedro, Ecuador to repair the town's water pipeline, which is their only source of potable drinking water. On this trip, we implemented designs for hanging and eroded sections of the pipeline, performed water testing, and introduced a filtration system. We worked in conjunction with the town and provided additional supplies, so they may continue making repairs until our next trip. While in El Cedro, we also conducted a survey to determine the town's future needs for their water system. The next phase of this project is to increase water storage capacity and expand the filtration system to point-of-use systems at each home.

**Moment, Rachel**

**Mentor(s): Dr. April Delaurier**

**Determining the function of phf21ab in craniofacial development in zebrafish**

Rachel Moment, Hyung-Goo Kim, April DeLaurier

PHF21A is an element of the BRAF-HDAC complex that causes target gene transcription to be repressed. In humans, mutations in PHF21A can result in a disorder known as Potocki-Shaffer syndrome, which causes craniofacial malformation and neurological defects. Previously, we generated potential mutant lines in zebrafish targeting phf21ab using CRISPR/Cas9 mutagenesis. Recently, we genotyped F1 offspring of an F0 line with potential mutations in phf21ab. We identified a female F1 heterozygote that was crossed with a wild-type male to generate an F2 line composed of heterozygotes and wild-types. The identification was made using PCR and T7 endonuclease assay. Results were analyzed to look for differences in band sizes to indicate genotypes. The original PCR product is 613bp. If a sample is from a heterozygote, two lower bands (447bp and 166bp digestion products) are created through T7 endonuclease digest. Fish that display all three bands are heterozygous while the fish with just a 613bp band are wild-type. We plan to create two additional lines of fish (using other F1 parents) and rear them into adulthood to generate additional F2 generations. Once F2 fish are adults, heterozygotes will be genotyped and in-crossed to create 25% homozygous mutants. The fish will then be screened for craniofacial phenotypes. This will be done through a staining process to label bone and cartilage two separate colors to make them identifiable. Potential mutant offspring will be sequenced to characterize lesions produced using CRISPR/Cas9 mutagenesis. Through this project and other projects in the lab, we hope to identify the function of the paralogs of phf21a (phf21aa and phf21ab) in zebrafish craniofacial development, and how mutants in these genes may reproduce aspects of PHF21A loss of function in humans. Potentially, this study could result in a zebrafish model for Potocki-Shaffer syndrome.

**Moncada, Claudia**

**Mentor(s): Dr. Thomas Hilbish**

### **Larval Distribution of Mussels and their Effect on Population Dynamics**

This study aims to determine if the larval pool of marine mussels is well mixed, meaning that larvae are evenly distributed between spawning and their final settling place. The study tests three hypotheses: 1) Larvae are spawned onshore and trapped there, 2) Larvae are spawned offshore and trapped there, 3) Larval dispersal is well mixed. To test these hypotheses, samples were collected at different distances from shore over time and were then analyzed using a polymerase chain reaction (PCR) to confirm the genetic identity of the bivalves. This data was then used to determine larval concentrations both along-shore and at increasing distances offshore. Preliminary results show that there is a substantial difference of up to 2 orders of magnitude in respect to larval settlement in nearby locations and indicate that larval dispersal is patchy at relatively small scales. However, the data is roughly concurrent with time. The data cannot support the third hypothesis because it is not compatible with a broad-scale, well-mixed patch of larvae. Future research will aim to determine if either the remaining two hypotheses can be supported.

**Montes, Angela**

**Mentor(s): Dr. Maksymilian Chruszcz, Ms. Leily Daneshian**

### **Glutathione S-transferases' role in *Tetranychus urticae***

Glutathione S-transferases (GSTs) are present in both prokaryotic and eukaryotic cells and serve to protect them from oxidative stress, endogenous toxins, and other xenobiotics. GSTs facilitate the detoxification of the xenobiotics by conjugation of reduced glutathione (GSH) to toxic compounds in order to make them excretable water soluble compounds. In this study we produced the recombinant GST (tetur01g02230) from *Tetranychus urticae*, or two-spotted spider mite (TSSM). TSSM is a polyphagous agricultural pest that is rapidly developing resistance against even newly developed insecticides and GSTs are known to play significant role in detoxification machinery of TSSM against new hosts and insecticides. The aim of this research was to recombinantly express, purify, and characterize this enzyme. The process is as follows: the plasmid with the gene coding for GST is designed and transformed into *E. coli* DH5-alpha strain for the purpose of amplification. Amplified plasmids are then purified and sent for sequencing. To express the protein, GST plasmids were transformed into *E. coli* BL-21 strain. BL-21 cells which contain the plasmid were grown overnight at 37°C in lysogeny broth (LB) medium. Cells were then lysed using sonication and the protein was purified using glutathione sephorase column. The GST was checked for purity using gel electrophoresis which separates the proteins by molecular weight. Next, the enzymatic characterization of the purified protein was investigated using kinetic assays. We demonstrated that this protein is indeed a glutathione S-transferase as the enzyme is able to conjugate reduced glutathione to 1-chloro-2,4, -dinitrobenzene which is a common substrate of the GSTs. Also, the three-dimensional structure of the protein was generated using homology modeling. The model of the protein was used to identify residues forming the active site of the enzyme.

**Montgomery, Parrish**

**Supervisor(s): Jordan Covington, David Gongora**

**Mentor(s): Dr. Karen Patten**

### **Web-based Database for ECCD**

In the ECCD (Engineering and Computing Capstone design) project we were tasked with creating a more sound and efficient way to access different pieces of information relevant to the Capstone courses. We gathered information from projects done by students, what year/semester, and the companies they worked with. We designed a database for all the scattered information and created it to where the end user was capable to create reports and pull data from the click of a button. Our overall goal was to consol-

update the data and make the database easily accessible for staff to use without the need for consultation. This database has been facilitated to be updated and revised with minimal experience on the back end of Microsoft Access to be used for years to come. It analyzes multiple methods for communication and employs research on the company and the project. Thus, allowing staff to company, staff to instructor, instructor to student, and student to company interactions to be possible for continuing and future projects.

**Moore, Hannah**

**Mentor(s): Mr. David DeWeil**

**Experiential Learning in the Physical Therapy Profession**

My EXSC Practicum allowed me to gain hands-on experience in the physical therapy world by working with multiple therapists, being exposed to new technologies, and learning about different types of therapies. I spent three hundred hours fully immersed in my future field of work. This practicum is a required course for the exercise science curriculum. I applied for the student position at Palmetto Health Physical Therapy Specialists in Columbia, SC. This clinic is respected for their excellent patient care and for the many types of therapy they provide. Orthopedics, neurological rehab, lymphedema, post-operation cancer therapy, and concussion and vestibular rehab just to name a few. Observing all specialties of physical therapy and learning from each therapist was fascinating for me. I was able to help during therapy sessions by moving equipment to and from the therapy gym, demonstrating the correct form of exercises for patients, and timing or measuring activities for the therapists. I was also able to learn about each patient and their specific diagnoses. As I begin physical therapy school this fall, I feel more confident in my ability to take on all aspects of physical therapy. I believe that I have laid a solid foundation for my education because of the valuable time I spent learning from the therapists at Palmetto Health Physical Therapy Specialists.

**Mora, Diego**

**Mentor(s): Ms. Tricia Kramer**

**If you see a need, take the lead**

Hello my name is Diego Mora. I am a senior Biology student and I chosen the Community Service pathway for Graduation with Leadership Distinction. I chose this pathway because I feel very strongly for what community service offers others and how it molds ones' character. When I started volunteering at my Atrium Health – Pineville, I immediately felt synergized to be a better volunteer for the patients I was helping. Realizing I'm innately motivated to help others gave me sense of purpose and affirmed my goal of being a physician. This signified I was driven by the purpose greater than myself I was indeed following the right path towards my life. To me, medicine is more than just becoming a doctor, it is having the privilege to deliver the highest level of care possible.

I chose to do the Community Service pathway for GLD because I had already found volunteering to be an essential part of my life during my time at UofSC. Volunteering and going on mission trips became a way for me to become a part of something larger than myself. I learned about myself through my actions as a volunteer. I entered Atrium – Pineville's hospital as a volunteer with dreams of becoming a physician some day, and I left knowing that this is what I am destined for. I would have never felt so certain about this had I not started volunteering.

My next steps are to apply to medical schools to continue my education and become a physician. I plan on spending my gap between medical school and graduation to work in a hospital setting and go on another mission trip. Missions trips are humbling and very gratifying experiences that I believe everyone should embark on. Having the chance to go on another trip before starting my career as a medical student is very important to me and it is something I look forward to. My Community Service Pathway for GLD has shaped me and transformed me into the man I am today and I could not be more thankful.

**Moran, James**

**Mentor(s): Ms. Katie Hopkins**

**Learning and Displaying Leadership Through Interning at the Federal Bureau of Investigation**

In the summer of 2018 I worked as an intern for the Federal Bureau of Investigation in Washington, DC. I spent 10 weeks working side by side with the men and women that protect our nation and its citizens every day. I was able to take on my own assignments and tasks, as well as assist Special Agents and support staff with their daily job duties. I sought after this opportunity because it is my goal to be a Special Agent for the FBI. I also wanted to take the opportunity to learn as much as I could about the agency and what it takes to be an employee. I learned a great deal about what it means to be a true leader in life as well as in the FBI. I was able to take what I learned about leadership and apply it in my life and in the classroom. This internship impacted me in many ways. It solidified what I want to do for a career and has allowed me to get a sneak peek at what lies ahead of me. It has also opened the door for employment after graduation, as I was offered full-time employment when my internship concluded. My biggest takeaway from this is that I trusted myself and was honest with everyone through the process and this is what I believe led me to be chosen as an FBI Intern. The next step for me is to pursue a Juris Doctorate which will better prepare me for a career in the FBI.

**Morgan, Molly**

**Mentor(s): Dr. Lisa Fitton**

**The Performances of Spanish-English Speaking Children on Phonological Awareness Tests as Compared to their Monolingual English-Speaking Peers**

Less than 10% of children classified as English learners in the United States meet benchmark criteria for reading proficiency in fourth grade, whereas 47% of their monolingual peers meet benchmark criteria (U.S. Department of Education, 2017). Reading performance in the early elementary grades is a strong predictor of later academic achievement (Kieffer, 2008). Consequently, early identification of children in need of additional support for reading skills is essential to maximize their later outcomes. Prior studies have shown that phonological awareness is one reliable indicator of later reading above and beyond measures including socioeconomic status, vocabulary development, and word recognition (MacDonald & Cornwall, 1995). Phonological awareness is the ability to recognize and utilize sounds in oral language (Stanovich, 1994). However, there are many tools available for assessing phonological awareness and few have been examined closely for reliability and validity with Spanish-English speaking children. This study reviewed children's performances on the phonological awareness portion of the Woodcock Reading Mastery Tests, Third Edition (Woodcock, 2011). Participants included over sixty students between the ages of four and six who were bilingual Spanish-English speakers or monolingual English speakers. The number and type of errors made on the phonological awareness task were analysed and compared for the two groups. Reliable tests are necessary for early identification of children at risk for reading difficulty and for assisting health providers and educators in better serving that population. This research will aid in the development of improved phonological awareness tests that are more accurate. This will in turn lead to stronger interventions, heightened academic achievement, and enhanced life outcomes for Spanish-English speakers in the United States. Preliminary results have revealed that the Spanish-English speaking children tended to receive lower overall scores than their monolingual peers. The Spanish-English speakers specifically tended to perform lower on rhyming than the monolingual students.

**Morgan, Christopher**

**Mentor(s): Dr. Susan Wood**

**The Role of Microglia in the Locus Coeruleus in the Cardiovascular Sensitivity to Stress**

Stress is a large part of our lives, especially in an Undergraduate or Graduate setting. In excess, stress

can lead to a variety of physical and psychosocial disorders and abnormalities, including tachycardia, hypertension, anxiety, and anhedonia (depressive behavior). Microglia are known to play a large role in neuroinflammation, which can mediate the aforementioned physical and psychosocial abnormalities. Our project aimed to observe these stress-related responses and the mitigation thereof via the drug-mediated depletion of microglia in the Locus Coeruleus (LC). Clodronate, a drug that causes microglial apoptosis, was injected into the LC to reduce the number of viable microglia by up to 50%, thereby locally reducing the levels of inflammation. Stress was conducted using a 5-day “Witness Paradigm,” during which a witness rat (the treatment group) observes an intruder rat being socially defeated by a resident rat. Heart rate, electrocardiogram (ECG), and blood pressure were recorded via radio telemetry. Rats were treated with vehicle, 10  $\mu\text{g}$  or 25 $\mu\text{g}$  Clodronate directly into the LC. The low dose did not show any significant differences compared with vehicle treatment. However, for rats treated with 25 $\mu\text{g}$  (ie., 50% knockdown of microglia), Day 1 of stress showed that the control rats had significantly lower heart rate and blood pressure changes than the witness stress rats, with no significant effect of Clodronate treatment. Upon the 5th stress exposure, on the other hand, witness rats that received Clodronate had significantly higher heart rate and blood pressure than vehicle-treated witness rats. This project is still underway and will go on to quantify arrhythmias in the stress response, specifically whether increased cardiovascular responses, such as the one seen here in the 5th stress exposure of the witness rats, also result in an augmented number of arrhythmias. These data suggest that microglia may buffer the cardiovascular stress response, and thus depleting their numbers causes increased cardiovascular stress responses.

**Morris, Tinea**

**Mentor(s): Dr. Alissa Armstrong**

**The RPR gene and cell death in *Drosophila melanogaster***

An overarching goal of the Armstrong lab is to better understand how an organism’s nutritional input is coordinated amongst multiple tissues. We are particularly interested in how fat tissue communicates to the ovary, two highly nutrient sensitive tissues in the model organism *Drosophila melanogaster* (the fruit fly). Previous studies have shown that insulin and TOR-mediated signaling in adult adipocytes, the major cellular component of *Drosophila* fat tissue, controls germline stem cell maintenance, early and late germline survival, and ovulation in the ovary. To gain a better understanding of all aspects of oogenesis that the fat controls, the objective of this project is to ablate adult adipocytes and characterize oogenesis. Using the well established Gal4/UAS system, a transgenic tool that allows cell-type specific expression of genes of interest, I drove expression of reaper (RPR), a member of the Halloween gene family, whose function is to promote apoptosis, or programmed cell death, in adult adipocytes. After several days of RPR expression in adipocytes we analyzed the fat body and ovary tissue using immunofluorescence to label DCP1, a cell death marker. Unexpectedly, RPR gene expression did not increase adipocyte cell death relative to controls. This suggests the current method of inducing RPR gene expression is not very effective in killing adult adipocytes. In the future we plan to the approach by performing a time course to find the best length of time to induce RPR expression and testing other genes in the Halloween gene family.

**Morris, Daniel**

**Supervisor(s): Tylar Roy, Tyler Austin**

**Mentor(s): Dr. Karen Patten**

**IIT Capstone 8 - Learning with LearnPress**

This Capstone project involves working with YesCarolina, a non-profit organization that specializes in teaching entrepreneurial skill to the youth. Students utilized WordPress and LearnPress, an extension of WordPress mainly used for the creation of online courses, to update and upgrade the functionality of the existing site.

Morrison, Cameron - Mentor(s): Dr. Robert Moore, Dr. Jeffrey Holloway, Mr. Jacob Kay -- Examining the Effect of Injury Modality on Pediatric Concussion Recovery -- Concussions are a growing health concern, not only within the world of sports, but more broadly within our community. However, there remains a common differentiation between sport-related concussion (SRC) and non-sport-related concussion, also known as mild traumatic brain injury (mTBI). To date, no study has compared injury sequelae across different mechanism of injury in a longitudinal manner. Thus, the purpose of our study is to investigate the relation between mechanism of injury and injury outcomes at 2 weeks and 5 weeks post-injury. We hypothesize that participants injured in a sport-related context will recover more quickly and exhibit less severe clinical symptoms, better mental health status, and fewer alterations in psychophysiological function. Data collected from a local pediatric concussion clinic will be analyzed. SRC and mTBI participants will be demographically matched (age, BMI, education) and compared to normative data. Clinical symptoms will be measured using the Rivermead Post-Concussion Symptom Questionnaire (R-PCS). Mental health will be measured using the youth Beck Youth Inventory of Depression (BYI-D). Psychophysiological function will be assessed via heart rate variability (HRV). Outcome measures will be statistically analyzed while controlling for key injury characteristics (time between injury and clinical evaluations, prior history of concussion, loss of consciousness, and amnesia). By longitudinally comparing SRC and mTBI outcomes, we aim to develop a better understanding of the role of injury modality in concussive injuries. Conclusions drawn from this study will address important knowledge gaps within current literature and provide important information regarding the clinical management of concussion and mTBI.

**Morrison, Cameron**

**Mentor(s): Dr. Douglas Wedell, Mr. William Hayes**

**Can affect conveyed through background music influence risk-taking behavior?**

Many decisions are thought to be guided by emotions, especially decisions involving risk and uncertainty. The affect infusion model predicts that individuals in a positive affective state should have higher risk tolerance, whereas those in a negative state should have higher risk aversion. On the other hand, the mood maintenance hypothesis predicts the opposite: being in a positive mood state should make an individual less tolerant of risk, while being in a negative mood state should increase risk-taking. Additionally, the somatic marker hypothesis holds that high arousal should act as a warning signal against making risky decisions in uncertain environments. To further clarify the roles of valence and arousal in decision making, 65 participants completed the Balloon Analogue Risk Task while listening to music that was rated positive or negative in valence and low or high in arousal based on a prior norming study. We hypothesized that risk-taking would be decreased in the negative valence conditions, in line with the affect infusion model, and in the high arousal conditions, in line with the somatic marker hypothesis. Group-level results from multilevel modeling were inconsistent with these hypotheses, with no significant differences between music conditions. There was a robust effect of previous-trial outcome, with negative outcomes resulting in decreased risk-taking on the next trial. Cognitive models fit to each participant's data were used to examine individual differences in the effects of valence and arousal on trial-by-trial decisions. We discuss possible explanations for the lack of group-level effects in the current study and propose a follow-up study that utilizes a stronger affect induction methodology.

**Morrison, Casey**

**Mentor(s): Dr. Scott White**

**Cardiac Rehabilitation Practicum Experience and Influence**

During the summer, I was a practicum student at Lexington Medical Center's Cardiac Rehab. Cardiac Rehab aims to improve the health and quality of living of patients through exercise, education, and gradual lifestyle changes. As a practicum student I had the opportunity to interact with patients monitoring pre and post exercise blood pressures, modify exercise prescription, and lead stretches and exercises. I was

able to see various stages of recovery after a cardiac event. This includes pre-op interviews, observing in the catheter lab, walking patients in the ICU after open heart surgery. I was most involved with outpatient recovery. Throughout 36 visits patients more mobile and healthy individuals. I worked directly with a team of exercise physiologists, nurses, and respiratory therapists. During this experience I was able to greatly improve my patient care interaction skills, I also was able to learn a lot about cardiovascular conditions and related clinical terms. My experience relates to many classes I have taken as an exercise science undergraduate. This includes the physiological effects of exercise and physical activity and aging. I discovered during this time that I had a passion for working with an elderly population and found a new avenue to help improve patient outcomes and health with my knowledge of physical activity and its benefits specifically as people age. After graduation I hope to pursue graduate school and eventually work with an aging population.

**Mosquero, Kimberly**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**The Amazing World of Kimberly**

As the President of the Aperion Society, I found a way to help students come into a safe space to discuss anything that is important to them. I also learned, how to engage with others that may have the same questions or the same ideas, that I also have. As president, I have kept a professional stance, by not letting things go out of hand during one of our discussions and by not taking one's side and staying neutral in a meeting. I have found that if you just listen to every side of the story, you will learn more about it, and you might learn something that could change the whole story that other people have learned . As president, I have motivated myself to make sure that everyone feels safe in all of our meetings. I have organized this Society to help each other, and to help others in the world that may need someone to talk to about anything.

**Moulton, Karah**

**Mentor(s): Dr. Nathan Hancock**

**Sequence analysis of a miRNA-Induced Arabidopsis thaliana mutant**

Understanding gene function is essential to solving genetic problems or beneficially altering gene expression. An important tool for determining gene function is gene silencing, because it allows you to see how the organism behaves when the targeted protein is absent. The method we used to randomly decrease gene expression of Arabidopsis genes was miRNA-induced gene silencing. This method involves attaching a microRNA target sequence to an mRNA sequence and inducing the production of tasiRNAs. The tasiRNAs subsequently degrade homologous sequences. We transformed a naturally occurring Arabidopsis thaliana miRNA, called miR173, into random positions of the genome. One of the resulting plants was a mutant that exhibits altered leaf shape, delayed flowering, and reduced seed set in a dominant manner. We extracted DNA from plants with the mutant phenotype and prepared a DNA library for nanopore sequencing. Nanopore sequencing is a relatively new technique that sequences long strands of DNA through a protein nanopore. This method provides high-throughput sequencing results, but also provides long sequencing reads. We are currently analyzing the nanopore sequencing results by conducting a BLAST search for the transgene sequence using Geneious software, and then analyzing adjacent sequences to identify candidate genes. After we identify the candidate genes, we will test for changes in gene expression using quantitative reverse transcriptase (RT) PCR to analyze changes in the mRNA levels. A decrease in mRNA levels in the mutant would confirm that the mutant phenotype is due to gene silencing.

**Moultrie, Michaela**

**Mentor(s): Mr. David DeWeil**

**Peer Leadership: Adapting, Problem-Solving, and Giving Back to Minority Programs**

Throughout my entire college experience, I have served on two separate Admissions Ambassadors teams underneath the Office of Undergraduate Admissions. As a member of our Multicultural Outreach Student Team (MOST), I spent time the past three summers serving as a Summer Seniors Counselor. Summer Seniors is a four-day, residential recruitment program that specifically targets rising high school seniors from South Carolina who are African American. The purpose of this program is to give the attendees of this program firsthand experience of college life, a template to navigating the college admissions process, tips from successful students, and the ability to network with current students, faculty, and staff. As a rising high school senior, I participated in the Summer Seniors program and it played a crucial role in my decision to become a Gamecock. Now, as a current student, I wanted to give back to the program and help Admissions to recruit the next generation. Through my experience as a Summer Seniors counselor, I successfully learned how to work in a fast-paced environment, manage a group of people while embracing the individuality of all of its members, and how to quickly prioritize, adapt, and problem-solve. Most importantly, my experience as a Summer Seniors counselor has taught me to recognize the importance of finding your community at UofSC. My hope is that by sharing my experience with the Summer Seniors program, others will be inspired to give back to their Carolina community in this way.

**Movva, Vikash**

**Mentor(s): Dr. William Jones**

**There is always more to learn**

4 years ago, I never thought I would be attending the University of South Carolina. On my 18th birthday, I got accepted into the International Business Chinese Enterprise program and that changed everything. I knew that I would get the ability to spend most of my time abroad. Having grown up travelling between India and America, I thought I knew a lot about the world, however the last 4 years have significantly changed my perspective. After my first year at USC, I headed abroad to Hong Kong where I quickly learned that my rudimentary Chinese wouldn't be enough to allow me to navigate around. I began to dive deeper into my Chinese language classes. These skills allowed me to venture into China to see historical monuments and visit parts of the country that most people don't get the opportunity to visit. Part of me believed that I have seen all there was to see, and I was an experienced traveler, but I harkened back to my previous experience and decided to go abroad again. Instead of returning to Hong Kong like I had initially planned, I changed my track and went to Europe to see a part of the world that had developed differently. From traversing the streets of Amsterdam to sitting on the beach in Nice, I experienced a culture that I would have missed out on due to my complacency.

Often times, when we discuss concepts in my International Business classes, we look at the problem through a borderline theoretical lens as if we are peering into a distant fictional world. Due to this, the articles we read and the information we retain often feels like a simple story, and the exams feel like reading comprehension. After my two experiences abroad however, I felt every reading as an extension of my current reality, further shaping my perception and understanding of not only distant places, but people with different cultures other than my own. I hope that I can continue my travels and continue my learning by building on the framework I laid down at USC.

**Mueller, Isabella**

**Mentor(s): Dr. Dawn Wilson**

**Assessing the Effects of Parenting Style and Feeding Practices on African American Adolescent Diet and Physical Activity Outcomes**

African American adolescents have a significantly high risk of developing obesity, which has been shown to be associated with increased prevalence of chronic diseases in early adulthood. Parenting factors may be important to consider when examining adolescent health outcomes such as exercising and eating a healthy diet. The purpose of this study was to examine the role of parenting style (authoritative parenting, high nurturance and moderate control) and feeding practices (parent restriction, monitoring, and weight related concerns) on dietary (caloric intake, fruit & vegetable intake, family mealtimes, adolescent motivation for eating healthy) and physical activity (PA; 7-day accelerometer estimates) outcomes in overweight African American adolescents. Participants included African American adolescents (N = 241;

**Mullin, Andrea**

**Mentor(s): Ms. Lisa Camp**

**The Meaning of Mentoring**

During my junior year of college, I had the privilege of serving as a University 101 Peer Leader. A University 101 (U101) Peer Leader is a mentor that facilitates in the successful transition of first-year students to the University of South Carolina. I worked alongside an instructor and co-taught 19 students during the Fall 2017 semester. My daily role consisted of leading classroom ice breaker activities and assisting in the delivery of academic lessons. The most meaningful part of being a U101 Peer Leader included being an active mentor in and out of the classroom. I met 1-on-1 with each student to develop a stronger relationship with them to better assist them in having a positive transition at the university. I believe an important part of mentoring is the lasting effect you leave on the mentee and how this effect can be passed on to others as well. Being a U101 Peer Leader at UofSC has given me a platform to grow and be a leader. In this role, I developed effective communication and facilitation skills, learned the importance of patience, and that you cannot control others' actions, but you can help guide them to choose a better option. I want others to remember that being a mentor is different than being a leader. As a mentor, you support the mentee while allowing them to learn and grow on their own. A mentor does not instruct the mentee on what to do, but instead helps to guide them through their own decisions. I believe the relationship between a mentee and a mentor is another unique difference. A mentee and mentor share a strong bond of trust; the relationship is better described as friends, not a co-worker and a boss. Through my leadership roles, I have learned that I have a strong passion for mentoring and will be evaluating other career options that would support this passion.

**Munie, Stephanie**

**Mentor(s): Dr. Melissa Moss**

**Examining Alzheimer-associated Cytokine Expression in THP-1 Macrophages**

Currently, 5.8 million individuals in the United States suffer from Alzheimer's disease (AD), a neurodegenerative disease that causes major impairment to the daily lives of affected individuals and ultimately leads to death (Alzheimer's Association, 2019). Chronic inflammation is linked with aging and AD, and our research involves the creation of an in vitro model to evaluate potential therapeutics within this context. One aspect of this model examines the cytokine response. To simulate aging-associated chronic inflammation in vitro, THP-1 monocytes were differentiated into macrophages and treated with a chronic low-level pro inflammatory stimulus, lipopolysaccharide (LPS), for three days. A "daily volume exchange" (DVE) component was added to assess the effect of cytokine buildup on cellular response: 25% or 50% of the total supernatant volume was refreshed daily throughout the chronic treatment phase while keeping the

concentration of LPS constant. At the end of the three days, cells were exposed to an acute, high-dose of LPS. Supernatant from both the chronic and acute phases of the experiment was harvested and analyzed for the presence of inflammatory cytokines via Enzyme-Linked Immunosorbant Assay (ELISA). Acute cytokine response of IL-1beta, IL-6, IL-10, and TNF-alpha was reduced in cells exposed to chronic LPS relative to cells that remained untreated for the chronic phase. This phenomenon was observed in both the 25% and 50% DVE subsets. Studies of chronic inflammation in vivo show that cells have a diminished response to acute injury, and this model achieves that response. Therefore, use of this model will more effectively evaluate potential AD therapeutics.

**Murphy, Reaghan**

**Mentor(s): Mr. William Quinlan**

**The Rhetoric of Organizational Success**

Rhetoric is a powerful tool that, when utilized successfully, can be leveraged to augment the efficiency — or inefficiency — of an organization. Throughout this project, I explore rhetoric within an academic and historical context and then expound upon it through the perspective of my experiences with organizational leadership through UofSC's Residence Hall Association.

**Muscat, Stephanie**

**Supervisor(s): Meghann Lange**

**Mentor(s): Ms. Courtney Buchanan, Dr. Deanna Smith**

**Role of cytoplasmic dynein in regenerative axon growth control**

Axonal transport is a vital function of neurons. Disruption of transport is seen in a variety of neurological disorders, including AD, ALS, Huntington's and Parkinson's diseases, as well as the childhood disorder lissencephaly. Cytoplasmic dynein is a primary transport molecule in mammalian axons. Several studies have implicated axonal transport in the capacity of neurons to extend axons during development and during regeneration after nerve injury. However, these results are somewhat confusing, and relatively little is known about dynein's role in regenerative axon growth. Even less is known about the mechanisms that regulate dynein function in axon growth. By examining the effects of inhibition of dynein itself (or the dynein-regulators GSK-3 $\beta$  and LIS1) on axonal growth from cultured adult rat neurons, we aim to clarify the role of this motor in the ability of neurons to regenerate injured axons. Early studies indicate that exposure to CT99021, a drug that stimulates dynein, increased branching compared to vehicle control. Interestingly, the drug had the opposite effect on neurons that were pre-conditioned in vivo to undergo long regenerative growth. Future work will examine the impact of the dynein inhibitor, ciliobrevin. This study will guide the development of potential therapeutic treatments for promoting regeneration.

**Muscella, Jessica**

**Mentor(s): Mrs. Asheley Schryer**

**Learning in Luxury: My St. Regis Experience**

Valuable internship experience in the hospitality industry is paramount to future career success. In the summer of my junior year, I completed an internship at the St. Regis Atlanta to gain five-star luxury training at one of the top hotel brands in the world. As a Rooms intern, my job focused in the Front Office department where I was the first point of contact for guest relations. I also cross-trained in housekeeping and human resources to learn more about the industry and operations of a full-service hotel. Luxury hotels have the highest quality of training due to the intense demands and expectations of guests. As a young professional, it was my goal to gain this elevated quality of training so that I would be prepared to apply five-star training no matter what level of the industry I started my career.

Through the internship, I gained an appreciation for teamwork and learned how to be more confident in

myself, both in my job and in the workplace. I also learned about leadership styles and the type of manager I want to become. This shaped my opinions about the industry and how to better prepare myself for my career. I will be able to take what I learned at this internship and apply it to my upcoming job as a Manager-in-Training for a 1,400 room convention hotel. By being exposed to every part of rooms division, I am able to be a more compassionate leader with experience to help guide me through this next chapter.

**Needle, Bette**

**Mentor(s): Dr. Stanley Dubinsky**

**An Analysis of the Ethnolinguistic Conflict In Cameroon Between the English Minority Speakers and the French Majority Speakers**

The country of Cameroon is on the brink of a civil war. Minority English speakers are rioting over the lack of representation and corruption by French speakers who hold the power. With an election just around the corner, English speakers are trying to take back their autonomy in Cameroon, but they risk destruction of their communities, lifestyles and what little voice they have left.

My thesis will explore the underlying ethnolinguistic conflict between these two groups. conduct an analysis of how this conflict arose, why, and what the real underlying causes are.

Language differences is one of the many characteristics that divide a group of people, along with gender, religion, sexual orientation, race, and so on. When language is the clear divider between peoples, as in the case of Cameroon, it's important to determine whether that's the real cause for hostility. English speakers in Cameroon are angry about the lack of representation in government. But Francophones in the region want to maintain their power over Anglophones. Why is it that enforcing language boundaries is the one of most effective ways to suppress a people? This thesis will aim to determine that.

**Neubig, Julius**

**Supervisor(s): Jonathan Rivera, Ross McNabb, Zachary Hunter, Hampton Slate**

**Mentor(s): Dr. Sanjay Ahire**

**Improving Operations Planning and Capacity Management at Ronald McDonald House Charities of Columbia**

Ronald McDonald House Charities of Columbia is a non-profit 501(c)-3 organization in Columbia, South Carolina, with a volunteer board of directors and professional staff serving families and children who travel to a Columbia medical facility so that their child can receive the medical care they need. They are supported by a caring community of volunteers and generous contributors and sponsors.

Operations management at RMHC faces the challenge of variable and uncertain demand of guests who stay in their lodging rooms, variable durations of their stay, and their needs during their stay. This, coupled with uncertain and variable supply of volunteer capacity, poses unique challenges to the staff at RMHC to manage on-going operations and special events executions around the year.

We helped RMHC of Columbia to better plan and execute their operations through a systematic study of the resource capacity bills for normal house operations (guest and volunteer tours, registration of guests including work to get them federal financial assistance, feeding breakfast, lunch, and dinner, regular housekeeping), as well as special events planning and execution. We developed Theory of Constraints based Excel operations management tool for running RMHC operations. Recommendations to optimally allocate resources and responsibilities between regular staff and volunteers, as well as process step and logic improvements are suggested and being piloted. The project deliverables will help RMHC to substantially improve their capability and capacity to serve more guests per year and improve guest satisfaction.

**Nicoladis, Anne Elise**

**Mentor(s): Dr. Matthew Irvin**

**Investigating the Best Ways to Encourage Students to Pursue Careers in STEM Through Participation at Informal Learning Environments**

Reports on undergraduate enrollment and retention in STEM fields show a need to reform STEM instruction nationwide. STEM Teens is multinational research study looking at ways to encourage K-12 students to pursue careers in science, technology, engineering, and math (STEM) through participation at informal learning environments. USC's participation is managed by the School of Medicine and the College of Education. I became a Research Assistant for STEM Teens because of my interest in discovering what can maximize children's learning. For two semesters, I spent Sunday afternoons at the two sites in Columbia, SC collecting in-person survey and video data from student participants and their parents. Data was collected from six total sites (3 US and 3 UK). We found that students who interacted with youth educators reported learning more than participants who interacted with an adult educator or who did not interact with an educator. In addition to self-reported learning, students who interacted with a youth educator scored higher on content related questions about the exhibit. These results show the positive impact of youth educators in informal learning environments. Children's museums and zoos can use these results to better educate and positively influence their patrons. Through STEM Teen's findings, I learned the importance of using research to make informed decisions.

**Nielsen, Christina**

**Mentor(s): Dr. Myriam Torres**

**Diving into Disparity: Mental Health Diagnoses in the Latino Population of South Carolina**

Anxiety, phobia, major-depressive, substance abuse, and impulse control disorders are some of the most prevalent psychiatric disorders in the United States. However, there has been limited research on mental health among Latino/Hispanic populations in the US, and even less research done in South Carolina. The purpose of this study is to determine the prevalence of mental and behavioral disorders among Hispanic/Latinos in South Carolina. Codes for mental disorders from the International Classification of Diseases, Ninth Revision (ICD-9) provided by the Health and Demographics Section of the Revenue and Fiscal Affairs Office in Columbia, South Carolina were used to compare the prevalence of mental and behavioral disorders between men and women across races. The major findings were that in South Carolina, anxiety, depression, and substance abuse were the three leading diagnoses for Whites, Blacks, and Hispanics. However, there were differences between Hispanic mental health diagnoses trends and those seen among their White and Black counterparts including sex differences. The data suggests that Hispanics are less likely to seek treatment for mental health disorders and/or are less likely to receive a mental health diagnosis in all health settings (inpatient, outpatient, emergency department and other services). Further studies looking at the quality of mental health care services for the Latino population in South Carolina, breakdown of diagnoses among Latino subgroups, and individual attitudes should be implemented to better understand diagnoses and service disparities.

**Nielsen, Christina**

**Mentor(s): Ms. Jennifer Bess**

**How to Fellowship: Gilman Alumni reflection on application process and language immersion in Spain**

Fellowship applications can be overwhelming when trying to cut through the red tape alone, but Gilman Alumni Christina Nielsen (who studied abroad in Alicante, Spain on a Gilman fellowship) guarantees it can be a rewarding and beneficial process for all students who take advantage of the services Office of Fellowships and Scholar Programs (OFSP) offers at the University of South Carolina. The Gilman applica-

tion process sets the applicant up for success while studying abroad and upon return to the United States by requiring the applicant to write a personal statement that includes self-reflection on the purpose of the study abroad program and propose a follow-on project (describe what that requirement is – i.e. to encourage other students to study abroad). The benefits of winning a fellowship include funding for international travel, the once in a lifetime opportunity to learn while fully immersed in a country's culture, and a network of alumni across the country who share a passion for international travel and learning. All one needs to do to reap the benefits of the Benjamin A. Gilman International Scholarship is be a Pell grant recipient, have the desire to intern or study abroad, and write a few essays with the help of the Office of Fellowships and Scholar Programs and the Study Abroad office. The process is made simple through guidance by OFSP advisors, and the rewards of the process and study abroad last a lifetime.

**Novak, Ashley Grace**

**Mentor(s): Dr. Amber Fallucca**

**A Semester in Florence, Italy**

The spring of my junior year I had the incredible opportunity of being able to study abroad in Florence, Italy. As a history major and art history minor I was immediately drawn to this city as it is an international mecca for culture and history. I was uniquely blessed in being able to truly 'live' within both my major and minor all the while studying in the cradle of the Renaissance. I have studied in books my entire life, so being able to physically see the terrain and touch the history I had to date only been learning about was life changing. Our classroom often times became the inside of churches analyzing frescoes by the likes of Botticelli and Michelangelo and articulating opinions of Brunelleschi's Duomo in the shadow of the cathedral. I realize in hindsight that these hands-on experiences fully ignited my long-held passion to further my education in the field of art history with eye towards curation. During this time, I better ingratiated myself in the international art world which I have now realized is the next step in my career path. On a more personal level, my study abroad experience gave me the confidence to not only pursue a career field but also in myself. At times, it became challenging being in a foreign country with new people, a new language, and a brand-new culture; but it allowed me to better learn myself and to redefine the goals I have for the future. Global learning has provided me the experience to gain the confidence in myself and the ability to look towards the future with assurance and excitement.

**Nugent, Darby**

**Mentor(s): Ms. Stephanie Suarez**

**Refugee Resettlement in South Carolina**

Refugee resettlement has been a highly politicized topic in recent years. However, little is understood about the process surround the resettling of refugee within the US. I spent this year examining the process of refugee resettlement here in South Carolina at Lutheran Services Carolina.

**Odhiambo, Diana**

**Mentor(s): Dr. Michael Shtutman**

**Interactions of Astrocytes and Microglia as models of HIV-Associated Neurocognitive disorder.**

While the deployment of combination antiretroviral therapy [CART] has seen to the decline in AIDS-associated deaths, HIV-associated neurocognitive disorders [HAND] remain increasingly high. The presence of HIV-1 virus and its regulatory protein Tat in the central nervous system is characterized by deleterious immune activation of resident glia followed by uncontrollable production of neurotoxins. Studies have also reported heightened severity in HAND following abuse of drugs such as cocaine. In elucidating mediators of immune activation in the brain, studies have suggested a role for microglia and astrocytes in the production of toxic factors that promote neuronal damage and subsequent inflammation in the brain.

In this regard, we are investigating the role of HIV-1 regulatory protein Tat in microglia and astrocyte activation while also studying the inhibitory efficacy of RK-33, a selective inhibitor of Dead box helicase 3 [DDX3]. Astrocytes and microglial cells were isolated from adult rat and cultured for two weeks before 72hr treatment with Tat, Cocaine and a combination thereof. Conditioned medium from treated culture was collected and applied on neuronal culture. Astrocytes and microglial cells were then immunostained while neuronal cells were subjected to a cell viability assay. While there was no sign of microglial activation which is characterized by an increase in size and number, there was a change in astrocyte phenotype from A2 to A1. The change in phenotype from A2 to A1 has been correlated with astrocytic activation and implicated in neurotoxicity. Neurons exposed to treated astrocyte and microglia conditioned medium, showed an increase in Caspase3 and ethidium bromide positive cells, suggesting apoptosis or cell death. These results, while preliminary, suggest a role for both astrocytes and microglia in the production of neurotoxins that cause neuronal damage.

**O'Halloran, Anne**

**Mentor(s): Dr. Elise Lewis**

**Studying Abroad in Sevilla, Spain**

In the spring semester of 2018, I studied abroad in Sevilla, Spain. I had only recently traveled out of the country for a very short period of time, and was looking to learn more about the world as a bigger picture. As an international studies major and Spanish and psychology double minor, I had learned all of these amazing things about countries, governments, languages, cultures, and people through coursework, but never through real-life experiences. When I first arrived in Sevilla, a small southern, isolated, traditional Spanish city, I was completely culture-shocked. I was eating drastically different food, living with a complete stranger, misunderstanding cultural norms, speaking broken Spanish to simply get by, and living under a different type of government with different political laws and structures. I didn't just get to see the bigger picture, but I was able to experience it as well. 8 countries and 26 cities later, I am not the same person I was before embarking on this journey. I better handle myself in uncomfortable or unexpected situations, I accept others' differences less consciously and more automatically, I'm more open to trying new things, and I speak Spanish at a significantly higher level now than before I left. Studying abroad has helped me stop doing, saying, or handling things solely through "my way," and has allowed me to live in a world where I appreciate other cultural values in school, friendships, and daily life. I was lucky to be so culturally immersed and away from the "American way," and because of this, I want to prepare students for the change in culture abroad to maximize their international experience as well.

**O'Leary, Matthew**

**Mentor(s): Dr. Matthew Childs**

**ACM@USC, A Student Organization Forging New Connections**

Student Organizations bring together like-minded students to make connections in their fields of focus. In the case of the Association of Computing Machinery Student Chapter, or ACM@USC, this is in the field of Technology, Computing, and Programming. One of my greatest contributions to USC is my commitment to improving the quality of our education in Computer Science by hosting talks that go above and beyond the classroom curriculum. These talks include topics such as new programming languages, such as a recent one on Python, a Programming Language that is easy to get started writing a program with, to other topics such as Advanced Website Design using Cascading Stylesheets (CSS) which is the part of the web page that adds the styling. ACM@USC also helps to provide connections with local leaders in the industry, such as with companies like Krumware, and people like Todd Lewis, the creator of the All Things Open Conference. It also also hosts a safe space for students interested in Computers, Programming, and Technology to share ideas and collaborate. During my time as the Vice President of ACM@USC, learned about problem solving in the context of business and in organizing and promoting events. For example, I

created a website to help with notifying the club in an efficient manner about upcoming events, making it easier for all students to be informed about events related to our Student Organization, as well as have a presence on the Internet. This leadership position has shaped me as an individual by allowing me to make a difference in the lives of students at USC, and also provided a positive impact on not just Computer Science and Engineering Students, but on the student body as a whole.

**Olsen, Allyson**

**Mentor(s): Dr. Alissa Armstrong**

**Evaluating Amino Acid Transporter Expression in Adult Fat Tissue of *Drosophila melanogaster***

Fat bodies communicate with other tissues to regulate physiology. Amino acid sensing by fat cells allow this tissue to contact the ovaries. However, of the sixty or so amino acid transporters we do not know which ones allow for this communication between the fat cells and ovaries. Using genetic tools we can study the connection between these tissues.

**Orcutt, Marilyn**

**Mentor(s): Ms. Lisa Camp**

**From Horse Shows to Court Rooms: The Avant-Garde Path That Led Me to Law School**

In November of 2016 I began working for the Mid Atlantic Equitation Festival (MAEF) as an event management and vendor relations intern. MAEF is a 501 3 c horse show that offers scholarship awards and premiere indoor competition for riders of all ages. The show is held annually one week during the month of November at the Showplace Arena in Upper Marlboro, Maryland. Since I am a Retail Management major and Sport & Entertainment minor at the University of South Carolina, this internship allowed me to pursue a unique opportunity to combine non-traditional retailing with sporting event management. Over time, my position evolved and adapted to meet the needs of the organization. Specifically, I worked on coordinating sponsorships with vendors, increasing new vendor partnerships, streamlining operations, making sure legal guidelines are adhered to, and formulating marketing campaigns on social media platforms. One important project I accomplished was the implementation of live ring status updates on Horseshowing.com. The website is used by horse shows to provide minute-by-minute updates such as start times, order of go, and class numbers. Successful implementation of this service allowed MAEF to run quicker and competitors to have a more enjoyable, rewarding experience. Additionally, I was part of the research team to help transition the organization from a for-profit company to a non-profit organization in 2019. From this internship, I developed an intensified desire to understand the policies and laws in place surrounding all aspects of the horse show association, the venue, advertising, retailing regulations, and much more. Therefore, I have transitioned my passion for horse shows into continuing my education at law school where I can learn how to be a part of the legal side of horse shows and sporting event compliance.

**Ortiz, Victor**

**Mentor(s): Dr. Amit Almor, Mr. Jonathan Rann**

**Effects of Verbal Tasks on Driving Simulator Performance**

In recent years, interest has increased focusing on capturing the dynamic shifting of resource demands during language production and comprehension over the course of conversation (e.g., Boiteau, et al., 2014). The resource allocation of comprehension and production is related to real-world scenarios in which language is used in the context of other tasks, such as driving and talking. We conducted two experiments asking whether the resource demands of production and comprehension affect simultaneous driving performance as predicted by current theories of language processing. Both experiments used the OpenDS Driving Simulator (Math, Mahr, Moniri, & Müller, 2012) and Continuous Tracking and Reaction task (Mahr,

Feld, Moniri, & Math, 2012) in which overall distance from a target on a driving-based tracking task is the dependent measure. We hypothesized that participants' driving performance would be more susceptible to interference from conversation during fast speeds than during slow speed conditions. We also hypothesized that performance would improve at the beginning of comprehension segments, and then decline at the start of speech planning and production. E1 tested performance under conditions involving only the driving-based tracking task (absent), passive listening to spoken prompts via headphones, or responding to spoken prompts. E2 tested performance under conditions involving only the driving-based tracking task (absent), passive reading of written prompts that were displayed on the driving simulator screen or responding to the written prompts. Results from E1 showed no significant performance differences among verbal task conditions during slow speed conditions. During fast speed conditions, performance steadily decreased as verbal task difficulty increased, with worse performance during respond conditions. For E2, the results showed significantly worse performance in verbal conditions compared to absent during slow speeds conditions. Performance during fast speed conditions decreased in a similar fashion as E1 but was more distinct. Overall, data from both experiments supported our hypotheses, revealing dynamic performance changes which are consistent with current theories of language production and comprehension, placing the requirements of both in the domain of general theories of resource allocation (i.e., Lavie, et al., 2004; Wickens, 2002).

**Osorio, Natalia**

**Mentor(s): Dr. Denise Wellman**

**Collaboration Amongst Diverse Minds**

Throughout my junior and senior year, I was president of the Multicultural Greek Council, as well as standards officer, service officer, and treasurer of Kappa Delta Chi Sorority, Inc. Through my roles in my sorority I had to learn how to separate friendship and business. Though this was difficult at the time, it helped me grow as a leader since I had to learn how to keep members accountable for their actions, as well as create professional boundaries amongst my sorority sisters. Once I developed these skills I believed I was ready for a bigger role which is why I became the Multicultural Greek Council president. I wanted to establish collaborative relationships cross-council and help us grow as a council on University of South Carolina's campus. Through this role I learned how to communicate to a diverse group who did not always agree on my ideas, such as the importance of cross council collaboration or even collaboration with other organizations on campus. I believe that when such disagreements occur, the best thing to do is stand tall and lead by example by setting a direct course of action and showing members that working with diverse groups outside of their comfort zone helps them grow as individuals and as an organization.

**Page, Kristen**

**Mentor(s): Dr. Lauren Sklaroff-Lamey**

**The Venereal Disease Campaign and Anti-Female Sexuality Agenda**

Beginning during World War One, the United States federal government undertook a campaign against venereal diseases. U.S. soldiers and the rampant cases of disease among them highlighted the necessity for action. As property of the United States, soldiers spending time out of commission as a result of venereal disease was a major problem. With the help of non-governmental organizations such as the YMCA and the ASHA, the federal government began a campaign targeting venereal disease. However, analyzing various propaganda distributed by these NGOs suggests that the venereal campaign had another agenda- attacking female sexuality. Prostitution and women who did not conform to traditional conservative values were targeted as the creation of the venereal disease problem in the United States. Much of the propaganda distributed to soldiers and civilian populations called for drastic actions to be taken to outcast prostitutes and promiscuous women from society. The solicitation of NGOs to lead a federal campaign and the connotations of the propaganda distributed under the guise of a medical basis had serious implications

for women in the twentieth century United States.

**Painter, April**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**The Abstracting world of April**

Becoming a part of a new campus is frightening. It doesn't matter if you've been in college for five minutes or five years, it's a new learning curve. It is the job of a University Ambassador to make sure SOAR runs as smoothly as possible. As an ambassador, it is my duty to take care of all the students in my group, from start to finish and to answer any questions that are raised, as the day went on. Ambassadors give a quick, but intensive tour of the school. After tours, it's time for lab. In lab, students create a username, and password for email and blackboard and register for courses. While being an ambassador, I learned that maybe I have what it takes to become a teacher. An ambassador, at times had to wrangle up their group and keep everyone together. This helped to reassure myself that, for one day I can keep a group of people together and get everyone where they need to be, then maybe this something I could do as a living. My hope is that one day future ambassadors will be able to learn and interact much like I did. Being an ambassador is an opportunity that I didn't see coming, but sure am glad it found me. I can't wait to be an ambassador again for the next upcoming term.

**Pande, Madhura**

**Mentor(s): Dr. Lydia Matesic**

**Histological Analysis of Ileal Mucus Layers in ITCH-deficient Mice**

The E3 ubiquitin ligase ITCH regulates the degradation of proteins and is integral in various signaling pathways that maintain intestinal epithelial homeostasis. Organisms lacking the ITCH protein suffer from a multisystem autoimmune-like disorder due to improper immune response. This manifests in structural abnormalities in the small intestine of ITCH-deficient animals, that can allow harmful bacteria to penetrate the intestinal barrier and enter the body, as a result of potential alterations in the immune system, the epithelium, the microbiome, or a combination of all three in ITCH-deficient mice. While most treatments of autoimmune or gastrointestinal disorders target the immune system, the role of the epithelium in maintaining a functional barrier has only recently begun to be appreciated and is the focus of this project. The goblet cells in the epithelium produce mucus to both prevent harmful bacteria from entering the mucosa and to propel bacteria down the gastrointestinal tract. We hypothesized that the mucus covering the intestinal epithelium of ITCH-deficient animals would be thinner and more permeable than that in ITCH-sufficient mice, thereby increasing exposure of the gastrointestinal tract to pathogens and contributing to inflammatory reactions and increased disease severity. To test this hypothesis, sections of tissue from the distal ileum of mice deficient and sufficient for ITCH were harvested at 9, 15, and 24 weeks of age. The tissues were fixed, sectioned, and stained with periodic acid-Schiff to highlight the mucus and hematoxylin to counterstain the nuclei. Images of 20x fields of the slides were then obtained by bright field microscopy using a Zeiss Axio Imager A1 equipped with an AxioCam MRc5 camera. ImageJ was used to digitally stitch the 20x fields, to define the lumen as the region of interest, and to quantify mucus secreted within the region. Preliminary analysis suggests no statistically significant difference in ileal mucus layer thickness in ITCH-deficient mice in comparison with ITCH-sufficient mice. In addition, it was noted that the ilea derived from ITCH deficient animals seemed to fall apart and lacked structural integrity. This could provide an alternative mechanism for exposure to gut microbes in animals lacking ITCH.

**Patel, Maitri**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Maitri's Madness**

It was my dream work in the IT department where I go to school and, I finally had an opportunity to work for USC Sumter IT, being work-study during the Summer of 2018. I was the first-ever IT work-study at the USC Sumter campus, luckily, I also got a chance to choose in which department I want to work for. Working in the IT department for the University has been a great experience for myself. It is not just a job for me, it was a great learning experience for me, still being a freshman. This experience was more like an internship, then a work-study. As a Computer Engineering and Science major, this work-study position provided me with hands-on experience in troubleshooting, help desk, audiovisual and windows operating system. I was my pleasure working and learning from one of the first IT people at USC Sumter. It gave me a great start as a computer major, developing relations in this field and I experienced the situations that I will face when I step into the world as Engineer. Through this experience, I hopefully get to work with Columbia IT department, when I transfer there this upcoming summer.

**Patel, Janu**

**Mentor(s): Dr. Dawn Wilson, Mr. Colby Kipp**

**The Relationship between Parenting Factors and Parent Perceived Stress on Adolescent Dietary Outcomes**

African American adolescents are at increased risk for developing chronic diseases such as obesity, hypertension and heart disease. This may be due in part, to parenting factors and increased perceived daily stress of living in underserved, low-income environments. Little research has examined the relationship between parenting factors and perceived parental stress on adolescent health outcomes. The purpose of this study was to examine the interaction of parenting styles (authoritative parenting- high autonomy-support) and feeding practices (parental monitoring, restrictive feeding) with parent perceived stress on adolescent dietary outcomes. The study participants took part in the baseline data collection during the Families Improving Together (FIT) for Weight Loss randomized controlled trial. African American adolescents (N = 138;

**Patel, Kajal**

**Mentor(s): Ms. Maegan Gudridge**

**Serving as a Resident Mentor**

In the Fall of 2017, I started my leadership position as a Resident Mentor (RM) in the Carolina Women's Community. My role is to cultivate a comfortable environment in a first-year residence hall for residents to express themselves and create connections with one another. I strive to educate residents and facilitate programs to introduce residents to academic opportunities. I chose to become a RM because I was a Senator for Women's Quad my first year at the University of South Carolina and I truly enjoyed the experience. I was directly impacting first year students and wanted to continue making this impact, so I chose to become a RM. As a RM, I have learned how to assist individuals in sensitive situations and remain professional. I am continually developing myself personally and professionally by identifying room for growth and improving. I plan on using my RM experience and applying it to positions I will hold in my Accounting career.

**Patel, Rhea**

**Supervisor(s): Brianna Thornton**

**Mentor(s): Ms. Carla Wall, Ms. Kayla Smith**

**Examining the Effects of Temperamental Attentional Regulation and Separation Anxiety Symptoms in Children with ASD on Parental Stress**

Autism spectrum disorder (ASD) is characterized by persistent deficits in social communication and social interaction across multiple contexts. In addition to these core deficits, many children with ASD have trouble maintaining attentional focus, difficulties with inhibitory control, and increased separation anxiety. Children with ASD who exhibit these behaviors may experience greater difficulty regulating their emotions and may subsequently require additional effort from parents. The increased effort to manage these atypical regulatory behaviors in children with ASD may amplify the parenting burden and contribute to parental stress and strain. Hence, the present study aims to examine how temperamental attentional regulation and separation anxiety symptoms in preschool children with ASD correlates with parental stress. We expect to find higher levels of parental stress in parents with children that exhibit poor attention regulation and high levels of separation anxiety. Twenty-nine males with ASD were evaluated at 48 months of age using the Child Behavioral Questionnaire Effortful Control Composite Score and the Spence Children's Anxiety Scale Separation Anxiety Subscale to assess temperamental attention regulation and separation anxiety symptomology, respectively. Parental stress was evaluated using the Parental Stress Index. Multiple regression will be used to evaluate how temperamental attentional regulation and separation anxiety relate to parental stress. The findings from this research can improve our understanding of the predictors of parental stress in relation to these behaviors in hopes of refining stress management techniques.

**Patterson, Alexandra**

**Mentor(s): Dr. Yogesh Wairkar**

**Understanding the Role of Presynaptic Par-1 Kinase in the Localization of Active Zones**

**Rational:** The active zone (AZ) is the presynaptic bouton region that mediates neurotransmission of chemical synapses. While mechanisms of localization for mitochondria and synaptic vesicles are well studied, little is known about mechanisms of localization for AZ proteins. Par-1 kinase is the Drosophila homolog of the Microtubule Affinity Regulating Kinase (MARK), which is upregulated in many neurodevelopmental and neurodegenerative disorders. Studies have shown, Par-1 is integral in localization of AZ protein Bruchpilot (BRP). Further studies have correlated elevated levels of presynaptic Par-1 and deficits of BRP in AZs due to mislocalization. Furthermore, decreases in presynaptic Par-1 lead to increases in selective accumulation of BRP within the axons. However, little is known about how decreases of presynaptic Par-1 affect localization of BRP at synapses. **Hypothesis:** Decreased levels of presynaptic Par-1 will disrupt localization of BRP to the synapses causing decreased levels of BRP at AZs and deficits in synaptic transmission. **Objective:** Characterize the function of presynaptic Par-1 and its' role in localization of BRP at AZs. **Methods:** The Drosophila larval neuromuscular junction (NMJ) is a model synapse which has been used extensively to characterize molecular pathways underlying synaptic development. Additionally, larval NMJs have high cellular resolutions allowing the study of AZ mechanisms and structures. Using a previously characterized Par-1RNAi line in conjunction with the ELAV-Gal4 driver, we decreased presynaptic Par-1 in the Drosophila. Next, NMJs of Par-1RNAi were stained with antibodies against protein markers for pre- and postsynaptic components and imaged using confocal microscopy. Fluorescence intensities were analyzed using Metamorph and bouton morphometrics were analyzed using ImageJ. Lastly, functional deficits were tested using intracellular electrophysiological recordings from Par-1RNAi larval NMJs. **Results:** Knock down of Par-1 leads to the mislocalization and accumulation of BRP and synaptic vesicles into distal axons. This results in ectopic formation of AZs within axons. Furthermore, the mislocalization of BRP leads to morphological changes and presynaptic retraction, ultimately resulting in

synaptic transmission deficits. Conclusion: This data indicates Par-1 has a physiological role in regulating localization of BRP to AZs, and that precise regulation of Par-1 kinase is needed for proper synapse development and function.

**Patterson, Robert**

**Mentor(s): Dr. Myriam Torres**

**Measuring the Association Between Non-Medical Prescription Drug Use and Violent Behavior Among Participants in the 2015 and 2017 YRBSS**

Both non-medical prescription drug (NMPD) use and violent behaviors have been shown to be pervasive in American public schools (King, 2013) (Eisenbraun, 2007). Use of opioid analgesics, such as codeine, oxycodone, and fentanyl, has sharply increased over the last 20 years (Paulozzi, 2012). Along with the emerging drug problem, violent behaviors have consistently been prevalent in American high schools since the inception of the topic in 1992. Participation in prosocial programs has shown to mitigate the risk of participating in violent and drug-related behaviors. Since both NMPD use and violence have this factor in common, could both violence and NMPD use be associated? Using data from the 2015 and 2017 questionnaires of the Youth Risk Behavior Surveillance System (YRBSS), variables of NMPD use and violent behavior were compared to measure the frequency and odds ratios using SAS programming. These results were then compared with earlier literature on the individual topics. From the data and analysis, a strong association was found between NMPD use and reported violent behavior. Those who used NMPDs were far more likely to report participating in violent behaviors. The initial review of the results would show that further interventions could be designed that integrate drug education along with violence deterrence to more effectively reduce the rates of both.

**Patterson, Hope**

**Mentor(s): Dr. Amber Fallucca**

**Swinging the Same Language**

This time last year, I was preparing to come home from Study Abroad in Bilbao, a major city in the Basque Country of Spain. I had two main goals invested in this opportunity: improve my Spanish skills, and learn more about myself and the world outside the US. While living in Spain I had the opportunity to stay with a wonderful host family who accepted me as one of their own and taught me about Spanish culture and language. This experience is something that made my Study Abroad experience even more valuable and I cherish those relationships we have, not only as friends and family, but that often taught me more than the classes I took. That said, I took several classes in Spanish on topics such as grammar, conversation, literature, and even cuisine, all of which contributed immensely to my Spanish language and cultural fluency. A crucial part of my experience was instructing local students in English as a tutor. Though I had seen and experienced socio-linguistic differences in my own country, I was able to learn and apply even more of what I had learned while abroad in Spain and other countries. I garnered valuable knowledge while traveling solo to other cities in Spain and other countries, and overall gained an appreciation not only for every new person and place I encountered, but also for who I was, and where I came from. My Spanish speaking, reading, and writing, as well as cultural fluency, has improved drastically from this experience, and I hope to use these skills in the future as a Spanish Medical Interpreter and graduate student of Spanish at USC.

**Pearson, Katelyn**

**Mentor(s): Mr. Duncan Culbreth**

**Making a Difference in my Community at the Department of Health and Environmental Control**

During my senior year, I had the opportunity to intern at the Department of Health and Environmental

Control (DHEC). DHEC is a South Carolina organization that is responsible for using evidence-based practices to promote and protect the public health and environment of the community. During this time, I assisted with many projects that exposed me to a wide array of disciplines within the Public Health field. The project that I found the most interesting was assisting the Epidemiology department with research about rabies treatment protocols. The goal of the project was to determine if the current protocol for animal bites is effective in deciding if the rabies treatment is necessary. My responsibilities for this project included creating a questionnaire to assess aspects of the patients care and cost of their visit and to call patients from the database that fit the criteria to interview them about their experience. During my time at DHEC, I have learned about career options in the Public Health that I am interested in pursuing. I have also learned how to work without a lot of supervision and direction because during my internship I was given free reign to explore different projects. I hope to use this experience to pursue a dual MD/MPH so that I can make a difference for individuals and my community.

**Pegues, Tania**

**Mentor(s): Dr. Jena Chojnowski, Dr. Alan White**

**Heart Disease and a Genetic Cause**

Heart disease is one of the leading causes of death in the United States. A systematic literature analysis of cardiomyopathy found that there are three gene in particular that are overwhelmingly involved in cardiovascular disease. These three genes of interests are Myosin Heavy Chain 7 (MYH7), Myosin Binding Protein C 3 (MYBPC3), and Troponin T2 (TNNT2). A lab portion of this study was to determine if these three genes can be tracked to the early stages of life. Developing chicken hearts were used as a model system to conclude if these three genes are found in early heart development. This study is a first step in understanding the role of genetic factors in long term heart conditions by looking at the earliest steps in heart development. These results will be used to encourage the American population to be cognizant of their family genetic and health history can lead the scientific community in better understanding the development of heart disease.

**Peksenaar, Celine**

**Mentor(s): Mrs. Ambra Hiott**

**Medial Mission Trip to Nicaragua**

One of the most meaningful experiences I had during my time at USC was going on several medical mission trips to Nicaragua during Spring Break. While we were there, we set up a free medical clinic in an underserved community that lacked access to proper healthcare. We interacted with the local community members and invited them to our clinic, while also learning about some of the common health issues they face and experiencing a new culture. Being a pre-med student, I personally wanted to go on this trip because I thought it would be a great learning experience for me to gain hands-on clinical experience, as well as to learn about healthcare in different parts of the world while helping people in need. However, I gained so much more from this experience than I ever could have imagined. Going on these trips solidified my desire to go into the medical field and increased my interests in wanting to do something where I work with underserved populations in the future, such as with Doctors Without Borders or Peace Corps. It was a fulfilling experience as I gained knowledge, confidence and friendships both with my team and people within the community that I am still in contact with to this day. As I continue on my journey to and through medical school, I will hold on to the inspiration this trip has given me as motivation.

**Pelzer, Courtney**

**Mentor(s): Ms. Lisa Camp**

**Orientating Social and Cultural Awareness**

New Student Orientation is the first time first year students come to campus after being officially accepted to the university for enrollment. Orientation is a two-day experience where students get the opportunity to fully immerse themselves in the traditions and inner workings of the University of South Carolina. As an orientation leader I was responsible for representing USC and helping orient over 6,500 students and 6,000 parents. I was also responsible for planning a small group curriculum to encourage involvement in the USC community and to promote an inclusive environment. I applied to be an orientation leader to share my love of the university and experiences as a first-generation minority woman with incoming students. By the end of the summer, I created lasting friendships with the very diverse group of orientation leaders I worked with and I learned how such a small role can have such a huge impact on incoming students starting their higher education experience. This role also has helped me to learn how to be socially aware of the differences of others while advocating for the underrepresented communities here on campus. Diversity and inclusion is a pivotal in a college setting to help shape well rounded individuals. Orientation was a stepping stone to helping me realize my interest in higher education and mentoring students. As a future career, I would like to work in higher education student affairs or some form of work that combines educating and helping students of diverse backgrounds and specifically those of underrepresented backgrounds.

**Perez, Elizabeth**

**Mentor(s): Mrs. Katie Hopkins**

**Preparing for a Life of Success**

While reflecting on the past four years at the University of South Carolina, I realized that my greatest life lessons have come from my experience and involvement in Alpha Kappa Psi (a co-ed professional business fraternity whose mission is to develop its members into principled business leaders). Becoming a member of Alpha Kappa Psi has greatly enhanced my college experience by allowing me to grow professionally, lead through service, and pursue my passions. Through my experience of serving as the philanthropy chair and leading the chapter to raise thousands of dollars for our philanthropy, Kiva, I learned how to think critically, solve complex problems, and further develop the people around me. My presentation will discuss the knowledge I gained through service leadership as well as the personal values I inherited through this organization and how these experiences molded me as a young professional.

**Perez, Camila**

**Mentor(s): Dr. William Jones**

**How The University of South Carolina Has Molded me Into the Young Professional I am Today**

My three years at the University of South Carolina have pushed me outside of my comfort zone and helped me grow. I attended the University of Alabama my freshman year but I realized I wanted to be closer to home. My start at USC was a rocky one, and transferring was not easy for me, but I was able to find my home on such a large campus.

With the skills I've acquired from my time at USC, I was able to receive several promotions in my counselor position at the YMCA. I was also able to take on an executive position within a student organization which helped me learn to appreciate my culture more than ever. With the knowledge I've acquired from my time at USC I was able to find my career path. I've decided to apply for Graduation of Leadership Distinction through Professional and Civic Engagement because my time at USC has helped me become more engaged in my community and cultivate the professionalism that I need in my career field. Without my time at USC I would not have the perspective I have today on social issues, health issues, and my self-iden-

tity now.

**Perka, Aminta**

**Mentor(s): Ms. Beth White**

**Learning the Value of Injustice while Abroad**

During the spring semester of my junior year, I had the opportunity to study abroad at Anglo American University in Prague, Czech Republic. I wanted to study in the Czech Republic because I have familial ties to the country and I wanted to expand my horizon and worldview. My experience traveling around Europe was unforgettable, and I learned more during these four months that I could have ever imagined. Although I experienced many positive moments and ideas, I also experienced injustice in society and I saw many problems in Czech culture that further opened my eyes to inequality in the world. Seeing these injustices in Czech everyday life further inspired me to pursue a law degree, so that one day I will be able to help seek social change through the legal system that will better the world.

**Peterson, Meghan**

**Mentor(s): Mr. Caleb Morris**

**Global Learning- Rome, Italy**

In the Spring of 2018 I had the opportunity to study abroad in Rome, Italy at John Cabot University. I had always known that I wanted to study abroad in Europe, and since my freshman year at the University of South Carolina, I became obsessed with understanding the global consumer and how their culture effects their decisions. In Rome, I had the chance to take courses in Sociology, Intercultural Communications, International Marketing and Market Research which allowed me deepen my classroom knowledge from a different perspective. This perspective was then grown through beyond the classroom experiences, traveling across Europe and Africa meeting people from all different cultures and walks of life. Since I have returned, this knowledge has been pivotal in not only my work within the classroom, but my personal development outside. I now am much more confident in my decisions and I am able to relate on much deeper level to people of both different and similar cultures to my own. I know that because of this experience I am a different person than before in the best way possible.

**Pilgrim, Emily**

**Mentor(s): Dr. Amber Fallucca**

**The Worth of Investment**

During an unforgettable summer, I had the privilege of completing an internship with a hospital in Mombasa, Kenya. I completed 8 weeks of rotations while simultaneously learning Swahili and being involved within local medical outreach for the community. The hospital I was partnered with was Coast Provincial General Hospital (CPGH), a public facility that serviced the majority of the southern coast of Kenya. My internship gave me real world experience with a concept I learned during the Biology of Neurological Diseases, BIOL634. This course had us analyze research studies prevalent in neuroscience and evaluate the efficacy of the study and investments made by the scientific community. Understanding how to evaluate if an investment is worth it was pivotal in success of my internship in regards to treating patients and understanding operations of the public facility. Both the course and internship will not only help me in my present, but also in my future as a Physician Assistant.

**Platt, Elizabeth**

**Mentor(s): Dr. Richard Maltz**

### **Create a Just Intonation Tuning System and Employ it in an Original Musical Composition**

I began my research because I wanted to create a system of intonation that was more natural than Just Intonation. My research focused on using algorithms to generate a range of frequencies. Just Intonation focuses on the octave, and uses ratios to divide the octave. I used the Fibonacci sequence to create a range of frequencies inside the human hearing range. This is based on the overtone series, which naturally occurs in sound. To create more opportunity for natural pitch, I generated the Fibonacci series in four different ways. I used the human hearing range as my margin. The overtone series uses a fundamental pitch and is generated upwards, similar to the Fibonacci series. The four different generations of the series I used generate pitch in different directions. These generations make up the space between the overtones of different fundamental pitches. I look to other composers who have done similar things with tuning before. What I need that other systems do not offer is a larger range of pitches, silence treated as pitch material, and pitches based on the division of the range of pitch as a whole rather than divisions of the octave. I think my material is effective because it offers these abilities to composers. My hope in the future is that I will continue to write compositions using this system, and other composers will too.

**Pokalsky, Margaret**

**Mentor(s): Dr. Jason Stewart, Mr. Percy Schuck**

### **Uncovering the Role of CST in Sister Chromatid Cohesion**

The CST (CTC1-STN1-TEN1) complex has a wide range of functions throughout DNA replication and repair. CST is a heterotrimeric protein complex which binds to single-stranded DNA, assisting the cellular machinery required for replication and repair throughout the genome. We previously discovered that CST has yet another role in sister chromatid cohesion (SCC). When a cell undergoes mitosis, the DNA is first replicated then passed onto each daughter cell. SCC ensures that the identical chromosomes bind together after replication, then in a stepwise manner separate into daughter cells. Improper segregation of chromatids leads to aneuploidy, a genetic condition where cells contain an incorrect number of chromosomes. To prevent this, SCC is controlled by cohesin, a ring-shaped protein complex, which keeps the sister chromatids together until anaphase. The cohesin complex is stabilized on chromatids with assistance from ESCO2, an acetyltransferase. We experimentally determined that cells which fail to express STN1, a subunit of the CST complex, have decreased SCC in mitotic cells. After further exploration, we determined that STN1 deficiency lead to aneuploidy in two cell types studied: 20% of HCT116 cells and 44% of HeLa cells, indicating dysfunction in mitosis. We also determined that SCC decreased similarly when CTC1 (another subunit of CST complex) was removed. Currently, we are utilizing fluorescent microscopy in order to visualize whether CST and ESCO2 co-localize and function at similar locations within the genome and whether there is a direct interaction between ESCO2 and CST. Previous studies have shown ESCO2 directly interacts with two subunits of another protein complex, MCM. Interestingly, CST also interacts with MCM and works alongside CST in DNA repair and replication processes. Research into CST and ESCO2 could divulge a relationship between the two proteins and subsequent effects on SCC. By understanding this process, our studies can help in understanding how to prevent cancer initiation and other genetic disorders that commonly arise due to aneuploidy and improper chromosomal segregation.

**Ponzo, Aisling**

**Mentor(s): Dr. Demetrius Abshire**

### **Differences in Diet Quality Between Urban and Rural Residents of South Carolina**

Obesity is associated with adverse effects on an individual's physical, social, and economic wellbeing. South Carolina currently has the 10th highest obesity rate in the United States; rural residents of the state

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may be particularly at risk due to limited availability of food options. This research was conducted to investigate differences in diet quality between urban and rural adult residents of South Carolina. Rural (n=199) and urban (n=227) adult residents were asked to complete an online, anonymous questionnaire that included dietary intake questions from the San Diego Health and Exercise Survey. Participants were given a list of ten food categories, which included healthy and unhealthy options with consumption frequency on a 5-point scale ranging from “never or a few times a year” to “almost daily.” A composite diet variable was developed to establish an overall food score ranging from 10-50, where a higher score indicated a healthier diet. An independent samples t-test was used to determine rural-urban differences in diet quality. The results gathered demonstrate that rural residents had a poorer diet quality compared to urban residents. The mean food score was  $31.4 \pm 4.8$  in the rural group compared to  $32.7 \pm 4.9$  in the urban group ( $p < .01$ ). This study shows a small, but statistically significant difference in diet quality between urban and rural residents of South Carolina. Future research should continue to investigate what aspects of rural living may be contributing to these differences. Communities in rural areas generally have lower incomes, lower levels of education, and a lower socioeconomic status. In order to promote healthier diets in these areas, it is important to determine if nutritious options are affordable and accessible. Additionally, people may need education on what food options are healthy, and the negative effects of a diet lacking in nutrition. Family and social support may also be important factors that can encourage or hinder an individual’s ability and motivation to maintain a better diet, and may be lacking in less populated counties. Further research in this area is warranted.

**Posey, Tessa**

**Supervisor(s): Grayson Gimblet**

**Mentor(s): Dr. Shani Egodawatte**

**Synthesis of Scintillating Nanoparticles Utilizing a Novel Salt Supported High Temperature Method**

Scintillators are materials that become excited through the absorption of high energy radiation, such as X-rays, before returning to the ground state with the emission of visible light. These materials, or scintillators, have numerous applications including use in nuclear detection systems, PET scans, CT scans, and X-ray phosphors. Of particular interest is the development of scintillating nanoparticles due to their small size and greater surface area. In prior attempts to produce scintillating nanoparticles, researchers have utilized numerous methods including the use of single crystal growth, hydrothermal, sol-gel, ceramic, nanocrystallization, and solid state procedures. However, an issue arises each of these techniques because they require long periods of calcination before producing scintillation. Longer periods of calcination promote the aggregation of nanoparticles that limits their effectiveness at the nano-scale. A novel method to solve this existing problem, utilizing a Salt-Supported High Temperature (SSHT) method, has been developed. This technique enables the nanoparticles to be calcined for longer periods of time without experiencing aggregation. In this study Ce+3doped Lu<sub>2</sub>Si<sub>2</sub>O<sub>7</sub> nanoparticles were synthesized. A core-shell method was used to allow for control over the size and morphology of the nanoparticles. This step was followed by the use of the SSHT method to produce fully reacted unaggregated nanoparticles that exhibit the phenomena of scintillation. The nanoparticles were characterized by transmission electron microscopy (TEM), powder X-ray diffraction (PXRD), energy dispersive spectroscopy (EDS), and Fourier transform infrared spectroscopy (FT-IR).

**Prescott, Cassandra**

**Mentor(s): Mr. Caleb Morris**

**Professionalism in an Industry Driven by Play**

During the spring semester of my second year at USC I decided to take an opportunity to work at the Commonwealth Games in Gold Coast, Australia. The Commonwealth Games are an international, multi-sport, mega-event involving athletes from the Commonwealth of Nations. My duty at the games was to assist in

the set-up, management, and operation of the twenty-nine-hectare athletic village that would house 7,000 athletes from 72 countries. Daily tasks included meeting with the Commonwealth Games Operating Committee and National Team officials about service needs, training non-English speaking staff, overseeing job performance, and upkeeping financial data. As a Sport and Entertainment Management student, I saw this as an opportunity for myself to complete life changing work experience while being able to immerse myself in an abundance of cultures. My hopes could not have been more spot on. For my work in Australia led me to some of the greatest knowledge about both myself and the industry that I could ever receive. I learned how to critically to solve complex problems, interact with a diverse group of people, and communicate more effectively. Though reflection, I see that this experience has added more value to my life than I will ever be able to know.

**Pretsch, Peyton**

**Mentor(s): Dr. Sayward Harrison**

**Knowledge of Human Papillomavirus (HPV) and Perceived Barriers to Vaccination among Male College Students in South Carolina**

Human Papillomavirus (HPV) vaccine coverage remains low in the U.S., with some states like South Carolina showing very poor rates of vaccination (less than 30%) among eligible youth. Males are less likely to understand the risks of HPV and are less likely to be vaccinated, despite the fact that both genital and oral HPVs are more common among men than women. This study used qualitative and quantitative data collection methods to examine the knowledge and awareness of HPV and the HPV vaccine among male college students in South Carolina, as well as identified HPV vaccine barriers. An online survey was administered to 73 male students, ages 18-22, at the University of South Carolina during the Spring 2019 semester. Students were recruited by email through undergraduate courses and student organizations. Results show that 98% of the participants had heard of HPV prior to taking the survey, and 63.93% reported receiving at least one dose of the HPV vaccine. Even though the majority of male students (65.5%) understood that HPV is a very common virus, only 1 in 4 of the participants believed that nearly all sexually active men and women would contract HPV at some point in their lives. 68.09% were unaware that HPV can cause penile cancer, and only 1% believed that they were at risk for contracting HPV. Insurance coverage and vaccine cost were not considered barriers to the HPV vaccine among the target population, but negative stigmas associated with HPV were. Overall, despite having a general awareness of HPV, the majority of male college students in South Carolina are unaware that they are at risk for contracting HPV and HPV related cancers.

**Pribyl, Anna**

**Mentor(s): Dr. Robin Dail**

**Use of Nursing Journals and Surveys to Examine Incubator Software for Monitoring Body Temperature in the Neonatal Intensive Care Unit (NICU)**

Background/significance: Premature infants born before 32 weeks gestational age often struggle with multiple basic functions present in infants born later. Due to incomplete development and immature immune systems, premature infants are at an increased risk for infection. Close monitoring of the temperature on the neonatal abdomen and foot has been found to be associated with the onset of infection.

Purpose: 1) to determine NICU nurse's attitudes towards using visual display of abdominal and foot temperature in their care of a premature infant; and 2) to examine notes written in journals by nurses related to abnormal temperature patterns displayed on the visual software.

Methods: During the first phase, surveys from multiple nurses were analyzed to evaluate their impression of the temperature software and if it improved care of the infant. The second phase examined individual

journals from ten premature infants of various birth age, weight, race, and gender. Nurses recorded what the infant was doing and if any stress or illness was suspected when the foot temperature exceeded the abdominal temperature. These data were then analyzed to identify a correlation between higher foot temperatures and stress events.

**Results:** Most nurses found the temperature visual display easy to read and understand, and believed the display improved care of the infant as they could closely monitor their baby when the temperatures changed. Upon analysis of the infant's journals, eight out of the ten infants experienced some state of stress or illness, including: increase in heart rate or respiratory rate, low-grade fever, or change in oxygenation level, when foot temperature exceeded the abdominal temperature.

**Conclusion:** These findings suggest that temperature displays not only allow for more thorough and precise care of infants, but can also help providers identify infant stress to investigate the infant closely for possible infection or decompensation.

**Pruden, Lauren**

**Mentor(s): Mrs. Asheley Schryer**

**Lauren Pruden, Y.C.D. (Young, Caribbean Doctor)**

Over the course of my undergraduate career, I was given the opportunity to travel to Barbados on multiple occasions spanning ten weeks to observe under Dr. Warner, a well renowned general surgeon. Dr. Warner practiced medicine in three different settings; a clinical office, private hospital/operating theater, and a family planning clinic. During my observership, I assisted Dr. Warner throughout all three locations. At the clinic I assisted in taking vital signs, documenting patient history, developing diagnoses and assisting in dressing changes. Within the two operating theaters at the private hospital and family planning setting, I was able to observe and scrub in on surgeries where I assisted with cauterizing, suturing, retracting, cutting and cleansing the area of focus. I took part in this observership to gain exposure to being a medical professional as opposed to a patient. The experience also introduced me to the reality of medicine and tested my ability to work in different environments. This opportunity fueled my passion for medicine, more particularly my desire to help people. From a young age I always went the extra step to assist someone or sacrificed myself for the betterment of someone else. Growing up as an athlete and having my own set of medical mysteries, I learned about the power of helping people in medicine. I began to value the power physicians had by changing the lives of others and solving problems. When I spent time with Dr. Warner and studied his weekly schedule I saw the changes he made in people's lives with my own eyes. Surgery became a whole new possibility by being able to physically solve a problem as opposed to suggesting care plans and hoping for the best. I began to see what field I wanted to go in. In addition, this experience motivated me to create the best version of myself in order to transition into the next step of my career by becoming a medical student. My time spent with Dr. Warner was a very defining moment for me in pursuing a medical career.

**Przywara, Sarah**

**Supervisor(s): Gabrielle Gray**

**Mentor(s): Dr. Adam Pazda**

**The Effect of Personality and Perspective Taking in Relation to Convicted Felons**

This is a two part study conducted over the course of two semesters. The aim of both studies is to investigate the influence perspective taking might have on behavior towards convicted felons. During study one participants were randomly assigned to either a control condition or one of the perspective taking conditions. Perspective taking was used as a manipulation where participants were required to take the perspective of either a CEO or an ex-convict during a writing exercise. Following this participants were asked

to rate an applicant, who was an ex-convict, on the likelihood of them hiring the applicant. The follow up study followed the same protocol except participants were asked to choose a partner for a group activity in which they would work closely with their partner. Study two also introduced a personality variable to determine its effect on perspective taking.

**Purser, Rebecca**

**Supervisor(s): Joseph Lannamann, Brandon Finnerty**

**Mentor(s): Dr. Karen Patten, Dr. Jorge Crichigno, Mr. Jose Gomez Goana, Mr. Elie Kfoury**

**IIT Capstone Project #1: High Performance Network Monitoring: perfSONAR and its Uses**

PerfSONAR, a network monitoring tool early in its life cycle, has excellent application for large organizations, specifically universities. We examined various use cases for perfSONAR and created hands-on lab manuals for teaching others the functions of the program. The labs are conducted through NDG's NET-LAB+ platform. The series of labs focuses on training users to configure performance tests, understand and use metrics tools, and manage multiple nodes. Our work was organized by the University of South Carolina's Dr. Crichigno with assistance from Ph. D students, Jose Gomez Gaona and Elie Kfoury. Rebecca Purser, Brandon Finnerty, and Joseph Lannamann formed the project team. Their positions were Project Lead, Production Lead 1, and Production Lead 2, respectively. Through this distribution of work, we were able to effectively communicate, plan, and execute our project.

**Pye, Sarah**

**Mentor(s): Dr. Maksymilian Chruszcz**

**Characterizing 4-hydroxy tetrahydrodipicolinate reductase from Bacillus anthracis for development of potential antibacterial compounds**

Anthrax infections are caused by Bacillus anthracis, which is a rod-shaped, Gram-positive, endospore-forming bacterium. They are extremely fatal, with a 90% mortality rate even in patients treated with antibiotics. According to the World Health Organization, 50 kilograms of anthrax spores spread over a two-kilometer path of a major city by a single bomber could render an area larger than 20 km<sup>2</sup> contaminated and could result in tens to hundreds of thousands of deaths. To identify novel drug targets to combat infectious agents, our laboratory targets the lysine biosynthetic pathway, which is critical for the survival of many bacteria. Moreover, there are no mammalian homologs for enzymes from this pathway, since mammals obtain lysine through their diets. One key enzyme in this pathway is 4-hydroxy tetrahydrodipicolinate reductase (DapB) and our laboratory hypothesizes that blocking the biosynthesis of lysine may induce defects in the bacterial wall similar to those caused by  $\beta$ -lactam antibiotics. There are not yet any commercially-available antimicrobial drugs targeting DapB, even though DapB has been shown to be a promising target for the design of antibiotics. This study describes the expression and purification of DapB from Bacillus anthracis along with crystallization and structural studies.

**Quero, Andrea**

**Supervisor(s): Mallory Lamperski, Matthew Roddy, Christian Matinchek**

**Mentor(s): Dr. David Cardenas**

**Implementing a Form of Sustainable Tourism to the Outer Banks Area**

The Outer Banks (OBX) is a group of barrier islands along the coastline that separate the Atlantic Ocean from North Carolina state. The Outer Banks is a popular, growing tourist destination that is famous for its history and is known around the world for its wide expanse of more than 100 miles of open beachfront. With more than five million people visiting each year, tourism has become the number one industry for this community. Due to the OBX being a popular tourist destination, different types of resulting impacts need to be taken into consideration. To bring awareness to these, we are bringing some measures to the

economic, social and environmental impacts in order to improve, increase and bring a sustainable form of tourism to the area. We mainly focus on sustainable measures based on economic data and interviews with local organizations. Our main goal is to minimize negative impacts from tourism to the local community, as well as maximize positive impacts to the community and other relevant stakeholders.

**Quirk, Madelyn**

**Mentor(s): Dr. Jessica Green**

**Differences in Stimulus-Response Prediction and Reorientation of Attention Relative to Student Athletic Background**

Within the game of baseball, every hit, pitch, and catch, whether anticipated or not, rely on a player's ability to respond quickly and appropriately to the resulting play in a manner that allows them to be an asset on the field and in the game. More specifically, the most successful athletes must be able to properly distribute their attention to best react to the given situation. In this study, we aim to identify individual differences that influence attentional control relative to degree of athletic background by examining stimulus-response timing and accuracy to the onset of the target stimulus following spatial and/or temporal cues, composed of both validly and invalidly predicted trials. We hypothesize that students with more advanced backgrounds in skilled sport training will be better suited to reorient their attention to elicit more accurate and rapid responses to the invalidly cued trials and, therefore, demonstrate superior top-down attentional control than the less athletically inclined students. Occipital alpha-band oscillations have also repeatedly been implicated in visual anticipatory event-related response behaviors. By using EEG to record brain activity during the tasks, we expect those who played sports for most of their lives to show stronger alpha phase coherence with the onset of the target stimuli. Data collection and analysis is still ongoing using undergraduate students at the University of South Carolina. Statistical analysis of the data will focus on determining the presence of any relationships between task performance and level of specialized sport training in conjunction with ERP analysis of phase synchronization and peak frequencies of alpha-band patterns in response to the targeted events. I expect the results of our study to contribute to current research focused on cognitive differences often observed with athletic training and the large body of work pertaining to neural correlates of attention.

**Rachele, Julian**

**Mentor(s): Dr. Jeffrey Persels**

**La Zone Rouge - A site for the discovery of France's**

La Zone Rouge is a web application that allows you to interact with 30+ villages that were destroyed in WWI and learn about each village, with progressive imagery (postal cards, memorials, wilderness) to demonstrate the degeneration of each village as a result of the war.

**Rafferty, Chloe**

**Mentor(s): Ms. Carrie Van Haren**

**Passion, Professionalism, and Expertise are Developed Through Practice**

Since the first day of my freshman year, I have been a part of the News 4 entity of Student Gamecock Television, also known as SGTV. News 4's content is broadcasted on one of Columbia's local cable channels and we are licensed under CNN. Although it's run by students, the station provides professional experience and practice. I currently produce and direct Monday Night Mashup and Friday Morning Live, which are USC's weekly live news programs. I give cues to the technical crew and the anchors, operate cameras and organize camera shots, manually operate a prompter at the ideal pace an anchor is speaking, edit scripts and graphics, and organize the order of the show, including stories and news packages. I first joined News 4 because I wanted to gain hands-on experience before going into the professional field,

and because I wanted to practice my on-air presence and get a sense of all the different aspects of a news broadcast. Through my time with News 4, I've learned how to work with others to put on a successful live show; this has made a huge impact on me because it confirmed that this is truly what I want to do as a career. I hope to use what I learned through SGTV News 4 to get a broadcast news internship this summer and ultimately land a job after graduation in a large southern city like Charlotte or Atlanta.

**Rahman, Teebro**

**Mentor(s): Dr. Mythreye Karthikeyan**

**Cobalt-Chloride Induced Hypoxia and Cell Migration Characteristics**

The goal of my project was to explore the changes to the migration characteristics of SKOV3 and PA1 ovarian cancer cells lines with induced hypoxic response mimicked through exposure to cobalt chloride. The hypoxic response of cells is induced when cells are in low oxygen conditions, and this response is often accompanied by increases in cell migration. This response can be seen in cancer cells as tumors often do not have adequate oxygen concentrations for the cells inside of them either due to large tumor size or due to poor vascularization. The purpose of this experiment was to test if exposure to cobalt chloride to induce hypoxic conditions could increase the chemotactic quality of the conditioned media to impact Ovarian cancer cell migration through a 0.4 micromolar trans well with cobalt-chloride exposed conditioned medium below the trans well. Experimentation was carried out through standard migration assay protocols optimized in the lab through an uncoated 0.4 micromolar pore trans well, and also through a Matrigel coated trans well 0.4 micromolar pore trans well. Crystal Violet solubilization of the trans wells was used in order to quantify cell migration. The results showed that exposure to cobalt chloride conditioned medium did in fact increase migration of SKOV3 and PA1 cells through a trans well, suggesting that cobalt chloride exposure to cells can produce conditioned medium that can act as a chemoattractant for SKOV3 and PA1 cells through Matrigel-coated and non-Matrigel coated 0.4 micromolar pore trans wells. Possible applications of this research could be comparing the cobalt chloride-induced chemoattractant properties of conditioned medium to migration characteristics of cells exposed to hypoxic conditions through a hypoxia chamber.

**Ramsey, Mary**

**Mentor(s): Dr. Tracy Skipper**

**Influencing media literacy at the collegiate level**

In an era shaped by “fake news” rhetoric and a dramatically changed media landscape, it's arguably more important than ever that young people develop a strong sense of media literacy so that they can be informed consumers of news. For many, this is a process that starts during one's college years. As such, the news media one is exposed to while in college can be remarkably influential. As a news editor, managing editor and eventually editor-in-chief of The Daily Gamecock, I strove to turn our paper into a digital first news organization capable of keeping a massive college campus informed about the issues they face. From leading an overhaul of our training process to a complete rebranding, I worked to create a valuable learning experience for student journalists that would also provide useful and trustworthy content to students who may not be used to finding their own news sources. Given the size and scope of this role, I learned a great deal about how to lead in a professional and collaborative environment. Moreover, the specifics of the situation taught me a lot about how my generation approaches news and information in an era where media is constantly changing. In this case, both aspects of my learning will help me as I begin my own professional career in journalism because I have a better understanding of how to manage such a role and how an audience approaches content.

**Ratkowski, Jakub**

**Mentor(s): Mrs. Asheley Schryer**

**Searching for Accessible, Affordable, and Effective Healthcare Solutions**

Over the last 3 summers, I have had the opportunity to participate in the MedEx Academy internship in Greenville, SC. MedEx Academy is a program hosted at the University of South Carolina School of Medicine Greenville campus that aims to provide personal and professional development to undergraduate students through increased access to clinical shadowing opportunities, physician lectures, and a continual discussion of the changes happening in healthcare. Since accessibility and cost are major issues in healthcare today, they were naturally a focus of discussion throughout the internship. Some of the ways to make healthcare more affordable is through more accessible primary care which allows for better prevention or early detection of diseases. Achieving the goal of more accessible primary care for the United States residents would greatly reduce costs of care for everyone as less expensive procedures and equipment would be needed to provide comprehensive screening for diseases and techniques to help prevent the occurrence of disease in the first place. Additionally, the health outcomes of individuals would be much better by lowering the incidence of chronic conditions.

The topics covered at MedEx Academy melded well with the classes I was taking for my Biomedical Engineering major at the University of South Carolina. In my classes, we spoke about the progress made in treating diseases and how health outcomes are better than ever. However, the progress in medical technologies still fails at bringing back the original quality of life individuals may have experienced prior to developing their disease. Such is the case for most chronic diseases, and while medicine can manage these diseases once they develop, effectively preventing them in the first place through low cost solutions such as lifestyle changes and minimal medical intervention leads to a much greater quality of life for the individual.

These experiences have played a critical role in my journey to pursuing a career in medicine after graduating from the University of South Carolina. I will be attending the USC School of Medicine in Greenville where I will continue my education and training in providing truly accessible care to all members of society.

**Ratkowski, Jakub**

**Mentor(s): Dr. Maksymilian Chruszcz**

**Structural Studies of the Cancer Related Proteins Ly6K, Ly6D and Ly6E**

The lymphocyte antigen 6 (Ly6) family of proteins is of research interest due to their association with the progression of tumor cells. It has been found that the genes encoding the Ly6 proteins are up-regulated in chemotherapy resistant cancer cells. Several studies have shown that (out of the 20 known proteins in this family) Ly6K, Ly6D and Ly6E are not only biomarkers for different types of cancers but are also indicative of their rapid progression and metastasis. However, there is lack of information regarding the structure of these proteins and their molecular mechanisms in the regulation of tumor progression. Therefore, in this study our aim is to first produce the recombinant Ly6K, Ly6D and Ly6E proteins in high quantities and next to characterize their structures using X-ray crystallography. To produce the recombinant protein, plasmids containing fusion proteins were designed and transformed into E. coli DH5-alpha strains for the purpose of amplification. Next, the plasmids were purified from the cells and sent for sequencing to confirm the correct sequences of our constructs. Afterward, plasmids containing the proteins were transformed into E. coli BL-21 strains and grown overnight at 37 °C in lysogeny broth (LB) medium. Cells were then lysed using sonication and the protein was purified using an amylose column. The purity of protein samples was confirmed using SDS-PAGE and mass spectroscopy. We were able to purify stable Ly6K in significant quantities. However, expression of Ly6E and Ly6D needs more optimization due to the instability of the purified proteins. Our future goal is to determine the structures of Ly6K, Ly6D and Ly6E proteins and study their interactions with potential inhibitors using biochemical and biophysical approaches. This

study will not only help in understanding the role of these proteins in invasive cancer but also provide information on the treatment of cancers.

**Rauch, Leisa**

**Mentor(s): Dr. Eran Kilpatrick, Dr. Annette Golonka**

### **Identification of Bacterial Isolates Originating from the Human Hand**

The human body provides habitat for a diversity of bacterial species collectively referred to as the normal flora. Identification of various members of the normal flora to the specific level requires a combination of biological staining procedures, biochemical tests and molecular techniques. In this experiment, ten bacterial isolates originating from the hands of nine students and one faculty member at USC Salkehatchie were identified. Classification to a general taxonomic group was accomplished with standard staining and biochemical tests. Polymerase Chain Reaction (PCR) technology, DNA sequencing, and GenBank nucleotide sequence database analysis provided the first phase of identifications. Eight of the isolates were identified as *Bacillus* species while the other two isolates were identified as *Paenibacillus* and *Micrococcus* species. The samples were then analyzed using matrix assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS). This technology served to complement the initial molecular work and provide further confidence for species identification. MALDI-TOF MS identified five isolates as *Bacillus megaterium*, *Bacillus thuringiensis*, *Bacillus subtilis* and *Micrococcus luteus*. Species identification of the five remaining isolates is in progress. This study used a combination of traditional and emerging molecular technology to systematically identify four species of bacteria that were isolated from the human hand. In addition to contributing to the study of the human normal flora, the diagnostic properties of each isolate will be incorporated into a laboratory resource used by microbiology students at USC Salkehatchie.

**Rea, Haley**

**Mentor(s): Ms. Tricia Kramer**

### **Fueled by Defeat**

From joining a Greek organization on campus I have grown more as an individual than I thought possible and have been pushed by other chapter members to reach my highest potential. In the fall of 2015, I accepted a bid from Alpha Chi Omega and was eager to get involved right off the bat. This eagerness led me to run for various positions, live in the Greek Village house, and eventually be elected into a position on the executive board. I was elected to be the Vice President of Recruitment Information during 2018. This means I was responsible for making sure my chapter adhered to all national fraternity and National Panhellenic Association policies during the formal recruitment process. and the specifics of my position. Throughout the year I spent on the executive board, I learned more about myself as a leader than in any previous experience. I have held various leadership positions throughout my life but nothing that had this much of an impact on others and the future of my sorority's chapter. My motivation to run for an executive position was fueled from being outvoted for a position on the board in the prior year. I refused to accept defeat and chose to run for a different position where I believed I could leave a lasting impact. Throughout the rest of my career I will hold on to the valuable lessons obtained while on the executive board. I have learned a lot of patience, how to be considerate of everyone's opinions, and how to be a strong leader that 300 women are looking to for answers. This process was very trying and difficult at times but I know it has made me a stronger and more confident person.

**Rea, Mikaela**

**Mentor(s): Ms. Sarah Keeling**

### **Leading the Dance**

Dancing has been one of my favorite activities since I took my first lesson at three years old. There came

a time during my senior year of high school when I thought I was finished dancing; I was feeling burned out. Then I was convinced to audition for the Coquettes Dance Team after I was accepted to the University of South Carolina. The Coquettes Dance Team performs with the Carolina Band at home football games. Performances include Pregame, Halftime, multiple Pep Rally performances, and other events throughout the year. As a leader on this team for three years, I was expected to choreograph up to 20 routines per season, teach dances, lead by example, and make in-the-moment decisions for the best of the team. The opportunity to be a leader of my peers gave me a new confidence in my leadership skills. I learned the importance of listening before speaking, understanding a situation before making a decision, and that sometimes I will make a mistake, so then I must reevaluate and try again. The skills that I learned while being captain of the Coquettes Dance Team have proven to be important in other aspects of my life as well. I have found them especially helpful as a University 101 Peer Leader. Students need someone to hear them, understand them, and problem solve with them when life does not go as planned. These skills will continue to be valuable as I pursue a career in Higher Education Student Affairs.

**Reck, Elaina**

**Supervisor(s): Lilian Hutchens**

**Mentor(s): Dr. Cary Mock**

**Reconstructing Climate and Weather Extremes of California**

This study describes some examples on analyzing archival original primary weather data for California. We focus on two main examples: 1) the Long Beach Tropical Storm of 1939, and 2) mid-late 19th century central California. Historical data include personal diaries, newspapers, ship logbooks, and systematic instrumental records. All the data were digitized and carefully assessed concerning data quality. We also applied a content analysis procedure on verbal data to reveal aspects such as storm intensity. Results on the 1939 Long Beach Tropical Storm, which include detailed weather data from over 22 US Navy logbooks, suggest a peak wind of 60 knots offshore Los Angeles and remaining just below hurricane strength. Hurricane force winds over Los Angeles, however, were evident, along with daily record rainfall amounts breaking a record heat wave. Results on central California examples focused on several long diaries, and rain day counts statistically reveal the severe wet winters of 1861-1862 and 1867-1868, as well as some drought years like 1863-1864. We also reveal a few examples on mapping the different historical data types together, which provides a spatial baseline procedure for analyzing other past historical weather extremes.

**Reddy, Kathleen**

**Mentor(s): Mr. William Quinlan**

**Leadership Through Starbucks**

During the summer of 2017, I worked as a shift supervisor for Starbucks Corporation. The shift supervisor role is the first level of management in a Starbucks store that contributes to the success of the store and contributes to maintaining the Starbucks Experience. The Starbucks Experience is defined by creating an atmosphere of inclusion while seeking opportunities for growth. It's concerned with genuine connections between people and always striving to do your best in every task. We often say at Starbucks that we're in the people business serving coffee. This Starbucks Experience is what motivated me to take on a new leadership role, having a passion for creating and keeping this Starbucks atmosphere. I was also motivated by my store manager to take the position as he saw strengths and opportunities within me I didn't know were there. During this experience, I learned how important time-management can be in establishing a work-life balance. I also developed a love for customer service and learned how gratifying a job can be when you're working for the collective purpose. Pursuing this role shaped my leadership abilities as well as shaped my emotional intelligence. I gained a genuine interest in getting to know the individual and took pride in empowering others to make a positive impact on the world around them. Through this

experience I hope to pursue more management roles and one day pursue a human resources role.

**Reese, Jenna**

**Supervisor(s): Claire Evangelist, Xitlalli Puerto, Bishop Hare**

**Mentor(s): Dr. David Cardenas**

**Asheville: A Study of Sustainability**

As a collaborate group, we cover a variety of majors at the University of South Carolina but are all highly interested in one common topic: sustainability. Through HRTM 485, we have the opportunity to explore this topic in depth, particularly when it comes to the tourism industry. In this study we discuss many different aspects of one of North Carolina's top tourism cities: Asheville. In 2009, Asheville placed ninth on Treehugger.com's list of the nation's ten "Greenest Cities" and has continuously striven to improve their sustainability efforts since then. Some key attributes that Asheville boasts of are their hiking trails, national parks, historic culture, and vibrant downtown area. Tourists are drawn to this city because of the never-ending lists of titles that it holds, from "friendliest city," to "foodie destination," to one of the "best beer cities" in the US. There is something for everyone in Asheville. Organizations such as the Buncombe County Tourism Development Authority and Explore Asheville Convention & Visitors Bureau play a huge role in the tourism planning and overall success of this city. Social, economic, and environment impacts also contribute to the well-being of a tourism destination. With regards to impacts, we will specially investigate their growing population, increase in wildfires, and growth in clean energy-related jobs and savings. Our group has various recommendations in mind to improve the sustainability of this destination, specifically to achieve Millennium Development Goals.

**Reeves, Amy**

**Mentor(s): Mrs. Asheley Schryer**

**Public Art and Urban Spaces in Budapest: Helping Communicate Modern Hungarian Identity**

In spring 2018, I studied abroad at Corvinus, University in Budapest, Hungary. Before my abroad experience, I considered myself an amateur traveler. My hope was that studying abroad would condition me to be a confident, curious, and frequent one. I was also eager to have the opportunity to take some courses that were very different from my field of study at USC, that I believed would help me in achieving a completely immersive experience. A few of these courses in particular helped me in achieving these goals. Contemporary Literature, Film and Visual Arts allowed me to explore the arts that are so significant to Budapest, and ultimately, the ways in which they communicate Hungarian identity. Urban Explorations of Spaces in Budapest helped me understand the inner workings of the city and taught me how history added significance to the small things I looked past every day. The concepts I learned in these classes worked together to help me achieve more insight on what was once such a foreign and unfamiliar city. I was able to discover that Hungarian history and identity was largely conveyed through aspects of everyday life in the city, like public art, urban spaces, and public transportation. Ultimately, I felt completely immersed in Budapest because I was able to apply the things I learned from my classes at Corvinus to my everyday life, as well as other travel experiences while abroad. Thanks to these courses, many of my adventures within the city had intention and awareness. Today, I feel the concepts and skills I learned have not only helped me to become a better traveler, but also a better citizen of the world.

**Reh, Jennifer**

**Mentor(s): Dr. Scott White**

**Students Helping Honduras' Influence on the Development of Leadership and Communication Skills**

Throughout college, the most significant involvement of mine has been my work with Students Helping

Honduras (SHH). Since my freshman year of college, I have been a member of the USC chapter of SHH, leading to me currently serving as president of the chapter. Students Helping Honduras is a national nonprofit organization working to end poverty and violence in Honduras through education and youth empowerment. Volunteers travel to Honduras to help break ground on a school and we then fundraise for that school throughout the year. SHH has continually helped me to develop my leadership and communication skills, both at USC and while in Honduras. While serving as the president of the USC chapter, I have had to delegate responsibilities, interact with a wide range of people, and carry out fundraisers with other executive board members to raise over \$12,000 within a year, all helping to strengthen my leadership skills. I have also learned to communicate effectively and persistently with executive board and general members in order to organize fundraisers, meetings, and trip orientations. Collectively, SHH has granted me the opportunity to refine my skills in order to transform into a better leader. This presentation will discuss the impact Students Helping Honduras has left on me, what I have gained through my work as president, and how this influences my leadership efforts.

**Reszczyński, Olivia**

**Mentor(s): Dr. Lindsey Woodworth**

**Effects of Medicare's**

The Centers for Medicare & Medicaid Services utilizes Prospective Payment Systems (PPSs) to provide compensation to hospitals for care provided to Medicare patients. Different types of hospitals are subject to different PPSs, depending on the services they perform. For example, acute care inpatient hospitals use the inpatient prospective payment system (IPPS) for patients with Medicare Part A. This PPS is set forth in section 1886(d) of the Social Security Act. Cases within the IPPS system are grouped into diagnosis-related groups (DRG), which are then assigned different payment amounts depending on the condition and resources required. The base payment rate is composed of labor related payments and payments unrelated to labor, and the base payment rate is multiplied by the DRG to determine the amount paid to the hospital. Different acute care inpatient hospitals receive different percentage add-on payments, such as the indirect medical education (IME) adjustment for teaching hospitals and the disproportionate share hospital (DSH) adjustment for hospitals that treat many low-income patients. In addition, the Centers for Medicare & Medicaid Services provides a percentage add-on payment to those acute care inpatient hospitals in "large urban" areas. The purpose of this study is to determine if there is a causal effect of this additional funding for "large urban" hospitals through add-on hospital payments on patient outcome variables. A regression discontinuity design will be used, exploiting the population distinction for "large urban" hospitals as the threshold, the hospital's payment rate as the treatment variable, and patient outcomes as the dependent variable.

**Reszczyński, Olivia**

**Mentor(s): Dr. David Simmons**

**Let Food Be Thy Medicine: A Feasibility Study of Food Prescription Programs in Columbia, SC**

Chronic conditions, such as diabetes and high blood pressure, are extremely prevalent conditions and rates are only increasing in the United States. Fifty percent of adults in the U.S. had at least one chronic disease in 2012, while 25% had two or more. Because chronic conditions are so prevalent, 86% of the \$2.7 trillion spent on healthcare in the US went to those with chronic conditions, with about \$245 billion spent on diabetes in 2012 alone and about \$147 billion in 2008 for obesity. In addition, many Americans are food insecure, meaning they do not have consistent access to food. Some Americans even live in areas known as "food deserts," defined as parts of the country without access to fresh food, usually in poor, urban areas. This lack of access to produce drastically affects dietary choices of individuals and therefore rates of chronic medical conditions such as diabetes, heart disease, and obesity. Recently, a food prescription program model in which physicians "prescribe" fruits and vegetables to low income patients

living with diabetes and other chronic conditions has emerged as a model to support preventative care in low-income communities. This model is a collaborative effort between health centers, farmers' markets, and other support staff, including universities, and often includes a nutrition education component as well. This study consists of an extensive literature review of the background and feasibility of establishing a food prescription program in the Columbia, SC community, investigating different models of community health intervention, the patient physician relationship, and other cities that have food prescription programs with similar demographics to Columbia.

**Reynolds, Jessica**

**Mentor(s): Dr. Kate Holland**

**Neurophysiological Indicators of Changes in Right Hemisphere Activation in Response to Changes in Arousal Level and Cognitive Stress**

The right hemisphere is differentially involved in arousal and spatial ability. The network of neurons responsible for processing overall arousal level, the mesencephalic reticular formation (MRF), is concentrated in the right hemisphere. Reductions in the capacity of the right frontal region to inhibit activation of the MRF results in over arousal, which may result from exposure to stress. We predicted that women exposed to cognitive stress in high arousal conditions would evidence a reduced capacity to process these stressors concurrently.

Undergraduate women were randomly assigned to a low arousal condition (n=20) where they completed the Mental Rotations Task (MRT) in a sound-attenuated room, and a high arousal condition (n=20), where they completed the MRT while listening to white noise played at 85 decibels. Heart rate (HR) and systolic blood pressure (SBP) were recorded across conditions.

A main effect for Condition was found for SBP ( $F(1, 38)=5.55, p=.02$ ), indicating increased SBP before completing the MRT. An Arousal x Condition interaction was also found for SBP ( $F(1, 38)=4.05, p=.05$ ) and for HR ( $F(1, 38)=5.91, p=.02$ ). Women in the high arousal condition evidenced a significant reduction in SBP and HR after exposure to cognitive and neurophysiological stress.

While women in the high and low arousal conditions performed similarly on the MRT, changes in SBP and HR indicate enhancement in right frontal regulatory control of temporoparietal regions. This effect may be due to potential effects of anticipatory stress in the high arousal condition. Future research is needed to determine this relationship.

**Reynolds, Lance**

**Mentor(s): Dr. William Jackson**

**Expression of pro-apoptotic Bax in a HIV-1 dependent lentiviral vector**

Human Immunodeficiency Virus (HIV) is a retrovirus that infects and destroys CD4+ T cells, gradually decreasing immune competence and leading to Acquired Immunodeficiency Syndrome (AIDS). HIV infection can be treated and suppressed using anti-retroviral therapy, but persistence of the latent HIV reservoir in host cells prevents anti-retroviral treatments from being curative. One approach to targeting and eliminating the viral reservoir is to selectively eliminate cells infected with HIV via expression of a pro-apoptotic gene. The goal of this project is to express pro-apoptotic Bax to induce apoptosis in HIV-infected cells using the lentiviral vector pLRed(INS2)R. In this vector, expression of the reporter gene, dsRed, is under the control of three HIV-1 regulatory elements: an inhibitory sequence (INS), the 5' LTR, and the Rev-response element (RRE). Together, these elements inhibit expression in the absence of the HIV regulatory proteins Tat and Rev, and therefore induce expression only in the presence of HIV. We hypothesized that this HIV-dependent vector can be used to express pro-apoptotic genes in HIV-infected cells, while leaving

uninfected cells unharmed. The Bax open reading frame from pCMV-Bax was cloned as a fusion gene with eGFP in place of dsRed to create pBaxTNG(INS2)R. In this vector, eGFP is localized to the nucleus using the SV40 Nuclear Localization Signal and can be used to monitor Bax-mediated apoptotic effects in the nucleus. However, eGFP cannot be used to select a stable population of cells without also inducing unwanted apoptosis due to Bax expression. Therefore, a neomycin phosphotransferase expression cassette was cloned just upstream of the 3' LTR in an inverted orientation, creating pBaxTNG(INS2)Rneo. Expression of the selectable marker is under control of the SV40 promoter and is therefore not HIV dependent. Current studies are underway to verify vector function, and if successful, will be followed by HIV inhibition studies.

**Rich, Mitchell**

**Mentor(s): Dr. Charles Hancock**

**Localization of the Ping ORF1 and TPase proteins regulate transposition**

Transposable elements (TEs) are segments of DNA that are able to move within the genome. The TE Ping can move as a result of the ORF1 and TPase proteins that it codes for. TPase has a nuclear exportation signal that prevents it from spending much time in the nucleus. ORF1 has a nuclear localization signal that helps the protein to enter the nucleus. Data from previous studies implies that TPase and ORF1 bind to each other, controlling their access to the TE in the nucleus. In yeast, TPase is localized mainly to the cytoplasm and ORF1 is mainly localized to the nucleus. In order to study the localization of these proteins in plants, *Arabidopsis* was transformed using a floral dip method with constructs that have fluorescent proteins attached to the ORF1 and TPase proteins. Seeds from the transformation were screened with an herbicide to select for seedlings with the desired transgene. Surviving plants are being analyzed using PCR and gel electrophoresis to confirm the presence of constructs. Once transgene expressing plants are identified, confocal microscopy will be used to localize the modified proteins within the *Arabidopsis* cells.

**Richardson, Mason**

**Mentor(s): Dr. Dawn Wilson, Dr. Allison Sweeney**

**Examining the Interaction Between Self-Efficacy and Perceived Neighborhood Safety on BMI in African American Adults**

Underserved communities, including people of low income and racial/ethnic minorities, experience some of the highest rates of obesity. Specifically, African American populations are more susceptible to various co-morbidities that are associated with obesity: cardiovascular disease, diabetes, and metabolic syndrome. Social Cognitive Theory proposes that self-efficacy, or confidence in one's abilities, plays a central role in shaping self-regulation and motivation for achieving weight-loss goals. Although previous research has investigated how individual and interpersonal factors impact self-efficacy, little research has examined the extent to which broader environmental stressors interact with self-efficacy. Relatedly, previous studies have shown that stress has a negative impact on weight-related outcomes, but further research is needed to understand the role of environmental stressors. One particular component of interest is perceived neighborhood safety. A neighborhood that is seen as unsafe isn't conducive to physical activity or walking to get fresh fruits and vegetables and could be an important source of stress for underserved communities. The present study uses data from the Families Improving Together (FIT) for Weight Loss Trial to evaluate whether perceived neighborhood safety moderates the effect of self-efficacy on obesity in African American adults. Project FIT is a randomized controlled trial testing the effectiveness of a motivational and family-based intervention for reducing body mass index (BMI) among overweight African American families. Data from 241 African American adults (Mean age = 44.35 years; 96% females; Mean BMI = 37.49) that participated in Project FIT at baseline was used for this study. A linear regression analysis revealed a significant interaction between self-efficacy and perceived neighborhood safety on BMI,  $B = 1.09$ ,  $SE = 0.51$ ,  $p = 0.03$ . Among adults with high self-efficacy, neighborhood safety was not significant-

ly related to BMI,  $B = -0.04$ ,  $SE = 0.73$ ,  $p = 0.96$ . Conversely, among adults with low self-efficacy, greater neighborhood safety was significantly associated with a lower BMI,  $B = -2.21$ ,  $SE = 0.77$ ,  $p = 0.005$ . These results suggest that an unsafe neighborhood environment, paired with low self-efficacy for making health behavior changes, may put African American adults at a higher risk for being overweight or obese.

**Ricker, Joseph**

**Mentor(s): Dr. Daniel Freedman**

**Effective Communication**

During my time at the University of South Carolina I've learned extensively how important communication with others has been. Communication is extremely important in everyday life, whether it be work life, social life, or personal life. Communication isn't just speaking with another person, it is expressing emotions, ideals, beliefs, and experiences with others through writing, teaching, or social interactions. Over the course of my 4 years at USC, I personally observed and experienced issues with communication whether it be because of me or someone else. As a Resident Mentor I saw residents presenting issues with their friends and families because of a miscommunication between them. Through honesty and transparency, one can successfully resolve conflicts, express expectations, and work more precisely with others. Accurate and effective communication skills can be beneficial to every single person and should be used in everyday life.

**Ridings, Lauren**

**Mentor(s): Mrs. Maegan Gudridge**

**Sports Medicine, History, and Culture: Australia**

After my spring 2017 semester, I did a USC guided Maymester called "Sports Medicine, History and Culture: Australia." This experience was personally meaningful to me because I had dreamed of traveling to Australia nearly my entire life, so being able to tour the continent while I further my studies in exercise science at the same time was truly unexplainable. I attended lectures with professional rugby players and even a former swimming coach from the 2000 Sydney Olympics who taught us about common injuries and treatments in Australia, the differences between physiology and kinesiology, and of course I ventured through the famous Sydney Opera House and the Great Barrier Reef as well. The three weeks that I spent exploring Sydney, Cairns, and Goldcoast allowed me to compare sports medicine practices in Australia to the United States, solidify my decision to pursue a career in Physical Therapy, and grow both personally and professionally. This Maymester was one of the most significant memories I have had here at Carolina and I can honestly say that I would not be where I am or who I am today without this experience.

**Riello, Bianca**

**Mentor(s): Dr. Austin Downey**

**Methodologies for Integrated Control and Data Acquisition of a Structural Test Bed**

Structural health monitoring (SHM) is the automation of damage diagnosis, localization, and prognosis tasks for structures. Successful SHM enables safer and more resilient structures. The aim of this project is to investigate various methodologies for an integrated control/data acquisition system. This system will be implemented on a test bed designed to quantify the reliability of the information provided by SHM systems. The test bed applies repeatable stress to monitored structural components until failure. However, the current control and data acquisition systems are incapable of sharing data. By combining these systems onto a common hardware platform we will enable the validation of sensors to improve their reliability. During this research project I investigated solutions for two research thrusts. During thrust one, I conducted a brief literature review and investigated system-level architectures that will enable an integrated control and data acquisition system to share information between these two systems. During

thrust two, I explored published algorithms and implemented an algorithm capable of integrating the control and data acquisition systems. The implemented algorithm has established communication between a singular Arduino UNO and the rest of the architecture, but a final solution incorporating the USB hub that may incorporate multiple UNOs is still being worked towards.

**Riley, Grace**

**Mentor(s): Dr. Debra Rae Cohen, Dr. Greg Forter**  
**Biology, Politics, and Pleasure in Huxley's**

Aldous Huxley's dystopian novel "Brave New World" is often labeled as a science fiction work, and thus analyzed as merely fantastical. However, many of the advances in science and technology that inspired Huxley's novel have continued to develop in ways even he could not have predicted. To illuminate the political structure that provoked "BNW", I researched Michel Foucault's theory of biopolitics and used it as a lens to analyze Huxley's novel. Foucault's "The History of Sexuality Vol. 1" and Huxley's "BNW" were my primary texts, but I also did extensive research within the field of biopolitics, utopia and dystopia, and social engineering to understand the context of both works. My research reveals that though Huxley's novel precedes Foucault's theory by decades, applying Foucault to Huxley's novel can reveal the author's skepticism about science and technology and how those forces could be used to manipulate and control the social body. Huxley's warnings about how advancements in the sciences may be used by state powers to inflict involuntary social control on its citizens should be the central focus when reading this novel, and thus the novel should be seen in this light. Indeed, this research holds implications for the 21st century: what scientific advancements may threaten our liberties today?

**Risher, John**

**Mentor(s): Dr. Wei-Kai Lai**  
**On Nesbitt Type Inequalities**

The famous inequality,  $a/(b+c)+b/(c+a)+c/(a+b) \geq 3/2$  for positive  $a, b, c$ , was introduced by Nesbitt at 1903. Since then, many proofs have been introduced. Among these proofs, one was introduced by Mortici at 2012, using power series approach. Adopting this new approach, we analyze several cases of the similar form as Nesbitt inequality and notice that they can all be proved using this new technique. In this presentation, we will introduce these new Nesbitt type inequalities along with our proofs.

**Rising, Morgan**

**Mentor(s): Dr. Nicole Hair**  
**Evaluating Medicare Reimbursement for Advanced Care Planning**

By 2030, one in every five residents in the United States (nearly 78 million people) will be 65 years or older. Among this group, two-thirds will experience multiple chronic illnesses. While advanced medical technology can extend the lives of seriously ill patients by months, and sometimes even years, end-of-life treatment intensity is associated with diminished quality of life and rising health care costs. Advanced Care Planning (ACP) refers to a professionally facilitated advance planning process for decisions about care in the event of a life-threatening illness or injury. ACP allows individuals to identify the factors that are important to them for quality of life and to make clear any preferences they have with respect to specific interventions. I analyze a 2016 Centers for Medicare and Medicaid Services (CMS) policy change that allowed physicians and other health care professions to begin billing Medicare for ACP services. Using data from the CMS Chronic Condition Data Warehouse, I first document significant cross-state variation in provider billing for ACP following the 2016 policy. Combining data from the CMS Chronic Condition Data Warehouse with information on Medicare service utilization from the Kaiser Family Foundation and national statistics on place of death from CDC Wonder, I next examine correlations between state-level

measures of ACP claims and end-of-life care. I find that ACP is associated with reduced inpatient length of stay as well as a reduction in the proportion of deaths occurring in a hospital setting (I observe a complementary increase in the proportion of deaths occurring at home or in a hospice setting). Finally, I find some evidence of cost-savings: ACP is associated with reduced Medicare spending.

**Rivers, William**

**Mentor(s): Dr. Caryn Outten, Dr. Angela Albetel**

### **Characterizing Aft-Grx Interaction During Iron Regulation in *Saccharomyces cerevisiae***

Iron metabolism disorders are the most common nutritional disorders in the world. Because iron is integral in many processes including oxygen transport in blood and energy production in mitochondria, it is vital that adequate iron levels are maintained in the body. As a result, understanding the mechanism of iron regulation is critical to preventing and treating iron metabolism disorders. In *Saccharomyces cerevisiae*, iron uptake and import gene expression is promoted by the paralogous transcription factors Aft1/2 which shuttle between the nucleus and cytosol in an iron-dependent mechanism. It is hypothesized that, in iron replete conditions, the glutaredoxins Grx3 and Grx4 and the BolA-like protein Bol2 interact to form an iron-sulfur cluster bound heterodimer. This complex is proposed to transfer a [2Fe-2S] cluster to Aft1/2 promoting their translocation into the cytosol, thereby turning off expression of the iron regulon. Grx3/4 have been shown to interact with Aft1/2 *in vivo*, but no definite role has been shown for Bol2 in this interaction. To investigate whether Bol2 is required for interaction between Aft1/2 and Grx3/4, bimolecular fluorescence interaction studies will be performed to determine whether Grx3/4 interacts with Aft1/2 in the absence and presence of Bol2. Interaction will be monitored in cells grown under varying iron concentrations via fluorescence microscopy and flow cytometry. As of now, we have successfully cloned tagged versions of Grx3 and Aft1/2 genes into inducible vectors and successfully transformed them into *S. cerevisiae* strains. Furthermore, we have confirmed the expression of tagged Grx3 with western blot. The results of this work will give a greater understanding of iron regulation in *S. cerevisiae* at the cellular and molecular level. Since both Grx3/4 and Bol2 have close human homologs, these studies will also shed light on their functional roles in human iron metabolism.

**Rives, Courtney**

**Mentor(s): Dr. Lisa Fitton**

### **The Relation of Language Proficiency and Gender to the PTONI in Spanish-Speaking English Language Learners**

Nonverbal IQ tests are important in school settings because the results can help teachers and parents identify children that have intellectual disabilities or deficits and allows for intervention to take place (DeThorne 2004). Nonverbal IQ tests are valuable measures of children's fluid intelligence and visual processing, without relying on language-based reasoning. This characteristic is increasingly valuable in tests, given the growing linguistic diversity among children being educated in U.S. schools. The PTONI (Primary Test of Nonverbal Intelligence) is one such nonverbal IQ test used by speech-language pathologist with school children.

However, there is not a lot of research supporting the PTONI as a valid measure for children from culturally and linguistic diverse backgrounds. Consequently, the purpose of this project is to investigate whether the PTONI is a valid measure of nonverbal intelligence for Spanish-English speaking children. To do this, a sample of approximately 60 Spanish-English speaking children and English-speaking monolinguals was assessed on a variety of measures. The relation between English and Spanish proficiency and PTONI scores as well the relation of gender and PTONI was examined. No relation was expected between language proficiency and PTONI scores due to the nonverbal nature of the test. There also should be no differences in PTONI scores by gender because there is no evidence of a significant difference in IQ scores across gender. Preliminary results indicated no differences in PTONI scores by gender or by Spanish profi-

ciency, but there was a positive correlation between English proficiency and PTONI scores. These findings will help researchers and test makers improve nonverbal test features to ensure that tests function similarly for children from all cultural and linguistic backgrounds.

**Rizzo, Nikki**

**Mentor(s): Dr. David Marlow**

**Striving for Exponential Impact: Pursuing Transformation Through an Integration of International, Interdisciplinary, and Service-Oriented Pedagogies**

Study Abroad, Integrative Interdisciplinary Studies, and Service Learning are three pedagogical approaches recognized by the Association of American Colleges and Universities as high-impact practices [1]. This paper will draw on both a published body of literature and the experiences of the author's faculty mentor and his students at a regional, comprehensive university in the Southeastern United States, to explore both the theoretical and practical implications of blending the three pedagogies in search of methodologies that have exponential impact. Study Abroad and Service Learning programs target the transformation of students into critically-thinking, socially aware, civic-minded adults who are more inclined to embrace diversity [2], complimenting Integrative Interdisciplinary approaches to academic content. With this pedagogical combination, it is hoped that students will not only undergo transformation themselves, but will come to recognize the interplay between the transnational and their own neighborhoods [3], leading to a larger transformation—one of community, whether it is local or global. That said, the time has now come to explore the intersection of the experientially-rich practices of Study Abroad, Integrative Interdisciplinary Learning, and Service Learning.

**Rodgers, Jeffrey**

**Mentor(s): Dr. Tarek Shazly**

**Microstructure and Functions Relations of Aneurysmal Popliteal Porcine Arteries**

DRAFT

An aneurysm is the result of increased stress and degradation of the structural proteins that comprise the arterial walls, the most notable of which is elastin. In vascular tissue, elastin is the main contributor to a blood vessel's adaptability to a variety of mechanical stimuli. Once this component of the vessels is removed, collagen, a much stiffer protein, becomes the primary support protein. This uncrimping from its normal, coiled state, can cause a more than twenty-percent increase in an artery's diameter, which will likely lead to the eventual dissection or rupture of the artery. Previous studies have found that treating arteries with elastase have produced a significant increase in their diameter by specifically targeting elastin without causing degradation in order components of the tissue. Other previous studies have also used Second Harmonic Generation microscopy (SHG) to examine the microstructure of the collagen in the vessels, specifically by measuring the tortuosity of the collagen fibers at a high resolution without causing photobleaching of the specimen. This project aims to expand upon the current body of knowledge in this field by examining the differences in the collagen structure between normal and aneurysmal popliteal arteries in-vitro and the differences in the properties of the collagen fiber under mechanical loads though Second Harmonic Generation imaging techniques. This project focuses on the evaluating how the change in orientation and tortuosity after decreasing the elastin content will cause a change in the elastic behavior of popliteal arteries under various physiological stretch ratios. Due to time constraints, current progress has been limited to the standardization of mechanical testing and aneurysm formation protocol and the development of control data, to which aneurysmal arteries can be compared during future work on this project over the summer.

**Rogan, Jack**

**Mentor(s): Dr. Sarah Keeling**

**Oral Health, Moral Lessons**

Through many experiences during my time at the University of South Carolina, I have sought and eventually experienced true professional and personal growth. A number of organizations I've joined, people I've met, and opportunities I have had have propelled me to be a more thoughtful, serving, and motivated individual. When I reflect on the incredible experiences I've had, what stands out most to me is how I spent Spring Break of my junior year. During March 2018, I served on a dental mission trip to a village near Managua, Nicaragua, assisting and shadowing a local dentist and helping to treat almost 50 patients over the course of four days. I went through Alpha Epsilon Delta with a small team of pre-dental students who joined me in working alongside a licensed dental professional in Nicaragua. During our five-day stretch of offering a free dental clinic, many individuals entered our small hut needing extensive dental work, but could only have a fraction of their complications resolved. And still, these people left so thankful, expressing their gratitude through handmade gifts, hugs, kisses, or just a simple, "muchas gracias." As a student attaining degrees in both Biology and Spanish, seeing my worlds collide was beyond fascinating, but experiencing the true influence of dentistry, a field which I will be entering in June when I begin dental school, left me speechless. Equipped with even the simplest of instruments, a dental professional holds promise in his or her hands.

**Rogers, Nicole**

**Mentor(s): Dr. Kimberly Shorter**

**Effect of miR-718 on the PI3K/AKT/MTOR pathway and dendritic spine counts in SHSY5Y cells**

Autophagy degrades cytoplasmic contents with the use of lysosomal hydrolases and is negatively regulated by mTOR. Autophagy is essential for many cellular processes including cell survival, proliferation, and homeostasis. Loss of autophagy has been linked to neurodegeneration. Neurodegeneration is characterized by the loss of dendritic and axon processes followed by the loss of communication. Dendritic spines in a typically developed individual stabilize into adulthood. Dendritic spine densities are linked to epigenetic mechanisms such as altered miRNAs. MiRNAs are non-coding RNA that regulates post-transcriptionally by targeting the 3' UTR of target genes. MiR-718 has been shown to degrade PTEN therefore allowing the PI3K/AKT pathway to occur. MiRNAs are looked at for future treatment of diseases such as ASD. ASD has increased significantly in the past 30 years. ASD individuals have increased spine density indicating hindered autophagy along with higher levels of p-mTOR. We investigated whether miR-718 regulates autophagy in a neuronal cell line by targeting PTEN for degradation and found miR-718 does target PTEN in both the knockdown and mimic and may regulate autophagy and dendritic spine formation.

**Rogers, Angela**

**Mentor(s): Ms. Sarah Gay**

**GLD Civic and Professional Engagement by Angela Rogers**

In summer of 2018 I had the opportunity to be a Finance/Accounting intern for Cardinal Health, Inc. Prior to working for Cardinal, I had no formal experience in corporate finance. My role was in the Internal Audit department on the Sarbanes Oxley team during the busiest time of the fiscal year. I learned so much about finance and accounting in a very short period of time, and by the end of my internship I had independently tested dozens of internal controls, edited and updated our COSO 2013 workbook, and managed the accounts payable substantive testing. I enjoyed the position because I got to see how all of the disparate parts of the huge company work together, and how internal controls work to make companies safer and more efficient. After I graduate in May I hope to enter a similar finance position, hopefully within Cardinal Health again.

**Rondinelli, Alexis**

**Mentor(s): Dr. Ho-Jin Koh, Dr. Joao Silvestre**

**Protein expression of TRB3, protein synthesis, and protein degradation markers after 6 hours of starvation in C2C12 cells**

It has been shown that TRB3 and ER stress are key factors for muscle mass loss during atrophic conditions such as food deprivation. We previously showed that food deprivation-induced muscle atrophy was attenuated in TRB3 knockout mice. Moreover, we found that inhibition of ER stress in C2C12 myotubes reduced food deprivation-induced gene expression of TRB3 and atrophy markers (atrogin-1 and MuRF1), suggesting that ER stress is necessary to induce TRB3 expression in response to food deprivation. These findings suggest that TRB3 is a key regulator in the regulation of atrogene expression. Here, our aim was to analyze the protein expression of TRB3 and protein synthesis/degradation pathways in starved C2C12 cells, in order to confirm the previous mRNA findings. C2C12 myoblasts were grown in DMEM containing 10% fetal bovine serum. When the cells reached ~90 confluence, the differentiation was induced by replacing the growth medium with medium containing 2% horse serum for 4 days. In order to induce C2C12 myotubes starvation, we incubated differentiated myotubes with PBS for 6 hours. Using the Western Blot, we then analyzed the protein expression of TRB3, the protein synthesis markers, Akt, pAkt (t308), mTOR, pmTOR and the protein degradation markers, Foxo1, pFoxo1, Foxo3a and pFoxo3a. The GAPDH was used as control. We did not find a difference in the protein expression of TRB3, mTOR, Foxo1 and Foxo3a. Interestingly, we found a dramatic increase in the phosphorylation of Akt t308, after 6 hours of PBS incubation in C2C12. Our next steps include analyzing other protein degradation markers such as Atrogin-1 and MURF1, and also further analyzing protein synthesis markers such as P70S6K1.

**Roopra, Harsirjan**

**Mentor(s): Dr. Hexin Chen**

**Effect of ECM on immune repressor micromanagement**

Tumors of breast cancer tend to be stiff and data has shown that the extracellular matrix (ECM) plays a role in this. As well as having an effect on the progression of mammary malignancy and tumor invasion. But, this link or relationship is still unclear. This study aims to look at this relationship between tumor progression and matrix stiffening and how immune response is affected. Collagen deposition has also been shown to have a positive correlation with the thickening of the matrix. So, through different lab techniques like gel electrophoresis, DNA extraction, and cell culturing we will be able to examine human breast cancer tissue by using Quantitative Polarized microscopy. Through clinical analysis of tumor samples I will be able to use biophysical and biochemical assessments of breast cancer tissue. This assessment will allow me link the relationship between ECM stiffening and tumor progression and overall can lead to long term implications for possible treatments of breast cancer.

**Ross, Carolyn**

**Mentor(s): Dr. Elise Lewis**

**10 countries, 7 months, & 1 backpack: Gaining a Global Perspective**

Last Spring, I studied abroad in China at Nanjing University with CIEE's Intensive Chinese Culture and Language Program. Before college, I never studied Mandarin and I knew little to nothing about Chinese culture. I enjoyed learning Spanish in high school, but in college, I wanted to study a critical language that would be important for future global politics. This led me to choose to Double Major in Chinese Studies and International Studies. Coming to college, I always knew I wanted to study abroad. I chose to study in China to improve my language skills and have a firsthand experience of what the country I had studied for three years was really like. Nanjing University is one of the top universities in China, and the CIEE

program was one of the only language focused programs in mainland China for foreigners. Another parameter I chose was to not study in one of the typical cities most other students go to in China because I wanted to be fully immersed to have a more authentic experience. While there, I took every opportunity to explore, experience new traditions, taste unfamiliar flavors, and learn from those around me. After the semester in China, I traveled to Europe to backpack through 9 other countries for another two months. The overall experience was priceless, as I not only significantly increased my language skills and confidence in speaking, but I also learned to adapt and engage with my surroundings, how to navigate wherever I travel, and how to interact with cultures and traditions different than my own. After 5 months studying in China and two more months with only a backpack in tow, I found confidence in myself to grow wherever I am planted; to build relationships, to get out of my comfort zone, and to be adaptable in whatever situation I face. As a future Air Force Intelligence Officer, I will be exposed to a multitude of cultures and people. I will face many unknown challenges, but I will continue to carry the lessons I learned from my study abroad experience into the future.

**Roth, Ashton**

**Mentor(s): Mrs. Asheley Schryer**

**Finding A Beneficial Meaning**

This past summer I worked at the oldest bank in Philadelphia, Beneficial Bank. Beneficial Bank is a steadily growing tri-regional institution that offers multiple communities a variety of resources and opportunities for banking needs. Primarily focusing on retail banking, Beneficial has grown over the past few decades and fixating on Insurance and Wealth Management. In my position I worked as a Credit Intern within the Commercial Real Estate and Commercial & Industrial Credit Departments. The Bank offered me a general overview of regional banking and its day-to-day activities. Within this role I balanced fiscal year-end statements and tax returns, read through loan contracts, and conducted industry analysis. I was exposed to a multitude of banking and loans processes while also having the opportunity to be educated further alongside full-time credit analysts pursuing their Underwriter license. My financial experience has also be intertwined with my time as a member of the greek community at South Carolina. As a member of Kappa Kappa Gamma Women's Fraternity, I was elected Treasurer from my Sophomore to Junior academic year. Serving as Treasurer on the executive board I was able to help individual members manage their finances, create and monitor the chapter's budget, and hold each member to a standard. I learned how to communicate with others, deal with complex financial problems, and understand how to work in a team setting. Reflecting on both of my experiences I was able to see the variability within finance. How the different viewpoints held among people drive their financial decisions and the impact it has, which I will further articulate through my presentation.

**Rothschild, Hayden**

**Mentor(s): Dr. Tracy Skipper**

**Combating the Stigma surrounding Mental Health in the Carolina Community**

Student organizations play a major role in stimulating academic success, building bigger networks, developing lasting relationships and strengthening leadership skills. My most significant contribution to the University of South Carolina has been my commitment to changing the conversation about mental health by holding leadership positions within the Active Minds chapter. As the vice president, secretary, and member, I was able to combat the stigma surrounding mental health through advocacy tabling, community building events, social media campaigns, member meetings, and a national conference. I had the opportunity to help completely rebuild the Active Minds chapter and make it known on campus. I plan to continue reducing the stigma around mental health as I enter into graduate school and in my future career as a mental health therapist. I hope that sharing my experiences will help to empower those who need and deserve it most.

**Rothschild, Hayden**

**Mentor(s): Prof. Ryan Carlson**

**A correlational study of ethnically diverse individuals in relationship education and their attendance**

Economic hardships create unique contextual stressors that put low-income individuals and couples at higher risk for poor relational health. Relationship education are skills-based programs that teach participants about effective communication and healthy conflict resolution, and have been funded through the Office of Family Assistance to help low-income individuals and couples build and maintain healthy relationships. Relationship education has demonstrated positive effects with low-income and ethnically diverse participants who attend. Although positive results are commonly reported for those who complete the program, contextual stressors make attending relationship education difficult. Therefore, the aim of this study is to examine participant characteristics that may be associated with attendance, as well as with participant scores on a measure called 'intent to attend', designed to reflect participants' intentions to return to their next scheduled visit. Study participants include individuals who enrolled in community-based relationship education for a six-month duration. I hypothesize that participants who are unemployed, in the lowest income bracket, and/or score lower on the intend to attend question, will have a positive correlation with low program attendance. In addition to study results, I will present study implications when attempting to include low-income and ethnically diverse participants into intervention research.

**Rowland, Alan**

**Mentor(s): Dr. Yordanka Ilieva**

**Studies of the Gain of Small-Pore Size Microchannel Plate Photomultipliers in High Magnetic Fields**

Microchannel plate photomultipliers (MCP PMTs) are small devices that convert light into an electric signal. These devices have many applications, but most notably in physics they are used to readout Cherenkov detectors. In the current designs of the central detector of a future Electron Ion Collider MCP PMTs will readout several Cherenkov detectors located in a magnetic field. Because of this, tests need to be conducted to determine whether the photomultipliers can retain their functionality in the magnetic field of the detector, which can go as high as 3 T. In this work we study two MCP PMTs, with pore sizes of 6  $\mu\text{m}$  and 10  $\mu\text{m}$ , inside a variable magnetic field. We determined that the gain of both devices would slightly increase as the magnetic field increased, until about 0.8T and 0.3T, respectively. While the gain would decrease afterwards, the photomultipliers are able to produce a signal until about 2 T. The orientation of the devices also has an effect, as the gain decreases faster for some orientations. This effect was more noticeable when the magnetic field was above 1 T. Our results suggest that photomultipliers with a small pore size are a viable option to use in the upcoming Collider in a limited range of magnetic-field magnitude. This work is supported by the U.S. DOE.

**Rubenstein, Hannah**

**Supervisor(s): Allison Krebs**

**Mentor(s): Dr. Teresa Moore**

**Energy Expenditure in Whitewater Kayaking: Comparison of Fitbit to ActiGraph Accelerometers**

Whitewater kayaking is an intense, outdoor sport that is swiftly growing in popularity and typically takes place in unpredictable, often remote environments. Whitewater kayakers must be able to meet high energy demands in order to react quickly to powerful rapids and avoid obstacles while maintaining enough stored energy to paddle for several hours on a single trip. This level of activity places a huge metabolic demand on the human body requiring adequate nutritional support to sustain several hours/days of intense activity. Without proper nutritional support, performance will be compromised, possibly

leading to serious injury or death. Caloric expenditure can be measured using accelerometers. Fitbits are commercial accelerometers available to the general public for use in measuring physical activity and have been validated against the Actigraph wGT3X-BT research ergometer. The Fitbit Versa is a waterproof Fitbit model that tracks GPS location in addition to heart rate and estimated caloric expenditure, making it an appropriate model for use with whitewater kayaking. The KayakPro ergometer is a type of equipment that allows users to replicate the specific upper body movements of kayakers and is used in research and in training Olympic level kayakers. This is an excellent device to compare both the Actigraph wGT3X-BT and the Fitbit Versa in controlled conditions. The research question is “Is the Fitbit Versa a reliable piece of technology to accurately measure calories burned during whitewater kayaking?” Preliminary results indicate inconsistent results when compared to the Actigraph accelerometer and KayakPro ergometer.

**Ruble, Charlotte**

**Mentor(s): Dr. Dan Freedman**

**Transformational Leadership**

Throughout my time here at University of South Carolina, I have learned that leadership is enhanced by specific goals and clearly defined with collective achievement. My most noteworthy contribution to the University of South Carolina has been my involvement with USC Dance Marathon, largest student-run philanthropic organization on USC’s campus. I have been able to personally contribute to raising over \$4.6 million in 4 years to help improve the lives of over 150,000 children across the state. Through my position on Board of Directors I recruited and led a team of 90+ individuals in weekly meetings to develop skills in leadership and fundraising. I learned through this leadership role that that you have to lead by example, whether that is in my attitude, fundraising, or passion. I learned the immense impact that encouraging and believing in one individual can do. And most importantly, I learned that individually you can only accomplish so much but working collaboratively, with open communication, miracles are possible. My position on Board of Directors has allowed me to take initiative and communicate to large groups of people as well as develop interpersonal connections. Individual meetings with over 90 members, individual weekly meetings with my committee, and constant motivation and challenging of each member individually has shown that interpersonal leadership is beyond effective. Being a leader does not mean you stop learning and suddenly know everything. The higher leadership positions I hold, the more I learn. One thing that makes a leader is the passion for what you are doing and sharing that passion with others. I was lucky to have that passion from the very beginning within Dance Marathon. Through seeing the impact that was made on the families and children at the hospital through our fundraising, I truly have been shown the impact one individual can have. My presentation will expand upon the insights I have learned as an emerging leader and the implications for being a transformational leader.

**Ruff, Skyler**

**Supervisor(s): Gabby Jabbour, Joel Aninao, Morgan Markwood, Caralynn Jamison**

**Mentor(s): Dr. John Jensen, Dr. Carrie Queenan**

**A Footstep in the Right Direction: Improving the Reserve Department in an adidas Distribution Center**

Located just off of Interstate 26 in the small town of Spartanburg, South Carolina, one of the world’s most prominent high-end sportswear manufacturers, adidas, operates two Distribution Centers that supply 80% of its American market with its increasingly popular footwear and apparel products. Quiet and unassuming from the outside, these facilities take up nearly two million square feet of space and are able to process upwards of 18,000 units per hour, twenty-four hours a day, seven days a week. Adidas has partnered with the Darla Moore School of Business’ Capstone Consulting Program in order to improve performance and productivity in a key constrained department in its second Distribution Center. Known as DC2, this Distribution Center stores and ships all of the company’s footwear products. Its constrained

department, the Reserve Department, encompasses four primary functions that span from putting away units into storage to picking units that will eventually be transported to awaiting customers. Historically, these processes have yielded lower productivity and performance rates than the department's counterpart in the first Distribution Center, DC1, ultimately causing adidas to seek viable and quantifiable solutions from the USC team. Adidas identified broad causes of the problem to be high labor force turnover rates coupled with inventory counting inaccuracies, giving our team a starting point for research. Over the course of the Spring 2019 semester, we have used the DMAIC Model, a tool used for Six Sigma processes to both improve and optimize specific business functions. Through this method, we have identified true roots of the problem, measured relevant data trends through a variety of methods, analyzed the impacts of our findings, constructed viable recommendations and implementation plans, and built plans to control our process improvement solutions in the future. Throughout this experience, we were able to apply the knowledge obtained from the Supply Chain and Operations coursework to a professional setting where we gained applicable and valuable real-world experience.

**Ruff, Skyler**

**Mentor(s): Ms. Theresa Harrison**

**Prague: A Medieval Fantasy of Self-Discovery and Cultural Appreciation**

The undergraduate experience at USC has given me three invaluable competencies: empathy, the need for improvement, and curiosity. Cultivated and refined through within and beyond the classroom experiences, my perspectives and viewpoints on a variety of topics have not only expanded, but changed directions almost entirely. These learnings stem from global experiences attained during my undergraduate career, and they have permanently permeated the ways with which I think and understand. The experience that I am beyond thankful and appreciative of is my study abroad program in Prague, Czech Republic, which offered me the opportunity to live, study, and immerse myself in a completely different world for the span of four months. The learnings I have gained through this experience are something that I hope to share, which is why I have decided to pursue my Graduation with Leadership Distinction in Global Learning. Living in Prague taught me to appreciate differences. Being thrown into an environment unlike anything I had experienced was terrifying, pivotal, and extremely influential. From taking classes in Czech to not being able to fully communicate with the people around me, I was put confronted with some of the most challenging situations of my life. However, I was also given some of the most beautiful opportunities of my undergraduate career. Never before in my life did I have the chance to take a day trip to Slovakia, live in a beautifully medieval city, or freely explore an Eastern European county. Reflecting upon my global studies, I am thankful for the insight I gained and the broader perspectives I was exposed to during my time abroad.

**Rush, Maya**

**Mentor(s): Ms. Carrie Van Haren**

**Lead by Preparing Your Leaders**

During my freshman year, I was selected to serve as an Orientation Leader for the following summer and welcomed more than 6,000 freshman and transfer students. I wanted to be an Orientation Leader not only to share information about the university, but also to share with families the opportunities I've been afforded, and my perspective of student life and the classroom experience here at the University of South Carolina. Through the intensive training provided by the Office of New Student Orientation, my coworkers and I were prepared for any questions we received. Our intensive training allowed us to form bonds and make connections within our group of about 60 people and feel supported from the professional staff. While we trained for our job, there was never a time where a question was left unanswered or we felt pressured to know all of the material immediately. My greatest takeaway was that to be a successful leader, you must make sure that those in your care and under your leadership know how important they

are to you, how important they are to the company, and that you support them. As I prepare to graduate and begin to search for jobs, I am always reminded of my experience as an Orientation Leader. I was unaware at the time, but after taking my Professional Development class, I realized that the Orientation staff was cultivating their corporate culture. The Office of New Student Orientation invested so much in their employees to ensure they developed Orientation Leaders committed to excellence.

**Russ, Grace**

**Mentor(s): Ms. Theresa Harrison**

**Mock Trial Strengthens Leadership Abilities**

Mock trial teaches effective public speaking, logical thinking, teamwork, and the ability to make arguments succinctly and effectively. My time as the Director of Public Relations and a member of the Executive Board my junior year helped me to grow as a leader and gave me a new respect for those who are in positions of power. I was responsible for all of our social media; which grew more under my leadership than it had any year prior and that is something I am very proud of. As a member of the Executive Board, I was one of five people making decisions for our entire program and our ability to work together and make the right calls were crucial to our program's success. I am a better leader because of that experience, and I am more prepared to deal with situations in which people have differing opinions. I am better at compromising and knowing when to give in because in order to make the best decisions for our team I have to take all factors and arguments into consideration. I have seen how five different people can have completely different stances and yet all be striving to do what is best for the program. What I am most proud of, though, is how well our Executive Board communicated and worked with one another. I believe it laid a strong foundation for this year's Exec Board to build off of and this has been our most successful season yet! I attribute this success in part to our strong leadership last year. We were all willing to stand up for our own positions, but also valued the opinions of others and knew when to compromise. Through my experience being in a position of leadership with mock trial, I have gained a better understanding of what it means to be a good leader and what those qualities look like in action.

**Ryan, Carmaria**

**Mentor(s): Ms. Jane Bouknight**

**Professional and Civic Engagement GLD: Student Organization/ Peer Leader**

Involvement in your local community encourages growth in personal development, organizational, communication and leadership skills within yourself. One example of displaying these skills in my community would be my role of a University 101 Peer Leader. In this role, I served as a mentor, teacher's assistant and a guide for help to freshman students who were getting adjusted to being in a new college environment. My role was to lead discussions on important topics like campus/personal safety on campus, meet with students one on one to make sure they were staying on the right track and assisting the instructor on class to make sure students were always interested in the lesson. I made sure I was staying involved with my U101 class and the instructor by keeping in touch with the class through group me text messages, planning lessons that kept everyone involved and get to know the students by meeting outside of the class environment. I found that the lesson plans that dealt with time management, social engagement, academic success and self-awareness of their ways of doing things really helped them become self-aware of what they needed to do in order to be successful at USC. I examined that many students have a rough time their first year because they are trying to find who they are, adapting to new class sizes, be social and etc. all in one year, which can be very hard. By being in that role of a U101 Peer Leader, your role is not only to instruct but it also to help guide your students on the right path and encourage them to step outside of their comfort zone when coming to a big campus like USC, while also providing the support and your knowledge of the campus to help them. Overall, this role has encouraged me to grow in having natural leadership skills, organization, communication skills among big groups, take on more leadership opportunities

and also improve on making understandable/interactive presentations.

**Ryman, Rebecca**

**Mentor(s): Prof. Kate Chappell**

**Surveying Asian-American young adults to examine the relationships of acculturation and caregiver vigilance on child maltreatment**

**Background and Purpose:** There is a significant gap in knowledge regarding child maltreatment (CM) and ethnic minority groups. Cultural norms and values affect not only the likelihood that child sexual abuse (CSA), a form of child maltreatment, is discovered, but also whether it is reported. The planned study aims to determine if there is a relationship between acculturation levels of Asian-American young adults and their families, caregivers' vigilance practices for child sexual abuse, and young adults' adverse childhood experience history. A higher level of acculturation, the extent to which an individual has adopted and accepted the surrounding culture, typically translates to more familiarity with child protection laws, which can help reduce their risk of child maltreatment.

**Methods:** The team will distribute a self-administered online survey to Asian-American young adults 19-29 years old (goal n = 100) living in the U.S. whose primary parent(s)/guardian(s) are Asian. The survey will be distributed via social media advertisement and personal and professional networks. The survey will include demographic information, the adverse child experiences (ACE) survey, items focused on caregiver vigilance responses to child sexual abuse (CSA) from a pre-existing questionnaire, and The Suinn-Lew Asian Self Identity Acculturation tool.

**Anticipated Results:** SPSS will be used for statistical analyses. Descriptive statistics, including chi-squares, independent sample t-tests and non-parametric tests, will be reported on the study variables and demographics following data collection. Regressions will be used to examine the influence of family acculturation and caregiver vigilance practices, including teaching on child safety or maltreatment prevention, on the number and type of ACEs and Asian American young adults' perceptions on CM and acculturation.

**Implications:** The results of the planned study will contribute to planning culturally-specific child maltreatment prevention initiatives. Additionally, the results will add to knowledge on assessing needs of individual families considering cultural differences in parenting and acculturation.

**GRANT SUPPORT:** This work was supported in part by the South Carolina Honors College Exploration Scholars Research Program (RSR).

**Sabbagh, Lauren**

**Mentor(s): Ms. Tricia Kennedy**

**Self Growth Through Travel**

During spring semester of 2018, I studied abroad at the Unvierstiat Autonomia de Barcelona in Barcelona, Spain. I had always planned on studying abroad and sought out a university that offered study abroad options upon entering my freshman year of college. My semester in Europe was an eye opening and enriching experience that changed my life. I took classes that supplemented my double major of marketing and operations and supply chain, all in a unique learning environment where I was surround by diversity. Although it was daunting to move to another country across the world and leave the comfort of home, I was able to grow and learn about myself and the world, which is a once of a lifetime opportunity. Through study abroad I experienced diversity, learned a new language, and vastly increased my knowledge on sustainability. I was able to experience how Spain functioned in the business world and how differently

Europe operates compared to the United States, which essentially led me to the decision that I wanted to enter the workforce by working with a large European based, international company. Without these experiences abroad I would be a much different person. Studying abroad has opened up many doors for me, connected me to people from all around the world, and ignited my passion for global learning and world travel.

**Sadek, Alia**

**Mentor(s): Mrs. Katherine Hopkins**

**Creating a Holistic Prescription: Translating Leadership and Intervention from Recreation to Medicine**

Personal training is a hands-on method of educating individuals of all ages on how to improve their personal wellness and physical fitness through adaptations to new motor skills and the acquisition of positive lifestyle behaviors. As a personal trainer for Campus Recreation, I have spent almost two years gaining experience creating individualized health interventions to address a range of physical goals (strength, cardiovascular endurance, hypertrophy, weight loss) and medical conditions (diabetes, obesity, hypertension and metabolic syndromes). By conducting fitness assessments, educating clients on their current health status, creating individualized workout programs and demonstrating proper exercise techniques, I have discovered a method of holistic intervention favorable to improving the lives of others. Personal training has taught me that any successful and effective intervention is dependent on the qualities and perspective of the “influencer” i.e. myself as the trainer, coach and friend. It is more than just making a good workout for someone; it is using sensory and quantitative data, problem-solving, and innovation to foster complete wellness in a person’s life. Creating the most optimal health program is the primary means to accomplish this through personal training, and in my experience, the most effective. I became a personal trainer because of the profound change that physical fitness and exercising had on my life. I knew that if I was good enough to change my behavior and lifestyle, I could spark the same inner potential in anyone else. My goal is to use my experience here at USC to continue developing myself as a personal trainer and future clinician to advocate and practice this “holistic prescription.”

**Saini, Subina**

**Supervisor(s): Ryleigh Rawson, Nick Laramée, Julianna Vargo, Julia Budiongan**

**Mentor(s): Dr. Donaldson Conserve**

**Highlights from the Brainstorming Session of the 2018 HIV/AIDS Research Forum in Tanzania: Findings and Recommendations for Organizing Future HIV/AIDS Forums**

**Background:** Although a number of international and national HIV/AIDS conferences exist, there is not a national conference focusing on HIV/AIDS research in Tanzania. To address this gap, the Tanzania Commission for AIDS (TACAIDS) organized the 2018 HIV/AIDS Research Forum to exchange knowledge, generate insights, define innovative solutions to issues facing HIV research. This paper reports on the findings from a brainstorming session conducted at the 2018 HIV/AIDS Research Forum to assess (1) perceived challenges of developing a national HIV/AIDS research conference and (2) recommendations to address these gaps.

**Method:** During the second day of the Forum, which was held in Morogoro, Tanzania, a 1-hour structured brainstorming session was conducted with the attendees. Participants included clinical researchers, medical professionals, government officials, and representatives from public health organizations. Transcription of the brainstorming session was analyzed to identify benefits of the Forum, perceived challenges for organizing a national HIV/AIDS conference, and recommendations for addressing the challenges.

**Results:** In general, attendees perceived the forum as a useful platform for sharing research and intervention program findings with the common goal of combating HIV/AIDS. To address concerns about cost, time, and repetitive information, the majority of forum attendees favored a biennial, national-level

forum, where scientific presentations took place the first day, and dialogues about policy-making and action plans occurred the second day. The use of non-technical language in place of technical terms was recommended so that information could be communicated intelligibly to non-researchers. Challenges with translating scientific research into policy and community-level interventions were addressed by recommendations to increase collaboration among all participating organizations, both clinical and nonclinical. Conclusion: Before these solutions are implemented, additional discussions on strategies to encourage attendance and presentations from non-clinical stakeholders (like policymakers) are needed, along with decisions on whether or not to co-opt new organizers. It is also recommended that attendees achieve a consensus on the format of the forum and identify specific approaches for strengthening teamwork among contributing organizations.

**Sakamoto, Iris**

**Mentor(s): Dr. Scott Decker**

**Determining the Utility of a Visual-Motor Test in Assessments of Academic Readiness**

The Bender Visual Motor Gestalt test, also known as the Bender-Gestalt test, is a psychological test used to measure the ability to coordinate visual input with motor output, known as visual-motor integration (VMI). In the Bender-Gestalt, visual-motor ability is measured by the test-taker's ability to accurately copy onto paper the shapes and patterns presented to them. The test is sensitive to developmental disorders, learning disabilities, neurodegenerative disease, traumatic brain injury, and several mental disorders. Additionally, there is some evidence to suggest that VMI can predict IQ and academic achievement in reading and mathematics. To determine the utility of the Bender-Gestalt as part of a lab-developed test of academic readiness, we will administer standard cognitive and academic tests (WJIV and NEPSY II) and the lab-developed test of academic readiness to 40 typically developing children aged 4-8, and analyze the relationships between the test scores. Including a visual-motor test on standard test batteries for elementary school aged children would aid in assessment of academic readiness, identification of dyslexia, learning disabilities, and developmental disorders.

**Sanders, Ariana**

**Mentor(s): Mrs. Laura Carnes**

**Leading For The Future**

I have learned how to apply several leadership techniques as part of my course work in the Bachelor of Organizational Leadership program and being involved at USC Lancaster

**Sansbury, Amber**

**Mentor(s): Dr. Amber Fallucca**

**Enhancing my Leadership Through Community Service**

Ladies Divine to Shine, Inc. is a non-profit 501(c)(3) organization founded by Shakeita Price. Her passion for social causes and being involved in community development, motivated her to seek out opportunities to help others. Today her efforts have created an organization which is steadily growing and reaching youth in underserved communities. During my senior year I joined this organization as a mentee and this organization impacted my life in a major way. We went on outings, learned the importance of self-worth and self-love and I was later the recipient of a \$1,000 scholarship from this organization. During my sophomore year of college, I decided to rejoin this organization to help make a difference in the life of a young female who could be facing difficult situations in her life. Having the ability to network with bright individuals who could help make an impact in my life led me to look at things in a different perspective. It was through events such as the Love Yourself V-Day Blast, and Higher Education Workshops that I improved my leadership skills. Being pushed out of my comfort zone to help plan and organize events helped me

to become a positive example for young girls in my community. As a result, I am now interested in hosted workshops for my Alma Mater to encourage students to go after their dreams. I also want to express the importance of strong resumes, networking and building professional relationships with individuals.

**Sauls, Abby**

**Mentor(s): Dr. Breanne Grace, Dr. Dinali Fernando**

**Outcomes Among Torture Survivors Served by the Libertas Center for Human Rights**

According to the United Nations, torture is defined as “any act by which severe pain or suffering, whether physical or mental, is intentionally inflicted on a person... by or with the consent of a public official or other person acting in an official capacity.” In the United States, over 1.3 million refugees are survivors of torture, and this does not include a large number of asylee and asylum-seeking survivors of torture. This research study took place at the Libertas Center for Human Rights at Elmhurst Hospital in Queens, New York City. The Libertas Center serves torture survivors, and nearly 90% of its clients are asylum seekers or asylees. It offers comprehensive medical, mental health, social, and legal services. The purpose of the project was to determine client outcomes at follow-up, study correlation between service utilization and outcomes, and assess factors affecting self-reported quality of life. Twenty-five in-person follow-ups were conducted, often with phone interpretation, using three assessment tools: WHOQOL-BREF, PROMIS, and a Libertas Center Questionnaire. Seventeen out of the twenty-five follow-ups were used for this research analysis. A retrospective chart review of the Libertas client database was conducted to measure outcomes between intake and follow-up. The research concluded that survivors of torture have multifaceted needs. A high percentage of clients self-reported improvement, despite ongoing problems, after receiving services and support provided by the Libertas Center. The study also determined that mental health support is critical to positive immigration outcomes. In addition, quality of life ratings did not change as expected in relation to the analyzed variables. This research contributes to the torture treatment field by measuring client outcomes in order to determine the effectiveness of different services.

**Saxon, Rachel**

**Mentor(s): Dr. Kristina Ramstad**

**Genetic analysis of nest parasitism in American wood storks**

The American wood stork (WOST; *Mycteria americana*) is a large, non-migratory wading bird. It is the only stork that breeds in North America and has been protected under the Endangered Species Act since 1984. WOST nest colonially with up to 25 nests per tree. Given the close proximity of nests, WOST may employ a strategy of nest parasitism, which occurs when a female lays her eggs in another female's nest to avoid the high cost of defending and feeding chicks. Nest parasitism has not been investigated in US WOST but would be highly beneficial to parasitic females given the species' long (>55 day) fledging interval. To test for nest parasitism in WOST, I collected blood and pin feathers from chicks nesting in two colonies located in Georgia over three breeding seasons (n=144 chicks). If nest parasitism is occurring in WOST, then chicks sharing a nest (nestmates) will not all share the same mtDNA haplotype or be related at the level of full siblings. We first attempted to sequence 460 base pairs of mtDNA but sequencing consistently yielded poor results due to a large CT repeat region. Microsatellite loci (2-4 alleles per locus in WOST) lack the polymorphism needed to assess relatedness among chicks in the absence of parental genotypes. The project has now been redesigned to assess relatedness via a RADcap approach involving >6,000 SNPs which will provide the power needed to estimate relatedness between WOST nestmates. Understanding the mating behavior of WOST, and how that relates to population vital rates (eg, hatching success and fledging success), will be crucial for conserving US WOST populations.

**Scamardo, Rebecca**

**Supervisor(s): Kaitlyn McAllister, Cameron Vinson, Tara Schimelman**

**Mentor(s): Dr. Sanjay Ahire**

**Improving In-Bound, Internal, and Out-Bound Patient Transfer Flow at McLeod Regional Medical Center**

McLeod Health Regional Medical Center (MRMC) treats about 40,000 patients per year using 500 patient rooms. The MRMC Transfer Center (TC) is responsible for inbound transfer of patients from other McLeod locations around the State of South/North Carolina as well as other non-McLeod locations. The TC staff is also responsible for monitoring direct admissions from the MRMC Emergency Department and other scheduled surgeries and procedures and scheduled admissions.

We conducted our Capstone Consulting Project during Spring 2019 through USC Operations and Supply Chain Center. Our project focused on improving several aspects of patient flow and length of stay: inbound transfer delays, internal patient flow and transfer delays, and discharge and outbound transfer delays.

Through primary observations at the TC, a survey of the TC staff, and detailed patient flow data for 10,000 inpatient visits, we analyzed the root causes for inbound transfer delays, internal delays in assigning beds and actually moving patients into these beds through a patient's stay, and discharge and outbound placement delay. These analyses, along with a survey of the TC staff, yielded several kaizens (focused process improvement projects) ranging from standard protocols for communications between TC staff and referring facilities and physicians for inbound transfers, standard work for TC staff, TC staffing levels alignment with call volumes, increased monitoring and communications to reduce delays in hospital units, and theory of constraints analyses and process flow improvements in five of the hospital units that exhibited the longest delays in bed assignment, cleaning, and patient transportation.

The project will provide clear benefits to the TC in managing its workload and reducing the balks of inbound transfers. Even more important, it will focus much needed attention on speeding up patient flow between value-adding treatment phases to reduce patient overall length of stay without sacrificing clinical outcomes.

**Schaltenbrand, Hannah**

**Mentor(s): Dr. Spencer Moore**

**Social Determinants of Healthcare Insecurity**

On the state level, there is a need for research emphasizing affordability as a key component of healthcare insecurity. The National Institute of Health defines healthcare insecurity as feeling uncertain, anxious, and vulnerable about the ability to obtain or sustain adequate healthcare services. While the government subsidizes healthcare for some, there are still groups facing social determinants of healthcare insecurity that are left in a coverage gap due to state funding, or a lack thereof. This research examines affordability to healthcare and risk determinants such as age, level of education and race for a random sample of South Carolina women. Data are from the South Carolina Women's Panel (SCWP). For this study, the SCWP sample consisted of 116 women. Participants were asked "Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?" to examine healthcare insecurity. Logistic regression was used to examine healthcare insecurity and key social determinants. Among our participants, 20.2% reported healthcare insecurity. Our study found that as age increased, the odds of healthcare insecurity decreased (OR: 0.96, 95%CI: 0.94, 0.99). People with lower levels of education were more likely to report being more health insecure (OR: 0.66, 95% CI: 0.46, 0.95). Race was not associated with healthcare insecurity. These findings indicate that younger and less educated women may represent a high risk

group of healthcare insecurity and un-affordability, but more needs to be done to understand the social determinants of healthcare insecurity and how it can be challenged.

**Scharner, Megan**

**Mentor(s): Ms. Theresa Harrison**

**Discovering the Need for Cultural Competence in Healthcare**

As a freshman Nursing major with a minor in Spanish, I anticipated that my required clinical rotations would be the only opportunity I had to combine my two courses of study. When an advisor suggested to me that I visit The Good Samaritan Clinic, I eagerly accepted the opportunity. The Good Samaritan Clinic is a free clinic in the Columbia area that serves the uninsured population, with a special focus on providing culturally competent care, in Spanish, to the Latino population. Though I prepared myself for a new and innovative experience, I did not expect The Good Samaritan Clinic to be such a transformative environment for myself throughout my college career. The Good Samaritan Clinic has proven to be an environment for learning, advancement, and innovation for both myself and the Columbia community as a whole. The Good Samaritan Clinic has taught me so much about the importance of cultural competence in health care, the significance of population-based care, and the vitality of maintaining a therapeutic environment for communication. Throughout my time serving as a triage volunteer and volunteer medical interpreter at The Good Samaritan Clinic, I developed a passion for providing culturally competent care to people of all backgrounds, with a special focus on maternal and prenatal care. The Good Samaritan Clinic has been paramount in helping me to develop passions and career goals throughout my time at The University of South Carolina, and will continue to serve as a model for practice as I move forward with my career.

**Schneider, Kirsten**

**Supervisor(s): Emily Herbert**

**Mentor(s): Dr. David Stodden, Dr. Megan Irwin, Dr. An De Meester**

**An investigation of Seefeldt's skill proficiency barrier on cardiovascular fitness in youth.**

Introduction: Seefeldt (1980) proposed the notion of a motor skill "proficiency barrier" suggesting that if children do not develop adequate levels of fundamental motor skills they will not be able to learn more complex skills and successfully engage in more complex physical activities and sports associated with health benefits in adolescence. Only two investigations in children and young adults have examined whether the proficiency barrier also relates to health-related physical fitness or physical activity levels. No studies have tested the proficiency barrier hypothesis on cardiovascular fitness (CVF) in youth. Purpose: The purpose of this study was to investigate potential presence of a motor skill proficiency barrier related to CVF in youth and adolescents. Methods: A total of 234 (123 boys) youth and adolescents (aged 10-18 years) participated in this study. A total of six motor skills including object control, locomotor and balance/stability tasks were evaluated, combined into a composite factor, and indexed into percentiles separately for boys and girls (Luz et al., 2016). Motor skill levels were categorized as low, moderate, or high. CVF was assessed using the Fitnessgram 20m PACER test. Participants' lap scores were converted to estimated VO<sub>2</sub> max and indexed according to Fitnessgram Healthy Fitness Zones (health risk, needs improvement, or healthy) according to gender norms. A 3-way Chi-square test was conducted to determine the probability of motor skill level predicting PACER Healthy Fitness Zone classifications. Results: Estimated VO<sub>2</sub> max was low-moderately positively correlated with individual motor skill measures (6/6; .28-.53) in boys and (4/6; .22-.51) in girls. Chi-square analysis for the total sample demonstrated a statistically significant predictive model;  $\chi^2(4, n=234) = 212.04, p < 0.001$ . Specific to the proficiency barrier hypothesis, no participants in the low motor skill group met the healthy fitness zone for PACER performance. Furthermore, 87%, (20/23), of low skilled participants were classified as being at health-risk on PACER performance. Conclusion: Study results provide support for a possible skill proficiency barrier related to CVF health in youth. These findings further emphasize the importance of developing adequate

motor skill competence levels in childhood to promote positive life-long health trajectories.

**Schneider, Nicholas**

**Mentor(s): Mr. Shane Berger, Dr. Parastoo Hashemi**

**Real-Time Measurement of Histamine Modulation in the Rodent Brain Using Fast-Scan Cyclic Voltammetry**

Histamine is a neuromodulator that is present throughout the central and peripheral nervous system. Histamine's role in the periphery is well-characterized, however its role in the brain is not fully understood due in part to the harsh environment of the brain and lack of minimally invasive analytical techniques able to monitor histamine. In this, interdisciplinary study, we combine experimental and theoretical neurochemistry to construct models that describe the mechanisms that regulate histamine in the brain. To accomplish this, we utilized use fast-scan cyclic voltammetry to probe the release and reuptake mechanisms of histamine in vivo in the mouse brain. By selectively targeting different elements of the histamine system we visualized key changes to release, reuptake, and metabolism and the influence of these factors on other neurotransmitters. The long-term goal of this work is to apply our novel model to healthy and disease models to identify key changes occurring in the histamine system that may shed new light on more effective therapeutic strategies.

**Schneider, Allison**

**Mentor(s): Dr. Stephanie Milling, Ms. Jen Bess**

**Global Learning in Costa Rica: Valuing Diversity**

During the 2017-2018 academic year, I studied abroad in San Ramon, Costa Rica through the USAC program at la Universidad de Costa Rica Sede Occidente. Costa Rica is known for its bountiful biodiversity, and as a biology student with an interest in ecology and Spanish it was the clear choice for my year abroad. While there, I was able to study in person the diverse ecosystems that the country is known for, from coral reefs and mangrove forests, to tropical rain and cloud forests. Being there for a year allowed me to improve my Spanish language skills and gave me the opportunity to truly appreciate many of the beautiful cultures of Central America. I am grateful for the scholarships and fellowships that made my year abroad possible, in particular for the Gilman Scholarship through the US Department of State which is a competitive study abroad award for Pell Grant recipients, intended to increase the diversity of study abroad students. My national fellowship and global learning experience in Costa Rica infected me with a passion for environmentalism and education that I am inspired to share with the world going forward.

**Schneider, Catherine**

**Mentor(s): Mr. William Quinlan**

**Prague's impact on my UofSC Experience**

Last spring semester, I studied abroad in Prague, Czech Republic at Charles University. Before I overpacked my one large bag and hopped on a plane out of the US for the first time in my life, I set a goal for myself. I wanted to return in May with a changed perspective on the world. What I did not yet realize was that these four months would undoubtedly be the most life-changing period of my college career. Living in another country removed the red, white and blue framed goggles I had worn my entire life. In Dresden and Nuremberg, Germany, I studied WWII from a unique perspective. I spoke with people who remember rebuilding their homes, churches and schools after the cities were demolished and left in ash at the end of the war. Several times, I tested my limits and stepped outside the bounds of my comfort zone. My experience in Prague made a lasting impression on how I see the world in relation to my coursework in mass communications and political science from UofSC. I became more interested in promoting journalistic freedom after visiting Radio Free Europe and seeing the firsthand role journalists played in overthrow-

ing an oppressive regime. I learned unique theories of soft power, foreign relations and diplomacy while speaking to members of the Czech Foreign Ministry. From these experiences I believe I could explain the history we discussed, conversations I had and information I learned from my time in Europe to potential study abroad students or those interested in Czech foreign affairs. In addition, my time in Prague, in combination with my UofSC education, has led me to pursue a career after graduation in strategic communications for public affairs or global affairs.

**Schoener, Jacquelyn**

**Mentor(s): Mr. Duncan Culbreth**

**Stepping Back: Personal and Professional Investment as a Leadership Style**

There are many types of leaders that have found success throughout history, each with their own leadership and management style. During my time at USC, I have had the opportunity to develop my own leadership skills as an intern with the Sustainable Carolina organization, from serving as a Garden Guide coordinating volunteers, providing input in management meetings as the Senior Garden Guide of Education, educating elementary school children on environmental stewardship as a part of the K-12 Garden Club Team, and most recently, aiding in the formation of the new Innovation Team dedicated to bringing new organizational initiatives into fruition. Each of these experiences afforded me a unique opportunity to reflect on the characteristics of a valuable leader, and led me to realize the importance of adapting my leadership techniques to best accommodate each situation and its goals. By applying what I learned from studying historically successful leaders such as Bell Labs' Mervin Kelly, practicing techniques studied in my Management in Information Environments course, and drawing from my hands-on work with my peers and children in the Columbia area, I have concluded that the most effective way to lead others is by investing in their ideas and abilities rather than taking a hierarchal approach. This investment is best achieved by finding and cultivating the common bonds that build communal trust, creating an environment of acceptance and comfort that is essential for productivity. Many times, the most important role of a leader is as a trusting supporter of the passions and abilities of her teammates, and an active listener who encourages those around her to reach their full potential.

**Schoener, Jacquelyn**

**Mentor(s): Dr. Susan Richardson**

**Concentrated Risk: Bromide and Iodide Mapping of SC Rivers Using Ion Chromatography**

South Carolina is historically known as the Wonderful Iodine State due to natural deposits of iodide salt in freshwater sources. In the 1930s, South Carolina touted their iodinated water as healthful for preventing goiter; today, halogenated drinking water is considered differently, having been linked to bladder cancer and, for pregnant women, heightened risk for miscarriage or birth defects. The presence of iodinated and brominated disinfectant byproducts, or DBPs, in municipal water sources has garnered concern in recent years due to their higher toxicity compared to chlorinated DBPs, but there is limited information available on current concentration gradients of bromide and iodide in South Carolina freshwater. Funded by a College of Arts and Sciences UREP grant, I conducted a study in conjugation with the environmental analytical chemistry laboratory of Dr. Susan Richardson which analyzed samples from a selection of ~200 river sites across South Carolina via ion chromatography (IC) to determine concentrations of bromide and iodide anions. Additionally, samples collected during or immediately after a rainfall event were noted to test whether dilution would lower bromide and iodide concentrations or if runoff from geological structures would lead to increased concentrations. Results were used to create maps of South Carolina displaying average bromide and iodide concentrations, which are helpful for identifying potential problematic regions for the formation of brominated and iodinated DBPs in drinking water. Data also provides insight into what extent weather and geological features affect bromide and iodide concentrations, which may be used to engineer better pre-treatment water storage methods.

**Scholten, Victoria**

**Mentor(s): Prof. Maegan Gudridge**

**My Summer Internship at Kohls**

During June and July of 2018, I had the opportunity to work as a store management intern for the department store Kohl's. As a store management intern, I was in charge of hardlines and overseeing customer service. I accepted this internship because I want to pursue a retail position post college and knew Kohls would teach me the basics of retail. I learned how to manage a large team while also being in charge of multiple tasks at the same time. Being a business major and a retail minor at the University of South Carolina, this experience was the first time I was able to combine my two interests while also getting the hands-on-experience I need. Using my knowledge to efficiently lead my team to success while working on my time management and multi-tasking skills to ensure all store tasks were completed. Being able to receive my first instore retail experience helped me grow and realized that I wanted to move into corporate retail. I enjoyed working with a team, but I want to be able to make a larger impact on the company. In the future I will be looking for a corporate retail career that will allow me to use my skills to successfully lead a team while also making a positive impact on the company.

**Schreiber, Dawn**

**Mentor(s): Dr. Randall Lowell**

**Bachelor Level GLD- Professional and Civic Engagement**

Public Speaking and Communications class has helped me significantly throughout my time in college. I have been able to apply the public speaking skills I learned when speaking to large groups of people or when I am talking to a smaller group of people and need to be the focus of attention. The first speech we had to deliver in class, I was so scared and nervous that my eyeglasses fogged up and could not see the people in the audience. Attending USC-Union has pulled me way out of my comfort zone and I have grown so much because of it too. Building my communication skills, staying focused on my main points, and controlling any nervous babbling is the area I have had to work on and focus on, along with learning to control my breathing. I feel working on these skills is what helped me with multiple presentations in front of various groups, including winning 1st place, in the Spring of 2017, at USC Discovery Day.

My first time outside of the United States was during a ten-day Study Abroad trip to London, Paris, and Amsterdam. While in Europe we had a full agenda of historical places to see, places to eat, and culture to enjoy. I had always dreamed of traveling to Europe and being able to touch, smell and taste things I had only seen on the television or read about in a book. Throughout my ten-days, in Europe, there were several times I was taken out of my comfort zone. There are probably larger lessons the University wanted me to learn during my time in Europe, but learning to carefully cross the street in London, mind the gap, watch for pickpockets in Paris, and look for bikes in Amsterdam is what I keep close in my mind when recalling my time abroad. Experiencing the small, mindless, ordinary tasks in a different country should be a possibility for every student.

**Schulteis, Selena**

**Mentor(s): Mr. Chuanji Gao, Ms. Christine Weber, Dr. Svetlana Shinkareva**

**The Effects of Lower-Level Features on Behavioral Ratings of Valence, Arousal, and Dominance**

Affective experiences are influenced by perceptual characteristics in everyday life. Visual and auditory lower-level features such as hue, saturation, brightness, and loudness are integral parts of audiovisual stimuli. This study examined whether behavioral ratings of affective content in film depend on its lower-level features. Participants (n=125) viewed an episode of Sherlock BBC series and made behavioral ratings of valence, arousal, and dominance every 4.5 seconds. Hue, saturation, brightness, and loudness were computed for each of the rated film segments. Behavioral ratings were correlated with each low-

er-level feature and simple linear regression models were generated for valence, arousal, and dominance. Valence and arousal were predicted by saturation and hue, while dominance was only predicted by saturation. Brightness and loudness were not predictive for any of the rating scales. These findings indicate that affect can be influenced by lower-level features, and thus these features should be accounted for in neuroimaging studies of affective processing.

### **Schwartz, Lauren**

**Mentor(s): Dr. Nina Moreno**

#### **Lauren Schwartz GLD Overview**

Leaders must draw on a collection of experiences to effectively guide and manage whatever or whoever they are leading. My variety of roles inside and outside of the workplace setting have established my ability to be a leader. The independence and responsibility I have developed over the years were especially influential to being successful with my internship for the ABC Columbia sports department. Through my position as a University 101 Peer Leader, I mastered the balance between being respected and being relatable to my students. Unexpectedly becoming the Communications Director of Columbia Relief compelled me to become more versatile than ever before. The personal growth I have accumulated throughout my college career has significantly improved my character. I am entering the workforce eager to tackle challenges and equipped with a well-rounded, diverse skill set.

### **Schwartzberg, Rachel**

**Mentor(s): Prof. Sarah Keeling**

#### **Understanding my Future Goals Through an International Lens**

Last spring, I studied abroad at the Florence University of the Arts in Florence, Italy. I chose Florence because I was interested in learning about the culture and history of the city. After studying the effects of globalization on today's society in my business courses, I was excited to venture to a new country and learn about their business and economic structures. Florence University of the Arts offered a variety of courses, and I was able to learn all about the Italian business culture, marketing, anthropology, and journalism in Italy. All of these courses exposed me to life with an international lens, and when I arrived back in the United States, I couldn't wait to continue to learn about countries around the world. While I had been out of the country prior to studying abroad, the opportunity to live in another country for four months allowed me to assimilate into a new city and live like a local. While I was abroad, I was able to visit nine countries and 20 different cities. My four months spent in Italy gave me a new sense of independence, belonging, exploration and tremendous growth. I felt exhilarated every time I explored a new city or got to practice my Italian with locals. The impact that has been left on me is immeasurable – and I will forever be grateful for how much studying abroad changed my career path and helped me to discover my ambitions.

### **Sciabarra, Marissa**

**Mentor(s): Ms. Tricia Kramer**

#### **Sports Medicine Experience Through Internship with USA Baseball**

Last summer I worked with USA Baseball at the National Training Complex in Cary, NC. USA Baseball is the national governing body of amateur baseball in the United States. Apart from organizing national teams for each age level, they are the responsible for leading the country in safety initiatives and regulations. While in Cary, I had the opportunity to work as an athletic training intern for the Women's National Open, Women's National Trials, 18 U Tournament of the Stars, and the College National Team home series. This experience was an amazing way to learn more about sports medicine, specifically related to baseball. I grew up as a baseball player so this internship was in a very appealing setting. My work with USA Base-

ball not only prepared me for a career with baseball athletes but allowed me to network with countless professionals already in the field. I was able to meet and establish connections with coaches, physicians, athletic trainers, media, and managerial personnel throughout the summer. Traveling to minor league stadiums allowed me to experience baseball health care while on the road and playing against international teams gave me a more worldly perspective. After graduation I hope to secure a graduate assistantship position with a collegiate baseball team and work towards a master's degree in Biomechanics or Nutrition.

**Scott, Sylessia**

**Mentor(s): Mr. Rico Reed**

**Being the Impact**

Peer leadership roles here at the University of South Carolina have provided opportunities to not only educate but also mentor first-year students. This poster will examine the impact of an upper-class student on first-year students. Throughout my time here I have been able to serve as an Opportunity Scholar Mentor, serve as a Supplemental Instructor in the Student Success Center, and as a Resident Mentor in the Women in Leadership community. Serving in these roles has not only had a positive impact on the first-year students I've come in contact with, but it has also had a positive impact on me as an individual. I have been able to improve my conflict resolution skills, communication skills, as well as enhance my ability to relate to others while working with diverse populations. The things that I have learned while working with first-year students will be something that will impact me for the rest of my life. The opportunity to give back to the university community in this capacity has been my favorite part of my Carolina experience.

**Searing, Marcus**

**Mentor(s): Mrs. Carrie Van Haren**

**"On Track" To A Career in Railroad Manufacturing**

Last year I began a supply chain internship at HARSCO Rail in West Columbia, SC, a company which manufacturers engineered-to-order equipment for new rail construction, rail replacement, and rail maintenance. Due to the nature of engineer-to-order firms, HARSCO's supply chain is highly complex. The equipment HARSCO makes is sold domestically and internationally, and each customer has specific requirements depending on the country and varying governmental regulations. Various departments – engineering, procurement, manufacturing – must coordinate daily to ensure continued production and this could mean outsourcing components or entire machines. The financial impacts of the recent tariffs on steel – the major raw material in these machines – has had a noticeable effect, although agreements with suppliers has helped to mitigate the effects. The company also recently publicly announced the closure of its manufacturing facility in Michigan, moving those operations to our facility in West Columbia, which is currently undergoing an expansion of its production floor.

Majoring in Operations and Supply Chain, I was able to apply my knowledge from the classroom to my initial project which revolved around finding a source for every part that was used in the Michigan facility, referred to in supply chain as "Plan For Every Part." Starting with a list of nearly 7,000 parts, I prioritized parts based on average yearly usage, analyzed engineering drawings to determine if a part was able to be locally supplied, tracked completed parts, and, if a new supplier could provide HARSCO with a part at a lower cost, documented the savings. I have stayed at HARSCO throughout the year and worked on several projects that have directly affected the continued expansion of the business.

Throughout my time at HARSCO I have learned the importance of clear and professional communication, both oral and written, and how this affects internal and external business interactions. I was able to witness how classroom knowledge can be directly applied and when firsthand experience transcends the purely academic. This internship has solidified my desire to continue working in manufacturing and provided me with valuable insights into the business world.

**Shankwiler, Amanda**

**Mentor(s): Dr. Elise Lewis**

**The Path That Helped My Career Take Flight**

College is an opportunity to make mistakes, to learn techniques and to learn professionalism. I pushed myself in social, academic, and career-oriented situations to help myself become a difference maker. I started fostering my leadership ability through Gamma Phi Beta Sorority where I served as Risk Manager and was a part of Academic and Philanthropic Committees. My involvement in those roles made me look at alternative perspectives and taught me how to stand up for unpopular opinions. I loved the logistics side of being Risk Manager, which led me to my career in Supply Chain Management. I excelled academically because of my involvement in classes and creating mentorships with my professors. I credit University 101, a first-year seminar for freshman, for instilling these successful habits so I became an instructor to help give back to that experience. During the summer, I worked for United Technologies Aerospace in their Strategic Sourcing and Commodity Management Department. I had the opportunity to handle supplier quoting and cost-savings identification. I'm continuing my work with them by creating a Total Landed Cost Model for commodity managers. This tool will give them a holistic view of the costs associated with each supplier. Through these experiences, I found that dream career is working in aviation field because of my passion for airplanes. My presentation will discuss the insights learned through college that will help shape me into an engaged professional eager to make a difference in the corporate world.

**Shay, Alexandra**

**Mentor(s): Mr. William Quinlan**

**Peer to Peer Learning: The Value of Students Teaching Students**

For the past year, I have worked at the Student Success Center (SSC) here at UofSC. The SSC's mission is to help students who are having trouble with their studies. Our services range from 1:1 tutoring, to group Supplemental Instruction sessions, to Academic Success and Study Skills Workshops. As a journalism major at the University of South Carolina, I have been able to truly understand how to communicate with every type of individual through this experience. I have worked with first generation college students, international students, students in Greek life and everyone in between. I have given over 90 one on one Success Consultations to undergraduate students at the university. The curriculums cover Academic Success and Study Skills, Procrastination and Prioritization, Concentration and Attention, and Exam Prep and Test Taking Strategies. During each session I spend time getting to know the student and understanding their struggles, and how best to help them through their academic journey. Having this opportunity made me realize the value of Peer to Peer Learning and how to connect with students in a way that is organic. Because of this job, I have been entertaining the idea of going back to school for a Master's Degree in Higher Education.

Being a student involved in Greek Life, there are always people to meet with new opportunities to share. Had it not been for Kappa Kappa Gamma, I would not have known that a job at the SSC was available. A sorority sister of mine introduced me to that opportunity, much like how I was introduced to being a University 101 Peer Leader. The class I took in congruence with being a University 101 Peer Leader was EDLP 520. In our class of eighteen we learned how to learn from each other, much like in a consultation. We shared lesson plans as well as fun ice breakers for our classes. My presentation will discuss my insight into how that class, coupled with my employment with the SSC guided me through my last two years at Carolina, and how I am preparing for life after graduation.

**Shealy, Ryann**

**Mentor(s): Dr. Hexin Chen**

**The Effect of miRNA-489 on Tamoxifen Resistant Estrogen Positive Breast Cancer**

About 70% of breast cancers are estrogen receptor positive. Tamoxifen is used as a hormone therapy that is commonly used in treatment of estrogen positive breast cancers. This drug acts as an estrogen analog thus blocking estrogen receptors and preventing the proliferation of breast cancer. However, breast cancers with tamoxifen resistance exist and are inherently nonresponsive to the drug. Treatment of tamoxifen supplemented with the addition of another molecule, such as miR-489, that would sensitize tamoxifen resistant cancers to the drug could be used to treat all estrogen positive breast cancers more effectively. To investigate this issue further, a miRNA-489 knock-out cell line was created using CRISPR/Cas9 editing. Clinically, tamoxifen-resistant breast cancers have lower expression of miRNA-489, so creating a miRNA-489 knock-out cell line would help determine how the miRNA affects estrogen positive breast cancer proliferation. It was found that loss of miRNA-489 promoted tamoxifen resistance and growth and conversely, it was found that miRNA-489 restoration decreased proliferation of estrogen positive breast cancers with the addition of tamoxifen. It is hypothesized that miRNA-489 has this effect because of its blockage of the HER2-P13K-ERK pathway. Future implications could look further at the effect of miRNA-489/tamoxifen treatment in a clinical setting.

**Sheppard, Anna**

**Mentor(s): Dr. Jennifer Bess**

**Hum Saath Saath Challenge: Social Support & Language Immersion Abroad through the Boren Flagship Languages Initiatives**

Part of the National Security Education Program (NSEP), the Boren Scholarships and Fellowships fund language study abroad for students from around the US. While most Boren awards fund programs of the applicant's choosing, the Boren Flagship Languages Initiatives are unique in that students take part in an intentionally-designed language program at institutes in the US and abroad with other members of their cohort. Upon graduation, all Boren Scholars and Fellows have the opportunity to work for the federal government for a minimum of at least one year, often utilizing their language skills to help contribute to our nation's security and prosperity.

I didn't learn about Boren until a random free afternoon in the spring of my sophomore year led me to attend an Office of Fellowships and Scholar Programs (OFSP) workshop on campus. Leaving the session, I found myself newly excited about the possibility of national scholarships in a way that I hadn't been since first applying to college. After a few months of essay drafting, interviewing, and invaluable help from the OFSP, I was named a 2018 Boren South Asian Flagship Language Scholar. The program began the following June with an intensive Urdu language program at the University of Wisconsin-Madison, followed by a semester of language immersion at the American Institute of Indian Studies in Lucknow, India. Throughout the duration of the two programs, the amount of programmatic and peer support that I received was critical, including help in the Indian visa application process, complete coverage of my vaccinations, and weekly group meetings to discuss everything from culture shock to professional development. Beyond the support, I also gained a new love for language learning and the spectrum of ways through which it can be accomplished. Since returning from my program, I have found that this new love has created changes in the way I view learning in other fields, too, especially poetry and health promotion, two of my greatest passions. What started as one meeting with OFSP turned into a life-changing experience and a new worldview, something I will always be grateful for.

**Shirah, Ali****Mentor(s): Mrs. Anna Oswald-Hensley****The Roles of Ali Lea**

During the summer of 2018, I became a student ambassador. My role was to show new students around USC Sumter campus, to help enroll into their classes, and possibly make a new friend or two in the groups that tour together. I choose this leadership role on campus, because I thought it would be a fun and amazing time to be around new people and helping others. Being in this role it taught me to work better with others, and to show students that our facility does care about them and want to see students achieve their goals in life. Being a student ambassador will help me out in the end, because it has brought me out of my shell to be more open to talk to new people, and it has led me to work better with others and public speaking in which that will help me with my future career as being a teacher.

**Shumaker, Cassidy****Mentor(s): Mr. David DeWeil****Peer-to-Peer Mentorship and My Journey Through Thick and Thin**

Student mentorship plays a huge role in the value of an individual's undergraduate career. This is not untrue of my own experience. Not only have I been effected by strong mentors, but I have had the opportunity to effect similar change through mentor roles of my own including as a Resident Mentor and University 101 Peer Leader. These opportunities were important to my time as a Gamecock and reinforced my ability to reach new heights in my education and career as well. As a result, I've learned to apply key classroom concepts to critical situations in my personal and professional roles. Particularly though lessons that highlighted emotional intelligence and servant leadership – which aided me through challenging times as a mentor – I have been able to make valuable connections which have led me to grow as a person and better help those around me, principally through the connections I have made to development of strength of character and the realization of the value of relationships. Ultimately, these experiences have molded me as a person and taught me what it means not only to be a mentor, but what it means to be a Gamecock.

**Silverman, Leah****Mentor(s): Dr. Ambra Hiott****Leah Silverman Global Leadership**

Last spring, I studied abroad in Budapest, Hungary. While in Budapest I pushed myself to embrace new experiences and people. While in Budapest I learned about Hungarian culture, history, and business regulations. While abroad I really wanted to push myself out of my comfort zone and learn and grow. While abroad I traveled to many different countries across Europe, and really tried to embrace each culture and emerge myself in the customs. My time abroad really helped me advance personally. I learned how to accept people that were different, how to adapt, and how to embrace things that are new and different. While abroad I experienced so much personal growth, by trying new things, and by learning about other peoples' beliefs and background. My time abroad taught me amazing lessons and introduced me to people I otherwise never would have met. The lessons which I learned while abroad, have carried over to my academic pursuits and extracurricular activities back at the University of South Carolina. My time in Europe was transformative. I have since learned how to be more accepting, adaptive, and curious. This new mindset has helped me work better with other people, and learn from other people's opinions and ideas/ Through studying abroad, I learned so much both in and out of the classroom. I know that my experience made a lasting impact on me, and the personal growth I experienced will stay with me through my entire life.

**Sitter, James**

**Mentor(s): Prof. Aaron Vannucci**

**Using Photo-Catalysts to Create Diazo Compounds in High Yields**

Azo compounds are compounds that are important in the making of dyes. Recently, however, they have garnered new attention with their applications in photoswitchable drugs due to their ability to change conformations with the application of light. Traditionally, however, these compounds have been formed utilizing fossil fuels and/or extremely harsh reaction conditions. This research is being conducted to instead use the renewable resource of light as an energy source with the side product of the reaction being water. This eliminates the need for fossil fuels, as well as toxic byproducts formed during the reaction, creating a sustainable, environmentally friendly reaction to produce these highly desirable compounds. Diazo compounds were synthesized utilizing a light-driven system. Tris(bipyridine)ruthenium(II) chloride ( $\text{Ru}(\text{bpy})_3\text{Cl}_2$ ) was used to photocatalytically oxidize and couple amines to create a symmetrical azo compound that can be utilized in multiple applications. Yields of over 60% have been reached with most products tested, with recovery of products or starting material up to 98%. Optimization work is being done on the system utilizing electron-donating amines to drive the process. The project is currently still in progress with the investigation of increasing product yields utilizing a sacrificial electron acceptor to adjust the equilibrium of the system. The diazo compounds were recovered via column chromatography and characterized via Nuclear Magnetic Spectroscopy (NMR) techniques.

**Smiley, Lauren**

**Mentor(s): Dr. Kristina Ramstad, Mr. Larry Bryan**

**Does nesting behavior correlate with nesting success in American wood storks?**

The American wood stork (WOST, *Mycteria americana*) is a threatened species of wading bird that has been highly affected by human activity and habitat loss. Improving our understanding of how WOST nesting behavior influences their reproductive success is critical to proper management and persistence of the species. In this project, nesting behavior of WOST in Chew Mill Pond, Georgia was monitored over the 2017 and 2018 nesting seasons to determine if fledging success (% of nestlings surviving to week 6) is correlated with parental attendance (% of observations with at least one adult in the nest with chicks) and/or nest site selection (height above water). We also compared nest success (mean number of chicks fledged per nest) at this colony among years using a long-term dataset collected by the US Fish and Wildlife Service. Mean fledging success in 2018 was 95.6% (range= 50% to 100%) and was not correlated with either the amount of parental attendance the nest received ( $R^2=0.06$ ,  $P=0.31$ ) or nest height ( $R^2<0.01$ ,  $P=0.74$ ). Long-term data show strong interannual variation in nest success at Chew Mill Pond, which ranged from 0.3 to 2.4 chicks fledged per nest (mean =1.5) between 1993 and 2013. Nest success at Chew Mill pond was average in 2017 (1.5 chicks/nest) and significantly higher in 2018 (2.1 chicks/nest,  $P<0.05$ ) and suggests positive population growth among Chew Mill WOST in recent years. Taken together, we suggest that the primary determinants of WOST reproductive success are environmental factors (e.g., precipitation or prey availability) rather than nest site selection or parental attendance. Additional studies of WOST nesting behavior are needed to confirm these findings.

**Smith, Bobbi**

**Mentor(s): Ms. Nicole White, Dr. Suzanne Swan**

**African American Male College Students' Perspective On Mental Health**

Mental health problems effect more than 50% of college students each year (Gruttadaro & Crudo, 2012). Mental health can be characterized in many forms such as anxiety and depression which are two of the main issues most college students struggle with on a daily basis. More than 40% of college students fail to seek help which can lead to poor academic outcomes (Gruttadaro & Crudo, 2012). Although many college

students have difficulties with stress and balancing school, minority students are more prone to stress and psychological needs than their non-minority peers (Smith, et al., 2014). The purpose of this qualitative study is to discover how black college men conceptualize mental health; in addition to how mental health was viewed within their family growing up. The current study consisted of five African American male undergraduate students at the University of South Carolina. The five men participated in face to face interviews. The interview consisted of ten questions to examine their knowledge of mental health within the African American male community. The results showed that 4 out of 5 of the men struggled with mental health problems while in college. Additionally, mental health was not a frequent discussion in their household growing up. Two of the men from the study expressed not having any knowledge of mental health until entering college, this resulted in confusion of how to seek help. The results demonstrate that mental health is not an active topic within the African American male community. Conducting more research on this topic will bring increased awareness to college campuses. This awareness may help African American college men feel more comfortable expressing their mental health struggles.

**Smith, Rhianna**

**Mentor(s): Dr. Jeremy Culler**

**Dadaism in the Twenty-first Century: The Rise of Millennial Nihilist Humor**

From 1915 to 1925, the art movement known as Dadaism emerged in Europe. Its chief proponents criticized social and political institutions, highlighted satirical responses to World War I, and produced nonsensical and contradictory art that often took the form of photomontages or collages. Many Dadaists, such as Hannah Höch, John Heartfield, Tristan Tzara, Marcel Duchamp, and Man Ray, took on the role of satirical commentators. Notable works that served as direct forms of social critique include Höch's *Cut with a Kitchen Knife Dada through the Last Weimar Beer-Belly Cultural Epoch in Germany*—a new type of montage that pieced together Weimar era politics in the early 1900s. In recent developments, the nihilistic social critique of the Dadaists has returned in the form of digital montages known as Internet memes. In this new era, contemporary critiques of the current social climate have emerged via the Internet meme.

This paper examines the Internet meme as a contemporary form of photomontage and an extension of Dadaist, nihilistic world perceptions to define the use of memes as avenues of social critique. While a small body of literature exists on the rhetorical nature of memes, this paper serves to connect the techniques exhibited by Dadaism to television sketches, political cartoons, and the Internet meme phenomenon. This paper illustrates contemporary usage of Dadaist technique through digital media technology to continue the agenda of social critique of art made possible through the development of photo manipulation software and the permeability of the Internet in everyday life. Further integrating Dadaist ideas and practices with Internet memes, it explores the use of nihilistic and cynical views in the two movements, especially regarding the use of negative views to enact social and cultural change. Finally, it addresses the ease of dissemination of Internet memes and the simplicity of adopting existing cultural elements through image manipulation has led to the development of a faster-propagating source of criticism which still resembles its roots in Dadaist critique, the nonsensicality of Internet memes becoming their greatest strength.

**Smith, Meghan**

**Mentor(s): Dr. Krystal Werfel**

**Developing a School-Age Language Screening Assessment**

Specific language impairment (SLI) is a language disorder that delays typical language acquisition and cannot be accounted for by hearing loss or any other developmental disorder. To date, the causes of SLI are unknown and children who meet the diagnostic criteria often enter elementary school unidentified. Omitting past tense in finite spoken language has consistently been a clinical marker of preschool

children with SLI. However, by the time children enter elementary school, past tense marking in spoken language closely resembles their same age peers. Thus, there is too much overlap in spoken language and spoken language finite marking stops being a useful marker. So recently researchers have explored using written language as a method of measuring finite marking in older children. Written language is more linguistically challenging, so these markers show back up when we tax the system. Our lab developed a school-age language screening assessment (SALSA) that uses oral reading as a context to measure past tense marking. Additionally, the Clinical Evaluation of Language Fundamentals-5, the Test of Word Read Efficiency-2, and the Test of Nonverbal Intelligence-4 were administered to assess overall language ability, overall reading ability, and non-verbal intelligence. I administered and scored these measures in addition to second, third, and fourth graders in a private school in Columbia, SC. Initial analysis indicates that the SALSA screening measure was successful in detecting SLI. Therefore, SALSA could easily be used by teachers and paraprofessionals to diagnose SLI in school-age children.

**Smith, Katie**

**Mentor(s): Prof. Hayley Ross**

**Lead, Serve, Listen, and Write**

The Daily Gamecock is a student-run newspaper on campus that delivers everything from local and national news, arts and culture features, and opinion pieces to the Columbia area. The mission of the paper is to creatively prepare and present ideas in a way that is new and engaging- a way that people haven't seen before. During my time as a member of The Daily Gamecock, my role of senior copy editor allowed me to gain leadership, editing, and communication experience, as well as a deeper understanding of and witness to self-expression through writing. Getting to work closely with the writers allowed me to serve them effectively and learn from their writing, while having the responsibility of managing a team of copy editors pushed me to reflect on and enhance my leadership abilities. Through these opportunities, I not only gained experience for my future career in editing, but also acquired insights on the skills that I obtained as a leader, servant, and listener.

**Smith, Austin**

**Mentor(s): Dr. Shannon Davis**

**Mutation in PACT may affect the development of the cerebellum and relate to dystonia**

Dystonia is a disorder characterized by intense prolonged muscle contraction coupled with repetitive movements. These sustained uncontrolled muscle contractions can have negative impacts on the health and quality of life for individuals. One form of dystonia has been related to the mutation of the gene PACT (also known as Prkra). PrkraLear5j mice have a mutation insertion affecting the PACT gene and present with craniofacial malformations, small ears, and ascending dystonia (12). PACT is important in the migration of cerebellar granular neurons, when PACT function is reduced these neurons fail to migrate properly (8). This would in turn affect the overall development of the cerebellum. PACT has also been linked to the arborization of sensory motor neurons in zebrafish (Corey Weaver personal communication). Since there is a linkage between PACT and neuronal arborization and the development of the cerebellum we question if its mutation could negatively impact neurons in the cerebellum as well as neurons elsewhere. Purkinje cells are a type of neuron located in the cerebellum and consist as the sole motor output of the cerebellum and act to inhibit motor function. These cells also have a high expression of PACT, especially during early development (8). This study is interested in these neurons specifically because we understand they are the "breaks" on motor function and dystonia which, has been related to the PACT gene, is characterized by the inability to inhibit motor function. And as mentioned above PACT is closely related to cerebellar development and has been shown to affect arborization in other neurons. Using immunohistochemistry we are able to stain the cells of interest for comparison. We are examining wild-type mice cerebellar tissue sections and the structure of Purkinje cells and contrasting those against the PrkraLear5j mutants to see

if there is a difference in either number or arborization of the Purkinje cells.

**Smith, Kaeli**

**Mentor(s): Dr. Shuo Xiao**

### **Zika Virus Infects the Reproductive Organs of Non-Pregnant Female Mice**

Zika virus (ZIKV) was isolated in 1947 from monkeys in the Zika forest, Uganda, and infections has been sporadically reported. The recent epidemic of ZIKV in Latin America has increased its relevance. From January of 2015 to January of 2019, 42,746 cases have been detected in US and its territories. Though ZIKV infection is not life-threatening, pregnant women who become infected with ZIKV have a significantly higher risk of fetal congenital abnormalities. Although guidelines are in place for pregnant women, they are lacking for those may be in the future. We aim to investigate the ZIKV infection pattern in non-pregnant mice and focus on the female reproductive system. Young adult C57BL/6 female mice with type I interferon receptor deficiency (*Ifnar1*<sup>-/-</sup>) were intraperitoneally injected with vehicle or ZIKV (Zika-MEX-1-44) at 1000 PFU once, and sacrificed on days 1, 2, 4, 7, and 14 after injection. The reproductive tissues were harvested, with spleens used as a marker of infection and positive control. ZIKV levels were determined by qRT-PCR using primers designed to amplify the portion of the non-structural NS5 protein of ZIKV, and tissue ZIKV distribution patterns were determined by IF and IHC using a rabbit polyclonal anti-ZIKV NS3 primary antibody. Results indicate that the spleen was positive for ZIKV RNA on day 1 after infection and peaked on day 2, followed by a decrease on day 4 and after. In the female reproductive system (the ovary, oviduct, and uterus), ZIKV was not present on day 1 but was detected on day 2 and increased to a peak on day 4. The ZIKV RNA levels in the female reproductive organs were decreased on day 7 and were non-detectable on day 14. We used the tissue sections on day 4 after injection to determine the ZIKV distribution in female reproductive organs. Immunostaining results suggest that ZIKV primarily infected stromal cells and luteal cells in the ovary, smooth muscle layers in the oviduct, and myometrial and stromal cells in the uterus. These preliminary results demonstrate that ZIKV infects reproductive organs of non-pregnant female mice and the ZIKV-infection pattern is time- and cell type-dependent.

**Smoker, Brice**

**Mentor(s): Dr. Mark Sarzynski**

### **Protein quantification of isolated HDL from whole plasma samples**

Introduction: Low concentration of high-density lipoprotein cholesterol (HDL-C) is a proven risk factor for cardiovascular disease (CVD) development. Yet, studies show that clinically increasing HDL-C does not lead to decreased CVD risk. Because of this, the “HDL function” hypothesis was formed, stating that the biological properties of HDL particles may be more important than the plasma concentration of HDL-C when determining the cardioprotective capacity of HDL. The isolation of HDL particles from whole plasma samples is an integral first step in measuring these biological functions.

Purpose: To learn HDL isolation techniques and to quantify HDL protein content.

Methods: Plasma samples from a previously completed exercise (high intensity interval training - HIIT) study were used. HDL was isolated from samples using the fast protein liquid chromatography (FPLC) with size exclusion chromatography (SEC) method. Each plasma sample was run through two superdex 200 10/300 GL increase columns arranged in series on an AKTA Pure 25 FPLC system (GE Healthcare). The chromatograph of the FPLC elution was used to identify the HDL fractions. The HDL fractions were then collected, combined, and aliquoted. One aliquot of each sample was used to conduct a Bradford protein assay, quantifying the amount of protein in each sample.

Future Directions: These data will be used to determine the anti-inflammatory properties of HDL by test-

ing its ability to inhibit cytokine-induced expression of VCAM-1 in human umbilical vein endothelial cells (HUVECs), quantified through quantitative reverse transcription polymerase chain reaction (RT-qPCR).

Significance: The leading cause of death in the United States is CVD, which has been proven to be protected against by the function of HDL particles. It is expected that HDL particles will become more effective at inhibiting the expression of VCAM-1 following a bout of HIIT exercise. If this is supported by my results, the study could provide a better understanding of how exercise (specifically HIIT) affects the anti-inflammatory function of HDL. Therefore, the results of this study may provide a better understanding of how exercise can be used to both prevent and treat CVD.

**Snyder, Josephine**

**Mentor(s): Dr. Amanda Wangwright**

**Practical Experience in Minor-League Baseball and Community Relations**

Over the summer, I completed an internship with a minor-league baseball team, the Hagerstown Suns, in Hagerstown, Maryland. The Hagerstown Suns are a single A minor-league affiliate of the Washington Nationals. I had the opportunity to gain experience in multiple different departments, but I specialized in the community relations and promotions department. As a Sport and Entertainment Management at the University of South Carolina, my internship gave me an opportunity to gain hand-on experience in the professional sports industry. During the internship, I served as a representative of the team throughout the community at different events. I managed and coordinated youth camps and community-based initiatives. I also collaborated in the preparation and execution of game-day promotions and Kid's Club memberships. This internship cemented my decision to pursue a career in the professional sports industry through community relations.

**Snyder, Laura**

**Mentor(s): Dr. Francis Spinale, Dr. Lydia Matesic**

**Ubiquitin Ligase Wwp1 Gene Deletion Attenuates Diastolic Heart Failure in Pressure Overload Hypertrophy**

Background. A common cause for hospitalization and mortality is heart failure (HF). One form of HF is due to an accumulation of extracellular matrix secondary to a left ventricular (LV) pressure overload (LVPO) and is termed HF with a preserved ejection fraction (EF; HFpEF). Ubiquitination is essential for normal protein turnover, and the E3 ubiquitin ligase WWP1 (encoded by the Wwp1 gene) is a fundamental determinant of this pathway. Since HFpEF arises due to LVPO and abnormal matrix accumulation, we tested the hypothesis that genetic ablation of Wwp1 would alter the progression of HFpEF with LVPO. Methods/Results. Global Wwp1 deletion was achieved in mice (n=9; Wwp1<sup>-/-</sup>) and echocardiography (40MHz) was performed to measure LV mass, EF, Doppler velocities of LV filling (early-E, late/atrial-A; E/A ratio) at 12 weeks of age (Baseline) and then at 2 and 4 weeks following LVPO (transverse aortic banding). Age-matched wild type mice (Wwp1<sup>+/+</sup>; n=12) were included and underwent identical measurements and LVPO. Baseline LV EF was nearly identical between the two groups (59 + 2% vs 52 + 4%, p >0.05) and remained similar with LVPO. LVPO increased LV mass in both groups but was lower in the Wwp1<sup>-/-</sup> animals (66 + 11 vs. 35 + 5, p<0.05). Functional indices of HFpEF progression occurred in Wwp1<sup>+/+</sup> but were blunted in Wwp1<sup>-/-</sup> mice. For example, with LVPO, the E/A ratio, an index of LV filling, was 3.97 + 0.46 in Wwp1<sup>+/+</sup> but was 1.73 + 0.19 in the Wwp1<sup>-/-</sup> group (p<0.05). At the transcriptional level, mRNA for fibrillar collagens (types I and III) was decreased by approximately 50% in the Wwp1<sup>-/-</sup> compared to the Wwp1<sup>+/+</sup> group (p<0.05).

Summary. Since changes in WWP1 alter protein turnover and, relevant to this study, extracellular matrix turnover, the novel and significant findings of the present study are two-fold. First, the absence of Wwp1 reduced the development of LVH and subsequent progression to HFpEF. Second, modulating the WWP1

pathway could be a therapeutic target to alter the natural history and severity of HFpEF.

**Spadaro, Caroline**

**Mentor(s): Dr. Dan Freedman**

**Serving Differently Abled Individuals**

Every summer of my college experience, I have worked at the Town of Hempstead's Camp ANCHOR program. This is a six week summer camp for children and adults with a variety of disabilities ranging from Autism to Cerebral Palsy, among many other things. This experience has changed me as a person, as well as the way I want to utilize my legal career in the future. Working with a differently abled population has taught me so much about being positive regardless of circumstance and recognizing the good in others and all they have to offer even if they appear different from you. I have also seen how much this community can struggle to find appropriate services for their needs, be treated fairly, and just generally be accepted by society at large. As a psychology and political science major looking to study the law next year, I believe combining all I have experienced through my job at Camp Anchor with my legal focus will allow me to make an impact on a community that has done so much good for me, and make their lives a little easier by ensuring that the law is serving the needs of those differently abled individuals.

**Spenner, Jordyn**

**Supervisor(s): Lauren Sabbagh, David Munson, Carson Potter, Sam Martin**

**Mentor(s): Prof. Dave Precht**

**Johnson and Johnson Capstone Team**

Our corporate partner, Johnson and Johnson (J&J), is addressing an issue with regards to their global corporate product donations. They are challenged to donate more product in a much more efficient manner, ultimately improving the lives of those in need. J&J recognizes that there are multiple processes that are inconsistent throughout the global corporation, which leads to inefficiency and improvement opportunities. Product donated is from J&J's Consumer, Medical Devices and Pharmaceutical businesses that is approaching the expiration date. Key customers are Non-Governmental Organizations (NGO) established to secure and supply needed products to those in need around the globe.

The USC team, as part of the Operations and Supply Chain Center's capstone projects, following the Lean / Six Sigma DMAIC problem solving methodology, has worked with J&J to understand the current process and to develop the future state process, including required changes, metrics, actions to support and maintain those changes, and reinforcement methods. Our team interviewed over twenty-five stakeholders around the globe, including internal J&J subject matter experts (SME) and key contacts at NGO's. Process maps and related statistics were compiled and verified by the SME's.

Partnering with J&J, the team traveled to New Jersey to lead a two-and-a-half-day workshop of J&J personnel to bring the team up to a common understanding, brainstorm and rank improvement efforts, develop the future state, and then identify actions to make this happen. After the workshop, the team worked with process owners to develop implementation plans focused on each business segment. Part of this effort was to draft solutions for the follow-up stakeholder calls and then to work with those stakeholders to develop final solutions. Solution areas included changes to the process to reduce overall cycle time, consolidation and elimination of steps, developing standards for monthly, quarterly, and annual business cycles, identification of roles and duties, and methods to reinforce positive behaviors.

It was a positive experience for the team, applying what we learned at USC to a real-world problem, and ultimately improving a process that will help people in need around the globe.

**Spetz, Madeline**

**Mentor(s): Dr. Michael Gower**

**Investigating the effect of PLG microparticles on endocrine function of adipose tissue**

As type 2 diabetes progresses, the adipose tissue becomes insulin resistant, resulting in the dysregulation of hormone production, including decreased production of adiponectin. Anti-diabetic therapeutic agents have been developed that manipulate the expression of these hormones in order to maintain healthy adipose endocrine signaling. One such drug is rosiglitazone (rosi), which has previously been prescribed as an anti-diabetes treatment, as it acts to improve insulin sensitivity. However, rosiglitazone is also associated with adverse effects on non-target tissues, specifically causing an increased risk of myocardial infarctions. Our lab proposes to deliver rosiglitazone locally through polymer drug delivery particles in order to avoid such off-target effects. We fabricated rosi-loaded poly(lactide-co-glycolide) (PLG) microparticles using an oil-in-water solvent evaporation method. Ethyl acetate and dichloromethane (DCM) were tested for use as the organic solvent. We also developed an easy method for fabricating drug-loaded particles of a specific size using differential centrifugation. A total of 6 particles batches were fabricated: 2  $\mu\text{m}$ , 7  $\mu\text{m}$ , and 20  $\mu\text{m}$  in diameter in both ethyl acetate and DCM. The loading of rosiglitazone was found to be higher in particles fabricated using ethyl acetate, however the morphology of the ethyl acetate particles appears to be porous and inconsistent. Both ethyl acetate- and DCM-fabricated particles show a sustained release of rosiglitazone over time. Future studies will include testing the bioactivity of the rosi-loaded particles in vitro by measuring adiponectin levels in 3T3-L1 adipocyte culture after particle delivery. Additionally, therapeutic potential will be studied in vivo in a mouse model by testing plasma adiponectin levels after particle injection to the inguinal adipose tissue.

**Spires, Mckenzie**

**Mentor(s): Dr. William Jackson**

**Cloning a HIV-1 Vif-resistant A3G gene into a lentiviral vector**

This study focuses on the HIV-1 Viral infectivity factor (Vif), and how it interacts with a host anti-retroviral protein called Apolipoprotein B mRNA editing enzyme, catalytic polypeptide-like 3G (A3G). During HIV infection, A3G is normally packaged into progeny virions, and following infection of a subsequent host cells, acts to induce extensive cysteine to uracil mutations, leading to guanine to adenine substitutions and provirus inactivation. However, Vif prevents A3G incorporation into virions by inducing A3G ubiquitination and proteasomal degradation. The goal of this project was to develop a lentiviral vector that expresses a fusion gene incorporating a Vif-resistant form of A3G (D128K) and the selectable marker, puromycin-N-acetyltransferase. This fusion gene was created by triplex PCR, which eliminated the A3G stop codon and linked the two genes together using the *Thosea asigna* virus T2A peptide cleavage sequence. During the cloning process, a Ha tag was added to the 5' end of A3G to assist with detecting A3G expression. The fusion gene was then cloned into the lentiviral vector, pLRed(INS2)R, which we have previously shown to express a Renilla luciferase/eGFP fusion gene in a HIV-dependent manner. Current work is underway to analyze the function of the Vif-resistant vector, pLHaATP(INS2)R and to determine if the vector can limit generation of a productive infection.

**Sponaule, Rebecca**

**Mentor(s): Ms. Sarah Gay**

**Real Estate Legal Internship**

In this presentation, I will be showcasing my experience and work as a legal assistant at the Law Office of Christopher J. Moran. At their office, I worked under a real estate attorney beginning in September 2016, and have gained knowledge in software databases, official documentation, and general law office etiquette. This involvement has led to my decision to pursue a law degree following my graduation at the

University of South Carolina, in either corporate or international law.

**Springer, Molly**

**Mentor(s): Ms. Sarah Keeling**

**Italy & Back**

During the Spring of my Junior Year at USC I had the opportunity to study abroad at Lorenzo de Medici, the International Italian Institute in Florence, Italy. Studying in another country was always a goal of mine. I have grown up with a love of travel and wanted to further my education in a new country. At Lorenzo de Medici, I studied coursework pertaining to my finance major as well as cultural classes such as cooking and elementary Italian language. My main goal when I explore a new place is to immerse myself culturally. Studying in Italy for four months was the best way I could think of to do that. I learned the basics of the language and the ways of Italian people and by the end of my semester, I was leaving behind a place I began to call "home." During my time abroad, I saw 24 different cities in 11 different countries. In each city I traveled to, I made my best effort to learn about the places and people I saw and keep more and more of an open mind. By the end of my travels, I had much more of an understanding and appreciation for other cultures in the world and am now able to use this inclusive lens in my daily life. I was also able to see how other countries run and was even challenged personally about my own. It gave me the opportunity to use theories I've learned in Political Science and Economics courses out of the classroom and see them in the real world. My travels thus far and what I have learned in my coursework have prepared me to be successful in my career after graduation.

**Squicciarini, Emily**

**Mentor(s): Mr. Duncan Culbreth**

**Learning through experience; How I learned more living in a foreign country than sitting in a classroom**

Being the experiential learner I am, studying abroad was always something I felt inclined to do but I never could have foreseen the impact it made on my life personally, professionally, and academically. Studying abroad multiple times has given me the opportunity to experience so many new cultures on a deeper level than just visiting a country, and the classes I have taken throughout my time at USC have taught me so many lessons on how to approach a cultural difference and work through any issues that may arise through those. As a global supply chain and operations management major, a lot of classes are focused on the 'global' piece of that term. I know I want to work internationally so studying in a few foreign countries seems the best way to get my foot in the door, feel more comfortable communicating cross culturally, and gain insight and knowledge into the daily lives of peoples far different from me. One of my biggest learning experiences was visiting China this past winter. After learning about Asian business culture in so many of my business classes, seeing and taking part in it first hand was an unmatched experience. One of the other influential trips was the time I spent in Tours, France living with a host family, and not being allowed to speak English. We were with students from all around the globe, and although I had ample learning in the classroom during the day, the things I learned the most about and grasped the best were at the dinner table with my host mom or walking around with my international friends. These are the little things I have learned throughout my time spent abroad that I will carry with me and continue learning from forever.

**Stallings, William**

**Mentor(s): Dr. Stanley Dubinsky, Dr. Michael Gavin**

**Terrorism and Ethnonationalism: The Basques in Spain**

Ethnic identity is, at times, in harmony with national unity, which has contributed to the creation of na-

tion-states in modern history. Other times, when ethnic minorities are involved, the two clash for supremacy and affect the stability of these nation-states. One such clash involves the indigenous Basque (Euskera) people of Spain.

Through the unique history of the Spanish state, the Basque language and its people were allowed to remain relatively undisturbed and autonomous under successive kingdoms and governments. It remained alone amongst pre-Roman languages, surviving the Roman Empire, al-Andalus, and the unification of the Spanish crown. However, throughout the 19th and 20th centuries, the gradual reduction of special liberties that the Basques maintained was slowly eroded by war and Spanish nationalization. The Spanish Civil War and the rise of Francisco Franco's dictatorship brought a swift end to the freedoms that the Basque people experienced in regard to language and culture. Subsequently, their backlash against the oppressive policies of the Francoist regime gave rise to the terrorist organization Euskadi Ta Askatasuna, or ETA, that is discussed in our presentation. Even after the end of Franco's regime, the ETA continued to agitate against the Spanish government and struggle for independence, rejecting the limited autonomy granted by the Spanish government and continuing to commit terrorist acts in pursuit of their goal of having a Basque state. The research that I have helped contribute to covers the period between 1839 and 2018, but the central years of the conflict run from 1959 to 2018. These are the years during which the ETA was in operation. In this presentation, I will describe the terrorism and ethnonationalism that was used to both oppress the Basque people under the Franco regime and to support the creation of a Basque nation-state through ETA's violent actions.

This work was supported in part by the South Carolina Honors College Exploration Scholars Research Program.

### **Stalls, Kendall**

**Supervisor(s): Andrew James**

**Mentor(s): Dr. Marj Pena, Mrs. Kristen Hogan**

### **The Effect of a Folate-Free Diet on Tumor Burden and Response to Chemotherapy**

Our research is to understand the effect of the microbiota on colorectal cancer. Evidence has been shown that the microbiota is linked to the development and progression of colorectal cancer. The research focuses on how the gut microbiome influences the effectiveness of colorectal cancer treatments. Specifically, how the composition of the microbiota and the metabolites that it secretes changes the response to chemotherapy. We also research how tumor burden can be altered through changing the composition of the gut bacteria. Our experiments are performed on APC/Min+ mice, that have been genetically altered to have colon cancer. We conducted an experiment to analyze the effect of giving a folate-free diet in combination with 5-fluorouracil (5-FU), an agent used to treat colorectal cancer, on tumor burden in mice. 5-FU acts as a Thymidylate synthase inhibitor to stop the production of cancerous DNA. However, damaged DNA can still be produced by using the folate obtained through our diet. This experiment allowed us to determine whether gut microbiome manipulation through diet can alter the response to chemotherapy and tumor burden in colorectal patients.

### **Stein, Bridget**

**Mentor(s): Mr. David Deweil**

### **Developing My Passions Through Leadership and Experience**

For the past year, I have interned at the Senate Judiciary Committee of the South Carolina Legislature. This internship was included as part of the South Carolina Semester Program in which I worked in a South Carolina State Government office and completed a class taught by Senator Sheheen. The Senate Judiciary Committee is a committee of the South Carolina Senate that has over twenty members and is charged

with screening judicial candidates. As a Political Science major and having interest in attending law school, I have gained invaluable professional development from this experience and have been promoted from an intern to bill keeper. In this position, I organize, prepare, and attend full-committee and sub-committee meetings and perform tasks to contribute to the efficiency of the committee. This internship has developed my passion for government operations and reaffirmed my desire to attend law school. Furthermore, I gained confidence to pursue my passions outside my internship by beginning a stand at a farmer's market, Bridget's Craft Corner, and pursuing leadership in my sorority, Phi Mu, as New Member Educator. These experiences have developed my leadership skills while seeking out new experiences to grow professionally and find joy in my life. This internship has inspired me to continue my experience at the South Carolina State House and be open to opportunities to explore my passions.

**Stephens, Jared**

**Mentor(s): Dr. Elise Lewis**

**The Importance of Project Management in an IT Environment and USC's Curriculum**

During my internship with Colonial Life, I was assigned to the Business Planning and Technical Strategy team. This team concentrated on project management and the planning of future technological initiatives. I took this position to gain meaningful experience in not just the project and product management field, but also to gain insight into Scrum and Agile environments. In this internship, I was able to shadow and play essential roles, lead events and ceremonies, and manage relations with clients. I found that project management is an integral position in any organizations that are looking to improve and stay up-to-date continuously. This means that it is crucial for not just organizations, but also colleges to invest in project management

**Stevens, Grant**

**Mentor(s): Dr. Nathan Hancock**

**Lysing *Bacillus cereus* with Phage Amidase**

Bacteriophage are viruses that attack specific types of bacteria. Scientists have shown that purified amidase proteins encoded by some bacteriophage can destroy the cell walls of specific bacteria. *Bacillus cereus* is a species of bacteria that infects human intestines and implicated in food poisoning cases. Development of phage-based strategies for controlling pathogens like *Bacillus cereus* will allow for more effective treatment of bacterial infection without traditional antibiotics.

We plan on using amidases from two different bacteriophage, BPS13 and DIGNKC, in order to lyse or break down the cell wall of, *Bacillus cereus*, without lysing other bacteria. The first step of our project is to create expression constructs for both BPS13 and DIGNKC. These constructs were verified by PCR and sequencing. The two amidase constructs were then transformed into *Agrobacterium* to allow for transformation into *Arabidopsis thaliana* plants. We predict that our plant produced amidases will successfully lyse *Bacillus cereus* in culture.

We have successfully transformed *Arabidopsis* with the DIGNKC amidase. We will test transgenic *Arabidopsis* leaf tissue to determine if our construct can produce enough amidase to inhibit growth of *Bacillus cereus* in culture. We will also test BPS13 in the future.

**Stewart, Christina**

**Mentor(s): Dr. Scott White**

**One Big Global Family**

During Spring Semester 2018, I studied abroad in Bilbao, Spain. From this experience I realized that despite the size of our world and the inherent differences in people, we aren't quite as different as we think. I had lived in South Carolina my entire life and had always been curious about a world outside of what

I was accustomed to. I craved a deep, diverse knowledge that one can only obtain through experience. I wanted a true understanding of how the world works and why things are the way they are. While abroad, I wanted to travel as much as possible to experience the many cultures of different European countries, but I also didn't want to miss out on getting to know the beautiful city I was residing in. So, I balanced the two. In Bilbao, I participated in a student teaching program where I learned about the lives of the local children, who brought me so much joy, and I gained significant leadership experience as well. While traveling, I learned how unique each European country is and realized how large and diverse our world is. I visited six European countries, just a small number compared to the rest of the world out there. However, my greatest takeaway from my four months abroad is that we are all one big global family. Now that I have opened my eyes, I have a strong desire to convey this message to others and help lead humanity to a better future.

**Stine, Joshua**

**Supervisor(s): Josie Cox**

**Mentor(s): Dr. Jennifer Parker-Harley**

### **A Comparison of Coaching and Teaching in the Private Music Lesson Setting**

In the traditional education of an instrumentalist in the U.S., the student receives one hour-long lesson per week with a teacher specializing in their instrument. Between the weekly meetings, the student is expected to take the information given to them and apply it to their individual practice. In contrast, athletes take a very different approach to their training. Most of their practice is done with a coach, with only a small portion done individually. Differences in the two models are much more prominent than one may think. According to website and blog "Project Idealism", writer Andrew Wicklander states that a teacher is someone that "knows something, shows you how to do something or tells you some piece of information that they know." The students receiving this information would then take it upon themselves to implement this knowledge into their individual practicing. In contrast, a coach would observe an individual and then give immediate feedback based on their observations. This means that the coach will observe you at all points in your advancement and be able to give on the spot advice and feedback. For musicians, this includes the time spent practicing or rehearsing, making an overall immensely different model for applied instruction than the traditional "teacher". Our project was designed to compare the experiences of daily coaching sessions over a two-week period with weekly lessons over the course of a semester to determine the benefits and drawbacks of each approach on the progress of music students. By compiling our experiences in Saarburg, Germany and from USC, we will compare and contrast the advantages and disadvantages of having a musical coach versus the traditional teacher. After conducting our experiment, we will learn whether the coaching's at the festival or the traditional teaching style here at the university are more effective for the progress of undergraduate musicians. Our findings could potentially impact instruction here at USC that we receive as students as well as the methods we use with our future students. We will then be able to potentially model private music instruction after the relationship between coach and athlete.

**Stocker, Vivica**

**Mentor(s): Ms. Carrie Van Haren**

### **The Journey from Peer Education to Mentorship**

After I switched my major from nursing to public health, I began searching for organizations that would provide me with public health-related experience. In the Fall of 2017, I saw a flyer that expressed interest in recruiting students for Changing Carolina Peer Leaders (CCPL). CCPL is a student organization that aims to promote healthy practices in the areas of general wellness, sexual health, mental health, and healthy relationships. I was selected to be a peer leader and began training during the Spring semester of 2018. My role as a peer educator impacted my academic career in the most profound way. As a peer edu-

cator, I chose to focus on the areas related to sexual health. I gave 50-minute presentations to University 101 students about the risk and preventative measures when engaging in sexual activities. Being a part of the organization allowed me to learn more about sexual health and become well informed on topics that I had previously studied in my public health classes. Being in this position, I gained the confidence to speak effortlessly in front of an audience while impacting their future decisions through my presentations. I learned how to actively engage audiences. I developed exponentially as a leader as I grew in my ability to process public issues and make recommendations to solve them. These learned skills and experiences helped me develop into a good mentor. Through my experiences of providing recommendations about various health topics to my peers, I am able to do the same when guiding my mentees. As a part of my Discover USC presentation, I will expand upon CCPL's major impacts on my life and how it helped me as a mentor.

**Stofik, Nathan**

**Mentor(s): Dr. Pooyan Jamshidi, Ms. Yuxiang Sun, Dr. Roozbeh Behroozmand**

**Neurofeedback-Based Reinforcement Learning Game Design for Improving Speech and Limb Motor Function**

Millions of patients are afflicted by neurological diseases, such as Parkinson's disease and Post-stroke Aphasia, in which difficulties in speech production or motor control arise. From various treatment methods, Neurofeedback (NF) has repeatedly shown its potential application as a non-invasive treatment. A general approach for NF is analyzing electrophysiological (e.g., EEG signals) directly sampled from the patients' scalp. These signals reflect patients' intent when faced with specific environments or tasks. An analysis of these signals output numerical instructions that are transmitted to a computer program to accomplish certain tasks. With the assistance sensory (e.g., visual or auditory) cues, patients are expected to modulate brain activities and improve physiological functions. In our study, we implemented a video game coupled with a reinforcement learning model to investigate the underlying neural mechanisms of speech and limb movement and use it as a NF component for guiding targeted treatment. The game design is one of the key components in NF-based treatment, which works as a bridge between reinforcement learning and neuroscience. After our initial reinforcement learning model is released, several healthy subjects and patients will be recruited as volunteers in our control and experiment groups respectively, to verify the validation of our model and video game. EEG signals sampled from healthy subjects playing our games are going to be set as the reference targets patients' training, in which patients' brain activities should look as close as possible after treatment. Patients will then play the game again, this time utilizing gameplay cues generated from the control group patients, in order to perform appropriately to achieve scores similar to healthy subjects. The distance between the two scores is used as a key indicator for the reinforcement learning algorithm to generate better cues. The strength of similar approaches in general machine learning has been validated widely, and using that knowledge, we aim for generating several robust reinforcement learning models for different neurological diseases and corresponding video games.

**Stokes, GraceAnne**

**Mentor(s): Dr. Stephen Thompson**

**Linguistic and Cultural Communication in Guanajuato, Mexico**

I spent last spring studying abroad in Guanajuato, Mexico with CIEE for five months. As a Spanish major, I considered it necessary to study abroad for at least a semester in order to practice my Spanish in a native setting, and hopefully improve it significantly. This program was for intermediate or advanced learners, and offered the opportunity to take classes at the University of Guanajuato with local Mexican students. I took advantage of this opportunity and took courses in Mexican history and the history of the Spanish language, among others. Interacting with locals, living with a host family, and taking intensive coursework

in Spanish definitely helped to improve my fluency, to the point where I now feel much more comfortable communicating solely in Spanish. Living in such close proximity with my host family, however, made me realize that the linguistic barrier was not the only problem, but that there also existed a cultural barrier that I had to overcome in order to effectively communicate. I found this aspect of communication much more challenging than the linguistic challenge, and spent my first couple of months struggling to adjust to the cultural differences such as conception of time and personal space. However, I believe this experience made me more adaptable overall, and I now feel much more comfortable traveling to different cultures, regardless of the language spoken there.

**Stone, Callie**

**Mentor(s): Dr. Elise Lewis**

**Implementing, Utilizing, and Monitoring ClickUp - Increasing Productivity Within a Small Business Environment**

My current internship is with Iris & Marie Letterpress as a Studio Assistant. My primary responsibility is to implement, utilize and monitor the productivity software ClickUp. The initial step was to transfer all client data from the previous databases Trello and Dubsado, and reorganize the information so the design of the software would allow for stronger time management. Our reasoning behind implementing ClickUp was not only to better monitor assigned tasks and work flow, but to also eliminate excessive written communication through email within the company and end distracting verbal exchange throughout the design process.

Every group of users adapts a technology to best fulfill their needs. Because ClickUp is a large-scale software that is designed to be applied to as many groups of people as possible, the individual user is tasked with adapting the application to best suit their business. Instead of diving directly into data transfer, I realized I had to personally design our database from the ground up. This was a large undertaking in deciding what features take precedent over others within ClickUp. As the purpose of the software is to increase productivity on all fronts, navigating the software must be productive in itself. With my internship only spanning the course of the semester, it is crucial that the design of each client template is flawless and easily understood by future employees.

**Stoudemire, Kathryn**

**Mentor(s): Ms. Maegan Gudridge**

**Learning from the nation's capitol**

During the summer before my senior year, I was a communications and public affairs intern at Global Strategy Group (GSG). As one of the top public affairs firms in the country, I was instantly drawn to GSG. GSG utilizes research to drive their communications strategies for everyone from Fortune 500 companies to local nonprofits. They place a necessary emphasis on doing work that benefits the community and country and only take clients that align with their values. As a communications and public affairs intern, I was responsible for six client accounts. I drafted letters to the editor, opinion pieces and social media on behalf of these clients. The culmination of my internship was my internship presentation. In the middle of my internship, I was placed on a team with four other interns and tasked with developing a communications strategy that would propel FWD.us into the criminal justice reform landscape. FWD.us is one of GSG's clients and GSG was looking to do this exact redesign for them. We were able to create a clear, cohesive strategy that was centered around the incorporation of new media, such as virtual reality. The last week of my internship, my team and I presented our project to GSG leadership.

As a mass communications major hoping to pursue a career in public affairs, GSG gave me the tools and opportunity to be successful. They encouraged me to take the lead on a variety of clients and gave me support when needed. Ultimately, I learned how important it is to not only enjoy the work, but to enjoy the people you work with as well. Even more, I learned how to work in an agency environment and will now

be able to adapt quickly into a post-graduate job.

**Strater, Richard**

**Mentor(s): Dr. Jennifer Reynolds**

**Learning English in Queretaro, Mexico**

Thanks to a Magellan Scholars Undergraduate Research Grant provided by the Office of Undergraduate Research at The University of South Carolina and the support of both my advisor and mentor Dr. Jennifer Reynolds as well as Dr. Lori Donath, I was able to conduct an ethnographic research project which I am developing into my Senior Thesis. This project, which I have titled, Learning English in Queretaro, Mexico, examines the lives and motivations of undergraduate university students who are learning English as part of their degree program. I spent six weeks conducting this project in the city of Santiago de Queretaro, Mexico. I used participant observation, field notes, surveys, and established case studies to ethnographically examine social, linguistic, and cultural patterns. I conducted three case studies, worked with these case studies to produce six transcribed interviews, took forty-five full pages of fieldnotes (5,000+ words), and collected one hundred and twenty-one student surveys from students at four different universities. This project has allowed me to examine the relations between global education politics, the political economy of Mexico, and international media transfers as they all have influenced the lives of university students who are learning English in the city of Queretaro, Mexico. While this project was only conducted over a short time period, did not collect large amounts of data, and did not receive copious amounts of funding, I hope that it adds a small contribution to the study of global language flows and the 21st century power of the English language.

**Streeter, Elisabeth**

**Mentor(s): Ms. Fran Gardner**

**Revitalizing Small Town Communities: The case for arts**

Through field research, literature review, and internships I have become aware of how the arts play a significant role in transforming small communities. The number of big "box" stores is on the rise, and small town U.S.A. is struggling. Arts should be an avenue to revitalize small towns.

**Strickland, Courtney**

**Mentor(s): Dr. Daniel Fogerty**

**Multimodal recognition of interrupted speech: Benefit from text and visual speech cues**

Presenting degraded speech with visual cues facilitates speech recognition. This benefit is observed for visual speech cues that are perceptually correlated with the auditory signal, as well as for text cues that delay integration until a later cognitive-linguistic processing stage. However, it is not clear how the benefit compares between these two types of degraded multimodal presentations. The current study examined how listeners integrate visually interrupted text or visual speech cues with acoustically interrupted speech. In Experiment 1, text was periodically interrupted by white space at visual interruption rates that were associated with the auditory interruption rate of speech. In Experiment 2, videos were visually interrupted by grey frames. The synchrony of audio-visual interruption was also manipulated by presenting visual cues in-phase or 180° out-of-phase with speech interruptions. For both experiments, speech was low-pass filtered at 2000 Hz. Preliminary results indicate that listeners obtain a benefit from both visual speech and text cues. In addition, performance is affected by the interruption rate of speech, with minimal performance obtained around an interruption rate of 2 Hz. Supplementing speech with incomplete visual cues can improve sentence intelligibility and compensate for degraded speech in adverse listening conditions. [Work supported, in part, by NIH/NIDCD]

**Strickland, Taylor**

**Mentor(s): Dr. Sheri Silfies, Dr. Jennifer Vendemia**

**Brain Activation Representing Motor Planning and Execution during Lumbopelvic Movement Tasks: Alterations in Individuals with Chronic Low Back Pain**

**Purpose:** To gain a better understanding of sensorimotor cortex changes and the role of altered motor control associated with chronic low back pain (cLBP) and impaired lumbopelvic movement.

**Methods:** 14 right handed participants (7 cLBP; 7 asymptomatic) completed a task-based, block design protocol to capture patterns of relative brain activation during lumbopelvic movements. Subjects performed 3 lumbopelvic movement tasks during functional imaging of the brain to investigate different voluntary motor plans: supine bilateral and unilateral modified bridging. Tasks was performed 6 times in random order, in a Siemens 3-T MRI. Image pre-processing was performed in FSL. First level whole brain statistical analyses were performed in native space and statistical maps registered to standard space prior to higher level analysis for identification of active clusters across the tasks ( $z > 2.3$ ;  $p < .05$ ; corrected for multiple comparison). Relative brain activation patterns were compared between individuals with and without cLBP. Sensorimotor integration (ROI correlations) were assessed for group-differences.

**Results:** The cLBP group demonstrated greater relative activation within the SMA during the bridge tasks and reduced within-hemisphere activation correlations between sensory and motor cortical regions.

**Conclusions:** Findings suggest a role for altered integration of somatosensory information into motor planning and task performance in the cLBP group.

**Stringfellow, Isabel**

**Mentor(s): Dr. Cynthia Corbett**

**Using Alexa to Promote Older Adults Abilities to Age Safely at Home: Initial Questions and Challenges among Patients and Care Providers**

The population of individuals aged 70 and older is expected to increase over 90% in the next twenty years. With an aging population and a limited number of care providers and home health aides it's important to acknowledge the critical role that smart technology may take in providing not only healthcare but companionship and ease of use. The purpose of our study is to evaluate the primary challenges and questions posed by both remote Caregivers and their patients/participants when using dyads of Echo Show and Dots. We hypothesize that putting Alexa in the homes of people with MCI/AD and their caregivers will allow for a decreased caregiver burden as well as an increase in independence for the participant. We also hypothesize that the initial questions and challenges may be ones regarding the learning curve of adopting and utilizing new technology as well as integrating it into the daily lifestyle or routine. We used five dyads of patients and caregivers and had them use their respective Echo Shows or Dots in their home for whatever purposes they need for 60 days. Within that time there was an initial visit, a second visit and discussion and a final interview of both the patients and caregivers about their questions and challenges they faced. Results will be explored further upon reception. We originally thought that the main challenges would be concerning the ease of use of technology and implementing an easy system for communication between the caregiver and care receiver.

**Sullivan, Courtney**

**Mentor(s): Mrs. Hayley Ross**

**What I learned from my study abroad experience**

During the spring semester of my junior year, I studied abroad in Florence, Italy at Florence University of the Arts. Deciding to go abroad was an easy decision as I knew this experience would encourage me to step out of my comfort zone and ultimately allow me to develop an understanding of my place in the world and how important it is to adapt in order to make a difference. The lessons I learned abroad, espe-

cially when interacting with the local Florentines, helped me find my place in the world. From learning about the Italian culture from an authentic Italian professor, to ordering a panini in Italian to conform to society, I engaged in unique, valuable experiences that I could not have had in the United States. These experiences forced me to learn how to adapt to, and how to improve any situation. I will carry these lessons with me as I venture into a career in environmental public health where it is important to adapt to undesirable situations in order to improve them. Without the things I learned in Florence Italy, I would not have developed into the confident young adult I am today.

**Sullivan, Tamera**

**Mentor(s): Prof. Ana Cueto, Dr. Emily Mann**

**A Comparison of the United States and Costa Rican Health Care Systems and Their Influence on Immigrant Women's Maternal and Child Health Outcomes**

Health is a fundamental right for all humans, and every nation has a unique system for health care delivery. The United States and Costa Rica follow two different welfare state models, but there is still value in comparing the two countries. I learned so much during my public health-based study abroad experience in Costa Rica which sparked a desire to learn more about the structures that form the health care system of each country. The United States has a more privatized and fragmented health care system, while Costa Rica has a public, universal health care system. Although different in many ways, The United States and Costa Rica have similar approaches when concerning the health of immigrants. In this project, I break down the structures that form each health care system and delve into how having an immigrant status affects the maternal and child health outcomes of immigrant women. In both countries immigrant women find ways to access health care for their babies and themselves but are in general viewed by society as burdens on the health care system.

**Sumpter, Nakeita**

**Supervisor(s): Daijah Pickens, Carson Bland, Samantha Peka**

**Mentor(s): Dr. Adam Pazda**

**Further Examination of The Less Is Better Effect**

The current study further examined the less is better effect by replicating Hsee's (1998) study. The less is better effect suggests that people will prefer cheap objects when closer to the ceiling of the price range compared to a more expensive object placed low in the price range. The current study added an extra component of usefulness. The t test analysis replicated results from Hsee's (1998) study; however, the less is better effect did not extend to perceived usefulness.

**Sun, Qiufen**

**Supervisor(s): Jiawei Zhou**

**Mentor(s): Prof. Jiajia Zhang**

**Association between periodontal disease and adverse pregnancy outcomes in adults**

Preterm birth, occurring before 37 completed weeks of pregnancy, is the number one cause of newborn deaths and the second leading cause of deaths in children under five. Known causes of spontaneous PTB and stillbirth include a previous PTB, black race, periodontal disease, tobacco and alcohol use, low maternal body-mass index and high levels of pregnancy-related anxiety. In recent years, both case-control and prospective studies have shown that maternal oral infection, including acute gingival infections (gingivitis) and chronic periodontal infections (periodontitis) is an independent contributor to adverse pregnancy outcomes. However, each study has a different definition of periodontal disease and adopts different evaluation indicators, so the results of these studies are not comparable. A targeted analysis of the relationship between each of the variables used to assess oral infection or periodontal disease and

PTB or stillbirth is more convincing because there is a uniform assessment of both pregnancy outcomes and variable levels, mainly including the antibody titer level of periodontal infection bacteria and some clinical parameters. The purpose of this study was to determine whether maternal periodontal infection was predictive of PTB (less than 37 weeks) or PTB and stillbirth through prospective studies, and look for a threshold to provide diagnostic criteria for clinicians in order to provide a means of clinical prediction for the prevention of the occurrence of premature infants.

**Sunderlage, Alexis**

**Mentor(s): Dr. Kerry McIver**

### **Objective Health Measures, Body Self-Perception, and Sport Participation in 9th Grade Students**

**BACKGROUND:** Many students choose to participate in sports while they are in high school, and adolescents who participate in sports have a more positive self-perception compared to adolescents who do not participate in sports. Adolescent males and females are much more likely to be unhealthy if they do not participate in a sport or physical activity. The purpose of this study is to examine the relationship between percent body fat, fat mass index, and body mass index related to body self-perception and weight satisfaction in 9th grade students who participate in sports compared to those who do not participate in sports. **METHODS:** 364 9TH grade students, 41.21% male, from 2 diverse school districts participated in the study. Participants had their height and weight measured using standard procedures. Demographic variables were also reported by participants. Percent body fat was measured using bioelectrical impedance analysis. Participants also completed a 9-item self-perception survey and reported satisfaction with current weight. Self-perceptions and objective measures of weight status were compared between sport participants and non-participants using t-tests. **RESULTS:** 46.98% (N=171) of students participated in sports, and students who participated in sports had a significantly lower percent body fat ( $p < 0.0001$ ). There was also a significant difference in fat mass index ( $p < 0.0001$ ) and in body mass index ( $p = 0.0148$ ). In the subjective measure of self-perception, the data were significant in weight satisfaction ( $p = 0.0359$ ) with students who participate in sports reporting higher satisfaction. The data were also significant looking at overall shape satisfaction ( $p = 0.0026$ ) and stomach satisfaction ( $p = 0.0462$ ). There was borderline significance concerning current weight importance ( $p = 0.0557$ ). **CONCLUSIONS:** In conclusion, 9th grade students who participated in sports had lower objective measures of percent body fat, fat mass index, and body mass index. Students who participated in sports also had higher self-perception, specifically self-perception of weight, shape, and stomach. Students who participated in sports had a borderline significant difference in current weight importance. These results support the positive effect of sport participation on body weight and also perception of weight. Future research should further investigate these relationships and examine other activities that may have the same positive effects.

**Swanstrom, Jacob**

**Mentor(s): Dr. Tobias Heinrich**

### **Brutal Terrorism and Public Attention**

In this study, the puzzle of how terrorism attacks influence public attention is developed into a nuanced understanding of how characteristics of terrorism attacks shape attention seeking behavior. Specifically, we analyze how individual's attention and interest changes depending on specific tactical choices by terrorist organizations. This research question is important as it relates to a fundamental understanding of the relationship between terrorism attacks, public reaction and tangential government action. To understand this phenomenon, we use Google Trend search data and Global Terrorism Database data to compare how tactical terrorism choices relate to search query data from the public (sorted by counter-terrorism active country specific internet data). We study how characteristics like citizens being killed, target type, and attack type influence the public differently. We increase the testing factor for the first 6 months and reduce to equilibrium afterward to measure all sides of the effect. Main results include interesting data

on the relationship between country-name attention and terrorist-name attention afterward an onset of terrorism in a country, with terrorist-name attention increasing for around 6 months while country-name attention decreasing (and even becoming negative) within 6 months. In the study of how the “brutality” index of a terrorist attack influences public attention, we find that the attributes of “attack type”, “target type” and “own citizen killed” all influence attention seeking behavior differently. We find the most difference to be among the country-name searching data. As the target type increases in brutality, searching queries for the country-name increase for a long period of time, while searching queries for the terrorist organization instantaneously increase but experience a dip into negative change within 5 months. Similarly, “attack type brutality” and “own citizen killed” experience similar trends in respect to the terrorist organization search queries but differ in country name attention with “attack type” momentarily increasing in attention but experiencing negative attention queries in a matter of months. Conclusions are ongoing but point to the strength and indicative factor of the study of tactical terrorism attacks and how characteristics of terrorism attacks can be shown to change public attention and attention seeking behavior.

**Swiecki, Allison**

**Mentor(s): Dr. Nathan Hancock, Dr. April DeLaurier**

**Optimizing Tol2 transposition in Zebrafish**

Transposable elements are DNA segments that move within the genome when induced by transposase proteins. The Tol2 transposable element from Medaka fish has successfully been adapted for integrating foreign DNA into a wide variety of vertebrates. In order to increase the usefulness of Tol2 as a transgenic tool, our goal is to optimize Tol2 transposition in zebrafish. To achieve this, there are two separate components to the project. The first uses activation tagging, a form of transposon tagging, in order to induce overexpression of genes, allowing us to learn about the function of genes that may otherwise be hard to study because of lethality or redundancy. An activation tag is created when a strong enhancer is positioned within the transposable element. Our activation tag construct consists of the Tol2 terminal inverted repeats flanking the enhancer region of the beta-actin promoter. This activation tag was cloned in front of the mCherry reporter gene to indicate when transposition occurs. A Tol2 transposase expression construct controlled by a heat inducible promoter was engineered to induce transposition of the activation tag in zebrafish. The two constructs were coinjected into zebrafish embryos to create a population for measuring transposition rates. Upon heat shocking the embryos, a loss of mCherry expression within the zebrafish will indicate the transposition of the activation tag away from the reporter gene. As a result of the activation tag landing somewhere else within the genome, it is expected that a mutant phenotype can also be observed. The second study investigates whether the removal of a Nuclear Export Signal (NES) from the Tol2 transposase will increase the efficiency of Tol2 transposition. We hypothesize that the NES is keeping Tol2 transposase outside of the nucleus, thus lowering the rate of Tol2 transposition. Comparison of rate of transgene integration rates for control and NES removed versions of transposase mRNA will indicate if the NES functions to suppress Tol2 transposition.

**Tager, Kylie**

**Mentor(s): Dr. William Jackson**

**Creating a reporter plasmid to allow testing of anti-HIV Rev siRNAs**

The Human immunodeficiency virus (HIV) is a retrovirus that infects and kills CD4+ T-cells, weakening the host's immune capacity. The Acquired Immune Deficiency Syndrome (AIDS) occurs when an infected individual has one or more opportunistic diseases and a T cell count of less than 200/ $\mu$ l. Although current drug treatments control HIV replication, they are not curative. Another way to inhibit HIV replication might be through the use of short hairpin RNAs (shRNAs) that are designed to target viral mRNA and induce RNA interference. ShRNAs are single-stranded molecules that are cleaved into double-stranded small interfering RNAs (siRNAs) by the host enzyme, Dicer. The complementary RNA strand, termed the

guide strand, is then utilized by the host RNA induced silencing complex (RISC) to bind to and cleave the targeted viral mRNA, thereby silencing the gene. A potential target of RNA interference is the HIV-I Regulator of Virion Expression (Rev), which functions to bind partially spliced and unspliced mRNAs and export them to the cytosol for translation, or in the case of unspliced mRNAs, to also act as the virus genome. Therefore, a shRNA was designed to target HIV-I Rev at nucleotide 8403 of the HIV genomic clone pNL43 (Accession number M19921). The resulting RNA was converted to dsDNA, HindIII and BglII sites were added for cloning, and both strands were synthesized. Revsh840, the anti-Rev shDNA, was cloned into the shuttle vector pHI.Stuffer(-) to create the pHIRevSh8403 plasmid. Successful cloning was verified by PCR and direct sequencing. To test the anti-Rev activity of this shRNA, a reporter plasmid is currently being created. For this, pCMV- $\beta$ -gal was digested with XhoI, located within the  $\beta$ -gal 3' untranslated region (3' UTR). Next, a portion of pNL43 containing Rev Exon 2, which includes the Rev 8403 target site, will be cloned into the 3' UTR of pCMV- $\beta$ -gal. Anti-Rev shRNAs targeted to this sequence are expected to silence  $\beta$ -gal activity, providing an efficient way to access specificity of anti-Rev shRNAs.

**Tamura, Alexandra**

**Mentor(s): Dr. Alissa Armstrong**

**Characterizing the Role of adipocyte ImpL2 in Regulating Oogenesis in the model organism *Drosophila melanogaster***

Heart disease, malignant neoplasms, and diabetes mellitus are the first, second, and seventh leading causes of death in the United States, and chronic disease treatment constitutes over 75% of health care spending in the United States. Obesity is linked to chronic diseases including type II diabetes, cardiovascular disease, and multiple cancers, and over 60% of American adults are overweight or obese. The cellular and molecular mechanisms underlying this well-established link between obesity and disease are not completely understood. The purpose of this project is to examine how the adipose tissue, which is dysfunctional during obesity, communicates to other tissues using *Drosophila melanogaster*, the fruit fly, as a model. Specifically, I characterized the role of adipocyte-derived ImpL2, a negative regulator of insulin signaling, in modulating oogenesis in the stem-cell supported ovary, a highly nutrient responsive organ in fruit flies. Using a traditional *Drosophila* genetic tool, the Gal4-UAS system, ImpL2 was overexpressed or knocked down specifically in adult adipocytes and ovarian effects were measured using immunostaining and confocal microscopy. Additionally, effects of perturbed ImpL2 expression on adipocytes was assessed. Given that ImpL2 inhibits signaling, which is known to positively regulate several aspects of oogenesis, including germline stem cell (GSC) maintenance and germ cell survival, as well as promote adipocyte growth, we propose that ImpL2 knockdown may result in increased GSC numbers and larger adipocytes in comparison to controls. Conversely, ImpL2 overexpression may result in decreased GSCs and smaller adipocyte size. Knowing how ImpL2 specifically expressed in the fat body is incorporated into the larger insulin signaling pathway will further the understanding of the molecular underpinnings of how fat tissue communicates to other organs. Because 70% of human genes have *Drosophila m.* homologues and insulin signaling is a conserved pathway, characterizing the role of ImpL2 may provide a better understanding of why diseases like diabetes mellitus and several types of cancers are associated with obesity.

**Tang, Wan-Yun**

**Mentor(s): Prof. Maegan Gudridge**

**Stepping Out of My Comfort Zone**

I was born in Taiwan but raised in Brazil, therefore my study abroad experience was my four years college experience at the University of South Carolina and my Spring semester experience at the City University of Hong Kong. I decided to come to the United States to pursue my college degree because I wanted to challenge myself by going to a different country. My international background and my passion for different cultures made me choose UofSC due to its outstanding International Business program. After arriving

at the United States, I had to overcome several challenges such as the cultural shock and educational differences. However, after I became familiar with the American environment, I decided to challenge myself again by going to Hong Kong for my study abroad program. I chose to go to Hong Kong because I wanted to reconnect with my Chinese roots since I lived most of my life in Brazil and did not have the opportunity to experience the Chinese culture. My experience in Hong Kong was unique and surprising because I learned a lot about my strengths and weaknesses in only four months. I realized that I struggle to adapt to the local environment despite my previous travel experiences. However, I also learned that my biggest strength was being a good listener to learn more about my environment. My study abroad experiences made me into an effective problem solver because it gave me the opportunity to use my strengths efficiently and improve my weaknesses.

**Tavakoli, Navid**

**Mentor(s): Dr. Parastoo Hashemi**

**Evaluating the Effects of Perinatal Lead Exposure on Developmental Neurochemistry with a Focus on Serotonin**

Lead exposure has previously been associated with an increased risk for developmental disorders, with nearly 20% of human exposure to lead coming from drinking water. Previous research on prenatal lead exposure has indicated a possible correlation between lead exposure and an increase in repetitive behaviors and anxiety, as well as a decrease in social dominance. While these correlations seem evident, many gaps exist in the determination of the perinatal health risks and the impact of lead acetate at low levels in drinking water. To address these gaps, breeding pairs of mice were exposed to drinking water with 15 ppb lead acetate, the current EPA drinking water limit, throughout the entirety of their pregnancy and to the point that the pups were weaned. At six weeks of age, the mice underwent a series of behavior tests to evaluate sociability, anxiety, and repetitive behaviors. Analysis of these results revealed that mature mice with perinatal lead exposure displayed alterations in the evaluated behaviors when compared to control animals. Furthermore, evaluation of serotonin transmission with fast-scan cyclic voltammetry revealed a chemical phenotype that differed from control animals. These findings provide further insight on the contribution of lead exposure to developmental disorders as well as the extent of the safety of the current EPA lead drinking water limit.

**Taylor, Slone**

**Mentor(s): Dr. Shan Qiao**

**The feasibility and acceptability of a mindfulness-based intervention in African American women living with HIV**

Mindfulness is a way of paying attention to individuals' own emotions and being aware in the present moment. Mindfulness-based interventions (MBIs) have been widely used for stress reduction among various populations, but there is limited MBIs targeting African American women living with HIV (WLH). This study aims to assess the feasibility and acceptability of a MBI to reduce stress in African American WLH. Three focus group discussions were held among 18 African American WLH purposely recruited from the Palmetto Health-USC Immunology Center. The participants discussed how they coped with stress, and then were given a presentation on MBIs with follow-up discussion about their thoughts and opinions on the information presented to them. The participants also completed a one-page personal questionnaire for demographic information collection. The discussions were recorded using audio recorders and then transcribed to complete a qualitative data analysis using the software NVivo. All 18 women said they were interested in mindfulness and participating in a MBI, and felt that mindfulness could be helpful in their life. One main area of concern was planning ahead of time to participate in the MBI. The majority expressed that they would need to know the dates and times of the MBI prior to agreeing to participate in order to request off work and ensure that they would be available for participation. When asked how they

felt about completing this intervention online or using an app or online resources in combination with in person meetings, the majority of the women stated they preferred in person meetings, and some women were open to the additional use of apps or online resources. These results suggest that a MBI is feasible and acceptable for African American WLH. Based on successful studies using MBIs to reduce stress in other populations and the positive reception to MBIs by our target population, a MBI could be promising to reduce stress and promote positive coping in this population. The next step is to develop a pilot study for African American women living with HIV to complete a MBI for stress reduction.

**Tedesco Barker, Lara**

**Mentor(s): Dr. Sarah Keeling, Prof. Gordon Humphries, Prof. Jill Chappel Fail**

**Semester at Sea**

During the first semester of my junior year, I had the opportunity to sail around the world on a cruise ship. While participating on Semester at Sea I spent more than 50 days at sea and traveled to 18 countries. This unique opportunity gave me the chance to grow and experience cultures so different from mine and learn in a new environment. On board I took four classes, History of Pacific Wars: Korea and Vietnam, International Mass Communications, Global Studies, and Global Social Movements. The courses were divided into classroom lectures combined with in country experiences to maximize the learning opportunity. This time in my life was so significant to me because I was able to take so many of the skills I've learned here at the University of South Carolina, like photography and use it to communicate and connect with new people, even if we didn't look the same or speak the same language. Reflecting back on my time abroad I can see how much this has shaped me and my career aspirations. As a future travel photographer, I know that cultivated many of the skills necessary to succeed in my career such as flexibility and determination. I learned to say at least a few phrases in twelve languages, and learned how to overcome cultural barriers while working. The growth I made as a person is immeasurable, and I am able to more clearly identify both my strengths and my weaknesses. I know that both that my time abroad challenged me to be a better person, as well as gave me the confidence I need to navigate my future endeavors.

**Tesch, Collin**

**Mentor(s): Mrs. Lisa Camp**

**Innovation can lead to Persuasion**

The past two years I have had the opportunity to be an Accounts Payable Intern at Scana Corporation. At this internship I was assigned numerous tasks that had a direct impact on the company. Some of these tasks include processing invoices, tracking the number of invoices a day, sorting the mailed in invoices, and even connecting with various companies that we use as Vendors. Being a Finance and Economics major I was able to use the skills I have learned in the classroom and put them to use in the field. One of the most important things I have learned throughout my time as a finance student is the fact that innovation is the key to success. Therefore, I was able to use the Consumer Decision Process I learned in Marketing 350 from a unique perspective. Using my version of the Consumer Decision Process, I was able to find the most efficient way possible to sort the mail and convince my supervisors this was the best way possible. Doing this made it so the Account Payable Department could enter more invoices in a work day. Although this may not be seeming like a lot, the mail process is a significant factor in determining how much work the Accounts Payable Department can accomplish each day. Now that I have successfully completed my internship at Scana Corporation, I hope to continue my career in the corporate finance world after college.

**Thickens, Elizabeth**

**Mentor(s): Prof. Daniel Freedman**

**Inclusion and Empowerment in the Special Needs Community**

Throughout my senior year, I have had the opportunity to serve as an intern and eventually an aide with Bridges at The Therapy Place. The mission of Bridges says “The Bridges Preschool Program at The Therapy Place is a holistic, therapeutic approach to child development. We employ the skills and expertise of physical, occupational, and speech therapists, as well as educators, parents, and other staff. The main goal of Bridges is to encourage independence, cognitive development, and socialization. We believe in using a transdisciplinary approach to meet the individual needs of the whole child.” Working with the children in the Bridges Program has given me a unique opportunity to prepare for my future career as a pediatric physical therapist, not only through assisting them with their therapy goals, but also by helping them with their academic goals, teaching them to become more independent, and encouraging them to have positive social interactions with their peers in the program. This is important because, as a physical therapist, I will be more aware of functionality in the lives of young children with special needs because I have worked with these children in a classroom setting and not only in a clinical setting. From this experience, I have gained the ability to empathize on a deeper level with families of exceptional children, which will help me tailor therapy experiences on an individual basis in the patient population I will serve upon graduation from physical therapy school. My goal as a pediatric physical therapist is to walk alongside children with special needs on their journeys to functionality and fight for acceptance in a world that often either avoids or pities those with special needs. Because of my experience at The Therapy Place, I have a strong set of experiences and knowledge that will allow me to meet the physical needs of my patients, as well as serve as an advocate that will inspire them to live their dreams, not despite their limitations, but because of them.

**Thomas, Hannah**

**Mentor(s): Mr. Rico Reed**

iMadrid, Que Guay!

The University of South Carolina offers a plethora of study abroad resources and opportunities for students. In the spring of 2018, I took advantage of these resources and studied abroad in Madrid, Spain at Universidad de Carlos III de Madrid (UC3M). I chose to undertake this experience because I have studied Spanish since middle school and had never visited a country where Spanish was spoken natively. I wanted to experience living in another country while practicing and improving my Spanish. I chose to study at UC3M because they offered more business courses than other universities in Madrid and because of their large international student population. I took courses with Spanish natives taught in English and had the opportunity to interact with locals every day. This experience was significant for me because my semester abroad was full of challenges, both foreseen and unforeseen. I grew a lot personally and academically from my challenges and failures and had an experience completely different than any other semester of my university experience. My Spanish skills improved as a result of my semester in Spain, and so did my confidence in myself to overcome difficult situations.

**Thomas, Yohance**

**Supervisor(s): Samuel Holtel**

**Mentor(s): Dr. Karen Patten**

**Space Saving Solutions eCommerce Site**

The project mission is to help Space Saving Solutions build upon and expand their e-commerce platform by adding more products to the site and aid them in building a mobile web-page that customers can use. The deliverables in the project are Microsoft Excel spreadsheets imported into website and a mobile web-

page for the site.

**Thornal, Ashley**

**Supervisor(s): Madeline Terpilowski**

**Mentor(s): Dr. Douglas Pittman**

**Analysis of the Protein-Protein Interaction between RAD51D mutants and SFPQ/NONO.**

Ovarian cancers are the leading cause of death from cancer of the female reproductive system. Approximately 50% of ovarian cancers have defects in the homologous recombination (HR) DNA repair pathway that is required for the repair of DNA double-stranded breaks. The status of HR genes, such as BRCA1, BRCA2, and the RAD51 family contributes to ovarian cancer development as well as treatment decisions regarding chemotherapy, radiation, and immunotherapy. The overarching goal of this project is to identify new insights into HR that can integrate with Precision Medicine Initiatives and align with the goals of the Cancer Moonshot 2020 Program. The paraspeckle proteins SFPQ and NONO were recently demonstrated to interact with members of the RAD51 protein family and appear to be essential for homology directed repair and maintaining genome stability. These proteins are also members of the DBHS family. For this particular project, the RAD51D protein is being analyzed for the individual protein-protein interactions with SFPQ and NONO. The ubiquitination degradation pathway of RAD51D begins by ubiquitin binding to lysine residues. By using functionally relevant lysine mutants of RAD51D, the effects of these mutations on the proteins binding ability to SFPQ and NONO can be determined. A Yeast II Hybrid system is being used to quantify this protein-protein interaction. To score this interaction, yeast cells transformed with SFPQ or NONO and RAD51D (and its lysine mutants) are grown on selection mediums in which the transcriptional activation of the reporter genes is required for growth. Our current results suggest that the lysine mutants of RAD51D do not affect the binding ability of RAD51D with SFPQ and NONO. This indicates that the ubiquitination pathway affects protein function as opposed to the protein interactions.

**Tierney, John**

**Mentor(s): Dr. Lara Ducate**

**Developing Leadership Skills in My Experiences as a Tutor and Nonprofit Intern**

Last summer, I had the pleasure of being an intern for the nonprofit organization Home Works of America. Home Works is dedicated to developing youth by letting high school volunteers participate in home repair projects for the disabled and elderly. As an intern, I was a site leader and program organizer for five weeklong sessions over the course of the summer. We were tasked with making sure the work sites ran smoothly as well as designing some of the evening programs after the workday had ended.

Since my sophomore year, I have been working as a tutor for the Student Success Center (SSC) here at the University of South Carolina. As a tutor, I have had to assist students in the understanding of different math and physics concepts through drop-in sessions, one-on-one appointments, and a few finals preparation sessions. This year I increased my involvement with the SSC by becoming a Peer Assistant/Mentor, or PAM. Being a PAM requires me to help with training new tutors, conducting tutoring observations, and helping with other logistical tasks within the SSC.

Serving in both of these roles has helped me develop my leadership skills immensely. Being an intern for Home Works allowed me to gain experience in leading large groups on the work site and afterward in evening activities. In my role as a tutor and PAM, I have learned to individually lead tutors in appointment observations and manage additional responsibilities around the SSC. These experiences have given me the skills I will need as a future leader in engineering.

**Tierney, John**

**Mentor(s): Dr. Paula Vasquez**

**Mathematical Modeling of Pituitary Organogenesis**

In humans, the pituitary gland controls many physiological processes such as the regulation of growth, metabolism, reproduction, and immunity. It is essential to understand the development of the pituitary gland in order to prevent diseases associated with defects in its formation. However, a complete understanding of pituitary organogenesis is hindered by the type of experimental data available. The gland's position deep inside the skull only allows for two-dimensional, static snapshots during development. Therefore, there is interest in using a mathematical model to get a more holistic picture of the pituitary's formation. This new model will allow us to inquire into processes, length and time scales that, at the moment, are out of experimental resolution. Cross-sections of pituitary glands from mice at different stages of development were used to create a preliminary two-dimensional vertex model. This model was then modified and corrected based on additional biological samples until it matched the observed development accurately. The transition into three dimensions is still in the preliminary stages. An initial Voronoi tessellation model was created for testing of three dimensional forces and parameters on the developing cells. Once these are understood, a better pituitary model can be created based on the existing two dimensional model. Once completed, the 3D model will allow us to see the effects of different scenarios and environments on the gland's development that cannot be seen in the lab, which could then give us insights into how any defects in development might arise.

**Tillman, Elizabeth**

**Supervisor(s): Bobbie Scherback**

**Mentor(s): Ms. Shannon O'Connor, Mr. Conner Black, Dr. Elizabeth Will, Dr. Jane Roberts**

**The impact of Autism symptoms on the prevalence of ADHD in children with Autism Spectrum Disorder and Fragile X Syndrome**

Attention deficit/hyperactivity disorder (ADHD) is the most prevalent disorder in childhood affecting 11% of the population.<sup>1</sup> ADHD symptomology includes inattention, hyperactivity, and impulsivity. Children with both fragile X syndrome (FXS) and autism spectrum disorder (ASD) displayed increased symptoms of ADHD (53-84%, 37-85%, respectively).<sup>2-4</sup> A substantial number of individuals with FXS and ASD also have intellectual disability (ID). Previous research has shown individuals with ID are at higher risk to develop ADHD.<sup>5</sup> Despite this, diagnostic certainty of ADHD decreases when there are comorbid disorders present, such as ASD or FXS, due to the fact that many symptoms of both disorders overlap. This comorbidity may lead to negative outcomes, more so than for those with FXS or ASD without ADHD.<sup>6,7</sup> Thus, it is important to extricate these overlapping symptoms within various disorders in order to provide more accurate interventions. The Autism Diagnostic Observation Schedule 2 (ADOS-2),<sup>8</sup> is a standardized assessment in which ASD-related symptoms and behaviors are observed. By looking at two individual codes from the ADOS-2, Overall Rapport, and Over Activity, ADHD symptoms can be evaluated in children with ASD and FXS. Overall rapport is a summary code that reflects the examiner's overall judgement of rapport established with the child and the degree to which the examiner modified their behavior to maintain positive interaction during the ADOS-2 evaluation; symptoms of ADHD during an assessment, such as inattentiveness and hyperactivity, can negatively impact overall rapport by making the interaction noticeably difficult, uncomfortable, or one-sided. Over activity codes for excessive movement or physical agitation. The Preschool Age Psychiatric Assessment (PAPA)<sup>9</sup> is a structured parent interview for children aged between 2-6 with limited verbal skills, which will be used to measure outcome diagnosis. The present study aims to compare rates of ADHD in preschoolers with FXS and preschoolers with FXS+ASD in order to examine the impact of ID and ASD on ADHD diagnoses in this population. Additionally, this study will look at the correlation between the two codes described above and ADHD diagnosis preschoolers with FXS, FXS+ASD and a group of preschoolers with non-syndromic ASD.

**Toumey, Vivien**

**Mentor(s): Prof. Tanya Wideman-Davis**

**Contemporary Choreographers' Response to Today's Divisive Political Climate**

Throughout the history of modern and contemporary dance in the United States, choreographers have created works that respond to the political and social issues facing contemporary American society. These works challenge the social norms set forth by society at the time, and they present a new viewpoint through the lens of dance. There is no doubt that choreographers can create impactful statements through their work that resonate strongly within the dance community. As American politics have grown more divisive, especially with the tumultuous 2016 election cycle, artists are crafting bolder statements. Choreographers are prompting their audiences into action with messages surrounding race relations, gender equality, and more. This project explores the work of current contemporary dance choreographers who have made political and social statements in response to today's divisive political climate. The goal of this project is to analyze current choreographic works about American politics and why these statements made through art should be given consideration, merit, and appreciation on a larger scale. This will be accomplished by analyzing qualitative data gathered through interviews with contemporary choreographers over the course of the semester. Additionally, this project aims to highlight the importance of expression through art and why these statements deserve recognition outside of the dance community.

**Tovar, Pinita**

**Mentor(s): Dr. Florencia Cornet**

**Latinos in the Outdoors**

This study will explore the various degrees of acculturation and socio-economic status of Hispanic families in South Carolina and will be assessed to see if there is a correlation between these variables and the likelihood of a Hispanic child's participation in outdoor recreational activities. Questions that will be answered in this project include, what is the current demographics/psychographic profile of Hispanic families who participate in outdoor recreational activities in South Carolina? What are the perceptions and attitudes that Hispanic children have towards outdoor recreational activities? This study will be exploratory in that it is looking for enhancements to current and future outdoor recreational activity adaptations based on characteristics that are most valued such as cost, location and activity culture. There will be one main data collection method that will be used to retrieve the necessary information via an online survey. The survey will be available to be administered in both Spanish and English. This is to ensure that Hispanic parents who are most comfortable responding in Spanish are able to do so. This is also to allow millennial and more acculturated Hispanic parents to respond in English if they prefer to do so. Participants will be recruited to participate in the study in various ways which will depend on the method by which they would like to fill out the survey.

**Tovar, Pinita**

**Mentor(s): Dr. Charles Pierce**

**6 Sigma: Seek Improvement not Perfection**

Change and opportunities have been the two consistent aspects of my college career. As Latina first generation college student I had no idea what to expect when coming to the University of South Carolina. I became involved in a variety of activities and organizations that kept me on my toes and encouraged me to continue challenging myself with new tasks and goals. It was the constant change that brought me to implement the fundamentals of 6 Sigma, from my operations management class, into eliminating the idea of pursuing perfection and instead seeking constant improvement. I have applied these fundamentals into various tasks as a Diversity Outreach Specialist with the South Carolina Department of Natural Resources.

Through the creation of a document with “frequently used” words and phrases I was ultimately able to translate information faster and as a program we were able to improve our consistency. However, unexpected obstacles do arise which call for quick thinking and problem solving. Priorities are assessed and the most important aspects are handled first. 6 Sigma encourages a macro view in which all aspect and perspectives are considered. This is especially true when interacting with a group where there are aspects that are fixed and those that are not, such as people. It was through my time as Chapter President of the Beta Xi Chapter of Kappa Delta Chi Sorority, Inc., the only active Latina sorority on campus, that I learned that no single system or single implementation of 6 sigma will work in every situation. There are many variables within an organization that are constantly changing the dynamic of the group thus the results that are produced will always be different. I plan to continue to use the fundamentals of 6 Sigma and problem-solving in a career in Marketing after my time at the University of South Carolina.

**Tremmel, Anthony**

**Mentor(s): Dr. Marianne Bickle**

**Athletic Leadership**

My name is Anthony Tremmel and I will be presenting on discovery day as part of my GLD portfolio in professional and civic engagement. My experiences in athletics, internships, and student government helped shaped my GLD portfolio. The main theme throughout my portfolio was following the university motto of “no limits” and trying to become the best person I possibility could while also helping others around the university become that as well. I also did GLD as well because of this motto, I wanted my college career to be held back by nothing. I chose professional and civic engagement because it is what I believe a true leader should do. GLD is building leaders, but I believe the most important category within the GLD is professional and civic engagement because you are involving a whole community as you try and better them. As a leader your main goal is to make a community better with your leadership and I believe I have created a better Carolina through my experiences.

**Turnbull, Madeline**

**Mentor(s): Dr. Amber Fallucca**

**A Summer of Work in the City That Never Sleeps**

During the summer of 2018, I fulfilled a lifelong dream: to live in New York City. This time in the city that never sleeps was important in that I grew as a young professional as an intern at Luxe Interiors + Design Magazine, a publication of Sandow Media. The Luxe brand is one of the top in its field, and I sharpened a dual skill set in sales and marketing. My experience at Luxe groomed me for a future career in the communications industry, and I learned the importance of networking and client communication through this role.

My objectives included co-planning the annual summer party, The Hampton’s 50, contributing to team and client meetings, assisting sales representatives, and gaining field experience through sales calls. My position as a Sales and Marketing Intern at Luxe Interiors + Design fulfilled a course credit for my public relations degree and lasted from early June until mid-August. I chose to gain experience at Luxe because of my interest in the publishing industry and Sandow brand, as well as a personal connection at the magazine.

This experience gave me confidence in my field of study and my future career endeavors. I enjoyed what I was doing and made meaningful, professional connections which will help me further my network and open future opportunities. My internship was significant because I was fully immersed in the field of my interest and implemented the strategies and methodology I have studied throughout my undergraduate career.

Throughout my senior year I have kept in contact with my mentors at Luxe and Sandow. I am interested in pursuing a career at Sandow upon graduation and will continue further communication. I am also pursu-

ing other full-time positions in the industry similar to my previous internship , and am looking forward to what my future holds.

**Turnquist, Drake**

**Mentor(s): Dr. Dan Freedman**

**Importance of Global Collaboration**

In the spring of 2018, I spent five months studying at the University of Strathclyde in Glasgow, Scotland. Little did I know that when I embarked on this journey, I would return to the United States a different human. My time spent abroad was a time of immense growth and a time of cultural immersion. I returned a more capable leader, a more curious learner, and a more inclusive, productive member of our global society. My experiences, specifically through conversations with individuals from across Europe and development of understanding country cultural, have opened my mind and shown me the necessity of diverse perspectives to solve current global issues. Additionally, after being in a foreign country for an extended time period, I saw how being an outsider can sometimes give you a voice and platform to influence others. Europeans are intrigued by American constructs; I was able to use my background to educate and provide new thoughts. On the flip side I was curious and able to learn from those who came from very different backgrounds than me, about a wide variety of topics. Remaining in our own country bubbles, we miss out on the knowledge and solutions that can be obtained through global collaboration and active listening. From a personal growth perspective, I learned that life's experiences aren't a to-do list to check off. Life isn't about marking the next country, the next trip or the next activity off the list, but about making an impact on others and our society. It's understanding others deeply so that you can better serve them, to better lead them. My five months spent in the United Kingdom have done all of this and more to make me the international business and societal leader I am today.

**Vagnoni, Lauren**

**Mentor(s): Mrs. Hayley Ross**

**Lauren Vagnoni's Global Leadership Experience**

During the spring semester of 2018, I studied abroad in Florence, Italy. I was born and raised in an Italian family, so I always knew I would study abroad in Italy. After purchasing my flights and doing some research, I took off for the best semester of my life. I learned so much about cultural differences, problem solving, and experiential value and this forced me to grow a lot as an individual. My perception of the world grew faster than I realized. I saw over ten countries around Europe and over twenty cities throughout the country of Italy. I now feel closer to my ancestral past, which has taught me ways to better my future. The most important findings to me were the little things, like listening to Italian chatter from my open window instead of music, that I will never forget. I learned to appreciate relaxing, and realized that every second didn't need to be filled with an activity to enjoy it. The stress-free culture taught me to prioritize what is important in my future. This experience was life changing and significant to my future because I will continue to apply the insights I learned to my career, a consultant in Risk Advisory, when problem solving for a living. My Italian has improved, but the history and community that I saw with my own eyes is what makes me feel closer to my ancestry and prepared for a successful future.

**Vahey, Lauren**

**Mentor(s): Dr. Daniel Freedman**

**Study Abroad: Personal and Intellectual Growth**

In February 2018, I travelled to St Gallen, Switzerland for my International Business study abroad. I chose St Gallen because the University of St Gallen has one of the highest ranked MBA programs in the world, and I knew being surrounded by such driven students would be a positive and intellectual experience. Ad-

ditionally, I would be interacting with students who, like myself, would be becoming leaders in the International Business world, as the students there frequently participate in exchanges as well. Studying abroad forces a student outside his or her comfort zone. For me, that included making new friends, travelling to new places, and taking courses designed for master's students with years more experience than I had. I was challenged academically, and I met people with similar aspirations and career goals as mine. It was really interesting to have classes with people with some work experience and a few more years of school than me, and that made the connections I made abroad really special. While I was abroad, I learned how to handle living alone in a foreign country with only a limited grasp of the language spoken. I learned how to plan trips and manage my time to balance travel and my courses at a difficult university.

### **Varga, Stephanie**

**Mentor(s): Dr. Ashley Smuder, Mr. Ryan Montalvo**

### **Autophagy Inhibition in Doxorubicin-Treated Animals Attenuates Mitochondrial Dysfunction and Oxidative Stress in the Heart**

Doxorubicin (DOX) is a highly effective chemotherapeutic agent used in the treatment of a variety of cancers. However, the clinical use of DOX leads to the development of irreversible and dose-dependent cardiomyopathy. Indeed, the mortality rate of patients who develop DOX-induced cardiomyopathy is ~50% within one year. DOX localizes to the mitochondria in cardiomyocytes, elevating the formation of reactive oxygen species (ROS) and causing damage to cellular components. Under normal conditions, autophagy is a proteolytic process that degrades and recycles damaged proteins as an essential homeostatic function. However, excessive mitochondrial ROS production as a result of DOX promotes accelerated autophagy and cardiomyocyte apoptosis. Although excessive ROS production is a well-studied mechanism of DOX-induced cardiotoxicity, the role of autophagy is not currently understood. In this regard, we hypothesize that reducing autophagy in the heart will attenuate the mitochondrial production of ROS and mitigate DOX-induced cardiotoxicity. Cause and effect were evaluated by inhibiting autophagy in 4-month-old female Sprague Dawley rats via administration of a dominant negative ATG5 rAAV (rAAV-dnATG5) 4 weeks prior to DOX exposure. DOX was systemically administered 48-hours prior to sacrifice at a clinically-relevant cumulative dose. Within the heart, DOX negatively regulated ventricular fractional shortening, ROS production and respiratory control ratio (RCR). Treatment with rAAV-dnATG5 attenuated the DOX-induced changes to fractional shortening, ROS production and RCR. In addition, autophagy inhibition increased SOD2 and catalase antioxidant expression. These findings demonstrate that autophagy plays a requisite role in the development of DOX-induced cardiotoxicity and oxidative stress.

### **Vargas, Andrea**

**Mentor(s): Dr. Rekha Patel, Mrs. Indhira Handy, Dr. Jason Stewart, Dr. Spencer Moore**

### **VNTR polymorphisms of the DRD4 Allele and Telomere Length**

Telomeres play a critical role in preserving the stability of genomic DNA. The initial length of telomeres at birth is long and with every cell division, telomere length is shortened. Telomere length shortening occurs throughout life span due to the lack of active telomerase in human somatic cells and has been correlated with accelerated aging. It is hypothesized that decreased telomere length contributes to broader health problems later in life. It has been proposed that a specific variable number of tandem repeat (VNTR) variant, the 7-repeat allele of the dopamine D4 receptor gene (DRD4), is an important factor in extreme longevity, because it plays a major role in dopaminergic signaling. Specific VNTR alleles of DRD4 have previously been correlated with ADHD, Autonomic Nervous System Disease, substance dependence, and reactions to stress. In this project, we studied to find a correlation (if present) between DRD4 VNTR alleles and telomere length to investigate if there was any association of a specific DRD4 VNTR allele with shorter or longer telomeres. We began with 200 samples of genomic DNA collected from women in

South Carolina. These women were randomly recruited and represent a racially, socio-economically, and geographically (urban/rural) diverse group from South Carolina. The DRD4 VNTR alleles were amplified by PCR, and analyzed by agarose gel electrophoresis. The telomere length analysis of all the samples was previously done by Telomere Restriction Fragment (TRF) assay for all the samples. Our preliminary analysis is not immediately indicative a simple correlation between DRD4 VNTR allele and telomere length. However, a detailed analysis of the participant age, environment and perceived stress in life, telomere length, and DRD4 VNTR allele is pending.

**Vasilakos, Alexander**

**Mentor(s): Dr. Matthew Childs**

**Leadership Learned Abroad**

As the world becomes increasingly interconnected through information, trade and travel, more businesses, even those which are not international per se, will be forced to deal with issues arising from the diversity of cultures across the globe. Realizing this, I decided to broaden my education as a Finance major at USC. In my sophomore year, I was accepted to the International Business program within the Darla Moore School of Business and spent the spring 2018 semester at the Fudan University School of Management in Shanghai, China. I chose to go to Fudan for several reasons. First, China is both a major U.S. trading partner and rival, and a familiarity with China is becoming increasingly important to success in the business world. Second, Shanghai is renowned as China's most modern and prosperous city, which has integrated economics from the West with the politics and culture of the East; Shanghai was the perfect place to see "capitalism with Chinese characteristics" in action. Third, Fudan offered the opportunity to study business concepts from the Chinese perspective. Finally, studying in China allowed me to improve my proficiency in Chinese. While at Fudan, I interacted with Chinese students, exchange students from other countries as well as native Chinese citizens and I traveled to both rural locations in China and to the capitol city of Beijing. I realized that, despite the world becoming an ever-smaller place with increasing cross-cultural familiarities, cultural differences will nevertheless always exist as we will never have one uniform culture. As these differences affect how people perceive the world and everything in it, they will always matter. To a large degree, the extent to which a business recognizes and successfully deals with these differences will determine the extent of its success abroad. I plan to carry forward my experience in China to my career in Finance, whether with an international entity or not. Wherever there is an international touchpoint in my career, I now know that assumptions must be realized and then questioned. Insights into cultural differences must be pursued as they are invaluable to the harmonization of business practices.

**Vaughan, Bryana**

**Mentor(s): Dr. Randy Lowell, Dr. Majdouline Aziz, Dr. Andrew Pisano**

**How Culture in the South Affects Facial Perception**

The current study examined the relationship between culture and facial perception in the southeastern United States. We investigated the extent to which an individual's race/ethnicity, primary area of upbringing, personality traits and implicit biases influence the perception of faces from different races (i.e. Caucasian and African-American), as reflected in participants' eye movements. Blais and colleagues (2008) concluded that East Asian participants primarily focused on the central region of the face (nose), while it was primarily around the eyes and mouth for Western Caucasian participants. Akechi and colleagues (2013) found that more prolonged eye contact stimulated increased physiological arousal. In attempting to understand the causes of the psychological and physiological impact of race, historical accounts written by Hoffer (2003) spoke of the difficulty that African-American slaves had in making eye contact. Furthermore, Hansen and colleagues (2015) found that individuals high in explicit racial prejudice were more likely to fixate in the mouth region of black faces, while individuals high in implicit racial prejudice were more likely to fixate in the eye region. Thus, race and bias both influence the way faces are visually

perceived and processed.

After USC Union students (N = 65) provided general demographic information, their eye movements were recorded (EyeLink 1000 Plus) while they viewed a series of 16 faces (male/female, Caucasian/African-American), each for 15 seconds. Three regions of interest for the face stimuli included around the eyes, around the nose/mouth, and around the forehead. For each face, participants described a hypothetical movie scene in which the face could be the main character, with their words analyzed for valence and arousal (Brysbaert et al., 2013). Participants also rated each face on multiple dimensions, and then completed a Big 5 Personality Test and a Race IAT (projectimplicit.net).

We found an interaction between the race and gender of the face stimuli on the valence and arousal levels of participants' descriptions of them, as well as an impact of these variables on the number/duration of fixations on the faces. Interestingly, the age of the participant had a significant impact on fixation patterns on the faces.

**Vazsonyi, Leah**

**Mentor(s): Prof. Steven Rodney**

**Projections for Constraints on Type Ia Supernova Delay Time Distribution with Predicted WFIRST Data**

When a low mass star like the sun reaches the end of its life, it becomes a compact white dwarf star (WD). In a binary star system, a WD can eventually explode as a Type Ia Supernova (SN). These Type Ia SNe all have the same luminosities, so they can be used as standard candles to measure distances to different points in the universe. However, much about their nature, including which precise mechanism produces the majority of these SNe, remains unknown. The delay time distribution (DTD) of these Type Ia SNe can provide insight into some of their characteristics. The DTD is a function which gives the probability of a given star exploding as a Type Ia SN a given time after its formation. Its parameters include an initial fraction of prompt SNe, meaning SNe which exploded within 500 million years of the original star formation (the "f<sub>0</sub>" value), and a delayed "tail" component. Current measurements of the prompt SNe are in tension with one another and have very large uncertainties. The major reason for such imprecise and divergent measurements of prompt Type Ia SN explosions is due to the lack of data from the early universe. The Wide-Field Infrared Survey Telescope (WFIRST), set to launch in the next decade, will be able to find SNe at higher redshifts than the data currently available. Using forecasts for SN observation from WFIRST and a set Cosmic Star Formation Rate, a statistical minimization routine was executed to predict the future constraints on the prompt fraction of Type Ia SNe. These predictions indicate a forecast error of approximately  $\pm 0.1$  which varies somewhat depending on the precise value of f<sub>0</sub>. This increased precision could resolve the current tensions in f<sub>0</sub>.

**Vickery, Hannah**

**Mentor(s): Ms. Theresa Harrison**

**Presenting at State Conferences Disseminates Knowledge in Professional Fields**

During the midst of my student teaching internship, two of my colleagues and I, along with the aid of one of our professors, presented at the South Carolina Association for Middle Level Educators (SCAMLE) conference. This educational organization not only provides support and professional development for both current and future middle level educators, but also educates professionals in best practices in order to promote adolescent education and well-being. As a middle level education major at the University of South Carolina, having the opportunity to present at the 42nd Annual SCAMLE conference allowed me to reflect on my internship experiences as a pre-service teacher and share that experience with others through a presentation addressing the needs of student teachers while they are in their final field place-

ment. This experience not only flexed my public speaking skills as an emerging professional, but also grew my leadership skills by requiring me to collaborate with colleagues, synthesize my learning in order to effectively communicate that learning to others, and use my new knowledge to take a stand for positive change and growth within my own profession. Presenting at a professional organization's conference, like SCAMLE, encourages new professionals to get involved in important conversations in their field, further their own education by listening to others' opinions and research, and make strong connections with colleagues who face the same challenges and have a network in which to celebrate triumphs. I hope to continue to be involved with professional organizations as a middle-level educator and to promote presenting in my field at both state and national conferences for the betterment of our profession.

**Vickery, Hannah**

**Mentor(s): Dr. Daniel Fogerty**

**Nonlinear Amplified Speech, Listening Effort, and Its Impact on Response Times**

This study aimed to measure the impact of nonlinear amplification on listening effort, as measured by response times. Previous literature shows that response times indicate a definite measure of listening effort. Current audiologists conduct routine hearing examinations where they test thresholds and word recognition in both quiet and noisy conditions. These hearing tests alone, however, do not create a complete nor coherent picture. For even if clients can repeat the words, this still does not indicate the level of difficulty that participants may experience while trying to recall and repeat those words. In this way, response time can be a measure of listening effort. This correlation suggests that if a client takes longer to respond, then they must exert more effort in formulating that response. This study used low-pass filtered speech and speech with linear amplification (shaped speech) to present study participants with various sentences. The 20 study participants were then instructed to repeat any of the words which they may have heard. The two speech conditions were presented at 3 dB levels: 55, 70, and 85. Every participant listened and responded to the same number and quality of sentences with each speech condition being presented at varying levels of noise as in quiet, steady state noise, and speech modulated noise. Preliminary results show that response time is longer for noisy conditions rather than quiet conditions. These results also differed across normal speech and linearly-amplified speech. The results of this study hold great significance for the clinical environment as they measure speech perception in ways that, as of now, may not be measured by routine audiological records.

**Villaire, Maxwell**

**Mentor(s): Dr. Francisco Blanco-Silva**

**Utilizing Knowledge Space Theory to Assess a Calculus Skillset**

The ultimate goal of this project is the development of agents that use Artificial Intelligence to teach high-level topics in an effective, individual way. We have specialized our agent to guide students through University-level Calculus. The core of the agent is a testing environment where questions are selected adaptively for each user, depending on previous responses and relationships between the underlying concepts of the questions. The agent dynamically assesses the user's mastery of the concepts as they answer questions, requiring only a small percentage of the concepts to be tested in order to make inferences about the user's understanding. Given a user who has mastered a particular set of skills, the agent is able to make recommendations as to which concepts the user is best prepared to learn.

**Walker, Mackenzie**

**Mentor(s): Dr. Sara Wilcox**

**Differences, by Disability Status, in Health Behaviors and Health-Related Attitudes Among Church Attendees**

**Purpose:** To examine differences, by disability status, in health behaviors and health-related attitudes of participants in a faith-based intervention.

**Methods:** Approximately 12 months after a faith-based intervention targeting physical activity (PA) and healthy eating, church attendees completed validated surveys of PA, fruit and vegetable (FV) intake, PA and FV self-efficacy, body mass index (BMI), and self-rated health. Participants who reported limitations in any activities or the use of special equipment (examples provided) were classified as having a disability. Regression models compared health-related variables by disability status, controlling for age, gender, race, and education. A Fisher's Exact Test compared the difference in percent inactive in intervention vs control churches among those with disability.

**Results:** Attendees (n= 1393, 287 with disability) from 54 churches (35 intervention, 19 control) averaged 54±16 years; 92% African American; 69% were women; 23% college graduates. PA, PA self-efficacy, and self-rated health were lower and BMI higher in those with disability ( $p<.05$ ). FV self-efficacy was also lower and marginally significant ( $p=.0558$ ). Differences by disability status were not found for meeting FV guidelines ( $p>.05$ ). Among those with disability, participants in intervention churches were less likely to be physically inactive than those in control churches ( $p<.05$ ).

**Conclusion:** Participants with disability had more negative health behaviors and health-related attitudes than those without disability. However, participants with disability who were in intervention churches were less likely to be inactive than those in control churches, suggesting that interventions that promote gradual changes, consistent with 2018 PA Guidelines for Americans, may be beneficial.

**Walker, Mackenzie**

**Mentor(s): Dr. Sara Corwin**

**Facilitating Adaptive Sports and Recreation for Persons with Disabilities**

Over the summer, I was an intern at the Brooks Rehabilitation Adaptive Sports and Recreation Program. Alice Krauss, started the program in 2007 to address the downward spiral of physical inactivity and social isolation that she observed working as an occupational therapist that was caused by changes in health-care funding that decreased the length of stay, greatly reducing the amount of occupational therapy that patients were able to receive. This program offers 11 cost-free weekly sports programs, educational seminars, and special events including everything from quad-rugby tournaments to rock climbing clinics. Although the majority of my hours were spent conducting weekly adaptive sports programs including adaptive yoga, wheelchair basketball, adaptive cycling, bowling, and game night, I spent a good bit of time in the office working on the creation of a reference guide that would cover all 26 conditions seen in the Adaptive Sports and Recreation Program to be used by new employees, volunteers, and customers. As important as developing a sense of professionalism was to me, I valued the personal growth I experienced through this internship even more. I was integrated into a work environment that hardly felt like work to me and I was motivated every day by the knowledge that I was contributing my efforts to a program that is changing people's lives.

My internship experience completely reaffirmed my intended career path of becoming an occupational therapist within an adaptive sports and recreation program, as it showed me how I can use my education and experiences to make a positive difference in the world. Involvement in adaptive sports and recreation has become a huge part of my life and I have started to take the next few steps in continuing this involvement in Columbia, SC by volunteering for the Richland County Recreation Commission wheelchair basketball team as well as Yoga for Everyone, the adaptive yoga class offered by Dara Brown, developing

inclusive sports programming such as seated volleyball with the intramural sports office, and starting Gamecock Adaptive, a student organization focused on increasing involvement in adaptive sports and recreation.

**Walker, Justin**

**Mentor(s): Prof. Daniel Ostergaard**

**Security as a Mixed Good: An Analysis of the Transportation Worker Identification Credential**

This study aims to explore private sector influence on the policymaking process for security policies through an analysis of the policymaking process of post-9/11 counterterrorism initiatives, with a focus on the Transportation Worker Identification Credential. This goal is achieved through the evaluation of substantial documentation surrounding the Transportation Worker Identification Credential, including public comments from private entities, congressional testimony, rules published on the Federal Register, and reports from the GAO and the Inspector General for the Department of Homeland Security. Public comments from private entities were sorted using Department of Homeland Security coding and analyzed to create a comprehensive picture of private-sector reaction to and participation in the Transportation Worker Identification Credential policymaking process.

This study revealed significant trends. Primarily, the study reveals significant private-sector opposition to the Transportation Worker Identification Credential and federal mandates for maritime security. Additionally, the study shows concessions on the behalf of the Department of Homeland Security in terms of federal requirements in maritime security, leading to the Transportation Worker Identification Credential policy being weakened. As of August 2018, implementation of the policy has largely been halted. Ultimately, the Department of Homeland Security's struggle to implement this policy shows that the private sector has significant impact in the development of security policy and indicates that security policy can be changed due to private sector input.

**Waller, Matthew**

**Mentor(s): Dr. Jeff Dudycha, Dr. Reginald Bain**

**Waltz Towards Disaster: A Representation of the Accumulation of Mutations Over Time**

Verbal, mathematical, and graphical models are commonly used in the biological sciences, but musical models are rarely found. This project was one of four interdisciplinary projects that arose from collaboration between students in Biol:599, special topics in biology and students in Musc:540/737, advanced projects in computer music. The overall goal of the interdisciplinary collaboration was exploring how the genetic process of mutation can be represented musically.

The goal of this project was to find a way to create a musical model of how mutations can accumulate over time. The accumulation of mutations is a biologically important process because every mutation alters DNA sequences. These changes to the genetic material can accumulate over time leading to a variety of effects that could have large or minimal effects on fitness.

This project started with a phrase of music that represented our initial genetic material. We then developed musical models of mutation. We found ways to alter the music that represent the change in base sequence observed in different types of mutations. We took our single phrase of music and repeated it seventy times to represent seventy successive generations where each generation and thus each repeat of the musical phrase was based on the previous iteration. Once we had this musical lineage, we applied our musical mutation model to the lineage. When a mutation was applied to a specific generation, all successive generations inherited that mutation.

This inheritance of mutations from one generation to the next meant that as generations progressed, our musical phrase became more distinct from the starting musical phrase.

This project successfully demonstrated the accumulation of mutations and resulted in a final piece of music that you can hear the accumulation of musical mutations over time. Because most people experi-

ence similar gut reactions to atonality, almost everyone can experience our auditory representation of the biological consequences of the accumulation of deleterious mutations regardless of their biological background. Through unconventional modeling, complex ideas such as the accumulation of mutations in somatic cell lines can be represented in ways that people with little or no formal biological education can learn from.

### **Walls, Katherine**

**Supervisor(s): Sydney Lewis, Hunter Fasolo, Carter Purvis**

**Mentor(s): Dr. Sanjay Ahire**

### **Optimizing Statewide Outreach Initiatives for SC Thrive**

SC Thrive is a non-profit organization in South Carolina that helps the State's underprivileged population with several services, focusing on food security, healthcare resources and financial wellness through work supports such as SNAP, Medicaid and tax credits, like the Earned Income Tax Credit and Child Tax Credits. In addition, SC Thrive offers Mental Health First Aid training to provide awareness and education about mental health, reducing stigma and myths surrounding mental health.

The goal of our project was to develop an optimal resource allocation strategy for SC Thrive to provide the maximum yield of enrollments into the food safety, medical, mental health, and financial counseling services that it helps with across all 46 counties of South Carolina through 22 specific outreach initiatives – including job fairs, back-to-school events, mailers, and tax clinics.

We developed a large scale (1,012 decision variables x 50 constraints) integer programming model for SC Thrive, with the help of inputs on resources, available resource capacities, and per event yields for each initiative from the top management of SC Thrive. The model was executed using the OpenSolver™ optimization software. The recommendations from the model provide roadmap to strategically alter SC Thrive's operating model for most efficient and effective use of their limited resources to maximize the returns in terms of actual enrollments into the social programs they support, thus maximizing the productive use of the resources to serve people in dire need.

### **Walsh, Nicole**

**Mentor(s): Dr. Robert Martinusek**

### **Physical Therapists are in the Fight of Forming America's Functioning Army**

As an exercise science major, I have to complete a 300-hour practicum to complete my degree. I could have worked at the gym I have been working at for years and make money. Instead I decided to use this opportunity to further my education and start accumulating physical therapy observation hours. I shadow a 1LT who is a Doctor of Physical Therapy (DPT). I observe, assist, learn, and teach. I am fortunate enough to do my shadowing in a unique setting, an Army Health Clinic. We get to see trainees, at the stress fracture capital, retirees, soldiers, and their families. There are multiple clinics and experts constantly trying to make service members more fit, ready, and healthy. I knew about the Army's Physician Assistant (PA) route and I thought that was a good opportunity. Then I shadowed a PA and I hated it. I hated how little time he had with patients, and how quickly he prescribed medication without a simple conversation of how folks could naturally make themselves healthier. Through my exercise science degree, I have learned the physical AND mental benefits of physical activity and exercise. I feel if I can help people heal through their own bodies, why wouldn't I? This practicum will teach me what DPT's can do and their function in the medical field. It will also give me a solid foundation to prepare for PT school. The impact on me was significant because my supervisor went beyond the anatomy, he demonstrated hands on, he empowered me to practice. Bottom line he was a mentor that furthered my passion for the field, unlike the PA who discouraged my desire to pursue that field. I want others to learn from my experience what physical

therapy can do to help heal you. People need to have a basic understanding of what their bodies need, in regards to nutrition, hydration, sleep, physical activity, and exercise, to stay healthy. My future consists of commissioning as a Field Artillery Officer, then applying to Army Baylor DPT program!

**Wandrocke, Kira**

**Mentor(s): Dr. Nina Moreno**

**Seeking Harmony**

When I entered college, I constantly heard that everyone was stressed out. In contrast, during my time studying abroad at Fudan University in Shanghai, China, I rarely heard anyone say this. Chinese philosophers such as Confucius and famous poet Li Bai preach seeking harmony with the natural world. It is believed that this balanced state must first be found within one's self before adapting outwardly. This harmony was created in me during my visits to China's parks and gardens, which have common features of water, fish, temples, and winding walkways. All of these features express tranquility, and the fish and water express a flowing quality that represents the constant state of harmony. Focusing on finding harmony within oneself, in a quiet place, effectively alleviates stress and allows for a more positive outlook on life.

**Wandrocke, Kira**

**Supervisor(s): Beata Biro, Claire Windsor, Federika Sydow, Kayla Christian**

**Mentor(s): Mrs. Hayley Ross, Ms. Colleen Sullivan**

**Professionalism Through the Lens of Sustainability**

Professional development is an important aspect of sustainability, yet is something that many UofSC students do not engage in. As interns in the Office of Sustainability, we serve on a team that strives to empower our peer interns to learn professional skills through the lens of sustainability. We host six workshops and two networking events throughout the year where our students hone their skills, meet other professionals in the field, and learn how to connect sustainability to their major and/or career goals. We recently hosted a campus-wide "Green Career Fair" for 100 students and 25 employers. Feedback showed that 100% of student attendees agreed or strongly agreed that they made a valuable connection with one of the community partners, and 100% agreed or strongly agreed they practiced communicating relevant skills and experiences to employers. Planning this event taught us about different careers in sustainability, the importance of networking, and project management.

**Warrington, John**

**Mentor(s): Dr. Phillip Buckhaults**

**TP53 knockout induces sensitivity to palbociclib and 5-fluorouracil combination in breast cancer.**

Breast cancer is the most commonly diagnosed and the deadliest malignancy among women in the United States. Of these breast cancers, 20-40% acquire a loss of function mutation in TP53, the tumor suppressor gene necessary for apoptosis to occur within cells [1]. Despite the frequent occurrence of TP53 mutations, there are currently no targeted therapies geared towards this aberration in breast cancers [2]. While mutations in this gene often lead to more aggressive tumors and worse patient outcomes, they may also create a targetable Achilles Heel within the cancer's somatic mutation landscape [3]. To identify therapies that exploit this weakness, we engineered TP53 knockouts using CRISPR-Cas9 gene editing in MCF7 breast cancer cells. These knockout and wild-type cells were then screened against 133 FDA approved anticancer agents from the NCI's approved oncology drug set (AOD-IV). Our results show that upon disruption of the TP53 gene, MCF7 cells developed a higher sensitivity to 5-fluorouracil (5FU) and palbociclib, individually. A combination treatment using these two agents revealed that palbociclib strongly synergized with 5FU against the TP53 knockout cells. Notably, the TP53 knockout also conferred resistance to

several other common drugs used in breast cancer treatment including methoxsalen, mitotane, olaparib, oxaliplatin, and paclitaxel. Future studies will validate the relative susceptibilities in primary breast cancer organoids with and without TP53 mutations to this combination therapy. Predictable sensitivity to the palbociclib/5FU combination therapy would justify clinical trials stratified by TP53 mutation status.

**Watkins, Vincent**

**Mentor(s): Dr. Krishna Mandal, Mr. Mohsin Sajjad**

**Crystal Growth, Characterization, and Fabrication of Cadmium Telluride (CdTe) Semiconductor Detectors for Emission/Transmission CT for Nuclear Medicine**

Currently, there is a great need for 'direct read-out' semiconductor detectors to monitor and image high energy gamma-ray emission from nuclear medicine injected into the human body. For this purpose, in recent years, cadmium telluride (CdTe) has been developed as nuclear detectors for room temperature (RT) operations. There is a strong need for nuclear detector grade crystals that can be grown and fabricated in large area devices at high yield and at a lower cost. CdTe, a wide bandgap (1.5 eV at 300K) semiconductor that is an ideal candidate to satisfy the requirements of emission/transmission computed tomography (CT) for nuclear medicine.

Through the Magellan program, we have grown CdTe single crystals using a vertical Bridgman method. The grown crystals have been characterized thoroughly for structural, optical, electrical, and electronic charge transport properties. X-ray diffraction analysis (XRD) revealed the zincblende structure and determined the lattice parameters of the grown CdTe crystals. Optical absorption measurements confirmed the bandgap of 1.50 eV at 300K. Current-voltage (I-V) measurements determined the resistivity of the grown crystals to be  $\geq 10^8$  Ohm-cm and revealed low leakage currents which contribute to low detector noise. Planar single-element detectors were fabricated, and nuclear detection characteristics were measured using Am-241 (59.6 keV) and Cs-137 (662 keV) gamma radiation source. The results clearly show that CdTe based nuclear detectors could operate with low electronic noise and could be used for wide range of applications including emission/transmission computed tomography (CT) for nuclear medicine, Homeland security, nuclear non-proliferation, high energy astrophysics/astronomy, and nuclear power plants.

**Webb, Malorie**

**Supervisor(s): Isabelle Robinson**

**Mentor(s): Ms. Elizabeth Will**

**Physiological Mechanisms of Object Attention and Exploration in Infants with Neurodevelopmental Disorders**

Infants use object exploration as a way to increase their understanding about their environment. Children with a neurodevelopmental disorder such as fragile X syndrome (FXS) and younger siblings of children with autism (ASIBs) often present with atypical object related attention and exploration. If a child exhibits these early impairments, they may miss important learning opportunities associated with object exploration, including language and social reciprocity, which can subsequently lead to delayed cognitive development. The purpose of this study is to examine group differences between children with FXS, ASIBs, and typically developing (TD) children. Specifically, this study will identify potential group differences in the association between physiology (i.e., heart rate) and object attention (i.e., visual attention and manipulation) in FXS, ASIB, and TD groups. This project utilizes data from a prospective longitudinal study collected from 12-month old infants from the FXS (n=27), ASIB (n=33), or TD (n=37) groups. Object exploration was measured using a 3-minute exploration task in which infants are given toy keys to play with. To determine group differences in associations, we will 1) test group differences in object manipulation and object attention, and 2) examine patterns of association of the relationships between heart rate and object attention across the FXS, ASIB, and TD groups. Based on previous research, we expect that the FXS group will manipulate the keys less than the ASIB group, but exhibit prolonged visual attention, while

the TD group will spend less time manipulating the keys than both the FXS and ASIB groups. We also expect that there will be a stronger association between heart rate and manipulation among FXS infants and moderate association among ASIBs as compared to the TD group. This research is important because it will help to identify early indicators of attentional difficulties and potential risk factors for developmental impairments. Identifying early risk factors for impaired developmental processes can inform targeted intervention strategies to promote optimal object interaction and cognitive development.

**Webb, Frank**

**Mentor(s): Dr. Amir Karami, Dr. Vanessa Kitzie**

**Characterizing Health Tweets: LGB vs Transgender Individuals**

There are millions of LGB and transgender individuals in the world but conducting LGBT health-related studies are labor-intensive and time-consuming because of the challenges inherent to studying these hidden populations. Social media sites like Twitter provide a platform for LGBT users to share their health concerns, giving researchers the opportunity to collect and analyze these social comments. This research used a mixed methods approach to examine the linguistic and semantic characteristics of health-related tweets shared by self-identified LGBT individuals. Findings uncovered 14 health topics shared by LGBT users. Further we found a significant difference between tweets shared by LGB and transgender individuals. These two groups have different health concerns and use distinct linguistic patterns to share their personal health experiences. These findings show further disparities within an already marginalized group, indicating the need for greater future focus to improve the health of all people. Our research approach can also inform studies in the areas of informatics, health, and medicine for analyzing the health concerns of not only sexual and gender minorities but also other hidden populations.

**Weber, Kiersten**

**Mentor(s): Dr. Karen Smith**

**The Mysteries Engraved: A Comparative Analysis of Late Archaic Decorated Bone Pins from the Southeastern Coast of North America**

A bone pin is a tool made of a modified animal bone that is generally cylindrical in shape consisting of a pointed in and a blunt end. Bone pins are found throughout the Eastern Woodlands from the middle Archaic through early Woodland periods. The late Archaic period ranges from 4000 years BP- 1000 BP. The artifacts in this research are from sites that have been dated from 3100-4400 years BP. Although they can be mundane, many are engraved with intricate, well-planned designs. This research compares the engravings on bone pins recovered from shell middens from the Edisto, Savannah, and Ogeechee rivers. The analysis tests the hypothesis of possible social links between the sites, as engraving style was likely a combination of personal choice and one's learning community. For this research, a data sheet was developed to record specific attributes on individual bone pins. In all, 203 bone pins were analyzed across 8 different archaeological sites and two donated museum collections. Many of the artifacts have not previously been studied. I found similarities in decorative styles among some of the sites while one site did not seem to share any similarities. Understanding where people moved across the landscape during the late Archaic period can lead to understanding why people moved across the landscape. This, in turn, can provide insight to the behaviors of people today and the relationship to the environment and to each other.

**Weirich, Nicole**

**Mentor(s): Ms. Kelly McCabe, Dr. Claudia Benitez-Nelson, Dr. Erik Smith**

**Are stormwater ponds hotspots of BOD5 production?**

Stormwater runoff is a major source of non-point source coastal pollution. Residential stormwater retention ponds are a common management practice in coastal South Carolina for collecting runoff because of

flat topography and frequent storm-driven rainfall events. The ponds chosen for this project were typical of the residential area of S.C. Ponds were chosen as the focus of this research because previous work has shown that ponds receive high amounts of nutrient runoff and are often sites of intense algal production. From this, we hypothesize that there is a large amount of BOD<sub>5</sub> exported from ponds to receiving waters. Biological Oxygen Demand (BOD) is defined as the concentration of DO (dissolved oxygen) consumed due to the microbial decomposition of carbonaceous organic matter present in the water sample plus any DO consumed in the conversion of nitrogenous compounds to more stable forms (nitrites and nitrates) over a period of five days at a temperature of 20 °C (Delzer & McKenzie 2003). To test this hypothesis, water samples from 14 stormwater retention ponds were collected during the month of July 2018. Water from all tested stormwater ponds is exported into the Waccamaw River. The samples were monitored for DO for fourteen days; daily measurements of DO were made in order to explore the non-linear dynamics of DO consumption with the BOD measurements. Standard method 5210 B for measuring BOD<sub>5</sub> was followed. A Witrox system with Loligo vs. 1.01 software and spot system was used to record BOD measurements. In order to answer if ponds are hot-spots of BOD, a preexisting data set of the Waccamaw River was used to compare ambient Waccamaw BOD<sub>5</sub> data to the BOD<sub>5</sub> data gathered. BOD<sub>5</sub> of ponds was found to be significantly higher than BOD<sub>5</sub> of the Waccamaw River using an Anova test ( $p < .05$ ). A significant positive relationship was found between BOD<sub>5</sub> and algal biomass within the pond, as measured by Chlorophyll a ( $\text{Log}[\text{BOD}_5] = 0.63 * \text{Log}[\text{Chl}] - 0.35$ ;  $r^2 = 0.79$ ;  $p < 0.001$ ), suggesting that algal production represents an important direct source of labile organic carbon contributing to BOD<sub>5</sub>.

**Weirich, Nicole**

**Mentor(s): Dr. Erik Smith**

**Integrating Science into the Government and Local Communities**

As a marine science student interested in the connections that occur between scientific research and environmental policy, I wanted to find an internship that allowed me to explore those connections to better understand them. Last summer I was able to intern at the Baruch Marine Field Laboratory researching biological oxygen demand of stormwater retention ponds. Biological oxygen demand (BOD) is a measurement stormwater managers use to quantitate the amount of pollution in a water sample. I worked in the field collecting water samples, conducted background research, worked in the lab to analyze the water samples, and finally I compiled a presentation on my findings and presented it at the 2018 SC Water Resources Conference. From this internship, I learned a lot about scientist's interactions with other professionals. The scientist I worked under, Dr. Erik Smith, was working with local wastewater managers because they didn't have a good measure of how much pollution (BOD) was entering coastal waterways due to non-point source pollution. Since land-runoff is a major source of non-point source pollution, we chose to take our measurements in stormwater ponds, which are the most common form of catching run-off water in coastal South Carolina. At the end of Dr. Smith's project, he will connect with local water quality officials to let them know how much pollution is entering coastal waterways from stormwater. The project helped me to realize how important it is to use scientific research to help local communities. This lesson was also taught to me in my Environmental Policy I took while studying abroad in Costa Rica for a semester. When the government works with scientists to improve environmental conditions, there is a better connect within a community resulting in a more harmonious society. I also learned that I can work very well with a team of scientists and that I want to work in the future to spread science to other professionals such as governmental officials.

**Welch, Joel**

**Mentor(s): Mr. Rico Reed**

**Growth through Challenges: A Global Perspective**

As a student at the University of South Carolina, seeking out challenging experiences can help you to

become a better student, professional, and person. This poster will demonstrate that by expanding your global horizons and seeking out experiences to help you grow as a person, you can enrich your time at the University and make the most of your experiences. Challenging experiences detailed in this poster include studying abroad in Germany, serving as an orientation leader for the International Accelerator Program, and working for BMW. All of these experiences had unique value that contributed to a better sense of global understanding, as well as empathy and compassion for other cultures. The poster will also explain how global experiences can relate to studies and experiences in the United States, like serving as President of a nonprofit or by rushing a business fraternity. Challenges are always an opportunity for growth, and by truly seeking out a global experience during your time in college, all aspects of your life can be enriched. Through examining key insights, this poster will exhibit such topics as how to relate a philosophy class to studying abroad, how to analyze your professional experiences critically in relation to your course work, and how courses from studying abroad can give meaning to topics you never thought it would. Personally, this poster is a representation of who I have become at USC, and how I have developed into the person I am. It is my journey through the University.

### **White, Rembert**

**Mentor(s): Dr. John Regalbuto, Dr. Ritubarna Banerjee**

#### **Controlled Rh/SiO<sub>2</sub> Nanoparticle Generation by Cl<sup>-</sup> Doping**

Rhodium (Rh) catalysts are useful for C-H bond activation in dehydrogenation reactions. These reactions can be used for the synthesis of renewable biofuels from organic material. A large electrochemically active surface area is required for optimal function of the catalysts. This is achieved by synthesizing very small catalyst nanoparticles on a support material. Strong Electrostatic Adsorption (SEA) is a simple and rational technique to obtain sub nanometer (< 2 nm) sized metal particles. Pentaammine chloro-rhodium [III] dichloride (PA) is frequently used as the precursor in rhodium catalysis, but it has been observed that large Rh-nanoparticles (> 5 nm) are obtained which will render the bulk of the metal incapable of participating in catalysis reactions. Tris (ethylenediamine) rhodium [III] chloride trihydrate (EN), however is a Rh precursor capable of generating sub-nanometer particles much smaller than that the PA precursor. It is hypothesized that the close association of chloride (Cl<sup>-</sup>) with the central Rh atom in the PA precursor may be a potential cause of the large Rh nanoparticle generation in the former case. To test this hypothesis, the EN precursor was used as the starting precursor and doped with varying weight loadings of chloride. We are interested in determining the effect of Cl<sup>-</sup> doping on nanoparticle generation during the reduction of molecular Rh on a silica support prepared by an EN precursor. Molecular Rh/SiO<sub>2</sub> catalysts will be prepared by the method of strong electrostatic adsorption (SEA) and doped with varying concentrations of sodium chloride (NaCl) or ammonium chloride (NH<sub>4</sub>Cl) before reduction in a hydrogen reduction furnace. The generated nanoparticles of Cl<sup>-</sup> doped and undoped Rh/SiO<sub>2</sub> will be analyzed by transmission electron microscopy (TEM) and X-ray diffraction (XRD) to determine the effect of Cl<sup>-</sup> doping on nanoparticle generation.

### **Whitley, Parker**

**Mentor(s): Dr. Alicia Wilson**

#### **Groundwater Flow and effects from rainfall in Cedar Creek**

The research completed was to find the groundwater flow rate underneath Cedar Creek in Congaree National Park. The rate of groundwater flow was obtained from temperature loggers at different depths and the rate of flow of heat, which is equivalent to the groundwater flow. This was compared to the rainfall over the time the stakes were installed to see the effects that flooding has on groundwater flow.

**Wiggins, Sarah**

**Supervisor(s): Amit Patel, Dana DiGiovanni**

**Mentor(s): Dr. Sanjay Ahire**

**Improving the Patient Visit Experience at McLeod's Clarendon Primary Care Associates**

Team: Evan Bluford, Dana DiGiovanni, Hye-In Jung, Amit Patel, and Sarah Wiggins

Faculty Mentor: Dr. Sanjay Ahire, Professor of Operations and Supply Chain Management

McLeod Health Sponsor: Donna Isgett, Senior VP, Quality & Safety, and McLeod Primary Associates Network

This project was completed in the Fall of 2018 through the USC Operations and Supply Chain Center as a Capstone Consulting Project. The project improved clinical and patient flow processes within the practice. Specific goals were to improve patient access to physicians through streamlining and improving the patient visit process, improve the patient visit cycle time, improve patient satisfaction, and to improve satisfaction of clinical and administrative staff.

To accomplish these goals, we conducted numerous site visits to track patient flow to collect primary observations on process challenges. An analysis of secondary data for one year (>10,000 visits) was completed to understand the trends of patient appointment delays by type (nurse visit, provider visit, lab visit). We built a detailed simulation of the patient flow processes (130 activities) using ProcessModel™ simulation software to model the current state and kaizens (focused process improvement projects) prior to implementation.

We developed and tested six specific kaizens ranging from standard protocols for communications with patients to managing the phone call system to even developing clinical and implementing clinical protocols for pre-testing (nurses authorized to conduct several specific tests without waiting for the providers). The simulation model was used to validate reduction in patient visit time by 25% with the same resources upon kaizens execution. All of these kaizens have now been either implemented or in progress. The project was presented to 50 clinical and administrative leaders of McLeod Health in December 2018. The clinical protocols for pre-testing are now being rolled out across the entire MPA network of about 100 McLeod-owned physician practices.

**Wiggins, Sarah**

**Mentor(s): Dr. Bridget Miller**

**Leadership Experience as a Peer Leader**

Fall semester of my junior and senior years I had the opportunity to be a University 101 and 150 peer leader. University 101 is a for-credit class for freshman that serves to encourage smooth transitions for the students and to equip them to become successful college students. I took these rolls to grow professional while taking advantage of the change to encourage new students. I served as an approachable student mentor, and collaborated with co-instructor to create and implement 28 different lesson plans that would leave our students informed, encouraged, and empowered. Senior year I was a U150 peer leader, which is a transition course from freshman who are four-year international students. In this course I worked with a different co-instructor with the same goal of mentoring students. In both cases I facilitated class discussions on a variety of challenging topics including diversity and inclusion, alcohol education, sexual wellness, and mental health. I strove to build relationships with each of my students, and to grow in my leadership skills, both as a facilitator and a mentor. This presentation will be glimpse into my experience as a peer leader and will delve into my biggest takeaways from the leadership role.

**Wiggins, Kali**

**Mentor(s): Dr. April DeLaurier**

**Determining the role of *ldlrp1a* in cholesterol metabolism in zebrafish**

Low density lipoprotein receptor adaptor protein 1 (LDLRAP1) is a factor which interacts with low-density lipoprotein receptors (LDLR) in endothelial cells to endocytose lipids from the bloodstream. Humans with mutations in LDLRAP1 have familial hypercholesterolemia, an autosomal recessive inherited disorder, resulting in abnormally high levels of blood lipoproteins. We hypothesize, as in humans, *Ldlrap1a* functions in zebrafish to prevent the accumulation of blood lipoproteins. To study the role of *ldlrp1a* in zebrafish, a reverse genetics approach was taken by using CRISPR-Cas9 to generate a mutant zebrafish line for *ldlrp1a*. In-crosses with heterozygous F2 *ldlrp1a* zebrafish were performed to generate F3 embryos. Sequencing of F3 mutant DNA and cDNA revealed a 7bp deletion in exon 3. This caused a frameshift resulting missense and a premature stop codon 37bp into exon 3. To study cholesterol clearance, we did a high cholesterol diet experiment. A heterozygous in-cross with the 7bp deletion line was performed, and the larvae were fed a high cholesterol or control diet from 4.5dpf until 9.5dpf, and then fish were stained with Oil Red O to label lipids. In fish fed the high cholesterol diet, homozygous mutants appeared to have more lipids in their blood stream compared to wild-type zebrafish, and in some cases, what appeared to be lipid deposits were seen in the vasculature of the zebrafish. A higher number of lipid plaques were observed in mutants compared to wild-type siblings, which suggests the mutants have a lipid clearance defect. Next, we plan to quantify the blood cholesterol and triglyceride levels, and we plan to perform qPCR on genes involved in lipid metabolism. If zebrafish have a lipid clearance defect, this line could be a useful model to study hypercholesterolemia in humans.

**Williams, Timothy**

**Mentor(s): Mrs. Anna Oswald-Hensley**

**Discover Timothy Williams**

My first leadership experience within USC-Sumter was a University 101 peer leader. I assisted a professor in a lecture setting. I assisted in many activities, class discussions, helping write questions for test, and quizzes. I also lead activities, that helped the class become more comfortable with their peers, but also constructive, so they had a task to complete. Through this experience, I learned how to construct class schedules and activities. We did activities such as, ice break games so they would communicate. Also, we did an activity where we passed out flyers for canned goods for the unfortunate. Also, how to become a role model to your students. Such as, showing up on time, looking professional, acting in a professional manner, and being available for anything at any time. I enjoyed this experience, because we grew close as a class and got to know each other as friends. The value of the professional skills I have acquired from this experience is beyond words and I truly thankful.

**Williams, Ellen**

**Mentor(s): Mrs. Katie Hopkins**

**Free Condoms For All: A Public Health Approach to Student Affairs**

Having a Resident Mentor your first year on campus can help make or break your collegiate career. Resident Mentors are invaluable resources for freshman students by promoting self-care, advocating for their well-being, supporting them through conflicts, and cultivating strong communities they can fall back on throughout the year. Serving as a Resident Mentor has allowed me to do all of these things, but one aspect of the job that I have most valued is utilizing my public health background to educate residents how to practice good public health. Using the Resident Mentor role as a platform to educate students, I have been able to build relationships with students interested in public health, encourage them to seek a second opinion in the Center For Health and Well-Being, and let them know that condoms are only awkward if

you make them awkward. Through all of this I learned how to make stereotypically uncomfortable conversations enjoyable, communicate the importance of all aspects of health, and create a strong sense of community within my residence hall. While not all of these learning outcomes will directly correlate with my career plans, the skills I have acquired along the way will help me become a successful public health professional.

**Willis, Ronald**

**Mentor(s): Dr. Mary K. Mills**

**Mosquito species richness in residential and non-residential environments**

Mosquitoes are Dipteran insects in the family Culicidae, which contains multiple species that are able to transmit (vector) pathogens to humans and animals, including Anopheles, Culex, and Aedes mosquitoes. Female mosquitoes must blood-feed to produce eggs, and if the source is infected, the mosquito can transmit the ingested pathogens to a naive host during the subsequent blood meal. After a blood meal, the female lays the eggs in aquatic environments. Once the egg hatches, it can become a free-flying adult within 5-7 days. Of interest, humans often build residential homes close to the natural habitat of mosquitoes, including habitats near lentic water systems (minimum flow or no flow of water), streams, and coastal zones. Control of mosquito populations and mosquito species surveillance are critical to limiting disease transmission to humans by these blood-feeding insects. The purpose of this study was to determine the mosquito abundance and species richness across different areas of Aiken, SC. We trapped mosquitoes using five CO<sub>2</sub>-baited, CDC light traps at two sites containing a lentic water system, a (a) residential and (b) non-residential site, every two weeks. Using dichotomous key, we identified trapped mosquitoes to species and all other insects to order. We found multiple vector mosquito species at both sites, and observed a drastic effect of temperature on mosquito abundance. We also observed slight differences in insect abundance and species richness between the two sites. Overall, this study demonstrates the importance of mosquito surveillance, as public health risk is linked to the vector mosquito abundance.

**Wilson, Bryce**

**Mentor(s): Mrs. Maegan Gudridge**

**Bryce Wilson Abstract**

Throughout my college career I had a lot of great experiences. The pinnacle or the apex of my college experience was when I had an internship with Hendrick Automotive, during the summer of 2018. The experience I gained from my time at Hendrick was great. I was able to apply numerous things in my work that I learned from my time at school. The summer was full of learning and experiences that bettered me as a professional and pushed me out of my comfort zone. The intensity of the internship coupled with the terrific support that I got from my mentors and peers created an amazing environment to work in and learn about what it means to be a professional in this day and age. I was able to lead a project for upper management. The project dealt mainly with data analytics and is the single thing from the summer that I am most proud of.

**Winch, Kathryn**

**Mentor(s): Prof. Jay Pou**

**Confronting Systemic Challenges: Navigating Barriers to Student Learning in South Carolina Classrooms**

In the Spring of 2019, I had the opportunity to intern and student teach within a third grade classroom at Geiger Elementary School. Geiger Elementary School is located within Fairfield County, South Carolina. In the arena of public education, South Carolina is constantly viewed as an insufficient system and also as a system where students are not achieving at a developmentally appropriate level. As an Early Childhood

Education major at The University of South Carolina, I was challenged through my internship to find ways to confront and fix a system that many consider to be broken. I was called to find ways to reach and connect with each student in order to ensure academic success for all. Through my experiences as a student teacher, I worked with experienced Educational Leaders and learned how to develop relationships with individuals of different backgrounds, critique and evaluate student work in a way that is positive, encouraging, and constructive to their learning, challenge the expectations of the public arena in terms of the education of students from traditionally underrepresented backgrounds, and also how to meet students where they are in terms of academics, home life, and cultural backgrounds. Navigating and constructing knowledge through a hands-on autonomous internship experience reaffirmed my experience to pursue a career in education. My presentation will discuss the insights that I gained about my leadership abilities as well as the positive impact that Culturally Relevant Teaching can have on learners.

**Winstead, Amy**

**Mentor(s): Dr. John Ferry**

**Didactic Research: A Prelude to Discovering Destruction Methods of *Microcystis aeruginosa***

*Microcystis aeruginosa* is a toxic cyanobacteria found in freshwater. Contamination in municipal water supplies can lead to health problems and filtration or treatment can lead to exceptional expense. *M. aeruginosa* grows within a finite stratum of the water column; any variance in sunlight exposure leads to changes in the photosynthetic processes which control buoyancy. A hypothesis for controlling these algal blooms is the alteration of buoyancy control mechanisms within the organism, causing the algae to self-destruct. In an effort to better understand the genetic, molecular, chemical, and physiological factors involved in buoyancy control, a database of research papers and published experiments was created. Through the gathering of didactic information, the buoyancy mechanisms were better comprehended. This understanding will lead to more efficient means of discovering ways to destroy invasive populations of toxic algal blooms by laboratory experimentation.

**Wood, Walker**

**Supervisor(s): Chelsea Mojica, Cooper Voigt, Dennis Smith, Christopher Evans**

**Mentor(s): Dr. Karen Patten**

**IIT Capstone #12 - IBM Maximo and SCETV Broadband Tower Project**

There are unused cell towers owned by SCETV throughout the state of South Carolina. These towers would help provide broadband internet access to low income and rural areas in need throughout South Carolina. In this project, IBM Maximo was utilized to setup a system of locations and assets for SCETVs' unused cell towers in the state of South Carolina. Our team then input the tower data and analyzed the SCETV towers in various counties. Locations were created for each tower SCETV has along with three assets on each location. The team also devised a plan on how to efficiently relocate a tower to the location of maximum coverage to provide broadband internet access. Towers in Kershaw county were surveyed to assess the current state of the towers. Heat maps provided by the client were utilized to map out six areas of greatest need in each county. These six areas are estimates of where towers would need to be relocated in terms of little or no broadband access and a high population density.

**Wu, Christopher**

**Mentor(s): Dr. Ehsan Jabbarzadeh, Dr. Maria Yanez**

**Development of a novel microwell-patterned PNIPAM-based hydrogel for temporary and tunable disruption of the cell membrane**

Current research in drug delivery and immunoengineering has faced the barrier of cellular membrane selectivity. Previous studies have shown that mechanical deformation of the cellular membrane causes

temporary disruption which increases its permeability to agents regardless of compound structure. A tunable platform for inducing temporary isotropic deformation of the cellular membrane would overcome its permeability limitations. Poly(N-isopropylacrylamide) (PNIPAM) based hydrogels have been extensively researched for biomedical applications. The polymer, PNIPAM, has a reversible lower critical solution temperature (LCST) of 32°C allowing the hydrogel to exhibit an increase in volume when cooled from 37°C to 25°C. During this process, cell-sized microwells imprinted on the surface of the hydrogels decrease in volume. The decrease in microwell volume induces isotropic mechanical deformation on the cellular membrane of cells seeded in these microwells.

PNIPAM hydrogels with microwell arrays were synthesized under inert atmosphere via free radical solution polymerization from the monomers N-isopropylacrylamide (NIPAM) and N,N'-methylenebisacrylamide (BIS) over a custom polydimethylsiloxane (PDMS) micropillar-array stamp. Potassium persulfate (KPS) and Tetramethylethylenediamine (TEMED) were used as the radical initiator and radical generator accelerator, respectively. To remove unreacted, cytotoxic compounds, the hydrogel underwent a thermocycling process depending on resulting hydrogel thickness. We observed a significant microwell volume reduction based on hydrogel swelling kinetics with a temperature change from 37°C to 25°C. This volume reduction provides the mechanism for inducing isotropic stress on cellular membrane. MTS cytotoxicity assay of seeded HDF (human dermal fibroblast), MDA-MB-231 (breast cancer), and THP-1 (monocyte) cells showed that there was no statistically significant difference between the cytotoxic effect of the 2D culture and 3 mm-thick hydrogels that have undergone the thermocycling purification process more than three repetitions. Isolation of single cells in individual microwells was accomplished through a cell-media-microwell centrifugation process.

Further experiments need to be performed to determine the pharmacokinetic effects of microwell-volume reduction on the cellular membrane. The insight gained from this project provides a rational basis for utilizing PNIPAM-based hydrogels in drug-delivery and immunoengineering systems in both research and clinical settings.

**Yarborough, Allison**

**Mentor(s): Mrs. Ambra Hiott**

**Internship with The Therapy Place Inc.**

During the fall semester, I was privileged to earn an internship with The Therapy Place Inc. (TTP). TTP is a nonprofit outpatient pediatric clinic offering PT, OT, and Speech therapies. This organization also offers scholarships and grants to underprivileged families of children with special needs to attend an onsite preschool program. Here, children are involved in an immersive early education curriculum catered to their disabilities. My position, specifically, was as a Therapy Intern. My internship has afforded me the opportunity to observe and assist therapists during appointments, observe clinical evaluations with the use of standardized testing, and taught me to read and file plans of care for a multitude of disabilities and developmental delays. In addition, I have been able to integrate knowledge gained in the classroom to a professional, clinical setting. At the end of the semester, after showing special interest in activities and events for patients and families outside of therapy, I was offered a position as a Volunteer Coordinator. In this position, I am responsible for recruiting volunteers for charity events, family fun days, and weekly support groups. I am also taking part in event planning for TTP under the Family Services Coordinator. These opportunities fulfill me in many respects including honing my communication and organization skills and also in giving me more experience with patients and their families. Learning to give children the tools they need to be successful is truly rewarding which is why participating in this internship continues to reaffirm my decision to pursue a degree in occupational therapy, specifically to work with the pediatric population.

**Yost, Madison**

**Mentor(s): Dr. Scott White**

**Under African Skies**

During the spring semester of my junior year I studied abroad at Stellenbosch, University in South Africa. I knew little about the country initially except that it would give me opportunity to focus on subjects such as conservation, which are not taught extensively at USC. As a biology major, I had the chance to explore the field from a new perspective and gain insight into how different parts of the world tackle many of the same issues. I wanted to test my capacity and see how well I thrived under the pressure of unfamiliarity. Learning through cultural, conservational, and social justice frameworks enriched my interpretation of the world as I learned to adapt to new ways of life. South Africa provided me with the conditions under which I could grow as a person and a scientist into a more culturally aware, well rounded adult. My fascination with South Africa ultimately guided my coursework selections for senior year where I have pursued classes that build upon my learning abroad. My time abroad encouraged me to extend my understanding of other cultures, particularly in Africa, and explore potential opportunities to return to the continent. I now hope to pursue careers that will allow me to spend more time abroad and test my limits. The ability to learn across cultures and grow in uncomfortable circumstances is crucial to evolving into the global citizen I hope to become. Through study abroad, I further developed my passions, capabilities, and understanding of myself in ways that will help me be more successful in the future.

**Zah, Benjamin**

**Mentor(s): Dr. Amit Almor**

**Public Perception of African American Vernacular English**

In progress.

Zahn, Julia - Mentor(s): Dr. Amber Fallucca -- The Impact of Serving as a Resource and Student Advocate -- In the Spring of 2017, I became a Resident Mentor (RM) for the University of South Carolina On-Campus Housing. Over the years, I have developed my skills as a leader, role model, student advocate, and resource as I have stepped into the role of Lead Resident Mentor (LRM) for my residence hall. I have served for two and a half years in this role working with freshman residents to help them acclimate to the university and take advantage of resources readily available to them. I chose to step into this role after my experience as an out of state student freshman year. My leadership skills and desire to help other freshmen feel at home at Carolina motivated me to apply to become an RM, and my passion for learning helped me move up into the role of LRM. I have developed ample crisis management and conflict resolution skills, varied teaching methods, and an understanding of how to best be a student advocate. For me, this was a wake-up call; I knew that I was supposed to be working with students in high school to help prepare them for all that comes as they move into adulthood. This experience has helped me realize my passion for teaching and motivated me to pursue a Master of Arts in Teaching Secondary Education.

**Zamiela, Sarah**

**Mentor(s): Dr. C. Nathan Hancock, Dr. Cliint Page**

**Investigating the transposition of the Harbinger3n\_Dr transposable element in yeast**

DNA transposable elements are mobile sequences of DNA that use a cut-and-paste mechanism to “jump” from one site in the genome to another. They are found in all kingdoms of life and are sorted by homology into groups called superfamilies. The Harbinger3n\_Dr transposable element, from zebrafish belongs to the PIF/Harbinger superfamily. We are interested in studying this element because it has previously been shown to transpose in human cells, where it can be used as a tool for transgenesis or mutagenesis. Our goal is to learn more about its transposition characteristics, as well as develop hyperactive versions

that transpose at higher rates. Previous experiments have shown that the Harbinger ORF1 and Harbinger Transposase (TPase) proteins must be present for Harbinger3n\_Dr to jump. I have developed Harbinger ORF1 and Harbinger TPase expression constructs and transformed them into yeast together with a Harbinger3n\_Dr reporter construct. Yeast transposition assays showed that Harbinger3n\_Dr transposes at a very low rate. Sequence analysis revealed that Harbinger3n\_Dr transposition can result in imprecise repair of excision sites. These results suggest that either the yeast cells are not a very compatible host of this element or that our assay is not effectively measuring transposition. Because we observed some imprecise repair of Harbinger3n\_Dr excisions sites, we are testing if providing a homologous template in a diploid yeast will allow for precise repair of the excision sites. If imprecise repair was the limiting factor, this strategy should allow us to observe the true number of transposition events.

**Zaritsky, Samuel**

**Mentor(s): Dr. Sarah Keeling  
Of Fjords and Finances**

During the spring semester, I studied abroad on exchange at BI - Handelshøyskolen in Oslo, Norway. While I was there, I got to study international finance, economics, and consulting at the most prestigious business university in Norway, as well as learn more about Norwegian culture both inside and outside the classroom. As a potential Norwegian citizen and aspiring businessman, I wanted to get first-hand experience with the country and its people, instead of just learning about it from behind a desk. To achieve this, I went to as many “Norwegian” events as possible – from going to museums and on tours of Oslo, right to going snowboarding and to concerts with my new Norwegian friends. Studying abroad both challenged me into being thousands of miles away from the comfort of my home and allowed me to empathize more with my parents. My mom and dad immigrated from Ukraine to the United States at around the same age that I moved to Norway for the semester. This put their move into perspective for me and allowed me to appreciate what they went through to a higher degree than just hearing about it from them. Through my business classes and my travels around Norway, I’ve learned a lot about Norwegian culture and etiquette, as well as about myself. Now, travel is a hobby of mine, and I believe I am fully capable of exploring foreign cultures the right way – by fully immersing myself with the people instead of just exploring tourism hotspots.

**Zeigler, Rachel**

**Mentor(s): Dr. Jay Potts, Dr. Katie Kathrein**

**Chromatin Modification during the Formation of Self-Organized Tissue Structures: A Comparison between Normal and Cancerous Cells**

Stem cells offer enormous potential for treating disease because of their regenerative abilities. Studies using stem cells enable scientists to learn about the cell’s essential properties and to generalize qualities observed to a wide range of cell types. Stem cell research continues to advance knowledge regarding development from a single cell and how healthy cells replace damaged ones. Stem cells have been observed to form self-organizing tissues (toroids) when grown on top of a collagen hydrogel. However, stem cells do not form these self-organizing toroidal aggregates when grown inside collagen gels. The mechanisms by which these cells form toroids remains unclear. Our hypothesis is that there are epigenetic modifications that dictate toroid formation in stem cells that can be detected using the chromatin immunoprecipitation and microarray-based analysis (ChIP) protocol combined with Next Generation Sequencing (NGS) bioinformatics. Application of ChIP-seq will identify the changes in gene expression that occur as a result of chromatin-modifying enzymatic activity during toroid formation. The histone variants and posttranslational modifications (PTMs) that are occurring driving toroid formation can be analyzed through the use of bioinformatics gleaned from the ChIP protocol. The bioinformatics will provide data indicating which particular histones have undergone epigenetic changes, thus indicating the sequences accessible or

restricted for DNA polymerase processing and exposing the genetic underlying of toroid formation. Interestingly, cancer stem cells never form toroids when grown on top of collagen hydrogel. Further study of the mechanisms by which cells behave, and the subsequent changes in chromatin given particular tissue parameters, will illuminate new chemotherapeutic targets. Thus this work extends beyond just development and give credence and has significance in the burgeoning fields of regenerative medicine and cancer biology.

**Zerhusen, Caroline**

**Supervisor(s): Claire Windsor, Abby Jacobson, Shannon Mulholland**

**Mentor(s): Mrs. Hayley Ross**

Reaching for the STARS -- Campus sustainability plans are widely used at institutions across the country as the framework for incorporating sustainability into institutional practices. At the University of South Carolina, we have not updated a master campus sustainability plan since 2015. As interns in the Office, we set out to research and create an updated campus sustainability plan. At first, we researched other schools' plans and brainstormed the sections we wanted to see in our plan, but we quickly realized that this task was too big for us to complete in one semester. After regrouping, we decided to assist with the Office's Sustainability Tracking, Assessment & Rating System (STARS) to evaluate a smaller area of campus sustainability. We collected 265 data points about campus and public engagement initiatives related to sustainability. Then we analyzed the data to create recommendations to be used in a future campus sustainability plan, and the Office's annual report. This process helped us improve our professionalism, teamwork, written and verbal communication, research skills, and project management.

**Zhang, Shuxin**

**Mentor(s): Dr. Michael Beets**

**Validity of Photoplethysmography for Measuring Heart rate: A Meta-Analysis**

Heart rate (HR) is a fundamental physiological measurement of health. It can be measured by using electrocardiogram (ECG) and telemonitoring devices (e.g. Polar with chest strap). However, both are not always feasible or comfortable when apply to daily activities or physical exercises. A more recently technology, photoplethysmography (PPG), is now widely used as a measure of HR. PPG measures HR by detecting the light changes of blood flow between heart beats. PPG has been introduced into wrist worn activity trackers (i.e., Fitbit, Garmin, Apple watch) and smartphone applications. In this study, we aim to valid the PPG measurement of HR by comparing to criterion measurements (ECG or chest strap).

Three databases (PubMed, Web of Science, and EBSCOHost) were searched. By February of 2019, 8991 articles were identified. Studies were included if HR was measured and compared both by PPG and criterion measurement. A total of 54 studies representing N = 2358 participants were included in the final analysis. Pooled correlation and mean absolute difference between PPG and criterion will be assessed using random-effect model. The effect of device placement (wrist, finger, or earlobe) and activity status/intensity will be evaluated. Comprehensive Meta-Analysis software will be used to conduct the analysis.

We believe the results of this systematic review and meta-analysis will provide evidence of the accuracy of PPG measured HR in widely available fitness trackers compared to a criterion measure of HR. These results will inform the scientific field regarding the acceptability of HR measurements derived from PPG for both intervention and epidemiological studies.

**Zhang, Xu**

**Mentor(s): Dr. Kevin Lu**

**Racial & Gender Disparities in the Association between Tuberculosis Exposure and Risk of Lung Cancer: A Meta-analysis**

Background: Lung cancer has the highest incidence and mortality among all cancers in 2018 worldwide. Tuberculosis (TB) is a disease caused by *Mycobacterium tuberculosis*. Previous studies have evaluated the potential association between TB and the risk of lung cancer, but the results are not consistent. Furthermore, no studies, to date, have evaluated the potential racial & gender disparities in the increased risk for cancer. Therefore, we aim to conduct a meta-analysis to determine the possible racial and gender disparities between TB exposure and the risk of lung cancer.

Methods: A systematic literature search and review was conducted for publications after 2000 based on the following key words: “tuberculosis”, “lung cancer”, and “risk”. A total of 19 studies out of 5 databases [PubMed, Web of Science, MEDLINE, EMBASE and the China National Knowledge Infrastructure (CNKI)] were identified, which included 7 cohort studies and 12 case-control studies. All analyses were done using Review Manager 5.3. Both fixed- and random-effect models were carried out, and subgroup analyses were done based on patients’ race and gender status. Additionally, Funnel plots were implemented to evaluate the possible publication bias.

Results: This meta-analysis found that there is an increased risk of lung cancer due to TB exposure in both cohort studies (OR=3.00, 95% CI: 2.15-4.18,  $I^2=98\%$ , N=7) and case-control studies (OR=2.06, 95% CI: 1.47-2.89,  $I^2=77\%$ , N=12). Asians with a TB history are more likely to develop lung cancer (OR=3.24, 95% CI=2.51-4.18,  $I^2=97\%$ , N=12) compared to Non-Asians with TB (OR=1.30, 95% CI=1.00-1.69,  $I^2=19\%$ , N=7). Males with TB are more likely to develop lung cancer (OR= 2.05, 95% CI: 1.62-2.60,  $I^2=73\%$ , N=6) than females (OR= 1.76, 95% CI:1.34-2.31,  $I^2=65\%$ , N=11). Results from funnel plots suggest that there is no publication bias.

Conclusions: The results are consistent with the literature that TB is associated with an increased risk for lung cancer. Our study further found that males and Asians have significantly higher risks for lung cancer compared to their counterparts with a history of TB exposure. Future interventional strategies should be targeted towards these groups to reduce the potential risk disparities.

**Zhao, Richard**

**Supervisor(s): Jessica Suggs**

**Mentor(s): Dr. F. Wayne Outten**

**Analysis of The In Vivo Role of Ferritin B in Iron Homeostasis in *E. coli***

Ferritin is an iron storage protein needed for iron homeostasis and is a key component in a variety of different biochemical bodily processes. Ferritin B (FtnB) is one of the four ferritin proteins involved in the iron homeostasis process in *E. coli*. Characterizing this protein is vital to the understanding of how the ferritin pathway works as a whole. Here we analyzed the effects of a  $\Delta$ ftnB gene deletion on cell survival and determined how the  $\Delta$ ftnB mutant cells survive in environmentally stressed conditions in order to characterize the iron homeostasis pathway. Two independent  $\Delta$ ftnB isolates ( $\Delta$ ftnB-A and  $\Delta$ ftnB-B) were placed into direct competition with the wild-type (WT) parent *E. coli* strain MG1655. Surprisingly both mutants outcompeted the wild-type strain under a variety of growth conditions. Mutant strains were then subjected to a range of environmental stresses, namely hydrogen peroxide, the cell-permeable iron chelator 2,2-bipyridyl, differing iron concentrations, and copper chloride. Growth behaviors were observed through optical density measurements over the course of 40 hours. Total RNA from the WT,  $\Delta$ ftnB-A, and  $\Delta$ ftnB-B strains was extracted and the levels of mRNA expression for iron acquisition genes were mea-

sured using the Reverse Transcription Polymerase Chain Reaction (RT-PCR). A total iron content analysis was performed on WT,  $\Delta$ ftnB-A, and  $\Delta$ ftnB-B strains using atomic absorbance spectroscopy. Our results help extend our knowledge of cellular iron homeostasis pathways.

# **Graduate Student presentations**

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**Abboodi, Fadi**

**Mentor(s): Prof. Lucia Pirisi-Creek**

**Molecular mechanisms of loss of E7 expression in HPV16-transformed human keratinocytes**

Human papillomavirus (HPV) causes about 5% of all human cancers. The HPV oncoproteins E6/E7 are responsible for the transforming potential of the virus. Although continuous expression of the HPV oncogenes was considered indispensable for HPV-induced carcinogenesis, we and others have demonstrated that in a subset of HPV-positive head and neck and cervical cancers, the HPV oncogenes are not expressed (HPV-inactive cancers). Interestingly, primary HPV-positive tumors express E6/E7, while metastases tend to be HPV-inactive. We hypothesized that HPV-inactive cancers begin as HPV-active lesions and lose their dependence on continuous E6/E7 expression during progression. This may be due to genetic and/or epigenetic modifications caused by the genomic instability and/or additional carcinogens. We observed that HPV-inactive cancers of the cervix often have mutated p53, while HPV-active cancers do not. Therefore, we proposed that HPV positive tumors may become inactive if p53 becomes mutated. The CRISPR-Cas9 system was used to knock-out the p53 gene in HPV16-transformed human keratinocytes. The DNA deletions within the p53 gene were confirmed by gel electrophoresis of PCR products and Sanger sequencing. We found that HPV16 E7 expression was significantly lower (4-5 folds) in the p53 knocked-out (KO) lines than in the p53 wild type (WT) lines. The reduction in E7 expression was reversed by using the DNA demethylating agent 5-Aza-2 deoxycytidine, suggesting that DNA methylation plays a role in this process. In situ hybridization of HPV16 E7 mRNA showed that some p53-KO lines cell spheroids were completely lacking the signal while the p53-WT lines have a universal distribution of the HPV16E7 mRNA signal. In conclusion, p53 mutations may be an important factor in the development of HPV-inactive cancers. However, complete loss of p53 alone is not sufficient to suppress E7 expression entirely. Also, loss of E7 expression may be due, at least in part, to DNA methylation. We are currently examining HPV URR methylation in the p53 WT and KO lines, and isolating pure lines with complete loss of HPV16 E7 expression for further studies of the molecular mechanisms that may lead to the HPV-inactive phenotype.

**Abdulla, Osama**

**Mentor(s): Prof. Prakash Nagarkatti, Prof. Mitzi Nagarkatti**

**TCDD attenuates DTH by downregulating FoxP3-targeting microRNA-125b**

MicroRNA (miR) are small endogenous single-stranded non-coding RNA that play an important role in regulating biological responses such as cell proliferation, as well as immune cell activation or suppression. Previous studies demonstrated that miR-125b could directly bind and inhibit FoxP3, the transcriptional factor for Regulatory T cells (Tregs). The aim of the present study is to investigate the effect of TCDD on miR-125b expression during delayed type hypersensitivity (DTH), and whether modulation of this miR altered the immune response after treatment. Treatment of C57BL/6 mice with TCDD attenuated DTH responses to methylated bovine serum albumen (mBSA). miR expression profile evaluation and PCR validation experiments confirmed this treatment resulted in downregulation of miR-125b in the draining lymph nodes, which correlated with an increase in Tregs. In addition, there was an increase in TGF $\beta$  levels, as well as an increase in the expression of transcriptional factor, FoxP3. Furthermore, there was a significant suppression of the inflammatory response, characterized by suppression of pro-inflammatory markers IL17, INF $\gamma$  and IL6 in draining lymph node. In summary, this study demonstrated that TCDD treatment modulated the expression of miR-125b during DTH, which led to the induction of FoxP3-expressing Tregs and Treg-associated factors, while suppressing the disease-associated inflammatory response. (Supported in part by NIH grants R01AI123947, R01AI129788, P01AT003961, P20GM103641, and R01AT006888).

**Ackerson, Stephanie**

**Mentor(s): Dr. Jason Stewart**

**CST promotes ATR activation and cell cycle progression**

DNA is constantly damaged as a result of endogenous and exogenous stressors and these damages must be repaired in order to preserve the integrity of the genome. Genome instability, a hallmark of cancer, is combated by DNA damage response (DDR) signaling pathways, which are initiated by recognition of DNA damage and activation of kinases to initiate repair and cell cycle arrest. One such family of kinases, the PIKK family, responds to different types of DNA damage such as double strand breaks or single stranded DNA (ssDNA). ATR, a member of the PIKK family, is recruited to sites of excess ssDNA. Localization of ATR is necessary but not sufficient for its activation, which is mediated by TopBP1. TopBP1 is recruited to sites of ssDNA and interacts with ATR. Then ATR activates downstream targets, such as CHK1 and p53, in order to facilitate resolution of the ssDNA and arrest of the cell cycle. Cell cycle arrest provides the cell with more time to repair any damage, however prolonged arrest can cause uncoupling of the cell cycle and cell death. Increasing evidence suggests that the ssDNA binding protein, CST (CTC1-STN1-TEN1), is involved in maintaining genome stability. Depletion of CST results in increased micronuclei and anaphase bridges which are indicative of genome instability, however the details of how CST functions to prevent genome instability are poorly understood. Here, we used a conditional CTC1 knockout (KO) cell line to investigate the consequences of CTC1 KO on the activation of the DDR. We find that CTC1 KO results in a G2 cell cycle arrest mediated through the tumor suppressor and guardian of the genome, p53. Due to the ability of CST to bind ssDNA, we hypothesized that loss of CTC1 results in deprotection of ssDNA and checkpoint activation by ATR. Surprisingly, we did not see an increase in ATR activation, and when we exogenously stress the cells ATR activation is decreased. In addition, these cells have decreased levels of TopBP1, suggesting that CST mediates ATR activation through control of TopBP1. Together, these data indicate a novel function of CST in ATR mediated DDR.

**Adams, Lacy**

**Mentor(s): Dr. Robin Kloot**

**Fielding Sustainability: The Potential for Compost Extract as Fertilizer on Athletic Turfgrass**

Sustainability and green initiatives are being pushed across the country and the globe, but athletics are not majorly seeing the same pressures. Golf courses are largely the only athletic arena that have received pressure and are beginning to implement more sustainable management practices. Agriculture is also making strides to use less chemicals through organic and regenerative farming. Meanwhile most of the athletic world continues to contribute to soil compaction, chemical maintenance, and runoff all of which affect the quality of the local environment. The strides to improve the sustainability of athletics can currently be seen in the energy efficient building, recycling programs, and reduced water use. However, outside on track, football, baseball, softball, lacrosse, and soccer fields, the original soils are dug up, replaced with a sandy soil, leveled, compacted, and planted with non-native turfgrass. The turfgrass receives massive amounts of chemical fertilizers, herbicides, and pesticides. When rain or irrigation falls on the fields the water quickly drains through the sandy soil under the field leaving little water for the grass roots. As an alternative to these traditional maintenance strategies, this experiment evaluates compost extract on University of South Carolina's track infield. Compost is being used in place of chemical fertilizers so that the soil and turfgrass can be compared. Viewing soil as more than a medium for turfgrass to grow, this study is interested in not only the above ground grass, but also the soil health and diversity of the microbial community belowground. Soil samples are used to determine nutrients, while a hand held NDVI sensor (Tribble Greenseeker) is used at much more regular intervals to quantify the turfgrass health and density. Soil cores are taken to determine bulk density, which is a critical component to athletics for athlete safety, and infiltration tests help to monitor soil hydrologic performance. Soil microscopy alongside phospholipid fatty acid analysis are used to compare the microbial diversity in the soil. The experiment

aims to determine if compost extract can successfully be used in place of chemical fertilizers or as part of a more environmental friendly field maintenance regime for turfgrass.

**Adeluyi, Adewale**

**Mentor(s): Dr. Jill Turner**

**Altered Microglial Signaling in the Nucleus Accumbens Contributes to Anxiety-like Behavior during Nicotine Withdrawal**

Tobacco smoking is the leading cause of preventable morbidity and mortality globally. Yet, about 80% of smokers attempting to quit, fail. Smoking cessation interventions developed to improve quit success rate among smokers have been somewhat ineffective in reducing nicotine withdrawal phenotypes underlying smoking relapse. While the role of microglia in the pathogenesis of many neurodegenerative disorders is well established, their contribution to the development of nicotine withdrawal phenotypes is unknown. To evaluate this, mice were subjected to 48h withdrawal following chronic treatment (15days) with either saline or nicotine (18 mg/kg/day) via osmotic minipump implantation. A day prior to withdrawal, and each morning for the next 3 days, both saline and nicotine-treated mice received either vehicle or N-acetylcysteine (NAC - 150 mg/kg per day) intraperitoneally, and behavioral tests were conducted 30 minutes post-injection on the 24h (Open field test - OF) and 48h (Marble-burying test - MB) withdrawal days. In this experiment, we used NAC as an antioxidant tool, and we found that increased expression of pro-inflammatory cytokines (TNF $\alpha$  and IL1 $\beta$  mRNA) and associated ROS in the nucleus accumbens during withdrawal were attenuated by NAC treatment. A similar profile was seen in NADPH oxidase 2 (NOX2) mRNA and protein expression analysis, suggesting this molecule as the key producer of ROS during nicotine withdrawal. Further studies in the nucleus accumbens showed microglial activation during nicotine withdrawal. Interestingly, amongst the cell types in the brain, NOX2 is mainly expressed in the microglia, suggesting that ROS induction during nicotine withdrawal is microglia-related. Finally, our behavioral studies showed that NAC-treated withdrawal mice displayed anxiolytic effects in both OF and MB task in contrast to the vehicle-treated counterparts. Altogether, our emerging evidence suggests that microglial activation and associated Nox2-induced ROS in the nucleus accumbens drive anxiogenic behavior during nicotine withdrawal in mice. Our novel findings demonstrate that nicotine withdrawal induces oxidative stress via activation of microglial-Nox2 pathway, which drive the development of anxiety-like behavior during smoking cessation. Therefore, therapeutics targeting these microglia-related effects may be promising compounds for smoking cessation.

**Aladhami, Ahmed**

**Mentor(s): Dr. Carole Oskeritzian**

**Mast cells promote local angiogenic and structural remodeling, a precursor to prostate cancer**

Prostate cancer (PCa) is the second cancer-cause of death of men in the USA. Upon transformation, prostatic epithelial cells (EC) gradually evolve from benign, premalignant, to malignant phenotypes. Prostatic Intraepithelial Neoplasia (PIN) is an abnormal growth of epithelial cells progressing from Low grade (L) PIN to High grade (H) PIN, which is considered as a precancerous stage. Therefore, most studies focus on the HPIN-PCa progression. We hypothesized that the less-studied LPIN stage may feature unique remodeling processes predisposing to PCa. Prostate-resident mast cells (MC) harbor plenty of preformed mediators, such as angiogenic vascular endothelial growth factor-A (VEGF) and sphingosine-1-phosphate (S1P), produced by sphingosine kinase (SphK). Using preclinical transgenic (C3) mouse model, we sought to investigate remodeling in LPIN. We designed a novel quantitative method of image analysis to measure in situ angiogenesis. Increased angiogenesis was discovered in LPIN. MC augmentation and activation were featured in LPIN sections compared to normal sections. Moreover, mRNA of Sphk, Vegfa and matrix metalloproteinase (Mmp) 9 were significantly increased in LPIN samples, accompanied with elevation of S1P. Additional evidence of structural remodeling in LPIN samples included a substantial increase in mRNA of

collagens type I and III (Col1a1 and Col3a1). Importantly, we established a novel computer-aided imaging method to quantify in situ cell-associated VEGF protein expression. Remarkably, VEGF expression was in MC in all experimental groups and was more elevated in LPIN samples. Next, transcriptomics for remodeling genes conducted with human patient samples revealed that, for each patient, cancer-bearing biopsies also featured significant increases in SPHK, VEGF, MMP9, COL1 and COL3 mRNA expressions. Altogether, our preclinical and human data provide a new strategic paradigm to untangle the link between MC, early local remodeling observed in LPIN and PCa which may lead to new diagnostic and precision medicine modalities.

**Al-Ghezi, Zinah**

**Mentor(s): Prof. Mitzi NAgarkatti**

**Role of CB1 and CB2 receptors in cannabinoid-mediated amelioration of experimental autoimmune encephalomyelitis: Effects on Treg development and cytokine production**

Multiple sclerosis (MS) is the most common inflammatory demyelinating disease of the central nervous system (CNS). MS is caused by an autoimmune response against myelin that eventually leads to progressive neurodegeneration and disability, leading to adverse symptoms among the patient population. Currently, there are no effective cures for MS, therefore new therapies are needed. We investigated the role of the cannabinoid receptors CB1 and CB2 in the physiopathological processes during experimental autoimmune encephalomyelitis (EAE), an animal model of MS, and evaluated their role after treatment with a combination of psychoactive  $\Delta^9$ -tetrahydrocannabinol (THC) and nonpsychoactive cannabidiol (CBD). We assessed cytokine levels and Treg (FoxP3+CD4+) numbers in control (EAE-Vehicle) and treated mice (EAE-THC+CBD). Mice treated with THC+CBD showed decreased levels of CD4+T cells and pro-inflammatory cytokines (IL-17 and IFN- $\gamma$ ), but increases in anti-inflammatory IL-10, resulting in overall reduced disease scores. However, clinical EAE scores were increased in the CB1 and CB2 KO mice, comparable to WT EAE-vehicle disease controls, even upon treatment with THC+CBD. Pro-inflammatory cytokines (IL-17A, IFN- $\gamma$ , IL-6 and TNF- $\alpha$ ) were also increased in CB1 and CB2 KO EAE mice, suggesting that THC+CBD-mediated effects on cytokine production and protection against EAE were dependent on these receptors. Thus, we demonstrated cannabinoid receptors are very important for THC and CBD to exert their anti-inflammatory and neuroprotective effects. (Supported in part by NIH grants R01AI123947, R01 AI129788, P01 AT003961, P20 GM103641 and R01 AT006888).

**Alhameed, Hanaa**

**Mentor(s): Dr. Scott Jeffry**

**Toxicological Effects of Silver Nanoparticles to Juvenile Hard Clam *Mercenaria mercenaria***

Silver in the both forms ions and nanoparticles are used a massive in consumer products and in medical devices. This is because of its interesting antibacterial exploit. However, there are increasing concerns about possible risks to humans and to the environment, especially in the case of silver nanoparticles. The assessment to the physicochemical and biological properties of silver nanoparticles and predicted their behavior is complicated because a number of properties, such as size, shape, charge, dispersion state, and surface functionality will be involving in the fate of nanoparticles in the media or in the environment . Therefore, the comparison of the result from different species of silver nanoparticles will typically help to understand the methods that silver nanoparticles will behave and interact with organisms in the environment. Therefore, we have conducted a multi experiments in the project and applied different assays in aqueous media for studying the toxic impact silver nanoparticles to juvenile hard clam *Mercenaria mercenaria*. The purpose of the project plan is to examine a commercially silver nanoparticles with different coated such as citrate and PVP with silver nanoparticles that have been already synthesized in the lab at Environmental Health Science department at public Health at University of South Carolina. Each nanoparticles will characterized and test their ability to make acute and chronic toxic effects on the

juvenile clams. Therefore, the research will determine the optimum conditions that will be observed toxicity to clam in different endpoints such as mortality, growth, and burden body. The research also assessed the effect of silver nitrate as a comparison source of non-Nano silver ions. The influences that changing silver nanoparticles behavior, concentrations, particle shape, and capping ligand have with regard to the time-dose response relationship are being investigated, and the preliminary data will be presented. Additionally, the quantifying uptake and elimination rates of silver nanoparticles particle under the experimental conditions will be presented.

**ALhameed, Hanaa**

**Mentor(s): Dr. Jeffry Scott**

**Toxicological Effects of Silver Nanoparticles to Juvenile Hard Clam *Mercenaria mercenaria* J.R. Lead, Geoffry Scott, H. ALhameed Center for Environmental Nanoscience and Risk, Department of Environmental Health Sciences, Arnold School of Public Health**

Toxicological Effects of Silver Nanoparticles to Juvenile Hard Clam *Mercenaria mercenaria*

J.R. Lead, Geoffry Scott, H. ALhameed Center for Environmental Nanoscience and Risk, Department of Environmental Health Sciences, Arnold School of Public Health, University of South Carolina, Columbia, SC.

Silver in the both forms ions and nanoparticles are widely used in consumer products and in medical devices. This is because of their strong antibacterial properties. However, there are increasing concerns about possible risks to humans and to the environment, especially in the case of silver nanoparticles. The assessment to the physicochemical and biological properties of silver nanoparticles and their behavior is complicated because a number of challenges, such as nanoparticle complexity, physio-chemical transformations, bio-uptake and toxicity mechanisms. We hypothesize that silver nanoparticle toxicity to juvenile clam *Mercenaria mercenaria* is a dominated by nanoparticle transformations which affects bio-uptake. The project has examined commercially available and in-house produced silver nanoparticles with different characteristics. Nanoparticles were characterized acute and chronic toxic effects to *M. mercenaria* were quantified. Results assessed silver ions. The influences that changing silver nanoparticle toxicity in comparison to a positive control (silver ions) as related to physico-chemistry and bio-uptake. Results are presented in synthetic inorganic seawater and in filtered natural seawater to examine the effects of trace components such as natural organic macromolecules on nanoparticle bio-uptake and toxicity.

**Alharbi, Khalid**

**Mentor(s): Dr. Carol Pardun**

**Saudi Women in the Driving Seat: A Content Analysis of Auto Companies Tweets**

This study examines how auto mobile companies used Twitter to speak to Saudi females from the day of the announcement of lifting the driving ban to the actual day when women started to drive. A content analysis of auto mobile companies tweets, 26 Twitter accounts, from September 26th 2017 to June 24th 2018.

**Al-Hashmi, Amna**

**Mentor(s): Dr. Geoffrey Scott**

**The Role of Iron Oxide Nanoparticles in Protecting Female Cancer Patients from Doxorubicin Induced Ovarian Toxicity**

Due to their unique magnetic properties and low toxicity; PVP-iron oxide nanoparticles (PVP-IONPs) can act as safe carriers for doxorubicin anti-cancer drug and protect the ovary from doxorubicin-induced female ovarian cytotoxicity and infertility. Doxorubicin is classified as anthracycline antibiotic and it is commonly used to treat tumors such as lymphoma, leukemia, and breast cancer. In addition to killing cancer cells, this vesicant chemical produce side effects when it reaches to non-cancerous tissues. Doxo-

rubicin can significantly promote ovarian follicle apoptosis and increase the risk of ovarian failure, early menopause, cardiomyopathy, liver failure, endocrine and reproductive disruption (e.g. infertility) in both women of reproductive and prepubertal age. Our functionalized nanoparticles consisting of iron oxide (magnetite) core and PVP polymer coating conjugated with doxorubicin will be prepared and their size, crystal structure, zeta potential ( $\zeta$ ), PVP-polymer attachment to DOX and DOX loading efficiency to IONPs will be measured using DLS, TEM, XRD, UV-vis and FTIR. PVP-IONPs are synthesized using hydrothermal method in which iron salts along with PVP are used as precursors while ammonium hydroxide is used as precipitation agent. Breast cancer in vivo model along with MCF-07 cell line will be used to test IONPs-DOX conjugate efficacy on treating cancer cells and decrease DOX side effects such reproductive toxicity. Our preliminary data showed that PVP-coated IONPs have low toxicity, stable and monodispersed (size range = 70nm- 120nm) and have good potentials in environmental remediation and biomedical applications since their negatively charged polymers bind to trace metals and anti-cancer drugs by the means of covalent binding or electrostatic interactions. In comparison, free doxorubicin showed significant cytotoxicity to HL60 leukemic cells and decreased their viability at 100-200  $\mu\text{g}/\text{ml}$  doses. For more effective and targeted DOX delivery, AC electromagnetic hyperthermia or external magnetic field can be applied to allow magnetic carriers accumulation in tumor site and DOX release and intracellular bioavailability in cancerous cells. Thus, the antitumor activity and specificity of DOX will be increased in targeted tumor tissue and its side effects such as ovarian toxicity will be decreased. As a result, cancer chemotherapy will become more effective with fewer side effects.

**Alkarkoushi, Rasha Raheem**

**Mentor(s): Dr. Traci Testerman, Dr. Ioulia Chatzistamou, Dr. Udai Singh, Dr. Marpe Bam, Prof.**

**Prakash Nagarkatti**

**The effect of *Helicobacter* spp., and indole-3-carbinol in animal models of colitis and colitis-associated colon tumorigenesis.**

Enterohepatic *Helicobacter* (EHH) species are epidemiologically linked to increased inflammatory bowel disease; however, little research has been done to elucidate potential contributions of individual species. Dextran sulfate sodium (DSS) treatment and DSS - azoxymethane (AOM) is widely used in mice to induce ulcerative colitis and colitis-associated colon cancer. We hypothesized that specific EHH species would alter the course of DSS-induced colitis and colitis-associated colon tumorigenesis and alter the response to indole-3-carbinol (I3C), an anti-inflammatory phytochemical. We infected C57BL/6 mice with human- and rodent-associated EHH species +/- DSS, or +/- DSS, AOM and measured the effects on DSS-colitis and DSS-AOM colon cancer by measuring pathology, inflammation markers. We found that *H. cinaedi*, *H. pullorum*, and *H. fennelliae* exacerbate DSS-induced colitis and delay recovery; whereas *H. hepaticus* reduced the effect of DSS-induced colitis severity and hastened recovery. *H. hepaticus* also lowered the number of polyps and adenocarcinoma in the DSS-AOM colon cancer model. Next, we treated *H. muridarum* (H.m.)-infected C57BL/6 mice with DSS +/- I3C and measured inflammatory biomarkers. We found that H.m. exacerbated DSS-induced colitis and increased the Th17 compared to the DSS group. Also, we found that H.m. bacteria produced inflammation and pathology in the absence of DSS. I3C, on the other hand, ameliorated colitis, shifted the Treg/Th17 balance, and altered expression of Treg and Th17-associated microRNAs in DSS+ H.m.-infected mice. Furthermore we found that I3C reduced the number of the polyps in H.m./DSS/AOM-treated mice. I3C also shifted the microbiota closer to that of healthy animals. Therefore, EHH species alter susceptibility to DSS-induced colitis and DSS-AOM colon cancer, while I3C reduces deleterious effects. These results suggest that EHH species could make humans more or less prone to inflammatory bowel disease and could alter the efficacy of treatments; and I3C ameliorates colitis via microRNA-mediated increased T-reg populations and microbiota shift.

**Almahmoud, Hanin**

**Mentor(s): Dr. Melanie Cozad**

**Evaluate and compare the satisfaction of mothers during their experiences of giving birth in private versus public sections in two National Guard hospitals in Saudi Arabia.**

Background and Aim: High-quality maternity care dramatically reduces infant and maternal morbidity and mortality. Patient satisfaction is an important indicator of the quality of care because it demonstrates the difference between what the patient expects and the current level of care received. Vision 2030 represents a blueprint for Saudi Arabia's future that is focused on improving the quality of health care through privatization. In support of that vision, Saudi women gained back the majority of their rights including autonomy to make their own health care decisions. While some research has elucidated women's satisfaction with their maternity care within the public sector, none have examined it within the private sector or compared it across sectors. With transformation toward Vision 2030 underway, this study is designed to measure and compare women's satisfaction with their labor and delivery care in the public and private sectors of two National Guard hospitals in Jeddah and Riyadh.

Methods: A convenience sample of 80 women across the public and private sectors of National Guard hospitals in Jeddah and Riyadh were recruited. Participants were consented into the study and completed 20 minute, face-to-face, semi-structured interviews. All interviews were recorded, transcribed, and coded. Codes were analyzed using grounded theory to build a conceptual framework regarding women's satisfaction with their labor and delivery care across sectors and locations.

Results: Preliminary results reveal that women within the public sector feel less satisfied with their care as compared to the private sector because of lack of privacy and nurses less-careful attention to their concerns.

Conclusion: Women within the private sectors of National Guard hospitals feel more satisfied with care particularly when it comes to the privacy and care provided by nurses. As Saudi Arabia transitions to privatization, careful attentions should be paid to how women within the public sector are transitioned during the privatization efforts.

Specifically, attention should be given to the privacy that all women receive during labor and delivery as well as how women are cared for by nursing staff.

**Almurshidi, Badria**

**Mentor(s): Prof. Geoff Scott, Prof. Swapan Ray, Prof. Wayne Carver, Prof. Jamie Lead**

**Plausible role of platinum nanoparticles in differentiation of oligodendrocyte precursor cells and therapeutic implication for multiple sclerosis**

Multiple sclerosis is an autoimmune neurodegenerative disorder caused by attack of immune cells to myelin sheath surrounding the axons of nerve cells. Furthermore the inflammation induced in the disease carry out the inhibition of differentiation of oligodendrocyte precursor cells (OPC) to a mature oligodendrocyte. This cells have a vital function in formation and maintaining the myelin sheath surrounding the axons of neurons. The overexpression of ID2 protein in OPC cells due to the inflammatory cascade carry out disease progression. Platinum nanoparticles have been studied for its antioxidant, anti-inflammatory activities. But, the molecular mechanism of action as anti-inflammatory and differentiation inducer is not clearly defined. Our study was designed to determine the in-vitro cytotoxicity, anti-inflammatory and differentiative effects of Platinum in primary mouse embryonic fibroblast (MEF cells) and OPC cells. In this study the MEF and OPC cells were exposed to (0, 1, 25, and 50 ug/ml) of platinum nanoparticles. Metabolic activities, proliferation and necrosis were evaluated. The protein levels expression of the pro-inflammatory cytokines [tumor necrosis factor- $\alpha$ ], sideways with cyclooxygenase (COX-2) were analyzed by Western blotting. The phosphorylation of extracellular signal regulated kinase (ERK1/2) and Akt, and the phosphorylation and degradation of inhibitory kappa B-alpha (I $\kappa$ B- $\alpha$ ) side to side with ID2, SMAD2/3 and

$\alpha$ -smooth muscle Actin were determined by Immunoblotting. Our data indicated that nanoparticles have no significant cytotoxic effects on cells. The role of platinum nanoparticles in suppression the phosphorylation of ERK1/2 and Akt, and inhibition of the phosphorylation/degradation of I $\kappa$ B- $\alpha$  as well as nuclear factor kappa-B (NF $\kappa$ B) activity and impact on OPC differentiation is in progress. Our data showed that the nanoparticles can still able to induce differentiation although the ID2 proteins are overexpressed in MEF cells. In this commentary, we highlight the application of platinum nanoparticles as emerging solution for MS therapy with the potential to restore homeostasis via reduction of inflammation. Furthermore, we propose the usage of platinum nanoparticles as a new therapeutic route for targeting ID2 protein in multiple sclerosis.

**Alrafas, Haider Rasheed**

**Mentor(s): Prof. Mitzi Nagarkatti**

**AhR ligation prevents TNBS-induced colitis and pro-inflammatory response by regulating miRNA targeting CD4+FoxP3+ T regulatory cells**

Inflammatory bowel disease including both ulcerative colitis and Crohn's disease are associated with aberrant regulation of the colonic mucosal immune system. This disease, which currently has no cure, results in an overall decrease in quality of life and an increase in health care costs. Resveratrol (RES), a component of plant products such as grapes, strawberries, and raspberries, has anti-inflammatory properties. RES is known to be produced as a defense mechanism in these plants when exposed to pathogenic bacteria and fungi. In the current study, we examined the effects of RES on 2,4,6-trinitrobenzene sulfonic acid (TNBS)-induced colitis in mice. Treatment with RES improved overall clinical scores by reversing weight loss and colitis-associated pathogenesis. Flow cytometric analysis of the mesenteric lymph node (MLN) showed RES was able to reduce colitis-associated increase in CD3+, CD4+ and CD8+ T cells. In addition, RES increased CD4+Foxp3+ Tregs and IL-10-producing CD4+ T cells. MicroRNA (miR) microarray analysis from CD4+ cells isolated from MLN showed treatment with RES decreased expression of several miRs (miR-31, Let7a, miR-132) that target cytokines and transcription factors of the anti-inflammatory T cell responses (Foxp3 and TGF- $\beta$ ). Transfection studies with miR-31 confirmed that this miR specifically targeted Foxp3. These studies demonstrate that RES suppressed colitis development by preventing colitis-associated dysregulation of miR that suppress the anti-inflammatory CD4+ T cell response.

(Supported in part by NIH grants P01AT003961, R01AI123947, R01AI129788, and P20GM103641)

**Altman, Katya**

**Mentor(s): Dr. Allison Marsh, Dr. Lucy Ingram**

**Community Engagement and Collaboration in Context of Coastal South Carolina**

Coastal communities are increasingly vulnerable to threats associated with changing climate, shifts in population density, and growing demands on limited natural resources. Rising challenges pressure coastal communities, impact quality of water and air, reduce access to clean and safe beaches and seafood, and influence health and well being of residents and local businesses. Such complex environmental issues require integrated approaches, multidisciplinary collaborations, and engagement of all community to find the most sustainable solutions. Proactive mitigation of risks associated with hazards and tailored approaches to resource management could have distinctive outcomes in the context of coastal communities. The purpose of this project is to increase understanding of the context of coastal community engagement and collaboration through semi-structured interviews with leaders in environmental engagement in coastal South Carolina. Learning from environmental leaders about prior efforts can help to ensure the selection of the most effective strategies in reaching desired goals and avoiding setbacks in future projects. Bringing together the whole community in a productive collaborative process will enhance community resilience to the ongoing coastal threats exacerbated by climate variability and change. Community engagement and collaboration are increasingly important issues in bringing sustainable solutions to

environmental resource management and connecting science with decision-making in cultivating healthy and resilient communities for all.

**Alzughaihi, Ali**

**Mentor(s): Dr. Julia Lopez-Robertson**

**Developing Critical Literacy through Reader-response Theory: A Case Study**

The way students' respond to literature can tell us about their critical literacy. Rosenblatt's (1995) Reader-response Theory (RRT) suggests that the text is only print if students do not connect with its content by responding to it and connecting their personal and cultural experiences to the content of the literature. Although there is consensus among ELT researchers (e.g. Chung, & Lee, 2012; Yilmaz, 2013; Iskhak, 2016) about the impact of applying RRT in literature classrooms, teaching literature still follows the traditional teaching methods in many language teaching contexts. In this study, I investigate how Saudi students bring the text to life by responding to a short story and connecting it to their personal and cultural experiences. I conducted a conversation analysis of a reading class session and interviewed students to answer two research questions: 1. What kind of responses do Saudi students provide in response to the short story "The Til-tale Heart"? 2. What are students experiences with the application of RRT in English classrooms? Findings from a pilot study reveal that students can engage in critical, meaningful conversation about the text when their beliefs about the text are challenged, asking them to step away from their comfort zone (Rosenblatt, 1995) and eventually connecting the content of the story to who they are. The study contributes to previous literature (e.g. Chung, & Lee, 2012; Yilmaz, 2013; Iskhak, 2016) by encouraging and supporting the application of RRT in language classrooms and the impact it can have on students' critical literacy while not jeopardizing their reading comprehension (Iskhak, 2016). From the interviews, students reveal that they have never experienced the approach of RRT in their classes and that teaching reading focuses on memorizing facts from the literature. More results will be obtained from the actual study to confirm whether the application of RRT can help students' critical literacy development.

**Anderson, Carrie**

**Mentor(s): Ms. Emily Jordon**

**The Perspectives of Emerging Adults With Hereditary Diffuse Gastric Cancer**

Individuals with hereditary diffuse gastric cancer (HDGC) caused by a CDH1 mutation have up to an 83% lifetime risk of developing gastric cancer. National guidelines recommend CDH1 carriers undergo prophylactic total gastrectomy— a surgery that greatly reduces the risk of developing gastric cancer but has significant co-morbidities. This study explores the specific impact of a diagnosis of HDGC in the transitional life stage between the ages of 18-29 deemed "emerging adulthood." We surveyed 21 CDH1 carriers and conducted semi-structured phone interviews with 6 CDH1 carriers between the ages of 18-29 to learn about their life experiences regarding education, job choices, relationships, and family planning. Participants were also asked about their experience with genetic counseling. Specific challenges that were highlighted by participants included time away from work due for doctors' appointments and surgery recovery, an impact on relationships with family, friends, and romantic partners, and difficult choices regarding family planning. Participants also struggle with the burden of being the expert on their condition in relation to their friends and healthcare providers, though they find support and knowledge in online groups for HDGC. These results suggest the need for increased awareness among health care providers to support their patients with HDGC.

**Arash, Saba**

**Mentor(s): Prof. Yanwen Wu**

**Modification of Second Harmonic Generation Signal from Multiferroic Nanofibers under Changing Magnetic Field**

Multiferroic materials have recently attracted widespread attention as a novel class of materials due to their diverse multifunctional properties and applications. In particular, multi-phase structures are easier to synthesis and more common at room temperature in comparison to the single-phase materials. The hybrid structures investigated in this study are Janus nanofibers consisting of two hemi-cylinders of ferroelectric barium titanate (BTO) and ferrimagnetic cobalt ferrite (CFO). The mechanism involved in the magnetoelectric (ME) coupling between the two phases for this particular system is strain. In this study, we used the optical second harmonic generation (SHG) technique to monitor changes in the ferroelectricity of the BTO half while modifying the magnetization of the CFO half. The optical investigation was performed on an ensemble of pre-aligned nanofibers. In addition, the polarizations of the SHG signal were analyzed at different magnetic field orientations. We observed a clear signature of the SHG polarization rotation as the magnetic field direction was changed. This result suggests the existence of a measurable ME coupling between the two phases of this hybrid structure at room temperature which is essential for realizing devices with multiferroic applications.

**Arrasmith, Kathleen**

**Mentor(s): Dr. David Garner, Dr. Wendy Valerio**

**It looks like it sounds: Transcribing young children's music vocalizations**

With the intention of increasing understanding of young children's music vocalizations, the purpose of this study was to investigate and describe transcription and analysis techniques. Music notation creates a visual representation of aural patterns and allows for visual analysis of an aural phenomenon. The purposes of transcription include description, enhancing analysis, creating performance material, generating notation techniques and styles, and learning about and learning from music notation. Young children make a variety of music vocalizations, but few researchers incorporate detailed transcriptions to aid their analysis and to augment readers' understandings and interpretations. I selected four, short video-recorded music engagement session excerpts based on variations in established music contexts, illustrations of music development stages, differences in and abundance of music vocalizations, and representations of social music interaction. Participants included children between 4-months and 3-years old. I primarily used my own aural skills and music theory training to create each transcription and only occasionally employed sound analysis software to illuminate specific difficult passages. I engaged in four stages of transcription: preparation, which included repeated listening and discriminating extraneous noise from music vocalizations; initial transcription, which included rough sketches using shorthand notation techniques; intermediary drafts, which included working toward saturation of visual sound representation, adjusting traditional Western notation practices, and creating new notation practices; and the final transcription, which included hand-drawing clean, simple, and accurate notations of young children's music vocalizations. Seeing young children's transcribed music vocalizations may enhance musicians' and music development specialists' ability to hear specific, individual music vocalizations. Adding detailed transcriptions to articles may aid readers' ability to understand, analyze, and audiate descriptions of young children's music vocalizations. Data from high-quality transcriptions may contribute to the understanding of young children's music vocalizations, music development, and social music interactions.

**Becker, William**

**Mentor(s): Dr. Mitzi Nagarkatti**

**Cannabinoids decrease intestinal permeability and induce colonic CD103+ dendritic cells to increase T regulatory cells leading to decreased murine colitis-associated colon cancer**

$\Delta^9$ -tetrahydrocannabinol (THC) and cannabidiol (CBD) are two abundant phytocannabinoids found in *Cannabis sativa*. Cannabinoids bind to cannabinoid receptors 1 and 2 (CB1 and CB2), located primarily on the neurons and immune cells, respectively. Cannabis and synthetic THC and CBD are quickly gaining attention for their therapeutic potential in diseases ranging from epilepsy to multiple sclerosis, and cancer pain.

Colon cancer is the third leading cause of cancer-related deaths, and treatment options are limited to surgery, chemotherapy or radiation. Many physicians are now moving towards a strategy focused on prevention. Chronic inflammation is a cause of many cancers including colon cancer. Thus, we used a murine model of colitis induced colon cancer, wherein BL6 mice were given a single administration of carcinogen (azoxymethane) followed by DSS (1%) in the drinking water daily for 1 week followed by 2 weeks without DSS. This cycle, along with bi-weekly treatment with cannabinoids (CBD, THC, THC+CBD, or vehicle; all 10mg/kg; by oral gavage) continued for 10 weeks, as the progression of cancer was monitored.

Our data revealed that treatment with THC and THC+CBD resulted in decreased polyp formation in mice with colon cancer. We also showed that cannabinoids increased CD103+ dendritic cells in the colonic lamina propria that led to an increase in the CD4+Nrp1+FoxP3+ T regulatory cells (nTregs), which was dependent on CB2. Cannabinoids also increased the colonic barrier integrity as assessed by increased levels of ZO-1, through CB1, and increased mucus production. These changes collectively demonstrated cannabinoid treatment reduced the incidence of colitis-associated colon cancer by inducing an anti-inflammatory response.

**Beguelin, Paul**

**Mentor(s): Prof. Michael Bizimis**

**Cerium isotopes: a new tracer of the deep rock cycle**

The mantle is the largest chemical reservoir of the Earth system, key to global elemental cycles. Radiogenic isotope ratios in mantle-derived lavas are time-integrated tracers of mantle composition, robust to chemical changes during magmatism. Recent mass spectrometry improvements made cerium isotopes ( $^{138}\text{La}$  decay to  $^{138}\text{Ce}$ ) usable as such a tracer.

I present  $^{138}\text{Ce}/^{136}\text{Ce}$  ratios for 30 mantle-derived lavas from the Azores and Hawai'i hotspots. These preliminary results show a higher number of source mixing trends in Ce–Nd and Ce–Hf isotope space than in Nd–Hf alone. These trends reveal heterogeneity in the refractory, melt-depleted part of the mantle, thus exposing time-integrated fluxes of magnesium and iron. Traditional isotope tracers (Sr–Pb–Nd–Hf) are mostly blind to these fluxes as their parent-daughter ratios are either modified by fluid interaction at the surface (Sr–Pb), or do not decouple significantly during mantle melting (Nd–Hf).

Cerium isotopes are therefore sensitive to processes affecting the major mass fraction of the mantle source. Future work will attempt using them as tracers for physically distinct reservoirs in the mantle, setting boundary conditions for dynamical models of mantle convection.

**Beneker, Chad**

**Mentor(s): Dr. Campbell McInnes**

**Discovery and Optimization of Macrocyclic Peptide Dimerization Inhibitors of BRAFwt**

The mitogen-activated protein kinase (MAPK) pathway modulates cell proliferation through regulation of the communication between extracellular signaling and intranuclear transcription. BRAF, a Ser/Thr kinase in the MAPK pathway, is frequently mutated in cases of metastatic melanoma, most frequent of

which is the phosphorylation mimicking V600E mutation. The FDA approved ATP-competitive inhibitor, vemurafenib, effectively inhibits signal transduction in the context of BRAF(V600E), but upon binding to BRAF(wt), paradoxical activation of the second RAF monomer within the dimer is induced, and drug resistance develops in the form of mutant RAS-driven tumorigenesis. The Brummer group rationalized that paradoxical activation was dependent on dimerization and identified the key residues for dimer formation. A peptide library was designed to encompass this interface and was tested for dimer interface (DIF) direct binding. The BRAF (wt) dimerization inhibiting linear has been shown to inhibit downstream phosphorylation events in a dose-dependent manner in the presence of vemurafenib. The initial peptide exhibited a  $K_d = 3.84 \mu\text{M}$  in a direct binding assay and truncation of this sequence led to a 30-fold increase in potency, potentially due to electrostatic stabilization of a pseudo-cyclic conformation. An alanine scan was then completed to identify key binding residues and included those critical for dimerization in the full length protein context. Peptides were cyclized to decrease the entropic cost of binding by covalently stabilizing their bioactive  $\beta$ -turn conformation. Cyclic peptides exhibit sub-micromolar binding affinities and the ring size has been optimized to a 6-residue macrocycle with an 8-atom cyclization linker. Lead molecules have been shown to inhibit paradoxical signaling in metastatic melanoma cell lines. Currently, work is being done to further truncate the sequence and to replace segments with small molecule analogs which will promote proteolytic stability and cell bioavailability. The ultimate goal is to systematically replace segments of the optimized cyclic peptide and to generate a macrocyclic BRAF(wt) dimerization inhibitor which is cell permeable and proteolytically stable. This approach of inhibiting BRAF(wt) dimerization is a novel method of avoiding paradoxical activation of BRAF during treatment with vemurafenib in metastatic melanoma patients, while inhibiting mutant RAS-driven tumorigenesis.

**Berger, Shane**

**Mentor(s): Dr. Parastoo Hashemi**

**Using Fast-Scan Cyclic Voltammetry to Explore the Transport Mechanisms of the Histaminergic System**

Histamine is present throughout the peripheral nervous system and its role in the inflammatory response is well-characterized. Also located in the central nervous system, histamine acts as a neuromodulator influencing a wide variety of processes. However, brain histamine remains an understudied neurotransmitter due to the harsh, dynamic environment of the brain and a lack of minimally disruptive analytical techniques to measure histamine. Recently, our group has developed a histamine selective waveform capable of simultaneous detection of histamine and serotonin using fast-scan cyclic voltammetry (FSCV) in the mouse brain. This allows us to study the relationship between the histaminergic and serotonergic systems and gain a better understanding of how targeted perturbations of one system affects another. Using this technique, we have previously shown that histamine negatively modulates the release of serotonin in the posterior hypothalamus (PH).

Currently, there are no identified transporters for central histamine despite the main route of metabolism occurring intracellularly. We hypothesize that other neurotransmitter transport proteins are responsible for histamine cellular reuptake. Here, we apply FSCV measurements of histamine in the PH of mice to determine the key transporters responsible for histamine reuptake and use a genetic mouse model to confirm this hypothesis. Data obtained from these experiments will ultimately be used to create a mathematical model of a histamine synapse to improve our understanding of healthy and diseased states. Critical information gained from these experiments and model will help aid in the development of enhanced therapeutic strategies for psychiatric diseases.

**Bernhart, John****Mentor(s): Dr. Caroline Dunn, Dr. Sara Wilcox, Dr. Ruth Saunders, Dr. Patricia Sharpe, Mrs. Jessica Stucker****Barriers and Facilitators to Implementing a Faith-based Physical Activity and Healthy Eating Intervention**

Background: Churches are trusted organizations that reach diverse and underserved populations, especially in rural areas. Faith-based health promotion programs may help increase healthy eating (HE) and physical activity (PA). Few longitudinal studies of faith-based health programs exist, and even fewer discuss factors that may influence programmatic implementation and maintenance.

Purpose: This study evaluated church leaders' (i.e., pastors and health coordinators) barriers and facilitators to implementation and maintenance in the Faith, Activity, and Nutrition (FAN) Program at baseline (T1), post-intervention at 12-months (T2) and follow-up at 24-months (T3).

Methods: Church leaders (N=36) who attended the program training answered open-ended questions about anticipated barriers and facilitators to implementing the HE and PA parts of the FAN program (T1). During follow-up interviews at T2 and T3, church leaders answered similar questions concerning experienced barriers and facilitators to program implementation and maintenance, respectively. Responses were coded using thematic analysis and descriptive statistics were calculated for responses at each time-point.

Results: Leaders reported similar themes across all time points for barriers and facilitators. Leaders did not anticipate member characteristics (e.g., age, health issues) as substantial barriers at T1 to implementing PA. However, at T2 and T3, member characteristics were commonly cited as a barrier to PA. For barriers to implementing HE, resistance to change was most common at T1 and T3, but not T2. Most commonly cited facilitators included internal support (e.g., consistency, planning) and communication for beginning and maintaining program HE elements at T1, T2, and T3. In addition, at T3, leaders' responses about the importance of offering healthy opportunities (e.g., changing Sunday school snacks, organizing a walk before or after service) were much more common.

Conclusions: Understanding barriers and facilitators to HE/PA programs from leaders in faith-based settings may help strengthen future programs, resources, and technical assistance.

Implications: Strategies to deal with resistance to change and meet the unique needs of aging members and those with health conditions may be particularly useful. Studying barriers and facilitators over time (before, during, and following the program) may be a useful approach for health initiatives within and outside faith-based settings.

**Bethea, Candace****Mentor(s): Prof. Jesse Kass****An equivariant counting formula for singular conics**

I will discuss work towards producing an enumerative formula for counting the number of singular conics in a linear span under symmetry conditions coming from a group action. This work generalizes a classical result by enriching the original formula from the integers to the Burnside ring of  $G$ -sets.

“Bethel, Samuel - Mentor(s): Dr. Teri Browne, Dr. Breanne Grace -- Influencing Federal Health Policy: lessons from nephrology social work -- Background/Purpose: Social workers have been embedded in United States' healthcare system for more than a century, providing professional assessment and intervention

to patients and their families to improve the psychosocial aspects of health and illness. Healthcare social workers commonly work on interprofessional healthcare teams in oncology, perinatology, infectious diseases, pediatrics, palliative medicine and hospice care, emergency medicine, and primary care. However, only in the medical specialty of nephrology does federal law require MSW-level social workers to be members of the interprofessional team. This study seeks to understand how nephrology social workers successfully lobbied the Centers for Medicare and Medicaid Services to include the policy provision in the Conditions for Coverage Social Security Amendment Act of 1976 and 2008 to require MSW-level social workers to be members of the nephrology interprofessional team.

**Methods:** Data were collected by conducting oral history interviews of nephrology social work leaders and past presidents of the Council of Nephrology Social Workers (CNSW), a subsidiary of the National Kidney Foundation. Interviews were transcribed, analyzed, and coded for common themes using MAXQ-DA software (version 2018).

**Results:** The most prominent themes that emerged from the analysis included nephrology social workers' professional organization and advocacy for their profession through a grassroots effort. All interviewees described that CNSW communicated with their membership continuously throughout CMS' proposed changes to the Conditions for Coverage in both 1976 and 2008. Proximity to policy making was also a prominent theme: having professional social workers embedded within policy-making organizations seemed to significantly contribute to the inclusion of MSW-level social workers in the 1976 and 2008 Conditions for Coverage.

**Conclusion:** Nephrology social workers successfully lobbied CMS in 1976 and 2008 to require by federal law that MSW-level social workers be members of the interprofessional team. Healthcare social workers in other medical specialties can learn from nephrology social work's successes. In an era of healthcare in the United States that is looking to be more responsive to the psychosocial aspects of health and illness, social workers could become the provider of choice in any medical setting where professional psychosocial services are needed.

**Bhalla, Nandini**

**Mentor(s): Dr. Holly Overton, Dr. Brooke McKeever, Dr. Linwan Wu, Dr. Christine Distefano**

**Problem Chain Recognition effect and CSR communication: Examining the impact of issue salience and proximity on environmental communication behaviors**

The aim of this study is to apply STOPS theory and test the mechanism of problem chain recognition effect in the realm of environmental corporate communication. Specifically, this study will conduct an experiment to examine the mechanism behind problem chain recognition (PCR) effect, which suggests whether the perception of a more salient issue (climate change) will be transferred to related less salient issues (air pollution/plastic waste). Thus, this study will first examine the STOPS variables for climate change problem and then, will examine PCR effect and behavioral intention through a 2 (issue salience: salient vs. non-salient) × 2 (issue proximity: local vs. global)) experimental design. The PCR effect has the potential to mobilize support for an organization and/or its cause. By applying the mechanism of the problem chain recognition effect in the context of environmental corporate responsibility (CSR) communication research, we can anticipate that, if consumers perceive an environmental problem as problematic, they may have behavioral intentions to support a corporation's effort to solve or reduce that environmental problem. Thus, this study seeks to investigate the influence of environmental issue types on individuals' environmental communicative behavior and CSR supportive intentions. This study also seeks to add significant contribution towards environmental CSR communication and the STOPS literature. The findings of this study may provide some important implications for environmentalists as well as multinational organizations for developing and communicating environmental (CSR) messages effectively, through identi-

fyng and targeting their key stakeholders for garnering their support.

**Biederman, Diane**

**Mentor(s): Mrs. Debera Zvejnieks**

**Understanding of Clinical Variability, Perceived Disease Burden, and Reproductive Decision-Making of Adults with Tuberous Sclerosis Complex**

Tuberous Sclerosis Complex (TSC) is a highly variable autosomal dominant disorder characterized by the growth of benign tumors, epilepsy, and TSC-associated neuropsychiatric disorders. While reproductive decisions always carry a level of uncertainty, individuals with highly variable genetic conditions like TSC must consider both the chance of passing on the condition and the uncertain clinical presentation. There is currently no literature on factors influencing reproductive decisions of adults with TSC. To address this gap in understanding, we conducted an exploratory mixed-methods survey utilizing an anonymous online questionnaire to assess study participants': 1) familiarity with the symptoms of TSC, 2) understanding of the recurrence risk, 3) perceived disease burden/quality of life, and 4) family planning considerations. A total of 204 individuals aged 18-45 who were diagnosed with TSC participated in the survey. Participants were highly familiar with symptoms of TSC, averaging a knowledge score of 86%. Most participants (86%) were aware of the recurrence risk of TSC. Perceived disease burden was low with 58.6% viewing themselves as mildly or very mildly affected. Quality of life responses fit this perception with 54% of participants feeling like they are often or very often in control of their life and 49.4% feeling like their symptoms rarely or never limit the things they can do. Negative impacts on quality of life experienced often or very often included difficulty sleeping (39.2%), pain (21.8%), and anxiety (36.2%) or frustration (40.8%) caused by symptoms. Only 28.4% of participants currently have children. Of the 58.2% of participants who are considering having children in the future, 49.6% are considering traditional conception, 41% are considering adoption, 16.2% are considering donor gametes, and 47% are considering preimplantation genetic diagnosis (PGD). Thematic analysis showed desire for biological children, fear of passing on TSC, health concerns, and financial concerns were major factors in reproductive decisions. While future studies are needed, the results of this survey will help genetic counselors address reproductive concerns of clients with TSC.

**Blahut, Matthew**

**Mentor(s): Prof. Franklin W. Outten**

**Biochemical and functional characterization of the ferritin-like protein FtnB in Escherichia coli and Salmonella typhimurium**

Regulation of the transition metal iron, which operates in important cofactors like heme and iron-sulfur (Fe-S) clusters, is vital to the survival of most organisms. The two most prevalent oxidation states of iron are the less soluble Fe(III), which predominates in aerobic environments, and the more easily transportable but potentially harmful Fe(II). Fe(II) possesses a prevalence to react with reactive oxygen species like H<sub>2</sub>O<sub>2</sub>, leading to the formation of free radicals responsible for cell death. This hazardous potential necessitates methods of iron storage required to prevent the development of human diseases and neurodegenerative disorders, like Friedrich's ataxia. Within the cell, the role of iron storage is served by the protein ferritin. Ferritin forms a large, 24-subunit complex with a conserved ferroxidase center capable of oxidizing Fe(II) to Fe(III) while also storing thousands of iron atoms. In Escherichia coli, four ferritin-like proteins have been identified in FtnA, Bfr, Dps, and FtnB. While the first three of these have been characterized and all possess the conserved ferroxidase center, FtnB shows potential differences in this region. We decided to attempt to evaluate both E. coli FtnB as well as the previously uncharacterized homologue from Salmonella typhimurium. Although protein studies have not yet been performed, genomic studies of ftnB in S. typhimurium demonstrated that this protein is required for virulence, potentially indicating a major role for FtnB in typhoid fever. Here, we have managed to successfully express the FtnB protein from

S. typhimurium with hopes of purifying and analyzing it in vitro.

**Blair, Sommer**

**Mentor(s): Mrs. Alexis Scurry**

**Human Trafficking in South Carolina**

This presentation covers frequently asked questions regarding the current status of human trafficking within the state of South Carolina. Emphasis is placed on intrafamilial trafficking and the high rate of minor sex trafficking which occurs. Topics include discussion of risk factors for children, warning signs for community members, and steps to take when encountering a possible human trafficking victims. The poster will give a brief overview into the world of domestic human trafficking.

Botchway, Marian - Mentor(s): Dr. Rachel Davis, Dr. Spencer Moore, Dr. Anwar Merchant, Dr. Lambert Tetteh Appiah -- Social network characteristics and blood glucose control among individuals with type 2 diabetes mellitus in Ghana -- The relationship between social networks and health is well established in high-income countries (HICs), and social network members can affect health outcomes through the provision of social support. However, few studies have examined whether social networks influence blood glucose (HbA1c) control in low- and middle-income countries (LMICs) where diabetes prevalence rates are rapidly increasing. In these settings where informal social relationships may be more critical for access to resources, evaluating links among social network characteristics, social support and HbA1c may provide clarity about important relationships that facilitate wellbeing among individuals with type 2 diabetes mellitus (T2DM). Between July and August 2018, we conducted a hospital-based, cross-sectional study of 254 adults with T2DM and their social networks in Ghana, an LMIC. Multivariable linear regression models were used to estimate three types of associations: 1) associations between HbA1c and three social network characteristic (kin composition, household composition, and network density); 2) associations between social support and each network characteristic; and 3) the association between HbA1c and social support. Findings showed that neither social support nor social network characteristics were significantly related to HbA1c, but each network characteristic was significantly associated with social support. We highlight some potential reasons for the observed findings and provide recommendations for diabetes research and practice within LMICs like Ghana.

**Bradley, Courtney**

**Mentor(s): Dr. Toni Torres-McGehee, Ms. Allison Smith, Ms. Samantha Weber, Ms. Rebecca Dayton**  
**Disordered Eating Risk and Body Image Dissatisfaction in Physically Active College-Aged Students**

Purpose: To examine DE risk and BI dissatisfaction among physically active college-aged students.

Methods: A cross-sectional study was conducted at a large southeastern public university. A total of 123 participants (males: n=45, ages: 21.2 ± 2.0 years, weight: 80.8±13.0 kg, height: 179.3±5.8 cm; females: n=78, ages: 20.2 ± 1.6 years, weight: 66.8±13.7 kg, height: 165.5±7.5 cm) completed an online survey. As part of a larger study, independent variable was gender and dependent variables were DE risk and BI dissatisfaction (perceived and desired BI in daily clothing and perceptions by others). Participants completed a demographic section to screen for DE risk behaviors, the Eating Attitudes Test-26 was used, and BI dissatisfaction was assessed using sex-specific silhouettes (Likert scale). Basic descriptive statistics to examine demographic variables; and cross-tabulations and chi square analysis examined the distribution between DE risk and gender. Repeated measures ANOVA examined differences between gender and PBI and DBI in daily clothing and perceptions by others.

Results: No significant differences were found across gender and DE risk; however, the overall prevalence for DE was 29.3% (n=36) for both males and females. Within females and males respectively. 34.6%

( $n=27/78$ ) and 20.2% ( $n=9/45$ ) were at risk for DE. A perception by gender interaction ( $F_{1,112} = 2842.4$ ;  $P \leq 0.001$ ;  $n_2 = .96$ ) was found for BI perception of students in daily clothing across gender (males vs. females) and perception. Females presented the largest discrepancy between PBI and DBI in daily clothing compared to males (PBI:  $4.0 \pm 1.1$ , DBI:  $3.0 \pm 0.7$  vs. PBI:  $3.8 \pm 0.9$ , DBI:  $3.8 \pm 0.8$ ). A perception by gender interaction ( $F_{1,112} = 2400$ ;  $P \leq 0.001$ ;  $n_2 = .96$ ) for BI perception by friends across females and males (PBI:  $3.8 \pm 1.1$ , DBI:  $3.3 \pm 0.6$  vs. PBI:  $3.7 \pm 1.1$ , DBI:  $3.8 \pm 0.7$ ) and for parents across females and males ( $F_{1,112} = 2363$ ;  $P \leq 0.001$ ;  $n_2 = .96$ ; PBI:  $3.9 \pm 1.1$ , DBI:  $3.4 \pm 0.7$  vs. PBI:  $3.7 \pm 1.1$ , DBI:  $3.8 \pm 0.7$ ).

Conclusions: Overall, DE risk was slightly higher than previously reported in collegiate populations. Body image dissatisfaction was present in both genders, but pressures from parents and friends were felt in opposite directions. Lifestyle stressors of college-aged students may contribute to their risk for DE and BI dissatisfaction.

**Bratsch-Prince, Joshua**

**Mentor(s): Dr. David Mott**

### **Cholinergic activation of parvalbumin-positive interneurons contributes to theta rhythm oscillations in the basolateral amygdala**

Theta rhythm (4-12 Hz) brain network oscillations function to bind neuronal assemblies and are important after learning in driving memory consolidation. Activation of local inhibitory interneurons (INs) is important in network oscillatory activity and driving synchrony in neuron ensembles necessary for this consolidation. In the hippocampus and cortex, acetylcholine (ACh) is well known to drive theta rhythm oscillations through activation of local INs. Altered cholinergic function has been suggested in learning and memory deficits. The basolateral amygdala (BL), which is important in emotional processing and memory, receives dense cholinergic innervation. However, the function of ACh in regulating oscillatory activity in the BL is not clear. This study explores the mechanism of cholinergic-induced rhythmic oscillations in the BL. In brain slice, we found that optogenetically released ACh from the basal forebrain induces theta rhythm local field potentials (LFPs) in the BL. Using whole-cell recordings in these slices, optogenetically released ACh onto BL pyramidal cells (PNs) induced rhythmic theta frequency IPSCs that could entrain synchronized PN firing. IPSCs were blocked by the GABA antagonist bicuculline, but not glutamate receptor antagonists, suggesting direct cholinergic activation of GABAergic INs. Selective blockade of M3, but not M1 muscarinic ACh receptors blocked the theta frequency IPSCs and rhythmic PN firing. Recordings from parvalbumin (PV)-positive, but not SOM-positive INs, revealed ACh-induced currents, suggesting a selective role of PV INs in driving the oscillations. This differs from hippocampal area CA1 and prefrontal cortex where CCK and SOM INs play a prominent role in generating cholinergic oscillations. Collectively, these studies suggest that alterations in cholinergic functioning in the amygdala could result in deficits in emotional memory through impaired theta oscillations. Supported by the NIMH (R01MH104638 to DDM and AJM).

**Brennan, Emily**

**Mentor(s): Dr. Sharon DeWitte**

### **Health & Well-Being in Pre and Post Black Death London: Assessing Sexual Stature Dimorphism**

The study of health and well-being in the past can contribute to the understanding of the biological and social causalities of health in the present. Recent public health research suggests that experiencing an early nutrition-poor environment results in reduced stature as resources are reallocated to the vital organs at the expense of limb development. Since shorter adult stature is positively associated with risk of infectious disease, this adaptive process can result in negative health consequences. The degree of sexual stature dimorphism (SSD), the ratio of male to female height, is argued to be an indicator of living standards. This argument is founded on evidence that physical growth for males is more sensitive to environ-

mental fluctuations while an increased immune response in females may allow better buffering against environmental conditions. Therefore, in a resource poor environment, the degree of SSD is expected to be lower. To test the hypothesis that a poor nutritional environment results in shorter stature and decreased SSD, this study compared adult individuals from pre-Black Death (n = 262) and post-Black Death London (n = 268) using skeletal metric data from the Museum of London. Previous research has indicated that food security, wages, and population health improved after the plague that rocked London from 1348-1350. Lower limb measurements were used as a proxy for stature and SSD was calculated for each time period. As expected, both females and males achieved taller adult stature in the post-plague environment. However, females were not significantly taller in the post-Black Death sample. For males, the tibia was the only lower limb measure that increased significantly after the plague, suggesting that it is more sensitive to environmental stress compared to the femur. Results also revealed no significant differences in SSD across the two time periods, necessitating further investigation of how cultural and biological processes influence the mechanisms that produce adult stature. Future studies may investigate the extent to which socioeconomic status mediates differences in stature since SES can enable or hinder access to resources.

**Buchanan, Anna Marie**

**Mentor(s): Dr. Parastoo Hashemi**

**In vivo Voltammetric Detection of Copper (II)**

In recent years, copper has been recognized as playing a substantial role in the pathology of several diseases, including various neurodegenerative diseases. Copper speciation dictates the ability of the ion to participate in various biochemical processes as well as copper's toxicity profile. 'Free copper' consists of copper ions not bound by proteins. While free copper only makes up a small percentage of the total copper in the brain, increased levels can be particularly dangerous, creating reactive oxygen species and oxidizing and reducing lipids, proteins, and various neurotransmitters. Previous studies have been limited to measuring total copper in vivo. To selectively measure free copper molecules in vivo, novel ionophore grafted electrodes have been paired with fast-scan cyclic voltammetry (FSCV), yielding high temporal resolution measurements of dynamic changes in copper levels. We describe the development and application of FSCV to measurements of Cu(II) in vivo. This study will further the understanding of copper's role in both healthy and disease states.

**Cajka, Aly**

**Mentor(s): Dr. Kenn Apel**

**Lexical and Sublexical Orthographic Knowledge Across the Elementary Grades**

The purpose of the present study was to extend previous investigation on orthographic knowledge of elementary-aged students. The study was designed to determine whether lexical and sublexical measures could be developed to capture the range of orthographic knowledge (OK) skills of students in the 1st through 6th grades. In addition, we sought to answer how OK skills relate to students' reading and spelling abilities. 1,095 students were assessed with researcher-designed, grade-level specific measures including orthographic-choice, word-likeness, alphabetic-generation, and alphabetic-identification tasks. In addition, norm-referenced measures of reading and spelling were administered. Overall, the developed grade-level measures captured a developmental range of orthographic knowledge within each grade-level. Furthermore, the measures of orthographic knowledge differentially predicted reading and/or spelling performance across the six grade levels. Further research should continue to study word-likeness and alphabetic tasks, as the results were variable across grades and tasks. In the future, these OK measures can be used to assess lexical and sublexical OK.

**Caravella, Kelly**

**Mentor(s): Dr. Jane Roberts**

**Pilot Data: Longitudinal Social Communication Comparisons in Preschool Age Children with Down Syndrome and Fragile X Syndrome**

Introduction: Individuals with neurogenetic syndromes, such as fragile X syndrome (FXS) and Down syndrome (DS) are at elevated risk for autism spectrum disorder, with rates of 60-75% and 7-18% respectively. However, it can often be difficult to disentangle if social communication impairments seen in these populations are attributable to intellectual disability or specific to a co-morbid diagnosis of autism spectrum disorder (ASD). Given that the co-morbidity of ASD in these neurogenetic syndromes results in more significant impairments across a range of domains, accurate diagnoses are imperative to inform targeted treatments.

Method: Participants were seen as part of a larger longitudinal study on the early developmental features of ASD in children with FXS, with comprehensive diagnostic visits occurring annually between 2-5 years. As part of the parent study, all participants were administered the Autism Diagnostic Observation Schedule-2 (ADOS-2). A clinical best estimate diagnosis of ASD was conducted at each annual visit. The Brief Observation of Social Communication Change (BOSCC) was applied to video clips from the ADOS-2. This study presents 2 aims; (1) to examine the prevalence of ASD in preschool aged males with Down Syndrome (n=10), and (2) to compare trajectories of BOSCC scores between participants with FXS and DS.

Results: In this sample, 20% (n=2) of the participants with DS met diagnostic criteria for ASD. In participants with co-morbid ASD, BOSCC scores were higher (i.e. indicating greater symptomatology) in children with FXS than DS. Across both syndromes, BOSCC scores were higher in children with ASD compared to participants without co-morbid ASD. Trajectories did not differ between the groups.

Discussion: Prevalence estimates in the sample are consistent with previous literature, providing additional evidence for the increased prevalence of ASD in DS. When ASD symptoms are present, young children with FXS appear to exhibit greater impairments earlier, which persist over time. These findings highlight the importance of comprehensive evaluations of ASD in children with DS, as their symptoms may appear milder than other genetic syndromes.

**Cashman, Frances**

**Mentor(s): Dr. Varsha Kulkarni**

**Abundance Variations in a Low Redshift Doubly-Lensed Quasar Absorption Line System**

We report a spectroscopic study of a 2-image gravitational lensed quasar at  $z \sim 1.4$ . The two sight lines are separated by  $\sim 9$  kpc. The lensing galaxy, at a considerably lower redshift, is inferred to have a strong 2175 Å dust feature in its extinction curve. Using archival HST STIS and Keck HIRES spectra, we take a closer look at the lensing galaxy in absorption and examine how the H I and metal column densities and metal abundances vary between the two sight lines of this very interesting system. The HIRES data can also allow us to examine how the gas kinematics differs in different parts of the lensing galaxy.

**Chavez, Bryan**

**Mentor(s): Dr. Thomas Crawford, Dr. Jennifer Andrew, Mr. Matt Bauer**

**Using Magnetic Field Chaining in multiferroic Janus nanofibers to extract the Magnetoelectric coupling**

Composite multiferroics couple piezoelectricity and magnetostriction, allowing electrical control of magnetism and vice-versa. At the nanoscale the magnetoelectric coupling is theorized to be an order of magnitude larger than the bulk due to connectivity and the surface to volume ratio. Even though multiferroics have been created in thin film, nanoparticle, and nanofiber form, metrology to quantitatively measure the multiferroic coupling is limited, especially for composite nanomaterials. Our previous work showed that

multiferroic Janus nanofibers chain end-to-end in a magnetic field, and that the scaling parameters ( $z'$ ,  $z$ ) are magnetic field dependent. Here, by simultaneously applying an electric field perpendicular to the magnetic field, we observe changes in the length of the fiber chains, as well as increases in dispersion of chain length across a multi-chain sample.

Our Janus nanofibers consist of two hemi-cylinders and are produced by electrospinning with a combination of BaTiO<sub>3</sub>(62% weight) and CoFe<sub>2</sub>O<sub>4</sub>(38%). We grind the fibers to produce random distribution of lengths with an average diameter of 1  $\mu$ m. The nanofibers are then suspended in polyvinyl alcohol using citric acid and sodium hydroxide to enable colloidal stability. Before magnetic assembly, the suspended fibers are sonicated and deposited into a Hele-Shaw cell created with ITO coated cover slides to allow application of a perpendicular electric field while imaging the chaining process in a microscope.

We use video imaging to monitor the chaining process in a 200 Oe magnetic field alone and together with electric fields of 44.44 and 111.1 kV/m respectively. Figure 1 shows typical chaining dynamics, the chaining scaling parameters, and the corresponding increase in standard deviation as the electric field is applied. We performed a two sample t-test which shows that we do not have sufficient data to claim a statistically significant change in chaining. However, the variation in chain length when electric field is applied suggests the electric field does modify the assembly dynamics. However, we cannot put a bound on the strength of the magnetoelectric coupling coefficient, but expect to with additional data.

**Chinaeke, Eric**

**Mentor(s): Dr. Kevin Lu**

**Protease inhibitor exposure and the risk of developing diabetes mellitus in treated HIV seropositive patients: A systematic review and meta-analysis**

Background

Potential risk for diabetes among HIV patients using protease inhibitors (PIs) has been largely controversial in the literature. This systematic review and meta-analysis attempt to determine if PI use in treated HIV patients is associated with an increased risk of developing DM.

Methods

A systematic literature search was performed using PubMed/Medline, EMBASE and Web of Science to retrieve observational studies published between January 1, 2000 and December 2018. Quality of cohort studies was assessed using the Newcastle-Ottawa Scale for cohort studies. Random-effects modelling was utilized to calculate pooled hazard ratios (HRs) and risk ratios (RRs). Possible heterogeneity was also assessed using Cochran's Q statistic from which the percentage of variation across studies (I<sup>2</sup>) was calculated. Publication bias was assessed using Begg and Mazumdar correlation rank test and visual inspection of asymmetry in the funnel plot. All analyses were conducted using Comprehensive Meta-analysis version 3.0.

Results

Sixteen (16) cohort studies that met the quality criteria were included. Pooled RR based on the random effects model showed that use of PIs is associated with an increased risk of developing DM: (n=10; [RR: 1.25; 95 % CI: 1.07- 1.45]; p-value = 0.006, I<sup>2</sup>=57.0) while the pooled HR random effects model did not detect a significant association: (n=6; [HR: 1.16; 95 CI: 0.88 – 1.53]; p-value= 0.296, I<sup>2</sup>=39.9). There was no significant publication bias based on Begg's test result: (p-value=0.5112).

Conclusions

This meta-analysis is currently the most comprehensive meta-analysis on the association between PI use and risk of DM. Results suggest that HIV patients taking PIs may have an increased risk of diabetes. More research using survival models is needed to better power the study to detect a possible association.

**Choi, Ran Hee**

**Mentor(s): Dr. Ho-Jin Koh**

**The effect of TRB3 in exercise-induced skeletal muscle adaptation**

Tribbles 3 (TRB3) is a pseudokinase and its expression has been shown to disrupt glucose metabolism through the inhibition of Akt under obese and diabetic conditions. We recently found that TRB3 overexpression in mouse skeletal muscle decreased skeletal muscle mass and function, including wheel-cage running capacity. Here, we examined whether TRB3 expression in mouse skeletal muscle affects exercise training-induced skeletal muscle adaptation. We utilized muscle-specific TRB3 transgenic (TG), TRB3 knockout (KO), and their wild-type (WT) littermates as controls. Mice from each genotype were randomly assigned in two groups (n=4-5/each); sedentary (Sed) and forced treadmill running (TM) for 6 weeks. TM group received 5 days/week of an hour treadmill running at 16 m/min with 5 degrees incline. During the training period, we did not detect any difference in body weight among the groups. At week 5, we measured glucose tolerance (ip injection; 2g glucose/kg of body weight), and found that trained TG mice showed glucose intolerance, whereas trained KO mice displayed improved glucose tolerance ( $P<0.05$ ), compared to WT, assessed by area under the curve measurement. Treadmill training increased hexokinase II and PGC1 $\alpha$  protein expression in WT, but these changes were not detected in TG mice. Furthermore, TG mice in Sed and TM groups showed significantly decreased glucose transporter 4 and citrate synthase ( $P<0.01$ ) mRNA expression compared to WT. Mitochondrial markers, including Cyt c and COX4, were elevated in WT, but not in TG mice, in response to treadmill exercise ( $P<0.05$ ). Moreover, after 6 weeks of training, KO mice did not show any differences in glucose and mitochondrial adaptation compared to WT. These data indicate that muscle-specific TRB3 overexpression diminished exercise-induced adaptation, however TRB3 knockout did not further affect the adaptation in mouse skeletal muscle. Taken together, TRB3 may blunt the benefits of exercise-induced skeletal muscle adaptation.

**Cocenza, Nathalia**

**Mentor(s): Dr. Matthew Childs**

**Out in the Streets of Rio de Janeiro: Public and Clandestine Prostitution from 1850s to 1900s**

Filthy alleys, sexually transmitted diseases, court rooms, and freedom fights are key themes this dissertation will consider. This project studies court cases, newspaper articles, novels, travel accounts, census data, published medical theses, police records, and other government documents to analyze the life of prostitutes from 1850s to 1900s in Rio de Janeiro. It tells about the life experiences of freed and enslaved men and women who had to work as prostitutes against their will and analyzes the roles these characters played in the construction of Rio's society. Women who were categorized as "public" prostitutes had more chances of making a living than their "clandestine" enslaved counterparts, who worked for their masters during the day and out in the streets at night. This dissertation argues that even though middle-class men used "public" prostitution as a way to support a patriarchal society, enslaved men and women found in "clandestine" prostitution a way to challenge white power and the institution of slavery. Furthermore, my dissertation focuses on what struggles these men and women encountered because of their gender and class, but most importantly, race and occupation. My work reexamines questions that have not been studied recently, thus, this project offers a new insight to the study of prostitution in one of the most important port cities of Latin America in the nineteenth century. Finally, by studying female and male prostitutes, enslaved and free, my dissertation bridges the gaps in the literature between those groups.

**Cofie, Anna**

**Mentor(s): Dr. Katrina Walsemann**

**Wealth Index and the Prevalence of Malaria amongst Children in Ghana: Data from the Malaria Indicator Survey 2016**

Introduction: Malaria is a chief public health concern globally. Children under five years of age and pregnant women are at higher risk compared to the rest of the population. The sub-Saharan region has the most massive burden of both malaria incidence and prevalence. In sub-Saharan Africa, Ghana is 4th

amongst total malaria cases. The objective of this study is to examine whether wealth is a factor that contributes to malaria prevalence amongst children under 5 in Ghana. We hypothesized that children who live in wealthier households would be less likely to test positive for malaria.

**Methods:** We used weighted cross-sectional data from the Malaria Indicator Survey Ghana 2016. We restricted our analysis to children who tested for malaria, children who were under five years of age and children who were the usual resident of the households (N=1734). A logistic regression analysis was conducted using STATA 15.1.

**Results:** Out of 1734 children, about 70% tested negative for malaria and 30%, positive. The mean number of children had per household was 3. Wealth was almost evenly distributed across the five quintiles (poorest, poorer, middle, richer, richest). Children who lived in the upper region (62%) were more compared to those in the lower part (38%). Although 85% of households reported owning a mosquito net, 52% of children did not sleep under mosquito nets. There was a significant relationship between wealth and malaria prevalence, where the odds of getting malaria was lower amongst children living in wealthier households.

**Conclusion:** Wealth index plays a significant role in whether a child is tested positive for malaria or not. Results generated from this study could give the Ministry of Health and government officials in Ghana a snapshot of contributing factors to malaria prevalence amongst children, so interventions are set in place to help mitigate this trend.

**Corr, Chris**

**Mentor(s): Dr. Richard Southall**

**All About Ball: An Analysis of Official Visit Itineraries among Football Programs in the SEC**

Athletic role engulfment can be linked and attributed to many behaviors that plague student athlete success. Collegiate football players have a tendency to become engulfed in their athletic role and the ramifications specifically associated with engulfing oneself in their role as a collegiate football player have been found to be increasingly negative in nature. College choice and readiness have been linked to the importance of high school aged students taking visits to college campuses. The current study aims to examine a football student athlete's experience on an official visit and the priorities institutions in the SEC place on specific aspects of their institution. The goal of the present study is to examine if an official visit taken by a football student athlete is successful in providing a realistic expectation of the college experience while preparing football student athletes for college and to discuss factors consistent across official visits and their relationship to athletic role engulfment.

**Cresho, Kirsten**

**Supervisor(s): Madison Walters**

**Mentor(s): Dr. Jessica Klusek**

**Executive Functioning Characterized by Verbal Fluency in Mothers of Children with Fragile X Syndrome**

**Introduction:** Executive functioning is defined as the ability to plan, regulate and complete tasks individually. Research has been completed on executive functioning abilities in individuals with neurological deficits using a verbal fluency task. Verbal fluency tasks are widely used to assess executive dysfunction, through analysis of phonemic and semantic patterns in word responses. Clustering (the ability to produce multiple words within phonemic/semantic categories) and switching (the ability to switch between clusters) have been identified as strategies underlying verbal fluency performance. Using the verbal fluency task, we compared the use of phonemic and semantic clustering and switching among mothers who carry the Fragile X premutation (FX), mothers of children with autism spectrum disorder (ASD), and control mothers of typically developing (TD) children.

Research Question: Do mothers who carry the Fragile X premutation perform lower on measures of executive functioning than mothers of children with ASD and the typical population?

Methods: 74 participants were enlisted in this study (37 FX, 22 ASD, 15 TD). Each participant completed a verbal fluency task. Responses were transcribed and then coded for phonemic and semantic switches, clusters, number of new clusters, and average cluster size. Statistical analyses were completed in SAS to determine any group differences with the clustering and switching variables. Correlational analyses were also completed using the SAS software to determine if participant age influenced output.

Results: There were no significant differences found between FX and the other groups for clustering and switching variables, however there were group differences shown between ASD and TD groups in number of phonemic clusters produced. ASD group showed significantly lower numbers of total phonemic clusters than TD group. There were no correlations found between maternal age and clustering or switching variables. Discussion: This study did not yield results supporting verbal fluency indicators of executive dysfunction in FX group in comparison to other groups. However, findings did indicate that ASD group used less phonemic clusters during the verbal fluency task. This performance could be an indicator of executive dysfunction as part of the broader autism phenotype, however, more research should be done to support this finding.

**Cui, Biyun**

**Mentor(s): Dr. Michael Shtutman**

**Regulation of Stress Granule Dynamics by DEAD-Box RNA Helicase 3 inhibitor RK-33**

HIV-infections were once synonymous with deaths, but fortunately, the advent of antiviral therapy has enabled HIV-positive individuals to reach a normal life span. However, HIV will still persist in the brains of these patients in its latent, but not infectious, form and produce neurotoxic proteins. The HIV-related neurotoxicity elicits behavior abnormalities, dementia and cognition problems, and can lead to a diagnosis of HIV-Associated Neurocognitive Disorder (HAND). These HAND symptoms are similar to those of other age-related neurodegenerative diseases (NDs) such as Parkinson's and Alzheimer's disease. Alarmingly, the prevalence of these NDs is on the rise and is expected to explode in the coming decades.

Recent studies have revealed that stress granules (SGs), membrane-less cytosolic structures that form in response to various insults while repressing mRNA translation, play a prominent role in the pathogenesis of NDs. Through our AI-based literature mining system, we uncovered that the one of the regulatory components of SGs, Dead Box RNA Helicase 3 (DDX3), could be a therapeutic target for NDs, and specifically, for HAND. Further, we experimentally validated the mining results, and confirmed the neuroprotective effects of DDX3 inhibition.

In this work, we investigated the effect of DDX3 inhibition on SGs by using its small molecule inhibitor, RK-33, and by using the osteosarcoma U2OS cell line as a model. The inhibition of DDX3 prior to and after the stress induction correspondingly decreased the SG formation and accelerated the SG dissolution. Mechanistically, SG formation was mediated by the cytosolic redistribution of DDX3 proteins rather than de novo DDX3 synthesis, highlighting the fast-paced dynamics of the stress response.

In conclusion, we show the significance of DDX3 in SG formation: it acts as an active component of SGs and affects the SG integrity during SG formation and dissolution. Given the recently established role of SGs as the global regulator of translation, the RK-33 dependent effects on stress granule formation could define neuroprotective capacity of the inhibitor.

**Davis, Anthony**

**Mentor(s): Dr. Roger Sawyer**

**Complex gene loss and duplication events have facilitated the evolution of multiple lorocrin genes in diverse bird species.**

The evolution of a mechanically-resilient epidermis was a key adaptation in the transition of amniotes to a fully terrestrial lifestyle. Skin appendages usually form via a specialized type of programmed cell death (PCD) known as cornification which is characterized by the formation of an insoluble cornified envelope (CE). Many of the substrates of cornification are encoded for by linked genes located at a conserved genetic locus known as the epidermal differentiation complex (EDC). Lorocrin is the main protein component of the mammalian CE and is encoded for by a gene located within the EDC. Recently, genes resembling mammalian lorocrin, along with several other proteins most likely-involved in CE formation, have been identified within the EDC of birds and several reptiles. To better understand the evolution and function of lorocrin in birds, we screened the genomes of 50 avian species and 3 crocodylians to characterize their EDC regions. We found that lorocrin is present within the EDC of all species investigated, and that 3 lorocrin genes were present in birds. Phylogenetic and molecular evolution analyses found evidence that gene deletions and duplications as well as concerted evolution has shaped the evolution of avian loricrins. Our results suggest a complex evolutionary history of avian loricrins which has accompanied the evolution of bird species with diverse morphologies and lifestyles.

**Davis, Denise**

**Mentor(s): Dr. Jijun Tang, Dr. Jianjun Hu**

**MicroBiome Tax-credit Benchmark:Random Forest Classifiers and Deep Neural Networks**

QIIME2 is a microbiome bioinformatics open-source platform specializing in analysis of bacterial microbiome studies produced from marker-gene amplicon sequencing. QIIME2 has released a new plugin for taxonomic classification, q2-feature-classifier, and a number of pretrained multinomial naive bayes classifiers for bacterial 16S rRNA sequencing data. QIIME2 also has released a benchmarking platform, tax-credit, available for evaluating new taxonomic classifiers. We have developed two new classifiers: one based upon deep neural networks and the other random forest classifiers. Both classifiers were analyzed and evaluated with tax-credit data and presented here. Improvements in accuracy as well as performance were observed with both algorithms as compared to multinomial naive bayes classifiers.

**Demir, Asiye**

**Mentor(s): Dr. Julia Lopez-Robertson**

**Reader Response To Uzun Hikaye (Turkish) by Mustafa Kutlu**

Mustafa Kutlu, one of the famous authors in Turkey, attracts many scholars with his works. Turkish scholars are interested in his works; however, most of these studies are either in depth or partial analysis of his works. (i.e., Tonga, 2007 or Duzlu, 2015). Although there are some satisfactory studies on reader response theory in Turkey, there is no reader response theory studies on Mustafa Kutlu. From this perspective, this study will be the first of its kind to step onto further studies in this area.

In this study, I want to analyze readers' responses to the movie Uzun Hikaye by Mustafa Kutlu. The central text for this study is the movie that is screened by Osman Sinav. It is based on the short story book by Mustafa Kutlu who is a famous short story writer in Turkey. I particularly chose this text because the messages in the movie -immigration, partisanship, conservatism, secularism, poverty, disability and political issues are all within just 137 minutes.

The participants of this study two Turkish graduate students who are in different majors. The first participant is a male (30) graduate student in the College of Engineering, at SCU. My second participant is a female (28) graduate student at the College of Education.

The study will be exploring the social phenomenon which is evoked by the movie. (Merriam & Tisdell, 2015) Since the audiences will receive the messages of the film and give responses according to their experiences and backgrounds, the data set for this study will be qualitative in nature. The most convenient methodology tools would be interviews, observations and field notes to measure the participants' responses.

The primary people who benefit from this study will be the participants and researcher. Examining the relationships between big people groups that seem to be like poles apart in their thinking, will give a chance to see the big picture. On the other hand, as a graduate student, I am going to have an opportunity to implement what I learned in the classroom. As a bigger circle, the Turkish community here at USC would benefit from this study.

### **Denton, Adam**

**Mentor(s): Dr. Rosemarie Booze**

#### **Neurochemical Dysfunction in the HIV-1 Transgenic Rat: Evidence from Fast-Scan Cyclic Voltammetry**

HIV is a serious condition affecting approximately 37 million people worldwide. Although the advent of combination antiretroviral therapy (cART) has dramatically improved the prospects for living with HIV, numerous deficits such as HIV-associated neurocognitive disorder (HAND), apathy and depression remain despite cART adherence. Roughly 50% of all HIV seropositive individuals report symptoms of clinical depression. Alarming, these individuals are roughly 5 times more likely to commit suicide than non-HIV seropositive patients suffering from depression. Dopamine and serotonin have been shown to play a role in both depression and in apathy. The HIV viral proteins tat and gp120 have been previously demonstrated to be neurotoxic to dopaminergic neurons. The HIV-1 Transgenic (Tg) rat contains 7 of the 9 genes that constitute the HIV viral genome, thus representing a non-infectious model of controlled HIV exposure. Fast scan cyclic voltammetry is an electrochemical technique that allows for the rapid temporal resolution of target analytes by applying an analyte-specific triangular waveform to a targeted neural region. Using this technique, our lab has evaluated dopaminergic, serotonergic and histaminergic function in nucleus accumbens, hippocampus and posterior hypothalamus of the HIV-1 Tg rat across a series of experiments. We report decreased rates of release and reuptake for dopamine and serotonin in the HIV-1 Tg rat relative to F344/N controls, in addition to an increased histaminergic response. These findings may provide an evidentiary basis for the high incidences of comorbidity between HIV and depression/apathy.

### **DeVivo, Katherine**

**Mentor(s): Dr. Christine Pellegrini**

#### **If You Include Them, Will They Help? The Use of Fitbit Social Support Features of TKA Patients and Their Friends**

Total knee replacement (TKR) has been shown to improve health-related quality of life, physical function, and pain. However, physical activity (PA) levels typically remain unchanged after surgery from pre-operative levels. Wrist-worn PA monitors have the potential to increase PA level through evidence-based strategies such as goal setting, feedback and social support. The purpose of this pilot study was to compare PA levels between TKR patients using a Fitbit with or without a social support "buddy" over a 4-month period. Participants were randomized to one of two remotely-delivered conditions: (1) Fitbit (n=8), mailed a Fitbit or (2) Fitbit+Support (n=8), who were mailed two Fitbits, one for themselves and one for a buddy. In addition, Fitbit+Support participants were instructed on how to use the Fitbit social support features and connect with a buddy of their choice, who did not have to have TKR. Daily steps recorded by the Fitbit Flex 2 and obtained from Fitabase were examined across both participants and participant buddies during the first 7 days during baseline and during 7 days of month 4. Repeated measures ANOVA to examine changes over time and group differences. Of the sixteen participants (mean±SD, 60.6±8.0 years,

81% female, 94% white, BMI 30.6+5.3kg/m<sup>2</sup>) randomized, 15 completed the 4-month assessment. Seven buddy participants (mean+SD, 56.6+7.4 years, 71% female, 86% white, BMI 28.5+3.0kg/m<sup>2</sup>) completed the intervention. Participants baseline steps were 6167±2257, 8044±4425, and 10025±3134 for Fitbit, Fitbit+Support, and Buddies, respectively. There were no changes over time or by group at 4 months. At both time periods, buddies trended to have more steps than TKA patients (P=0.07). Low usage of the Fitbit Friend feature was reported across Fitbit+Support participants (37.5%) and their buddies (14.3%). This small pilot study suggests that Fitbits alone may not change PA in a TKR population. Due to the low usage of the Fitbit Friend feature, it is unclear of the role of social support in modifying PA. Future studies should examine the use of Fitbits in this population within a more intensive, face-to-face PA intervention.

**Dickerson, Shelby**

**Mentor(s): Dr. Sheryl Wiskur**

**Exploration of Silicon Phthalocyanines as Viable Photocatalysts for Organic Transformations**

Photocatalysis has increasingly become a major focus as a sustainable pathway for chemical reactions with visible light photocatalysts performing a large range of reactions such as redox reactions, cyclization reactions, and energy transfer reactions. Silicon phthalocyanines (SiPcs) have been largely ignored as photosensitizers in photocatalytic reactions, despite their low energy excitation, long triplet lifetimes, and their ability to form singlet oxygen. By incorporating alkyl, aryl, and silicon protecting groups as axial ligands on the silicon center, three SiPcs have been generated by the Wiskur research group with the goal of developing three novel photocatalysts for organic synthesis. Using cyclic voltammetry and Stern Volmer quenching studies, we have shown SiPcs are capable of acting as electron donors or acceptors with appropriate substrates, including Hünig's base, maleic anhydride, and benzoquinone, with varying redox potentials. We have also successfully used a SiPc catalyst in a reductive quenching reaction where Hünig's base served as a sacrificial electron donor in the reaction. In addition to being redox-active, our preliminary data also shows SiPcs are capable of performing energy transfer reactions, by performing a reaction that utilizes singlet oxygen as a reactant under visible light conditions. This reaction, in combination with cyclic voltammetry studies, has also served as a model to understand how axial substitution on the silicon center seems to influence the photostability of these species. These results, as well as the photophysical and electrochemical experiments for each SiPc, will be presented.

**Dissanayake, Madushanka**

**Mentor(s): Prof. Aaron Vannucci**

**"Anion pool" driven green organic transformations**

"Anion pool" synthesis is a technique that incorporates both electrochemistry and organic synthesis for the derivatization of pharmaceutically important molecules. This is a base and metal free procedure carried out in common organic solvents. The anion pool procedure generates reactive nucleophiles in situ via reduction of heteroaromatic substrates. The adoption of such a methodology prevents generation of waste from bases. Hydrogen is the main by-product of anion pool synthesis, which, if produced at a large enough scale could be used as a renewable fuel. These attributes comply with the principles of green chemistry, allowing synthetic chemists to carry out reactions in an atom-economic and environmentally friendly manner. We established the "anion pool" method with the derivatization of benzimidazoles. We were able to achieve selective substitution at the 1H position in high yields with a variety of benzimidazoles and electrophiles bearing a variety of functional groups. We have continued to apply "anion pool" method to a wider variety of substrates. The second study was aimed at selective acylation of indazoles at the N1 position. Indazoles bear two nitrogen atoms on the pyrazole ring that tend to undergo non-selective reactions with electrophiles. By adopting the anion pool approach, we were able to achieve great selectivity to N1-position while also improving the yields, decreasing chemical additives, and utilizing safe solvents. We have also shown that this procedure can be carried out in an inexpensive set-up con-

nected to a 9 V battery, indicating that this reaction could easily be adapted to being driven by the power of a basic solar cell. This procedure is applicable for amidation reactions. Amide formation avoiding poor atom economy reagents has been identified as a priority for the ACS GCI Pharmaceutical roundtable. By applying anion pool method two pharmaceutically important compounds can be produced in a single cell with very good atom economy.

**Doerr, Vivian**

**Mentor(s): Dr. Ashley Smuder, Mr. Ryan Montalvo**

### **Doxorubicin-Induced Skeletal Muscle Dysfunction is Mediated by Autophagy Signaling**

Doxorubicin (DOX) is a highly effective chemotherapeutic agent used in cancer treatment. However, clinical use of DOX is limited due to deleterious effects on skeletal muscle. DOX accumulates within skeletal muscle following administration and has been shown to promote atrophy and contractile dysfunction by enhancing mitochondrial reactive oxygen species (ROS) production and increasing autophagy. While evidence indicates that increased ROS production is required for DOX-induced muscle weakness, the contribution of autophagy is unknown. We believe that reducing autophagy will positively regulate signaling pathways related to increased ROS and the endoplasmic reticulum (ER) stress response, and will therefore improve skeletal muscle function following DOX treatment. To test this hypothesis, 4-month-old female Sprague Dawley rats were administered an rAAV overexpressing a dominant negative mutation of ATG5 (rAAV-dnATG5) directly into the soleus muscle. This mutated form of ATG5 is defective in its conjugation to ATG12, which is required for LC3 incorporation into the early autophagosomal structure, and thus inhibits autophagosome formation. Four weeks following rAAV-dnATG5 administration animals received either DOX (20 mg/kg) or saline (equal volume) treatment. Our results demonstrate that 48 hours following DOX administration, soleus muscle specific force production and cross-sectional area are reduced. This DOX-induced muscle wasting corresponded to a reduction in antioxidant enzyme expression. However, DOX did not affect transcription of genes required for the ER stress response. Importantly, inhibition of autophagy in DOX-treated animals prevented the reduction in muscle fiber cross-sectional area and soleus muscle specific force production. In addition, antioxidant enzyme expression was increased in rAAV-dnATG5 treated animals. These results indicate that DOX-induced autophagy plays an important role in promoting soleus dysfunction by regulating oxidative damage to skeletal muscle.

**Dolbashian, Cory**

**Mentor(s): Dr. Thomas Crawford**

### **Magnetic properties of aligned multiferroic Janus nanofiber agglomerates measured with the Scattered Magneto-Optical Kerr Effect**

We report magnetic properties of electrospun multiferroic nanofibers assembled into linear aggregates with an external magnetic field, and measured with the Magneto-Optical Kerr Effect (MOKE) in a non-specular or scattering geometry (ScMOKE). CoFe<sub>2</sub>O<sub>4</sub>-BaTiO<sub>2</sub> nanofiber aggregates are assembled prior to measurement by suspending and aligning the fibers in a transparent air-cured polyvinyl alcohol (PVA) solution. We detect the polarization change in light scattered from the fibers, collected at an off-specular angle in order to eliminate the background caused by substrate reflection. Additional improvements in signal-to-noise are achieved by averaging many continuous field sweeps. Averaged hysteresis loops from different aggregates show a variety of unique structures. For our optical spot size of ~15 μm, multiple fibers are detected simultaneously, suggesting ScMOKE can distinguish local magnetization reversal fields that vary from fiber to fiber, as well as magnetic interactions between fibers. Compared with bulk magnetometry, ScMOKE's sensitivity to subtle differences between aggregates offers a route to determine local multiferroic coupling in disordered nanomaterials.

**Domlyn, Ariel**

**Mentor(s): Dr. Abraham Wandersman**

**What and When: Refining measurement and support for integrating behavioral health and primary care.**

Background: Integrated behavioral health and primary care services is an established best practice. It ensures clients with mental health needs access necessary care. Previous research identified healthcare organizations' readiness is a critical component affecting the process of integrating care. The R=MC2 framework of organizational readiness (composed of 17 subcomponents) has been adapted for aiding this process, both as a measurement and technical assistance tool. However, current standards do not specify when each of the subcomponents are most important in the process, nor the degree to which technical assistance may be able to improve readiness.

Method: The Delphi method is an iterative, qualitative participatory research process for gaining consensus on a topic. The basic premise capitalizes on expert opinion by soliciting confidential feedback about a topic then feeding collated results back to the same experts in multiple rounds until there is a convergence of opinion. Using a Delphi methodology, this study surveyed experts across the country to determine when in the process of implementation each subcomponent is most critical for success and whether each could be improved by coaching, technical assistance, or additional resources. This took place over four rounds with activities including individual interviews, two surveys, and a focus group.

Results: Ten experts in readiness research and integrated care agreed to participate, with eight completing all study procedures. Findings illustrate that some organizational elements are important across time (i.e., leadership, organizational culture) as are several features specific to the process of integrating care (i.e., a program champion, supportive climate, priority of integration). Other elements are important only at specific intervals. Results also show variability on the potential helpfulness of technical assistance for improving readiness.

Implications: This study has implications for targeting support and resources to effectively integrate care. A refined model of R=MC2 for integrated care would consider when in the process to measure and build organizational readiness.

**Dopkins, Nicholas**

**Mentor(s): Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti**

**Tryptamine treatment results in the amelioration of EAE, an anti-inflammatory shift in the Th17/Treg balance, and promotion of an anti-inflammatory miRNA expression profile.**

In this study we focus on understanding the novel immunotherapeutic potential of tryptamine, a bioactive indole compound derived from microorganisms and various botanicals, in the context of ameliorating symptoms of Experimental Autoimmune Encephalomyelitis (EAE). EAE is used in the laboratory setting to replicate the etiology as well as pathology of Multiple Sclerosis (MS) in murine organisms for research purposes. Globally MS, an incurable autoimmune disorder, is experiencing increases in incidence and treatment costs which placing emphasis on the discovery of novel immunosuppressants with limited toxicity. In this study we show that tryptamine poses potent immunosuppressive activity and ameliorates the clinical parameters of EAE by shifting the balance of CD4+ T cells from a pro-inflammatory T helper 17 cell (Th17) towards an anti-inflammatory T regulatory cell (Treg) dominated landscape in chronic progressive EAE. Based on preliminary miRNA array data we believe that the observed shift in the Th17/Treg balance following tryptamine treatment is due to an anti-inflammatory miRNA expression profile within the lymphocytes of treated mice. MiR-3473g and miR-140-3p, putative targets of the enzyme SIRT1, were found to be upregulated within the lymphocytes of tryptamine treated mice. SIRT1 in the

context of inflammatory disorders works as a marker of pro-inflammatory responses within lymphocytes due to SIRT1's activation of the master transcription factor of Th17 cells known as ROR $\gamma$ t. This epigenetic regulation of gene expression provides a clearly linkable mechanism explaining the shift in the Th17/Treg balance as well as the amelioration of symptoms observed following tryptamine treatment in EAE mice.

**Ejebavwo, Otega**

**Mentor(s): Prof. Natalia Shustova**

**Heterometallic Multinuclear Metal-Organic Frameworks**

The interest in metal-organic frameworks (MOFs), which are well-defined and porous extended structures consisting of organic linkers and inorganic building units, has thrived over the last decade, owing to their potential usage as a platform in a variety of applications. Due to porosity, modularity, crystallinity, flexibility and long-term stability, MOF applications have extended beyond the more "classical" realm of gas storage, heterogeneous catalysis, separation, towards, for instance, areas of nuclear waste administration. My projects in the Shustova group focuses on the synthesis and comprehensive characterization of novel heterometallic actinide-containing metal-organic MOFs for (i) the development of the materials with a high actinide content toward preparation of novel hierarchical forms for future nuclear waste administration,<sup>1,2</sup> and (ii) tailoring of electronic properties of MOFs through metal node engineering while retaining their integral porosity.<sup>3,4</sup> Success in these areas, however, largely depends on a fundamental understanding of the structure-property relationship, which is a crucial aspect of my work.

**Eliot, Lewis**

**Mentor(s): Dr. Matt Childs**

**Rebellion and Empire in Britain's Atlantic World, 1807-1884.**

This project explores abolitionism through investigation of anti-slavery and colonial ethics from the outlawing of British slave trading in 1807 to the formalization of African colonization at the Berlin Conference in 1884. I examine how slave uprisings in the British Empire and Atlantic World caused the nature of anti-slavery and imperial policy to evolve through discourse on the ethics and morality of slavery. Using sources in four languages from twenty-one archives across the Atlantic, I argue that Britain's post-1807 abolitionism became an integral aspect of its plans for imperial expansion as the Empire continued to define its ethical paradigms using racial hierarchies. The lessons Britain learned in both its own empire and in other slaveholding Atlantic states in turn informed the nature of Africa's colonization in the later nineteenth century. Britain's harnessing of abolition as an aspect of its imperial expansionism has resulted in a state that boasts legal racial equality and yet treats its citizens of color as second-class. For example, the contemporary debates over the citizenship status of Britons of Afro-Caribbean descent is intrinsically connected to the imperial attitudes formed during the era of abolition and explored in this dissertation. This project therefore speaks clearly not only to scholars of Britain, slavery, or the Atlantic World, but also those interested in the origins of racism, the colonial legacies of enslavement in Europe, Africa, and the Americas, and the development of state ethics in relation to race.

**Erichsen, Jennifer**

**Mentor(s): Mr. Coleman Calva, Dr. Claudia Grillo, Dr. Lawrence Reagan, Dr. James Fadel**

**Dose-dependent neurochemical, molecular, and behavioral effects of intranasal insulin**

Cognitive dysfunction with aging is a dreaded and costly (both economically and personally) aspect of growing old. Unfortunately, there is no therapeutic strategy to date that effectively treats age-related cognitive decline (ARCD). It is plausible that intranasal insulin (INI) could fill this gap, as a number of studies have demonstrated that INI improves memory. However, the mechanistic basis for these pro-cognitive changes has yet to be elucidated. Behavioral, neurochemical, and molecular techniques were employed

in adult Sprague-Dawley rats following INI with the goal of beginning to understand this mechanism. Because previous behavioral studies with INI have shown dose-dependent effects, several doses of insulin were explored in these experiments. First, feeding behavior was assessed for 18 hours following INI or IN vehicle to examine if the insulin elicited a behavioral effect. INI produced an inverted-U dose-dependent reduction in food intake over 18 hours post administration. Next, cholinergic transmission and insulin receptor signaling in the brain were assessed. Probes were inserted into the medial prefrontal cortex and hippocampus of the rats for in vivo microdialysis. Levels of acetylcholine and glutamate varied in the three hours after IN vehicle compared to different doses of insulin. On a separate day, the rats were euthanized 30 minutes post INI and hippocampal extracts were processed for immunoblot analysis to determine if changes in central insulin signaling in response to IN vehicle vs. different doses of insulin could be seen. The results of these experiments provide a potential molecular/neurochemical basis for the pro-cognitive effects of INI. It is important to understand the mechanism of action, as INI could eventually be used in the broader clinical setting to treat ARCD. Further, this could initiate the development of other treatments for ARCD that exploit the same mechanism. More studies are needed to fully understand the neurochemical, molecular, and behavioral changes following INI and to determine the most effective clinical dose, but these results demonstrate the ability of INI to rapidly target the brain and influence neurotransmission, central insulin signaling, and feeding behavior.

**Ezell, Jordan**

**Mentor(s): Dr. Jane Roberts**

### **Rates and Predictors of Anxiety in Preschoolers with Autism Spectrum Disorder**

Anxiety disorders constitute the most common and debilitating mental health condition in childhood (Salum et al, 2013) with 20% of 3-to-5-year-olds in the general population meeting criteria for an anxiety disorder (Buffered et al, 2011). Autism spectrum disorder (ASD) is a highly prevalent (1:68) neurodevelopmental disorder. While anxiety disorders are widespread in the general population, they are even more pronounced in specific clinical populations such as ASD, with an estimated 79% of school-aged children with ASD meeting criteria for anxiety (Salazar et al, 2015). Additionally, one of the most significant predictors of impairment in children with ASD is the presence of co-morbid conditions, such as anxiety. Little is known, however, about the early emergence or psychophysiological indicators associated with anxiety in children with ASD. The aims of this study are to (1) examine the prevalence of anxiety disorders in preschool-aged children with ASD using an autism-specific diagnostic tool and (2) examine the physiological correlates of anxiety in preschool-aged children with ASD by examining respiratory sinus arrhythmia (RSA), an index of parasympathetic activity, during an auditory startle probe. Preliminary results show distinct group patterns with typically developing children exhibiting a single anxiety disorder, which was most often specific phobia. In contrast, preschool children with ASD often met for multiple anxiety disorders including specific phobia, separation anxiety and social anxiety disorder. Further, children with ASD show lower RSA at baseline and after the auditory startle, suggesting less physiological regulation in response to sensory threat. Overall, these preliminary results suggest that children with ASD are at an increased risk for anxiety beyond what is typical for this age and that poor physiological regulation could be a risk for anxiety in this sample.

**Faulkner, Alena**

**Mentor(s): Mrs. Victoria Vincent**

### **Discussing History of Mental Illness in a General Genetic Counseling Setting: Patient and Caregiver Interest and Comfort**

This study explored patient, parent, and/or caregiver interest in and comfort with discussing personal and/or family history of mental illness with a genetic counselor during a general genetics visit. Participants were seen for initial genetic evaluation/consultation through offices of the Greenwood Genetic

Center between October 8th, 2018 through January 31st, 2019. Following the genetics appointment, participants completed a 38-item questionnaire. Thirty participants completed or partially completed the questionnaire. Preliminary results show that 70.00% (n = 14/20) of participants who were directly asked about personal and/or family history of mental illness indicated they were very comfortable being asked, while 77.80% (n = 7/9) of participants that were not directly asked indicated they would have been very comfortable. 80.00% (n = 8/10) of respondents that had a discussion about mental health topics with the genetics provider indicated they were very comfortable having this discussion. The majority that did not have a discussion about mental health topics (n = 13/20, 65.00%) responded that they would be interested in discussing these topics. Comfort did not seem to be dependent on positive or negative personal and/or family history of mental illness. Participant depression and anxiety severity measured by the PHQ-9 and GAD-7 scales respectively, was statistically significantly different in this study's population compared to a standardized sample. There was no statistically significant correlation between participant comfort level with being asked about or discussing personal and/or family history of mental illness in relation to PHQ-9 and GAD-7 scores. These preliminary results suggest that patients, parents, and/or caregivers are interested in and comfortable with discussing a personal and/or family history of mental illness with a genetics provider during a general genetic counseling visit. Additionally, this sample of individuals expressed significantly more depressive and anxious symptoms compared to a general population. This study has the potential to produce improved clinical practice implications for genetics providers and expresses the importance of discussing mental illness at these visits, not only to discuss the multifactorial etiology of these conditions, but it gives the opportunity to identify individuals with psychiatric symptoms who could benefit from referral to further support services.

**Ferster, Brady**

**Mentor(s): Prof. Subrahmanyam Bulusu**

**Diagnosing Biases in Estimates of the Antarctic Polar Front Location and Variability**

Two methods for estimating Polar Front (PF) location, one based on sea surface temperature (SST), the other on sea surface height (SSH), are compared. Using the latest product from the Estimating the Circulation and Climate of the Ocean (ECCO) group, the PF locations are found to be similar to both climatology and a 24-year mean position. The SST approach produces larger estimates of seasonal and monthly variability. Both methods indicate geographically localized patterns in the location of the PF; a shift northward in the central Pacific and southward in the Atlantic and Indian Basins. SST-based zonal averages indicate a significant northward trend in the Pacific Basin ( $1.15 \pm 0.73$  km year<sup>-1</sup>), which is not observed in the SSH-based averages. On the other hand, the SSH approach suggests a southward drift in average position in all basins over time, a result not seen using SSTs. The seasonal and interannual variability of the PF is moderately-to-strongly correlated to decreasing temperatures and salinity within the ACC region. Combined with the northward trends of the PF in the central Pacific, the northward shift could be driving the observed decrease in central South Pacific temperatures. The interannual variability of the PF is weak-to-moderately correlated with the Antarctic and Southern Oscillations, but a large portion of the PF variability remains unexplained.

**FitzGerald, Sara**

**Mentor(s): Prof. Thomas Crawford**

**Optimizing magnetic recording media for nanoparticle self-assembly: Using non-magnetic layer substitution to isolate hard layer magnetism**

Commercial magnetic recording media has been adapted to create templates for magnetic nanoparticle self-assembly. However, many media attributes critical for storing information are not necessary for self-assembly, for example thermal stability over long time scales and sub-nanosecond switching speeds. Thus commercial media is not engineered specifically for self-assembly. Here we adjust the properties of

perpendicular media to better tune it for templating complex self-assembled nanoparticle patterns. Since perpendicular recording requires deposition of a soft magnetic underlayer (SUL) beneath the media, which acts as part of the write head during recording, we require an SUL beneath our customized media as well. Regardless of application, magnetic characterization of the media layer with a Vibrating Sample Magnetometer (VSM) is hampered by the presence of the SUL (in our case Permalloy, Ni<sub>80</sub>Fe<sub>20</sub>), which contributes a large signal as seen in Fig. 1. By replacing the SUL with Cu, which is non-magnetic but has similar crystal structure and lattice parameters to Permalloy, we create a composite response by adding the signal from a recording layer only sample (Si/Ag/Cu/Ti/CoCrPt) to a SUL-only sample (Si/Ag/NiFe/Ti). Fig. 1 compares the hysteresis loop of the added signals with the loop from a sample with both layers (Si/Ag/NiFe/Ti/CoCrPt). The full sample loop shows a clear pinching, which likely indicates antiferromagnetic coupling between the layers, that is absent in the summed independent layer data.

**Fram, Paul**

**Mentor(s): Dr. Matt Irvin**

### **Racial disparities in low-level school discipline: a mixed methods approach**

This research uses a mixed methods approach to examine the relationship between race/ethnicity and rates of and reasons for low-level school disciplines such as lunch detention. The data are analyzed through the interpretive lens of institutional racism as influenced by implicit bias research. The quantitative analyses are drawn from data that includes student demographic information such as race/ethnicity, free/reduced and full pay lunch status (as a proxy for social economic status), and gender, as well as data on lunch detentions (the students name, the assigning teachers name, and the reason for the detention) that were gathered during the 2013-2014, 2014-2015, 2015-2016, and 2016-2017 school years at a racially and economically diverse urban middle school in the southeastern United States. Because students attended the school for multiple years, each year of data is analyzed distinctly – with an N of between 900 and 1000 students per year. Additional qualitative lunch detention data includes both student and teacher accounts of the contexts of the lunch detentions. The student responses were gathered during the detentions as answers to intake questions and the teacher responses were gathered from the detention forms as required narratives describing the contexts of the punishable events. These responses are only available for the latter years of the study because the narratives were instituted midway through the study as the administration of the school became aware of the need for additional data to inform racially sensitive changes in their discipline policies. The author uses ANOVA to analyze the race/ethnic disparities in rates of and reasons for punishment, and disparities and agreements within the student and teacher accounts of the contexts of the lunch detentions are examined to situate the reasons for the lunch detentions within a discussion of the role of institutional racism and implicit bias in exacerbating the race/ethnic disparities in rates of and reasons for school discipline. The study is set within a discussion of the national trends regarding racial disparities in school discipline rates.

**Gao, Chuanji**

**Mentor(s): Dr. Svetlana Shinkareva**

### **Audiovisual Affective Processing in Direct and Indirect Tasks**

In social communication, we acquire emotional information from multiple modalities, such as facial and vocal expressions. The extant literature has provided valuable insights about how visual and auditory emotional cues are processed, but there remain at least four gaps. First, most studies have not isolated audiovisual integration of neutral items from audiovisual integration of affective items. Second, though unimodal happy stimuli were found to be recognized faster than negative emotion stimuli (happy advantage), it is unclear whether the effect changes for audiovisual stimuli. Third, most studies used a direct emotion categorization task in audiovisual affective processing, it is an open question whether similar effects occur for indirect speech categorization task. Fourth, most studies analyzed accuracies and reaction

times separately, leading to difficulties in interpretation. To resolve these issues, we collected behavioral data for 15 participants (data collection ongoing) to investigate audiovisual integration of emotion. Participants were presented with a series of silent videos showing a person with a happy, neutral or angry expression, or a series of audio clips spoken in a happy, neutral or angry tone. A third condition consisted of audio-visual presentation of these affective stimuli. In one session, participants were instructed to judge the person's affective state, as quickly and accurately as possible. In the other session, participants were instructed to judge what the person is saying, as quickly and accurately as possible. The following predictions are tested with ANOVA and mathematical modeling: First, reaction times are faster for audiovisual affective congruent (e.g., happy-happy) compared to unimodal condition (e.g., happy), and reaction times are faster for audiovisual neutral (i.e., neutral-neutral) compared to unimodal neutral condition, with larger effects for the affective comparison. Second, reaction times for happy facial expressions are faster for both audiovisual and unimodal stimuli across the two types of tasks. Third, the linear ballistic accumulator model can account for the speed-accuracy tradeoff as well as both correct and incorrect responses at the individual level.

**Gasque, Katie**

**Mentor(s): Ms. Victoria Henbest, Dr. Kenn Apel**

**A Comparison of Linguistic Awareness Skills in Children with Autism Spectrum Disorder and Children who are Typically-Developing**

Children who perform well on measures of reading and spelling often have good linguistic awareness, the ability to manipulate language, which is related to their literacy performance. However, little is known regarding the linguistic awareness skills of children with autism spectrum disorder (ASD), although these children often learn to read at or near a level commensurate with their typically-developing peers. Thus, the purpose of the current study was to examine the linguistic awareness skills of school-age children with ASD and compare these skills to those of their typically-developing peers. Twenty school-age children (mean age: 8.9; 10 with ASD; 10 typically-developing) participated in the study. The children with ASD were matched with the typically-developing children on age and real-word reading performance; all participants had non-verbal IQs and receptive vocabulary scores that were within or above the average range. In addition to tasks, which measured their problem solving, spoken language, and literacy skills, the participants completed tasks measuring the following linguistic awareness skills: a) phonological awareness, the ability to manipulate sounds of language, b) prosodic awareness, the ability to perceive cues that relate the rhythm of speech, c) orthographic awareness, the understanding of how speech is represented in print, and d) morphological awareness, the ability to consciously manipulate morphemes. The children with ASD performed similarly to their typically-developing peers on measures of decoding, spelling, and reading comprehension ( $p > .14$ ), although effect size calculations suggested that the children with ASD performed less well on the spelling ( $d = .23$ ) and reading comprehension tasks ( $d = .61$ ) compared to their typically-developing peers. Although not statistically significant, the children with ASD performed below that of their typically-developing peers on most linguistic awareness measures ( $d$ s ranged from  $.10$ -. $.58$ ) which suggests that children with ASD may have less developed linguistic awareness skills compared to their peers. Future directions for this research include obtaining a larger sample size and determining the relation between linguistic awareness skills and literacy outcomes in children with ASD and whether the magnitude of these relations differ from those seen in typically-developing children.

**Gates, Alyssa**

**Mentor(s): Mrs. Whitney Dobek**

**Impact of service delivery model on patient perceptions and utility of group genetic counseling for hereditary breast and ovarian cancer: An exploration of group genetic counseling**

Patients at risk for hereditary breast and ovarian cancer (HBOC) participate in individual, in-person can-

cer genetic counseling sessions to be educated about cancer genetics concepts, their personal cancer risks and genetic testing. With expanding technology and increased public awareness of HBOC, referrals to cancer genetic counseling services have grown. The current number of practicing genetic counselors struggles to meet the demands of increased referrals, so new service delivery models need to be explored. The purpose of this study is to assess the utility of group genetic counseling for HBOC by evaluating patient perspectives of group genetic counseling versus individual genetic counseling. We aimed to determine patient satisfaction and comfort level with group genetic counseling while also assessing the time efficiency and patient willingness to participate in these group sessions. Sixty-eight individuals with new diagnosis of breast cancer participated in the study and were randomly assigned to group genetic counseling sessions (n=30) or individual genetic counseling sessions (n=38). These individuals then completed a questionnaire regarding their personal perspectives on their genetic counseling session. Preliminary results demonstrate that each study cohort reported relatively high satisfaction with their genetic counseling session. Participants in the group genetic counseling study group were statistically more likely to be less overwhelmed by information given in the genetic counseling appointments and more satisfied with the length of time for their session. Comfort and anxiety levels between the two study groups had no statistical differences and a majority of participants reported high comfortability and reduced anxiety after their genetic counseling appointment. A large majority of participants in the individual genetic counseling stated that they would not be willing to participate in group genetic counseling and cited privacy and comfortability as the main reasoning. When assessing time efficiency, preliminary evidence demonstrates that group genetic counseling sessions were, on average, a shorter amount of time than individual genetic counseling sessions. From this study, group genetic counseling shows promise for allowing genetics providers to see more individuals in a reduced amount of time while providing similar satisfaction and benefits to patients as traditional individual genetic counseling service delivery models.

**Gillette, RoKami**

**Mentor(s): Dr. Lucy Ingram**

**Culturally Relevant Pedagogies**

#### ABSTRACT

The term “achievement gap” is widely used in spaces. However, this term is part of a problem which puts the blame on the victims of an unjust system, the students. Ladson-Billing’s (2006) explanation of the ‘educational debt’ owed to students better describes a long Eurocratic status quo which has kept many students of color from an equitable education. Research consistently shows the disparities between Black students’ achievement at various levels of their educational journey. The National Center for Educational Statistics (2016) reported that in 2012, in grades 4, 8, and 12 there was an achievement gap in reading among Blacks and Whites. Research indicates that there are factors that lead to achievement among elementary-aged Black students such as implementing culturally relevant lessons and lessons that provide views of their culture and supply insight on themselves (Baines, Tisdale, & Long, 2018; Ladson-Billings, 2006). Culturally Relevant Pedagogy is teaching that involves using the cultures, experiences, and perspectives of African, Native, Latino and Asian American students as filters through which to teach them academic knowledge and skills. Other critical elements of culturally relevant teaching are unpacking unequal distributions of power and privilege, and teaching students of color cultural competence about themselves and each other (Gay, 2003/2013). Most teachers in the profession are White, middle class females. Most teacher education programs continue to produce this population into the teaching profession (Allen & White-Smith, 2014; Goings & Bianco, 2016). Preservice teachers should be prepared to acknowledge, embrace but I argue, more importantly, value and learn how to center the cultural ways of knowing and being of children of color (Baines, Tisdale, & Long, 2018; Ladson-Billings, 2009). To ensure this, there should be some changes made in what and how preservice teachers are taught culturally relevant pedagogy. My study looked internally and self-reflectively as I studied the impact of my attempts to teach culturally relevant pedagogies to 24 preservice teachers. Data were collected in the forms of ana-

lyzing lesson plans, exit slips, and critical school memoirs project the students completed. My research will help preservice teachers consider broader issues of negative profiling and discrimination. Further research is needed in other settings.

**Guo, Wenyu**

**Mentor(s): Prof. Yang Wang**

**Embracing culturally and linguistically diverse learners in a Columbia local Chinese immersion program through translanguaging**

Two-way dual language (TWDL) program have frequently been identified as a strong model for bilingual education and an alternative to traditionally deficit-oriented bilingual programs (Lindholm-Leary, 2001; Marian, Shook, & Schroeder, 2013). However, in many language immersion and dual language programs, the policy involved in enhancing bilingualism is “language separation” which positions a particular teacher as monolingual speakers of a target language and designates a special space and time period for bilinguals’ home language or target language only. The language separation policy within TWDL programs features bilingual education as a kind of “parallel monolingualisms” (Heller, 1999) or “the pluralization of monolingualism” (Makoni & Pennycook, 2005), which leaves little room for bilingual students to engage in everyday dynamic language practices. Building on dynamic bilingualism (Garcia, 2009; Kleifgen and Garcia, 2010) and translanguaging (Garcia, 2009; Garcia & Li, 2014), this study provides an in-depth understanding of the language practices of a Chinese classroom in a southeastern elementary. The study explores how two kindergarten Chinese teachers make sense of everyday translanguaging practices in a Two-way dual-language (TWDL) program in a low-income, working-class, predominantly Southeastern African American school. We drew on classroom video data, field notes, and other relevant artifacts collected weekly during one academic semester to document two kindergarten Chinese teachers’ interaction with each other and their African-American students. We show how the teachers of a Kindergarten TWDL classroom create a sheltered space in which the full repertoire of students’ languages is recognized and validated. We illustrate how the teachers, Ms. Yuan and Ms. Liu, guide students to use strategies and meaning-making tools in both languages to construct meanings in classroom. Findings suggest that translanguaging is present within the intersection of a conceptual and pedagogical tool that allows fluidity and movement of the teaching and learning process and maximizes the co-construction of meaning; in doing so, translanguaging identities are being practiced. Some implications for teachers and teacher education programs are presented. We welcome our audience to interact during the presentation and invite the opportunity to connect following the panel to further connect on these important topics.

**Gwynn, Melanie**

**Mentor(s): Dr. Janice Probst**

**Continuity of Care: Evaluation of multi-facility and single-facility retention in HIV care and patient health outcomes**

For individuals diagnosed with HIV/AIDS, “retention” in care is one of the core clinical indicators of patient engagement in the HIV care continuum and is associated with improved patient health outcomes. The term retention is synonymous with continuous care and is defined as having 2 or more viral load or CD4 counts (HIV medical visits) at least 3 months apart, within a calendar year or 12-month time frame. However, the retention measures does not account for the continuous use of a sole provider for HIV primary visits. Therefore, the estimated 1 in 10 people living with HIV (PLWH) receiving dispersed care are mischaracterized as being retained in care. This study is novel by using both administrative and surveillance datasets to determine the prevalence of single-facility retention versus dispersed care; the prevalence or comorbid conditions among the population and the role of comorbidities as predictors for single-facility retention versus dispersed care; and the association between single-facility retention versus dispersed care and patient health outcomes in the Southeastern US region. This study will follow

an observational cross-sectional study design. The study sample will include all persons diagnosed with HIV that lived in the South Carolina from 2014-2016, and were receiving Ryan White HIV care services in 2014-2016. Data for the study will come from three sources: 1) South Carolina enhanced HIV/AIDS Reporting System (SC e-HARS) from South Carolina Department of Health and Environment Control (DHEC); 2) South Carolina Ryan White (also from DHEC); and 3) Revenue and Fiscal Affairs Office (RFA). These datasets will be combined in order to analyze comorbidity and multi-morbidity data and health outcomes (CD4, viral load (VL) and death). For each study question, descriptive statistics will be reported and logistic regressions will be conducted. Data from this research could be used to enhance current state-level surveillance activities. Primarily, this would include the monitoring and reporting of retention metrics, categorized by the continuity of patient HIV service utilization behaviors. By distinguishing between the two types of HIV service users, trends in HIV continuum progression, health disparities, and areas for further research can be more clearly identified.

**Hamilton, Akeen**

**Mentor(s): Dr. Ronit Elk**

### **Development of Cultural Sensitivity Palliative Care Training Videos for Physicians in Rural South Carolina: Phase 2 of a Three Phase Study**

Background: Palliative care is an interdisciplinary approach of caring for and meeting the needs of persons who are battling chronic illnesses. The goal of palliative care is to help patients find relief from symptoms which are associated with their illness and to improve their quality of life. The domains of palliative care include: an assessment of pain and symptoms, psychosocial care, identifying the goals of care, treatment support, and decision making. While palliative care has become more common in health-care, no studies or interventions have explored the development of culturally-targeted training videos for physicians and nurses working in rural South Carolina to better treat African-American patients after a diagnosis or prognosis of a chronic illness.

Aims: 1) Develop culturally-relevant training messages for healthcare professionals caring for African-American patients with serious illness, and their families through recorded videos. 2) Address a lack of sensitivity to, and lack of respect for cultural differences in healthcare practices. 3) Train physicians in cultural competence for rural, southern African-American elders with serious illness and their families.

Method: A Community Advisory Group (CAG) was formed in Orangeburg, SC in August 2017. The CAG consisted of six Pastors and seven Nurses. Beginning in May 2018, the CAG met at least twice monthly.

The group worked together to develop the scripts and the settings for the filming of culturally-specific training videos for Physicians who diagnosis and treat African-Americans in rural South Carolina.

Results: Four culturally-tailored training videos were developed between June & July 2018. The themes of the videos included: Never Give Bad News Alone, Invite Family Members, There is Always Hope, and Treat Us Like You Treat Your Own. All CAG members participated in the production of each video and were either actors or extras. The length of the videos ranged from 1:49 minutes to 4:01 minutes.

Conclusion: CAGs provide an invaluable resource and may be used to develop culturally-tailored training videos for physicians to gain cultural competence when diagnosing or treating African-American patients with chronic illnesses. Future research should incorporate CAG input in training development.

**Hati, Debolina**

**Mentor(s): Dr. Caryn Outten**

### **Saccharomyces cerevisiae as a viable model for the overexpression and purification of proteins involved in iron homeostasis**

Iron is indispensable for the eukaryotic cell but excess of iron is toxic. Disruptions in iron metabolism leads to numerous human diseases, hence the study of iron regulation and metabolism is of high importance. *Saccharomyces cerevisiae* is used as a model system in our lab to study iron trafficking and ho-

meostasis pathways to better understand iron regulation at the cellular and molecular level. In yeast, two paralogous transcriptional activators, Aft1 and Aft2, play a central role in iron regulation by activating the transcription of target genes in response to iron deprivation. Monothiol glutaredoxins Grx3 and Grx4 that utilize glutathione to bind [2Fe-2S] clusters interact specifically with Aft1 and Aft2, transferring an Fe-S cluster to Aft1/2 that inhibits its DNA binding activity. Aft1 is considered the primary regulator of iron homeostasis because *aft1Δ* mutants exhibit a stronger iron deficiency phenotype than *aft2Δ* mutants. Aft1 and Aft2 share 39% sequence homology in their N-terminal DNA binding domains. The only available structure is of a truncated version of Aft2 that contains this homologous portion and includes the domains responsible for DNA binding and iron sensing. Aft1/2 have been shown to be very unstable and difficult to overexpress and purify in *Escherichia coli*. Hence we optimized the growth conditions to overexpress Aft1 in its native organism, *Saccharomyces cerevisiae*, and further try to purify Aft1 from the same. Further studies will be carried out in order to investigate the in-vitro interaction between full length Aft1/2 and Grx3/4-Fra2 to better understand the mechanism of Aft1/2 inhibition at the molecular level.

**Havighorst, Amanda**

**Mentor(s): Dr. Hippokratis Kiaris, Mr. Youwen Zhang, Dr. Elena Farmaki, Ms. Vimala Kaza, Dr. Ioulia Chatzistamou**

**Inherent Variation in the Unfolded Protein Response in Outbred Deer Mice: Effect on Susceptibility to Metabolic Disease**

Endoplasmic reticulum (ER) stress has been causatively linked to the development of various conditions, including metabolic diseases. However, the potential effect of inherent variations in the resulting unfolded protein response (UPR) on the predisposition to ER stress-associated metabolic conditions have not yet been explored. By using deer mice (*Peromyscus maniculatus*), an outbred, genetically diverse rodent model, we show that the profile of tunicamycin-induced UPR in fibroblasts isolated from animals at puberty varies between individuals and predicts deregulation of lipid metabolism and diet-induced hepatic steatosis later in life. Among the different UPR targets tested, CHOP most consistently predicted elevated plasma cholesterol and hepatic steatosis. Compared to baseline expression levels or inducibility, the maximal intensity of the UPR following tunicamycin treatment best predicts the onset of disease. Additionally, differences in the expression profile of UPR-associated genes recorded in cells from different, genetically distinct populations of deer mice correlate with the varying response to ER stress in altitude adaptation. Our data suggest that the response to ER stress in cultured cells not only varies between individuals, but that an individual's profile early in life may predict susceptibility to ER stress-associated disease later in life.

**Haynes, Eboni**

**Mentor(s): Dr. Allison Marsh, Dr. Lucy Ingram**

**Youth Engagement in Local Land Use Planning & Advocacy**

Youth are the most frequent users of public spaces; however, historically, youth perspectives have not been sought or incorporated into community/land use planning efforts in the United States. Although the lack of youth participation in community planning has been formally recognized since the mid-1990s, there is still little literature on effective planning practices involving youth.

Given that the 2015 flood damaged several properties in the Rosewood Neighborhood in Columbia, SC, and emergency management officials are determining how best to use land acquired using FEMA Flood Mitigation Assistance Program (FMAP) funding, this project sought to identify how neighborhood youth would prioritize land uses, if given an opportunity.

In Spring 2019, middle- and high-school students who attend the Arnold Boys and Girls Club in the Rosewood Neighborhood in Columbia, SC learned from community partners about neighborhood history, land use planning, community assets and needs assessment, and advocacy. Prior to two educational sessions on land-use planning, students were surveyed to determine how they would prioritize uses for vacant properties in their neighborhood. After the students learned about land use planning, the students completed another survey to determine if their land use priorities had changed. Eleven students completed the initial survey.

Initial results found that none of the students knew what “land use planning” was. Nine students (82%) believed youth should be consulted about neighborhood land use. Seven (64%) indicated they would use vacant land for a public purpose. When asked how they would use vacant land within FMAP guidelines, most students preferred land to be used for walking and biking paths (55%) followed by parks and recreational purposes (27%). Results of the follow-up survey were not available at the time of abstract submission; however, they will be presented during Discover USC.

Local youth have an interest in community planning; therefore, government officials should create opportunities where youth can engage in planning efforts. This project created one opportunity for municipal staff to learn from local youth; however, intentional, ongoing efforts by municipalities to engage this population will not only be fruitful for youth, but for all neighborhood and city residents.

**Heflin, Jorman**

**Mentor(s): Dr. Beth Krizek**

**Regulation of Arabidopsis floral organ development by the transcription factor AINTEGUMENTA-LIKE6**

Flowers originate around the periphery of the inflorescence meristem. The ABCE model of flower development in Arabidopsis proposes that discrete floral organ identities are specified by several classes of homeotic genes. Classes B and C (BC) are needed to establish petal, stamen and carpel identity. Two members of the AINTEGUMENTA-LIKE/PLETHORA (AIL/PLT) transcription factor family, AINTEGUMENTA (ANT) and AINTEGUMENTA-LIKE6 (AIL6), may help activate these genes in stage 3 flower primordia. ant ail6 double mutant flowers lack petals, stamens and normal gynoecium, and exhibit reduced BC gene expression in stage 3 flowers. ChIP-qPCR using an AIL6 epitope tagged line in a synchronous floral induction system (AIL6m:gAIL6-VENUS AP1:AP1-GR ap1 cal) shows that AIL6 directly binds to regulatory sequences of the class B genes APETALA3 (AP3) and PISTILLATA (PI) and to the class C gene AGAMOUS (AG) in stage 3 flowers. A steroid inducible AIL6-GR line in the double mutant background (AIL6m:gAIL6-GR ant ail6) was also created to determine how quickly expression of the homeotic genes respond to induction of AIL6 activity. Phenotypically, activation of AIL6-GR partially restores petal, stamen and carpel identity in these double mutant flowers, indicating that homeotic gene activity is restored in these plants. RT-qPCR on mock and dexamethasone treated AIL6m:gAIL6-GR ant ail6 inflorescences did not show increased expression of the homeotic genes at four and twenty-four hours after steroid treatment. Because stage 3 flowers contribute little tissue to the entire inflorescences harvested for these experiments, we are also examining AP3 and AG expression in these plants by in situ hybridization. Furthermore, we are generating plants that contain AIL6m:gAIL6-GR ant ail6 in the synchronous floral induction system (AIL6m:gAIL6-GR ant ail6 AP1:AP1-AR ap1 cal) so that RT-qPCR can be performed on tissue composed solely of stage 3 flowers.

**Hersey, Melinda**

**Mentor(s): Dr. Parastoo Hashemi, Dr. Lawrence Reagan**

**The role of acute and chronic neuroinflammation in depression: uncovering the relationship between histamine and serotonin transmission**

Changes to the central nervous system (CNS) are often reflected via neuroinflammation, which consequently plays a role in the pathology of many neurological diseases, including depression. In order to understand the neurochemical underpinnings of depression we are targeting the neurotransmitter systems of serotonin and histamine. We are interested in serotonin because of the long hypothesized notion that serotonin signaling is impaired during depression. We are interested in histamine because of this messenger's well-established role in peripheral inflammation and new data from the Hashemi lab showing that histamine release inhibits serotonin signaling. In this work, fast-scan cyclic voltammetry (FSCV) is used to simultaneously measure histamine and serotonin, in the posterior hypothalamus and fast-scan controlled adsorption voltammetry (FSCAV) is used to measure serotonin in the hippocampus of rodents following acute (peripheral injection of lipopolysaccharide) or chronic (high fat diet; 45 kcal % fat) neuroinflammation. Our results indicate that these inflammation models correspond to an increased histamine release, thereby further inhibiting serotonin release. We believe this relationship to be responsible for the decreased capacity of escitalopram to increase extracellular serotonin that we observe in these models. These results suggest that histamine plays a fundamental role in modulating serotonin during inflammation, thereby providing novel insights into the neurochemical basis for depressive illness.

**Hill, Alexandria**

**Mentor(s): Dr. Lesly Wade-Woolley**

**Prosodic awareness skills and literacy acquisition in school-age children**

This study researched the prosodic awareness skills of typically developing school-aged children in comparison to children who have literacy and/or language impairment in regards to reading acquisition.

**Hinderliter, Jillian**

**Mentor(s): Dr. Lauren Sklaroff**

**Rewriting Women's Health: Jewish Journalist-Activists in the Women's Health Movement, 1968-1988**

In the late 1960s, women's health activists began to fundamentally redefine the relationship between patient and practitioner. Applying feminist politics to the patient experience, the women's health movement challenged health care to become a proactive, informed process for all. Among these activists were many Jewish women who embraced roles as women's health advocates, health journalists, and feminist clinicians to help create and sustain the movement. Despite this trend, few histories of medicine or of second-wave feminism recognize the role of Jewish women in redefining health policy and politics in the United States.

In this poster presentation, I argue that American Jewish women's activism shaped health feminism in tone as well as in strategy. Jewish journalists and writers played a central role in advancing the women's health movement through newspaper columns, self-help manuals, and nonfiction books on issues like birth control safety, breast cancer, and hormone replacement therapy. Accessible in writing style and price point, the work of Jewish journalist-activists allowed a wide audience to access reliable, up-to-date women's health information. These articles and books also helped readers feel less isolated as they struggled with health concerns or stigmatized conditions.

Highlighting the careers of Barbara Seaman, Esther Rome, and Rose Kushner, among others, this poster

will show the range of issues written about by Jewish activists and how their approaches reflect both the multi-issue approach and single-issue approach to women's health reform. Health journalism was a major strategic tool for the women's health movement. Using personal papers, newspaper articles, speeches, other writings, and oral histories, I will also show how activists' Jewish identities were influential to their understanding of the body as a site of social justice.

**Hirschhorn, Rebecca**

**Mentor(s): Dr. Susan Yeargin**

**The Prevalence of Sick Cell Trait in a Division I University Athletic Program**

Incoming NCAA athletes must be tested for the presence of hemoglobin (Hb) S but the prevalence with positive sickle cell trait (SCT) status at Division I institutions and their prior knowledge of status is unknown. PURPOSE: Determine the prevalence of athletes with SCT at a Division I university and describe their demographics, prior knowledge of status, and Hb profile. METHODS: A retrospective chart review of the 2010/11–18/19 academic years at one university. Main outcome measures included: actual and expected prevalence of SCT positive athletes, sex, race, sport, prior knowledge of SCT status and family history, and Hb profile (HbA, HbA2, HbS, HbF, and HbC) proportions. Expected prevalence was calculated from CDC statistics and applied to the known athlete racial breakdown per year with Fisher's Exact test utilized for comparison. RESULTS: Twenty-six SCT positive athletes ( $6 \pm 1$  per academic year) were identified, accounting for  $\sim 1\%$  of the athlete population each year. The majority were Black/African-American ( $n=24$ , 92.31%) males ( $n=23$ , 88.46%). There were less SCT positive Black/African-American athletes than expected on average per year (4 vs 13,  $p=0.044$ ). Football had the greater part ( $n=18$ , 69.23%) of SCT athletes followed by men's track and field ( $n=3$ , 11.54%). Other sports included women's track and field, volleyball, baseball, men's basketball and cheerleading. Five athletes (19.23%) reported prior knowledge of their SCT status. Seven athletes (26.92%) reported a family history of SCT or sickle cell disease, three of which did not know their own status. One athlete provided a newborn screen. Results of Hb electrophoresis testing were available for 25 (96.15%) athletes. Average values for HbA, HbA2, HbS, HbF and HbC were  $57.10 \pm 2.70\%$ ,  $3.13 \pm 0.47\%$ ,  $39.72 \pm 2.84\%$ ,  $0.23 \pm 0.83\%$  and  $0.00 \pm 0.00\%$ , respectively, excluding one unique case with 0.00% HbA, 1.40% HbA2, 59.70% HbS, 38.90% HbF and 0.00% HbC. CONCLUSIONS: Athletes with SCT accounted for a small proportion of the athlete population at a Division I university and were lower than expected prevalence. The majority had no prior knowledge of personal or family history. Obtaining Hb profiles beyond solubility testing can provide health care providers with information that may affect clinical manifestation and management.

**Hollenbeck, Mary**

**Mentor(s): Dr. John Lavigne**

**Using Boronic Acid Functionalized Synthetic Lectins To Detect Prostate Cancer From Blood Samples**

Prostate cancer is the second most commonly diagnosed cancer in men. However, the false-positive and negative rates as well health risks associated with current detection methods for prostate cancer have generated a need for a novel diagnostic tool. This research intends to develop a diagnostic tool to utilize boronic acid functionalized synthetic lectins (SLs) as direct detection method for prostate cancer. This method is based on the idea that during the onset of various diseases, such as cancer, aberrant glycosylation occurs which involves the over-, under, or neo-expression of carbohydrates, also known as glycans, on the surface of secreted and membrane proteins. This presents a unique opportunity for the detection of cancer at the earliest stages of the disease when cancer is the most treatable. Use of this SL array has resulted in a 93% classification accuracy when discriminating the prostate cell lines by their metastatic potential. However, in order to make this SL array into a diagnostic tool the SLs need to be able to classify blood samples by their metastatic potential rather than cell lines. Current research focuses on the use of

the SL array with blood samples with varying prostate cancer statuses.

**Holmes, Jordan**

**Mentor(s): Dr. Parastoo Hashemi**

**Voltammetric Analysis of Human Stem Cell-Derived Serotonin Neurons with In Vivo Chemical Characteristics**

Psychiatric diseases are growing at an alarming rate world-wide; depression, in particular, is currently the leading cause of disability according to the world health organization. Chemical diagnostics and efficacious treatments for psychiatric illnesses are extremely challenging. No biomarkers have been identified in the periphery that reflect brain neurochemistry, because of a chemical trafficking and regulation system between the blood and the brain, called the blood brain barrier. Serotonin is an interesting potential biomarker because this molecule is heavily implicated in mood regulation and because the most commonly prescribed antidepressants are serotonin selective reuptake inhibitors (SSRI). One approach to measuring serotonin in the brain is to use fast-scan cyclic voltammetry (FSCV), a well-established technique capable of observing neurotransmission in real-time. FSCV is commonly used in rodent animal models, however in this work, we apply this method using a more translational strategy by making serotonin measurements in human induced pluripotent stem cells (iPCs) derived into serotonergic neurons as our in vitro model. Live cell imaging and expression of phenotype-specific proteins are used to confirm successful differentiation into serotonergic neurons. We verify the chemical functionality of these neurons via electrically evoked serotonin release and reuptake from the cells via FSCV, and show that cells are responsive to tryptophan loading and changes to stimulation parameters. Furthermore, the application of computational modelling confirms that FSCV responses from cells resemble in vivo responses, incorporating parameters previously established in vivo such as multiple reuptake mechanisms and autoreceptor control. Finally, an SSRI (escitalopram) is administered and dose dependent internalization of serotonin transporters is both chemical and microscopically observed, closely following the SSRI response observed in rodent models in vivo. With this work, we build a connection between the in vivo serotonin responses in the rodent brain and in vitro responses in human iPC derived serotonin neurons, in an effort to translate FSCV results and draw conclusions about the chemical mechanisms behind depression in the human brain.

**Holt, Hope**

**Mentor(s): Dr. Melissa Moss**

**Transport of Amyloid- $\beta$  Across the Blood-Brain Barrier by P-glycoprotein: A Novel Therapeutic Target in Alzheimer's Disease**

Alzheimer's disease (AD) is characterized by accumulation of aggregated amyloid- $\beta$  protein ( $A\beta$ ) in the brain. One currently investigated therapeutic approach is the transport of excess  $A\beta$  across the blood-brain barrier (BBB). P-glycoprotein (P-gp), located on the apical BBB, has been shown to transport  $A\beta$ . However, the aggregation state of transported  $A\beta$  has not been explored. While monomeric  $A\beta$  is inert, oligomeric  $A\beta$  exhibits neurotoxicity and initiates formation of  $A\beta$  fibrils that deposit in the brain. Even so, formation of oligomeric  $A\beta$  may be important to its clearance from the brain. Therefore, this study explored the  $A\beta$  assembly state that most effectively interacts with P-gp.

An ATPase activity assay was used to quantify  $A\beta$  binding by P-gp. When a ligand binds P-gp, ATP is hydrolyzed, releasing phosphate ( $P_i$ ). The concentration of  $P_i$ , measured via absorbance, correlates with binding activity. When inverted vesicles, which present P-gp on the outer surface, are incubated in the presence of  $A\beta$  prepared to optimize different assembly states,  $A\beta$  oligomers are observed preferentially bind P-gp.

To determine which of P-gp's two binding sites interact with oligomeric  $A\beta$ , a competition binding assay was performed. Rhodamine 123 (R123) and Hoechst 33342 (H33342) are fluorescent compounds with

well-described alternate P-gp binding sites. The transport of each R123 and H33342 is impeded by the presence of a compound that binds to the same site, therefore, the accumulation of either dye indicates the presence of a competitive inhibitor. MDCK-MDR1 cells grown in a monolayer are incubated in the presence of both oligomeric A $\beta$  and either R123 or H33342 for identification of the binding site. This study demonstrates that the size of A $\beta$  aggregate species plays a crucial role in A $\beta$  binding to P-gp for transport and identifies the probable P-gp binding site of A $\beta$ .

**Hope, Marion**

**Mentor(s): Dr. Sajish Mathew**

### **cis-Resveratrol Sensitizes Tamoxifen-Resistant Breast Cancer Cells**

Breast Cancer (BC) is the leading cause of cancer death and most diagnosed cancer in women in the United States. In 2018 roughly 260,000 new cases were diagnosed and 40,000 deaths occurred. Although a highly heterogeneous disease, around 75% of all BCs overexpress estrogen receptor (ER) alpha and are commonly treated with various endocrine therapies modulating ER level and/or activity, among which tamoxifen is a mainstay therapy. Despite the initial clinical success of tamoxifen, approximately 20-30% of high risk, advanced ER-positive BC patients are resistant to tamoxifen or develop resistance over time due to genomic instability that drives the epithelial to mesenchymal transition (EMT), which significantly decreases patient survival. Therefore, we hypothesize that therapeutic strategies that restore genomic stability and promote mesenchymal to epithelial transition (MET) would sensitize chemoresistant breast cancer cells. Resveratrol (RSV) is a natural compound known for its anti-cancer effects. Interestingly, RSV exists as cis- and trans- isomers and trans-RSV is known to inhibit p53, to induce DNA damage triggering genomic instability- a hallmark of cancer and consistently, trans-RSV promotes cancer growth. However, the anti-cancer effects of cis-RSV remains unexplored. Our work recently demonstrated that tyrosyl-tRNA synthetase (TyrRS) is a novel target for cis-RSV that activates poly-ADP-ribose polymerase 1 (PARP1) and p53- major determinants of genomic stability. Because p53 activation prevents EMT and enhances genomic stability, we hypothesized that treatment with cis-RSV would overcome tamoxifen resistance. Consistently, treatment with cis-RSV sensitized tamoxifen resistant MCF-7 and T47D breast cancer cells without inducing DNA damage. Moreover, cis-RSV downregulated the expression of cyclins (cyclin D1 and cyclin E1) whereas trans-RSV induced the expression of cyclins and increased the levels DNA damage. Moreover, we discovered that trans-RSV in combination with tamoxifen also downregulates the protein levels of ataxia-telangiectasia mutated (ATM) kinase and p53. These observations indicate that although treatment with trans-RSV would evoke growth inhibitory effect in the short-term, treatment with trans-RSV would eventually evoke genomic instability triggering the emergence of drug resistance. In conclusion, our discovery that cis-RSV sensitizes tamoxifen-resistant cells unravels a novel strategy to overcome chemoresistance by restoring genomic stability and promoting mesenchymal to epithelial transition (MET).

**Hossain, Akhtar**

**Mentor(s): Dr. Alexander McLain, Dr. Hrishikesh Chakraborty**

### **Joint Model to Dynamically Predict Co-morbidity Risks for Chronic Disease Patients**

Co-morbidity can be defined as simultaneous presence of two or more disease condition in a patient. Chronic disease patients periodically experience co-morbidities. For many chronic diseases, the disease biomarkers and co-morbidities are believed to be related. Data from these chronic disease patients generally consist of multivariate longitudinal measurements on disease bio-markers and multiple time-to-event co-morbidity outcomes. The observed data may sometimes be censored by an informative terminal event e.g. death of patient. The traditional statistical methods are not capable of effectively capturing the correlations between the longitudinal biomarker outcomes and the time to co-morbidities. We present a joint statistical model for multivariate longitudinal biomarker outcomes and multiple co-morbidity

time-to-events in presence of informative censoring by a terminal event. We modeled the biomarker outcomes using a multivariate partially linear mixed effects model and the co-morbidity time-to-event data are modeled using Cox proportional hazard models with frailties to account for their associations. For estimating the model parameters, we proposed a Bayesian approach to jointly model the longitudinal biomarkers and co-morbidity time-to-event processes linked through shared random effects. We also present a Bayesian framework for dynamic predictions of future bio-marker trajectories and co-morbidity risks. The proposed model and dynamic prediction methods are evaluated using simulation studies and an application to the South Carolina HIV/AIDS surveillance data. We jointly modeled the longitudinally observed viral loads, CD4 counts, and HIV/AIDS co-morbidities with death as the terminal and informative censoring event.

**Huang, Xiao**

**Mentor(s): Dr. Cuizhen Wang**

**Human Settlement in Hurricane-prone Areas on U.S. Atlantic and Gulf Coasts: a view from nighttime remote sensing**

Hurricanes, as one of the most devastating natural disasters, have posed great threats to people in coastal areas. A better understanding of spatiotemporal dynamics of human settlement in hurricane-prone areas is demanded for sustainable development. This study uses the DMSP/OLS nighttime light (NTL) to examine human settlement development in areas with different levels of hurricane proneness from 1992 to 2013. The DMSP/OLS NTL data from six satellites were intercalibrated and desaturated with AVHRR and MODIS optical imagery to derive the vegetation-adjusted NTL urban index (VANUI), a popular index that quantifies human settlement intensity. The derived VANUI time series was examined with the Mann-Kendall test and Theil-Sen test to identify significant spatiotemporal trends. To link the VANUI product to hurricane impacts, four hurricane-prone zones were extracted to represent different levels of hurricane proneness. Aside from geographic division, a wind-speed weighted track density function was developed and applied to historical North Atlantic Basin (NAB)-origin storm tracks to better quantify the levels of hurricane proneness. Spatiotemporal patterns of human settlement in the four zones were finally analyzed. The results clearly exhibit a north-south and inland-coastal discrepancy of human settlement dynamics. This study also reveals that both the zonal extent and zonal increase rate of human settlement positively correlate with hurricane proneness levels during the investigated period. The intensified human settlement in high hurricane-exposure zones deserves further attention for coastal resilience.

**Irdam, Greysi**

**Mentor(s): Dr. Matthew Irvin**

**The Predictors of Rejection and Justice Sensitivity in Adolescence**

Rejection sensitivity (RS) and justice sensitivity (JS) are multidimensional constructs which are related to cognitive-affective processing. Earlier studies showed that anxious RS has been linked to depression and internalizing symptoms whereas angry RS has been related to externalizing problems and aggression in adolescence (London et al. 2007). JS, on the other hand, is considered as both risk and protective factors for emotional and behavioral problems in adolescence. To date, research has mostly concentrated on the effects of different facets of RS and JS on adolescents' social-emotional development. In contrast, little is known about predictors of different dimensions of RS and JS. Thus, the current study examines possible individual and social predictors of RS and JS to advance our understanding about their relationship with adolescents' well-being. Participants included 6th and 9th graders (N = 898, 52.8% female). Ethnicity was 63.3% European-American, 22.4% African-American, and 14.3% other. We measured adolescents' rejection sensitivity (Bondü & Elsner, 2015), justice sensitivity (Downey et al., 1998), attachment (Rochester Youth Development et al., 1991), empathy and sympathy (Vossen, Piotrowski, & Valkenburg, 2015), perceived exclusion (Eccles, Wong, & Peck, 2006) and discrimination (Zullig et al., 2015). Five hierarchical

multiple regression analyses were conducted to examine predictors of RS and JS. Results demonstrated that participants with higher surgency, attachment and cognitive empathy were less likely to display anxious RS while participants with higher affective empathy, sympathy and perceived teacher discrimination were more likely to display anxious RS. Female participants were more likely to report anxious RS. Further, higher teacher discrimination, negative affect and affective empathy predicted higher angry RS. With regard to victim JS, negative affectivity, affective empathy and sympathy were positive predictors while affiliation was negatively correlated with victim JS. Moreover, younger participants were more likely to high in victim and observer sensitivity. Participants with higher affiliativeness, attachment, affective empathy and sympathy were more likely to display observer and transgressor JS while participants who perceived more exclusion reported lower observer and transgressor JS. Additionally, effortful control positively predicted transgressor JS. Overall, our findings suggested that individual differences in facets of RS and JS were explained by different mechanism.

**Isely, Christopher**

**Mentor(s): Dr. Michael Gower**

**Development of microparticles for controlled release of resveratrol to adipose tissue and the impact of drug loading on particle morphology and drug release**

Resveratrol is a small molecule produced by various plants with a remarkable range of beneficial functions in animals. One of these is stimulating signaling pathways in adipose tissue that protect against obesity. Unfortunately, resveratrol suffers from poor bioavailability that inhibits its accumulation in target tissues, including fat, thus hindering the realization of its therapeutic potential. To address this, we are developing biodegradable microparticles as drug depots for controlled release of resveratrol within fat. In this study, resveratrol was encapsulated into poly(lactide-co-glycolide) microparticles using an oil-in-water emulsion/solvent evaporation technique. The oil phase consisted of resveratrol and poly(lactide-co-glycolide) dissolved in a mixture of dichloromethane and ethanol; meanwhile, the aqueous phase contained poly(vinyl alcohol) as the emulsifier. Increasing ethanol's volume ratio increased resveratrol's solubility in the oil phase and particle drug loading. The maximal loading achieved was 65  $\mu\text{g}/\text{mg}$  (6.5 %) and occurred when the ethanol to dichloromethane ratio was 1:3. Under these conditions, particles exhibited ruffled surfaces, which resulted in variable drug release over the first three days of a six-week release assay. By decreasing resveratrol and ethanol in the oil phase and increasing poly(vinyl alcohol) in the aqueous phase, smooth particles were achieved, but they suffered a 15 to 25-fold decrease in drug loading depending on size. Small particles exhibited higher drug loading and burst drug release compared to larger particles because of their higher specific surface area. Taken together, resveratrol can be encapsulated into poly(lactide-co-glycolide) microparticles, but it accumulates at the particle surface impacting drug loading, surface roughness, and drug release.

**Islam, Mohammad Jahirul**

**Mentor(s): Prof. Dmitry Peryshkov**

**Sterically Encumbered Dianionic Dicarboranyl Pincer Ligand  $(\text{C}_5\text{H}_3\text{N})(\text{C}_2\text{B}_{10}\text{H}_{11})_2$  and its Nickel(II) Complex**

Carboranes are of topical interest due to their unique structures and applications in the fields of catalysis, polymers, material sciences and supramolecular chemistry. Icosahedral closo-dicarbododecaboranes are remarkably robust electron deficient three-dimensional boron-carbon clusters with two slightly acidic C-H bonds. Coordinatively unsaturated transition-metal complexes containing C-functionalized ortho-carborane are considered as potential catalysts for activation of small molecules. Recently, we reported the synthesis of a pyridine-backbone pincer complex  $\{(\text{C}_5\text{H}_3\text{N})(\text{C}_2\text{B}_{10}\text{H}_{10})_2\}\text{Ni}(\text{CH}_3\text{CN})$  (1) in which two ortho-carboranes act as the arms of the pincer ligand. The complex 1 was found to be a competent catalyst for nucleophilic addition of piperidine to acetonitrile.<sup>1</sup> Upon addition of  $\text{KOtBu}$ , we observed activa-

tion of a C-H bond of a labile acetonitrile ligand at the nickel center, and N-bound acetonitrile (Ni-NCCH<sub>3</sub>) was converted to a C-bound cyanomethyl ligand (Ni-CH<sub>2</sub>CN). Oxidation of K{(C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>)<sub>2</sub>}Ni(CH<sub>2</sub>CN) (2) by oxygen yielded a cyano coordinated complex K{(C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>)<sub>2</sub>}Ni(CN) (3), along with HCHO, CO<sub>2</sub>, HO-CH<sub>2</sub>CN and another unidentified compound. EPR and <sup>1</sup>H NMR studies revealed that the reaction followed a free radical pathway. Currently we are working to identify the free radical species by using a spin trapping agent, 5,5-Dimethyl-1-pyrroline N-oxide (DMPO). Moreover, we discovered the formation of acrylonitrile and acrylamide by coupling of acetonitrile with aldehyde at nickel center.

#### Reference

1. Islam, M. J.; Smith, M. D.; Peryshkov, D. V. Sterically Encumbered Dianionic Dicarboranyl Pincer Ligand (C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>11</sub>)<sub>2</sub> and its CNC Nickel(II) Complex. *J. Organomet. Chem.* 2018, 867, 208-213.

#### **Islam, Mohammad Jahirul**

**Mentor(s): Prof. Dmitry Peryshkov**

#### **Sterically Encumbered Dianionic Dicarboranyl Pincer Ligand (C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>11</sub>)<sub>2</sub> and its Nickel(II) Complex**

Carboranes are of topical interest due to their unique structures and applications in the fields of catalysis, polymers, material sciences and supramolecular chemistry. Icosahedral closo-dicarbododecaboranes are remarkably robust electron deficient three-dimensional boron-carbon clusters with two slightly acidic C-H bonds. Coordinatively unsaturated transition-metal complexes containing C-functionalized ortho-carborane are considered as potential catalysts for activation of small molecules. Recently, we reported the synthesis of a pyridine-backbone pincer complex {(C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>)<sub>2</sub>}Ni(CH<sub>3</sub>CN) (1) in which two ortho-carboranes act as the arms of the pincer ligand. The complex 1 was found to be a competent catalyst for nucleophilic addition of piperidine to acetonitrile. Upon addition of KOtBu, we observed activation of a C-H bond of a labile acetonitrile ligand at the nickel center, and N-bound acetonitrile (Ni-NCCH<sub>3</sub>) was converted to a C-bound cyanomethyl ligand (Ni-CH<sub>2</sub>CN). Oxidation of K{(C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>)<sub>2</sub>}Ni(CH<sub>2</sub>CN) (2) by oxygen yielded a cyano coordinated complex K{(C<sub>5</sub>H<sub>3</sub>N)(C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>)<sub>2</sub>}Ni(CN) (3), along with HCHO, CO<sub>2</sub>, HO-CH<sub>2</sub>CN and another unidentified compound. EPR and <sup>1</sup>H NMR studies revealed that the reaction followed a free radical pathway. Currently we are working to identify the free radical species by using a spin trapping agent, 5,5-Dimethyl-1-pyrroline N-oxide (DMPO). Moreover, we discovered the formation of acrylonitrile and acrylamide by coupling of acetonitrile with aldehyde at nickel center.

#### **James, Robin**

**Mentor(s): Dr. Victor Giurgiutiu**

#### **Nondestructive evaluation of barely visible impact damage initiation and progression in quasi-isotropic CFRP composites**

In carbon fiber reinforced polymer (CFRP) composites, barely visible impact damage (BVID) can occur due to tool drops during manufacturing and low velocity impact of small debris during the service life of the structure. In low velocity impact events, the impactor may not penetrate the composite material but still may lead to BVID causing various types of damage such as delamination, matrix cracks and fiber fracture. BVID can lead to surface indentations which are too small to be seen during aircraft inspections and can cause the formation and growth of considerable internal damage. Under compressive loading such damage can propagate and can lead to extensive overall strength reduction. In this work, the initiation and progression of damage growth in quasi-isotropic CFRP composites subjected to low velocity impacts is characterized using ultrasonic non-destructive evaluation. Various 2-mm thick quasi-isotropic composite specimens having the same stacking sequence were manufactured in a compression molding machine.

These specimens were impacted in accordance with ASTM D7136 standard on a Dynatup impact testing machine. The goal of the experiments was to identify the combination of impactor mass and impact energy at which approximately 1" delamination could be produced. The delamination sizes were measured by conducting ultrasonic testing (UT) scans in an immersion tank.

**Jesmin, Rubaiya**

**Mentor(s): Dr. Anindya Chanda**

### **Fine-tuning of silver nanoparticles physical properties can alter their abilities to inhibit aflatoxin biosynthesis**

Aflatoxins are a group of fungal toxins (mycotoxins) that occur naturally and contaminate crops worldwide. These toxins are immunosuppressive and carcinogenic and therefore a global threat food safety and human health. Based on the foundation of our previous findings that demonstrated the efficacy of engineered silver nanoparticles (Ag NPs) in inhibiting aflatoxin biosynthesis, we investigated in this study, whether the physical properties of Ag NPs could influence their ability to target aflatoxin biosynthesis. Using *Aspergillus parasiticus*, an aflatoxin producer and established model for mycotoxin biosynthesis in filamentous fungi, we show that three differently sized citrate-coated Ag NPs denoted here as NP1, NP2 and NP3 (where, sizes of NP1 < NP2 < NP3) inhibit aflatoxin biosynthesis at different effective doses in the fungus. Recapping NP2 with polyvinylpyrrolidone coating (denoted here as NP2p) also altered its ability to inhibit aflatoxin production. Dose-response experiments with NP concentrations ranging from 10 ng mL<sup>-1</sup> to 100 ng mL<sup>-1</sup> indicated a non-monotonic relationship between aflatoxin inhibition and NP concentration. The maximum inhibitory concentrations differed between the NP types. NP1 demonstrated maximum inhibition at 25 ng mL<sup>-1</sup>. Both NP2 and NP3 showed maximum inhibition at 50 ng mL<sup>-1</sup>, although NP2 resulted in a significantly higher inhibition than NP3. While both NP2 and NP2p demonstrated greater aflatoxin inhibition than NP1 and NP3, NP2p inhibited aflatoxin over a significantly wider concentration range as compared to NP2. Our results, therefore, suggest that nano-fungal interactions can be regulated by altering certain NP physical properties. This concept can be used to design NPs for mycotoxin prevention optimally.

Keywords: Aflatoxin; Nanoparticles; fungus

**Jhanji, Megha**

**Mentor(s): Dr. Sajish Mathew**

### **A novel role of Tyrosyl tRNA synthetase (TyrRS) in the modulation of murine double minute-2 (MDM2) neuronal function and global protein translation**

PARP1 is a DNA damage sensor that stimulates DNA repair and R-loop resolution by metabolizing its substrate nicotinamide adenine dinucleotide (NAD<sup>+</sup>) to nicotinamide and poly-ADP-ribose (PAR) resulting in active DNA damage response (DDR). PARP1 is essential for the reconsolidation and extinction of contextual fear memory and for long-term memory formation. Consequently, high basal PARP1 activity is a hallmark of healthy, young neurons. However, the molecular signaling network that is regulated by PARP1 for memory formation remains elusive. We recently discovered that the tyrosyl-tRNA synthetase (TyrRS) moves into the nucleus under stress and activates PARP1-dependent DDR signaling. Quite interestingly, we also discovered that the cis-isomer of the natural compound resveratrol (cis-RSV) and novel activators of TyrRS potentiate activation of PARP1 whereas the trans-isomer (trans-RSV) acts as an inhibitor of PARP1. We observed that treatment with trans-RSV downregulated the protein levels of FMRP in differentiated SH-SY5Y neuronal-like cells, suggesting a potential small molecule could mimic the molecular signaling events in FMRP knock out mice. Consistently, treatment with trans-RSV stabilized the MDM2-eEF1a complex and prevented the interaction of PARP1 with eEF1a. However, treatment with cis-RSV rather disrupted the MDM2- eEF1a complex. Consistently, our preliminary data suggest that TyrRS is a

novel interacting partner that determines the stability of the MDM2- eEF1a complex. However, treatment with cis-RSV facilitates interaction of PARP1 with eukaryotic elongation factor 1a (EF1a). eEF1a-mediated nuclear retention of the MDM2 prevents myocyte enhancer factor 2 (MEF2)-induced synaptic scaffold PSD-95 degradation and synapse elimination in an autism-mouse model. Based on our preliminary data, we hypothesize that treatment with cis-RSV will disrupt the MDM2- eEF1a complex and will thus facilitate MDM2-mediated PSD-95 degradation and synapse elimination. Therefore, TyrRS/PARP1 complex is a potential novel therapeutic target against Autism Spectrum Disorders (ASD), which can be activated by small molecules.

**Jin, Dan**

**Mentor(s): Dr. Robin DiPietro**

**Attitude Change Via Discomfort with Contradiction: Examining Customer Participation in Dining and Yelping**

Customers' relevant attitudes about a service experience can predict their relevant behavior represented by WOM (word-of-mouth) (Shih, Lai, & Cheng, 2015). With the high degree of technology involved in the hospitality industry, attitudes can be developed in service situations and behavior can be taken by customers through eWOM (electronic word-of-mouth) to other people, but service experiences are also frequently discussed in online platforms, where customers can share their eWOM. While customers' attitudes often form through affective processes, over time customers develop relevant offline WOM and online eWOM that will support the original service attitude. For example, in interpersonal service encounters, if a person had positive offline WOM after his/her first visit to a restaurant, this person will stick with the original positive offline WOM even if a later experience is not quite as satisfactory. In online reviews of service encounters, if customers read several positive online eWOM comments related to a restaurant on Yelp, they may unconsciously form a positive attitude based on other users' reviews, and expect a promising service experience that ensures other customers' positive online eWOM when they dine in that restaurant. Interestingly enough, when customers' original attitudes are formed based on positive offline WOM, they often change their current attitude — as it is an easier route toward staying consistent with their past positive offline WOM (Festinger, 1962). For example, if a person positively rated a restaurant 4 stars (out of 5 stars) on Yelp, this person will be writing his/her reviews relatively positively (Fogel & Zachariah, 2017). The theory of cognitive consistency (Redondo & Puelles, 2017) provides reasons for why people are in need of a quick remedy to posit the inconsistency between attitude and behavior as a way to avoid cognitive dissonance (Tsao, Hsieh, Shih, & Lin, 2015). Therefore, to avoid such dissonance, people often stay consistent with their attitude and behavior and minimize dissonance. By studying this, the anticipated outcome is to confirm how customers self-justify their attitude change and help restaurant operators to have better solutions to reply to the comments or improve the service that can minimize customer dissonance.

**Johnson, Lisa**

**Mentor(s): Dr. Julius Fridriksson**

**Speech entrainment improves synchrony between anterior and posterior cortical speech areas in non-fluent aphasia**

Introduction

Prior studies have shown speech entrainment (SE), defined as the online mimicking of an audio-visual model of speech, increases speech fluency in individuals with chronic non-fluent aphasia. One theory that may explain why SE works is because it synchronizes the connectivity between anterior and posterior brain areas. The present study aimed to test this very notion by measuring functional connectivity (FC) between two individual functional regions of interest (fROIs) and correlating this with behavioral language measures. In addition, anterior-posterior cortical connectivity was examined before and after a

six-week SE treatment period to investigate treatment effects.

## Methods

Twenty-four individuals (5 women, mean age at stroke =  $53.3 \pm 10.97$ ) with chronic Broca's aphasia due to stroke were enrolled. Upon enrollment, participants' aphasia type and severity were determined using a standardized assessment (measures included in analysis). High-resolution structural brain scans were also collected.

Prior to training (pre-tx), participants completed three functional MRI tasks: (i) audio-visual SE, where the participant mimics the audio-visual speech model; (ii) spontaneous speech (SS); and (iii) audio-visual perception without overt response (PO). Following each scan, participants were trained on three, unrelated discourse scripts.

Two fROIs in left hemisphere language areas were drawn for each individual for both the SE pre-tx and SS pre-tx conditions. To investigate training effects, fROIs were drawn for SE post-tx, as well. FC of fROIs was measured by correlating (Pearson) the BOLD timeseries between the two fROIs during the respective functional condition (SE or SS).

## Results

FC on the SE task (pre- and post-tx) was correlated significantly with lesion volume as well as receptive and expressive language measures. FC on the SS task, however, was not significantly correlated with lesion volume or speech measures. Of interest, a paired-samples t-test revealed FC for the SE task was significantly greater at post-tx ( $M=.44$ ,  $SD=.28$ ) compared to pre-tx ( $M=.33$ ,  $SD=.28$ ),  $t(21)=-2.24$ ,  $p=.036$ .

## Discussion

Results of this study show that FC between posterior and inferior fROIs during the SE task is associated with language measures. These findings provide more insight into the effects of SE training, specific to not only speech production, but speech perception.

## **Kader, Safaa**

**Mentor(s): Prof. Esmail Jabbari**

## **Synthesis and Characterization of Photo-cross linkable Sericin based Hydrogels for Stem Cell Encapsulation**

The objective of this study was to fabricate a photo-cross linkable hydrogel based on sericin extracted from silk cocoons for encapsulation and delivery of stem cells in tissue regeneration. Sericin was extracted from cocoon using citric acid. Since cocoon sericin is rich with hydroxyl residue of serine, the free hydroxyl groups were converted to urethane methacrylate by the reaction with isocyanatoethyl methacrylate (IEM) to produce methacrylated-sericin (SerAte) biopolymer. Human mesenchymal stem cell (hMSCs) were suspended in SerAte's aqueous solution, injected into a mold, and photo-polymerized to generate a SerAte hydrogel encapsulating hMSCs. The freeze-dried photo-crosslinked SerAte hydrogel had a porous, interconnected fibrous, microstructure with pore sizes in the 10-40  $\mu\text{m}$  range. The compressive modulus of the SerAte hydrogels ranged from 5 to 34 kPa depending on SerAte concentration and modification. The results suggest that by varying degree of methacryloyl substitution, SerAte' network density and mechanical properties could be readily tuned to accommodate diverse requirements of tissue engineering applications.

**Kalaitzakis, Michail**

**Mentor(s): Dr. Nikolaos Vitzilaios**

**Dynamic Structural Health Monitoring using a DIC enabled Drone**

The structural assessment of infrastructure components, such as bridges and railroad tracks, is crucial for their safe operation. The process is expensive and time-consuming given the large amount of structures that require continuous inspection. Over the last decades, non-contact measurement techniques have been developed that allow remote evaluation of a structure that is accurate and not labor intensive. One of the major techniques in this field is Digital Image Correlation (DIC) that has proven itself to be an accurate method to measure 2D and 3D shape and deformation fields in structures. In current applications, DIC makes use of a stationary stereo vision camera system that is rigidly placed close to the inspected object. In this paper, we present an application where a drone is equipped with a DIC camera system and successfully performs remote structural evaluation of a railroad tie. This development significantly increases the portability of DIC, resulting in faster deployment of DIC/Drone measurement systems that can reach remote locations and perform fast and accurate structural health monitoring.

**Karakchi, Rasha**

**Mentor(s): Dr. Jason Bakos**

**An overlay Architecture for pattern matching**

Symbolic Non-Numerical data set such as web data, financial dataset, social media data, e-commerce data, and genetic datasets, are growing rapidly in size and complexity. Processing such data requires pattern matching operations. The purpose of such operations to find a matched sequence in text, virus in file, or gene in bioinformatic data sequences.

With large and complex dataset, executing pattern matching operations on CPU requires massive memory accesses and large memory size is needed to store the rule set. This makes such architecture ill-suited for such operations. On the other hand, CPUs are sequential architecture, while pattern matching requires executing multiple tasks at same time (parallel execution). For this reason, Domain-specific architectures DSA, which are hardware-based parallel architectures, are well-suited in symbolic-data analysis.

As an example of such architectures is Micron Automata Processor AP, memory-based architecture. Micron AP comprises of rule sets defined as state tables, interconnections, and input buffer. The major granularity of Micron AP is to reconfigure NFA topology, but at the cost of inefficient compilation time. Another example is the FPGA logical-based approaches which are implemented by the fine-grained chip components. This approach requires re-program the entire chip (low-level cells of the chip) which leads to too long programming time, same challenge as in Micron AP's.

In this research, we propose to develop reconfigurable Automata Processor overlay. The overlay defined as an intermediate fabric in FPGA chips. This fabric represents the coarse-grain components of the chip. With overlay, only the abstraction level of the chip is reprogrammed which speeding up the compiling time.

**Kase, Bezawit Eyob**

**Mentor(s): Dr. Catharina A. Hartman, Dr. Nanda Rommelse**

**Longitudinal associations between symptom domains of attention deficit-hyperactivity disorder and body mass index from late childhood to early adulthood**

Introduction: Overweight and obesity are disproportionately affecting individuals with Attention Deficit Hyperactivity Disorder (ADHD) resulting in poor health outcomes. It is currently unknown how this co-occurrence develops. We examined if changes in ADHD symptom domains predict changes in Body Mass Index (BMI) and vice versa from late childhood across adolescence up to early adulthood. Methods: Participants were adolescents (n=2773, 52.5% males, mean age=11 years at baseline, 5 waves up to

mean age 22) from the Tracking Adolescents' Individual Lives Survey (TRAILS) cohort. ADHD symptom domains (hyperactivity/impulsivity & attention problems) and BMI from five measurement waves were used to examine their stable association as well as within-person reciprocal longitudinal effects, using the Random Intercept Cross-lagged Panel Model. We adjusted for medication effects, pubertal stage, and socioeconomic status, examined the possible role of depressive symptoms and family functioning, as well as sex differences. Result: A modest stable association between hyperactivity/impulsivity & BMI was found in males and females ( $r = 0.102$  in females and  $r = 0.086$  in males,  $p < 0.05$ ). At the within-person level, virtually no longitudinal effects were found between ADHD symptom domains and BMI over time. This was not due to depressive symptoms or poor family functioning being better predictors of ADHD and weight change. Conclusion: This study found no evidence of a causal cycle where ADHD symptoms led to greater BMI and/or high BMI leads to enhanced persistence or deterioration of ADHD symptoms during adolescence and young adulthood. Rather, the association between mostly hyperactive/impulsive symptoms and BMI was stable in this developmental period, pointing to a shared genetic or familial background and/or direct causal effects between hyperactivity/impulsivity and BMI already established earlier in childhood.

Keywords: ADHD, BMI, Obesity, Overweight

**Keator, Lynsey**

**Mentor(s): Dr. Julius Frikdriksson**

**Functional connectivity underlying auditory comprehension in chronic stroke**

## Introduction

Auditory comprehension (AC) is often impaired after left hemisphere (LH) stroke. Traditionally, Wernicke's area was considered crucial for AC; however, voxel-based lesion-mapping and functional imaging studies reveal a distributed LH network consistent with the dual-stream model of language processing (Hickok and Poeppel, 2007). Functional connectivity (FC) analysis measures the temporal synchrony of activation between brain regions to study cortical networks. In this study, we investigate residual FC in relation to impaired AC and introduce a novel approach to control for potentially confounding effects of lesion volume and structural connectivity (SC).

## Methods

Sixty-three participants with chronic LH stroke (11 Conduction, 30 Broca's, 2 Wernicke's, 13 Anomia, 4 Global, 1 Transcortical Motor, 2 no aphasia) were assessed using a standardized battery to determine aphasia type and severity and baseline neuroimaging was acquired.

FC for each pairing of cortical regions of interest (ROIs) was estimated as Pearson's correlation coefficient between the mean BOLD time courses measured in those regions. NiiStat (<https://github.com/neurolabusc/NiiStat>) was used to analyze the association between FC and behavioral performance, using a general linear model (GLM). To control for lesion size, we regressed it out of behavioral scores; to control for SC, the fiber count between ROIs was regressed out of the FC value for the same pair.

## Results

We identified several LH ventral stream functional connections where decreased FC was associated with impaired AC. The GLM Z-scores (measuring the strength of association between FC and AC scores) ranged between 3.7 and 4.6. FC within dorsal regions were not significantly correlated with AC scores. Correlations were not significant for connections within right-hemisphere ventral homologues.

## Discussion

It is clear AC is not localized to a single cortical region, but rather involves a widely distributed network of ROIs. The current study reveals functional connections within the LH ventral stream (posterior parie-

to-temporal network) that correlate with AC which suggests poor AC is likely caused by loss of synchrony in this network. Since we controlled for lesion size and SC, this effect is not solely driven by damage to ROIs nor do the findings reflect frank damage to white matter connections between ROIs.

**Kenworthy, Tara**

**Mentor(s): Dr. Lucy Ingram, Dr. Allison Marsh**

**Assessing the Needs for Group Therapy at the Psychology Resources Center (PSC)**

Individuals with mental health needs far exceed those who receive mental health services in the United States. Mental health care is constrained by the number of trained therapists. However, group therapy allows individual providers to multiply the number of clients served within a given period of time – and it has demonstrated positive outcomes. Thus, group therapy is a potential solution to increase access to mental health services for those in need. Yet, it is critical to ensure that the delivery of any new intervention fits with the needs and resources of the community in which it is being delivered. The aim of this project was to assess how group therapy at the Psychology Services Center, a community mental health clinic affiliated with the University of South Carolina's Psychology Department, could serve the mental health needs of individuals in the Columbia, SC area more efficiently and effectively. This included a systematic needs and resources assessment to understand (1) the mental health needs of the community served by the PSC, (2) which groups would best serve the mental health needs of the community, (2) needs and resources of PSC graduate student therapists, (4) group supervision needs and resources at the PSC, and (5) how the PSC can facilitate provision of group therapy to the community. This assessment was conducted using records reviews, focus groups, and individual interviews with key stakeholders. The results demonstrate gaps between needs and services currently available and to provide suggestions for better serving the community through provision of groups. This needs and resources assessment is a first step to a comprehensive planning process for implementing group therapy at the PSC. When groups ultimately get implemented, the PSC is poised to more efficiently serve members of the community and increase accessibility to the PSC for community members.

**Key, Heather**

**Mentor(s): Dr. Toni Torres-McGehee**

**Examination of athletic identity and quality of life related to sport participation**

Athletes often develop athletic identities over time, which helps an athlete's performance and self-esteem during sport participation but can have negative repercussions once an athlete retires. Preparation for this loss is important in preventing negative mental health consequences and decreases in the quality of life.

Purpose: To examine overall quality of life and athletic identity (e.g., immediately after retirement and "now" in retirement) and determine differences across gender, sport type (team vs. individual), and number of years of participating in sport and number of years retired (e.g., 0-5, 6-10, 10-15 year, etc.).

Methods: Retired athletes (n=125; ages: 29.1±11.1 years; males: n=51; females: n=74) were recruited via convenience sample to participate in an online survey. Each participant completed at minimum of 4 years of high school sports, or ≥ 2 years of collegiate athletics, or ≥ 2 years of professional sports. The survey included demographic questions, the Athletic Identity Measurement Scale (AIMS) to measure athletic identity (immediately following sport and "now") and the Quality of Life Index (QLI). Basic descriptive, independent samples t-tests and ANOVAs were used.

Results: A significant difference between gender and AIMS "now" in retirement was found (males: 31.2±10.1; females: 26.4±7.5; P = .003); but no differences were found between gender and QLI total, QLI subscales and AIMS "now" in retirement. No significant differences were found between team vs. indi-

vidual sport and total QLI and both AIMS. A significant difference was revealed between number of years participating in sport and AIMS immediately following retirement ( $P = 0.02$ ) and QLI-family subscale ( $P = 0.014$ ). There was a significant difference between number of years retired and the QLI-family subscale ( $P=0.014$ ); with Tukey post hoc revealing significant differences between years 0-5 and 21-25 ( $6.08 \pm 4.5$  vs.  $12.8 \pm 2.2$ ;  $P= .018$ ).

**Conclusion:** Those who played sports longer, had the strongest athletic identities upon retirement. Men are more likely to maintain a strong athletic identity, even after retirement. Men and women are equally likely to exhibit a decrease in quality of life, in regards to family 25 years post retirement.

**Khathayer, Firas**

**Mentor(s): Dr. Swapan Ray**

### **Diosgenin is a novel alternative therapy for inhibition of growth, invasion, and angiogenesis of different glioblastoma cell lines**

Fenugreek (*Trigonella foenum-graecum*) seeds and roots of wild yam (*Dioscorea villosa*) have a lot of nutritional and medical benefits and used in traditional medicine to treat diseases and inflammatory responses for centuries. Diosgenin is a natural steroidal sapogenin extracted from fenugreek and wild yam and is one of the major bioactive compounds known to have big roles in the treatment of diabetes, hypercholesterolemia, and inflammation. The recent studies have also shown a big role of diosgenin as a very promising anti-tumor agent for inhibition of cell proliferation and induction the apoptosis in many cancers such as colon cancer, leukemia, breast cancer, and liver cancer. We examined the effects of different concentrations (5, 10, 15, 20, and 25  $\mu\text{M}$ ) of diosgenin on proliferation of rat glioblastoma C6 cell line and human glioblastoma T98G cell line. We noticed that diosgenin had a high inhibitory effect on the growth of both C6 and T98G cell lines. The molecular mechanisms involved in the induction of apoptosis in C6 and T98G cell lines included increase in pro-apoptotic Bax protein and decrease in anti-apoptotic Bcl-2 protein. Besides, diosgenin induced differentiation in the cells by increasing a differentiation marker protein such as glial fibrillary acidic protein (GFAP) and decreasing the dedifferentiation marker proteins such as Id2, c-Myc, TERT, and Notch-1. Also, diosgenin was not only inhibited growth but also played big roles in suppressing invasion by down regulating MMP2 and MMP9 and angiogenesis by down regulating VEGF and FGF2. In conclusion, diosgenin showed anti-cancer effects in rat and human glioblastoma cells by induction of apoptosis and differentiation and by inhibition of invasion and angiogenesis

**Kidd, Victor**

**Mentor(s): Dr. Richard Southall**

### **A Narrative Analysis of Athletic Identity Among High School Football Players**

Previous empirical inquiry of athletic identity and participation has failed to examine how such identities and roles are developed in the high school. While focusing on salient athletic identities or role sets is important, research has failed to examine how devotion to an athletic identity, role, and responsibilities is developed and communicated to adolescent athletes through environmental and social mechanisms. Therefore, adopting Narrative Identity Theory (Loseke, 2007; McAdams & McLean, 2013; Polkinghorne, 1991; Smith 2010) as an appropriate lens, the current study will investigate how an athletic identity, role, and responsibilities are developed through complex interaction and temporal lived experiences that assist in developing a person's self-concept (Nasco & Webb, 2006), ultimately developing their identity (Ezzy, 1998; Ricoeur, 1984, 1985, 1988, 1991, 1992). Specifically, through ethnographic interviews and participant observation, the current study will examine the lived experiences of high school football players in order to investigate salient athletic identity development as part of cultural, institutional, organizational, and personal narrative co-construction. The current study seeks to answer three

fundamental questions: (1) Do sampled high school football players display markers indicative of athletic role engulfment and a salient athletic identity? (2) If so, in what ways do such cultural, institutional, organizational, personal narratives shape salient athletic identity development? (3) What athletic role engulfment factors and salient athletic identity serve as determinates of academic, life, social, and occupational/vocational skill development?

**Kirchner, Kristin**

**Mentor(s): Dr. Steven Harrod, Dr. Rosemarie Booze**

### **Histamine Dysregulation in the HIV-1 Transgenic Rat**

Histamine, originating in the tuberomammillary nucleus (TMN) of the hypothalamus, has been suggested to play a role in neurodegenerative diseases, such as HIV-1. Histamine release and presence of HIV-1 viral proteins have a positive relationship, with an increase in spontaneous histamine release found in HIV-1 patients. It is possible that a dysregulated histaminergic system might contribute to HIV-1 associated neurocognitive disorders, which are found in roughly 50% of HIV-1 patients. Immunohistochemistry was performed on HIV-1 transgenic (5 male and 4 female) and F344 control (5 male and 4 female) rat brains to identify and quantify histaminergic cell bodies in the tuberomammillary nucleus of the posterior hypothalamus. Stereological methods were used to estimate the number of small (<18 microns in width) and large (>18 microns) histaminergic neurons in the TMN for each rat. There was not a significant effect of transgene on small or large histaminergic neuron counts ( $p>0.05$ ). There was not a significant effect of sex ( $p>0.05$ ) on the number of small histaminergic neurons. However, there was a significant effect of sex on the number of large histaminergic neurons, with males displaying significantly more large histaminergic neurons than females ( $p<0.05$ ). It has previously been established through voltammetry that the HIV-1 Tg rat shows increased histamine release relative to controls. The results of the present study strengthen the conclusion that the increased histamine levels from voltammetry in the HIV-1 Tg rat are most likely due to increased activity of the histaminergic neurons rather than increased histaminergic neuron number.

**Kishman, Erin**

**Mentor(s): Dr. Xuewen Wang**

### **Effects of Instability on Core Muscle Activation in a Side Bridge**

Training the musculature of the core continues to be perceived as an essential component in conditioning and rehabilitation settings. A popular way to train the core is through the use of instability devices, such as the Swiss ball or suspension trainer. However, there is limited research on the effects of these devices on core muscle activation. Purpose: To compare core muscle activity during side bridge variations with and without instability devices through electromyography (EMG) recording of the rectus abdominis, external oblique, erector spinae, and latissimus dorsi muscles. Methods: A total of 39 participants (22 men, 17 women) performed three variations of a side bridge in a randomized order: on the floor, with feet elevated on a swiss ball, and with feet suspended in a TRX suspension trainer. Each bridge variation was held for 5 seconds and repeated three times. Prior to performing the side bridges, participants completed a maximal voluntary isometric contraction (MVIC) for all four muscles, for EMG normalization. Root mean square values for each side bridge were reported as a percentage of MVIC. Results: Significantly higher muscle activation occurred with the use of the instability devices. Mean  $\pm$  SD %MVIC was significantly higher on the ball and TRX when compared to the floor in the rectus abdominis (Floor:  $21.7\pm 11.8$ ; Ball:  $29.7\pm 15.6$ ,  $p= 0.001$ ; TRX:  $31.7\pm 18.5$ ,  $p< 0.001$ ) external oblique (Floor:  $32.9\pm 13.6$ ; Ball:  $40.1\pm 24.4$ ,  $p= 0.032$ ; TRX:  $38.0\pm 18.5$ ,  $p= 0.035$ ), and latissimus dorsi (Floor:  $7.0\pm 4.5$ ; Ball:  $12.2\pm 9.1$ ,  $p< 0.001$ ; TRX:  $12.2\pm 7.3$ ,  $p< 0.001$ ). Conclusion: It was concluded that instability devices may be beneficial in training the core musculature as shown by higher muscle activation. Higher muscle activation may indicate a greater dependence on the selected muscles when completing these types of activities.

**Kittikhunnatham, Preecha**

**Mentor(s): Dr. Andrew Greytak**

**Controlling electronic properties of a semiconductor nanowire through diffusion doping and cation exchange**

Semiconductors enable modern technology; they are essential components in a variety of electronic devices: computers, memory storage devices, sensors, solar cell, etc. Before semiconductors are used to manufacture those components, their electronic properties have to be tuned usually by introducing elemental impurities into their crystals, so called doping. Over the years, nanoscale semiconducting materials allow electronic devices to be more compact and efficient. Semiconductor nanowires (NWs) have quasi-cylindrical shape with nanoscale in diameter and microscale in length, which can be integrated into microscale electronic devices. This leads them to be promising candidates for nanoscale semiconducting materials. However, the doping technology for bulk semiconductor is typically not suitable for semiconductor NWs. This hinders the use of semiconductor NWs as semiconducting materials for many applications. Thus, developing a doping process for semiconductor NWs is very important to allow semiconductor NWs for many applications. This study employed the combination of nanocrystal diffusion doping and cation exchange, which was successfully used to introduce  $\text{In}^{3+}$  into CdSe quantum dots, to dope CdSe NWs with  $\text{In}^{3+}$ . In this presentation, the doping process, integration of the semiconductor NWs into a microscale electronic device, and the change in electronic properties of CdSe NW after the doping will be discussed.

**Komar, Mary Sarah**

**Mentor(s): Dr. Lesly Wade-Woolley**

**Examining the relationship between music, prosody, and reading ability in seven and eight-year-old children**

Research has indicated that music can be related to reading and reading related skills. However, this research is mixed regarding the nature of this relationship and the specific elements of music that may contribute to reading and reading related skills. Some studies have suggested rhythm to be a significant predictor of reading ability, while other studies have suggested pitch to be the significant predictor. One element that may be important in both music and reading is prosody, which is considered to be the melodic aspect of language that includes both rhythm and pitch. Although previous studies have investigated how music and prosody may relate to reading, none have analyzed the elements of rhythm, pitch, and prosody in combination. This study aims to more deeply examine the relationship between rhythm, pitch, and prosody in conjunction and how these elements contribute to reading and related skills in forty 7 and 8-year-old elementary school students.

**Kristinsson, Sigfus**

**Mentor(s): Dr. Julius Fridriksson**

**Functional Brain Activation by BDNF Genotype in Chronic Aphasia**

**Introduction:** The BDNF gene has been shown to mediate synaptic plasticity in a healthy brain. Presence of a single or twofold Met allele in the gene has extensive functional consequences, including poorer performance on cognitive tasks, decreased learning, and worse functional recovery and decreased brain activation in stroke patients.

**Aims:** We aimed to explore functional brain activation by BDNF genotype in individuals with chronic aphasia due to left hemisphere stroke.

**Methods:** We recruited 87 individuals with chronic stroke-induced aphasia. Participants performed a naming task during fMRI scanning in which they were presented with 40 colored pictures of high-frequency nouns. We explored our hypotheses using two approaches to analyze the data: 1) We obtained the

number of voxels where naming-related brain activation was significantly greater than zero (FWE=.05) for each group and compared across groups, 2) Average group-based contrast maps were compared using a two-sample t-test ( $p < .001$ , uncorrected). Overall language impairment was used as a covariate in all analyses.

Results: Participants in the typical and atypical BDNF genotype groups presented with distributed cortical and subcortical lesions that covered the middle cerebral artery territory. The overall activation pattern was similar across groups, with greatest intensity of activation present in the bilateral posterior temporal gyrus, pre- and postcentral gyrus, and the longitudinal fissure. We found that the number of activated voxels was greater in the typical genotype group compared to the atypical group at the whole brain level (98,500 vs. 28,630;  $t(85)=18.63$ ,  $p < .001$ ), in the left hemisphere (37,290 vs. 7,000;  $t(85)=8.33$ ,  $p < .001$ ), and in the right hemisphere (74,830 vs. 30,630;  $t(85)=11.29$ ,  $p < .001$ ). Corresponding to results from functional MRI data analysis, we observed clear differences in language impairment between the typical and atypical BDNF genotype groups, where aphasia severity was significantly greater in the atypical compared to the typical group (WAB-R AQ: 54.3 vs. 64.2,  $p = .033$ ; PNT: 52.8 vs. 74.7,  $p = .047$ ).

Discussions: Our results are consistent with findings in healthy individuals and the stroke population, while contrasting some findings in studies examining the association between BDNF genotype and recovery in acute aphasia.

**Lamarche, Alicia**

**Mentor(s): Dr. Matthew Ballard**

**Exceptional collections of toric varieties associated to root systems**

Given a root system  $R$ , one can construct a toric variety  $X(R)$  by taking the maximal cones of  $R$  to be the Weyl chambers of  $R$ . The automorphisms of  $R$  act on  $X(R)$ , and a natural question arises: can one decompose the derived category of coherent sheaves on  $X(R)$  in a manner that is respected by  $\text{Aut}(R)$ ? In this presentation, we explore progress towards answering this question in the case where  $R$  is of type  $D_n$ .

**Larsen, Chelsea**

**Mentor(s): Dr. Delia West**

**Feasibility of recruitment for a sedentary behavior reduction intervention for overweight or obese adults with controlled hypertension**

INTRODUCTION: Sedentary behavior, which is any waking activity  $< 1.5$  METs in a sitting, lying or reclining position, is associated with an increased risk for poor health outcomes. Those at the highest risk of excessive sedentary behavior are individuals who are overweight or obese and/or have a chronic condition (e.g. hypertension). Therefore, sedentary behavior reduction interventions targeted at these vulnerable populations are needed. However, little is known about how to recruit overweight or obese adults with hypertension into sedentary behavior reduction interventions.

METHODS: Adults who were overweight or obese (body mass index between 25 – 50 kg/m<sup>2</sup>), taking medication to control their blood pressure, owned a smartphone, lived or worked in Columbia, and had at least 7 hours of self-reported sedentary time were eligible. A multi-faceted recruitment approach that included online newsletters, listservs, boosted social media posts, and flyers in doctor's offices was used for recruitment. The target sample size was thirty-six. Interested individuals completed an online screener and if likely eligible, were phone screened and invited to orientation.

RESULTS: During 5 months of recruitment, 112 people visited the screener. Of these, 43 (38%) never started the survey. Of the 69 individuals who started it, 50 did not meet  $> 1$  eligibility criterion (59%) or never completed the survey (13%). Nineteen were phone screened, and 14 were consented after further ineligibility (3%) or decisions to withdraw (2%). One individual could not tolerate accelerometry data collection, which resulted in 13 individuals who were eligible and randomized (12% yield or 2.6 partici-

pants/month).

**DISCUSSION:** Only 13 individuals from the target population were eligible and interested in participating in a sedentary behavior reduction intervention over 5 months of active recruiting across multiple settings. The low yield was surprising considering 44% of adults in Richland County have diagnosed hypertension and the majority of individuals with hypertension are overweight/obese and thus prone to excessive sedentary behavior. Insufficient knowledge and/or interest in sedentary behavior reduction may have contributed to the modest response rate. Greater population-wide education about the detrimental effects of sedentary behavior may be needed before individuals seek out sedentary behavior reduction interventions.

### **Larson, Morgan**

**Mentor(s): Dr. Toni Torres McGehee**

### **Examination of Low Energy Availability and Macronutrient Intake among Female Collegiate Athletes**

Low energy availability (LEA:  $< 30\text{kcal/kg/FFM}$ ) is one component of the Female Athlete Triad and is a catalyst for negative health consequence. Female athletes may be at increased risk for LEA due to a multitude of risks: individual judgments, body size expectations, uniforms, lack of nutrition knowledge or pathogenic behaviors.

**Purpose:** Examine the prevalence of LEA and macronutrient intakes (protein [PRO], carbohydrate [CHO], and fats) and differences between sport type and academic status (e.g., freshman, sophomore, junior, senior) in female collegiate athletes.

**Methods:** Data from a larger cross-sectional study was used to examine 75 Female collegiate athletes (age:  $19.5 \pm 1.3$  years; height:  $170.4 \pm 6.8$  cm; weight:  $65.6 \pm 8.8$  kg) across various sports [beach volleyball ( $n=18$ ), softball ( $n=17$ ), equestrian ( $n=28$ ), and indoor volleyball ( $n=12$ )]. Data collection consisted of anthropometric data, surveys (e.g., demographics, health history, etc.), resting metabolic rate, a 7 day online dietary to measure energy intake (EI) and exercise logs to measure exercise energy expenditure (EEE). Basic descriptive stats and Chi-squares and cross-tabulations were used to examine the proportion of participants classified as “at risk” for LEA and across sport and academic status.

**Results:** Overall, 92% ( $n=69$ ) of athletes demonstrated LEA ( $13.3 \pm 11.9$  kcal/kg/FFM, EI:  $1490.2 \pm 437.3$  kcals, EEE:  $874.4 \pm 490.8$  kcals). Differences were found between LEA and PRO intake for both sport type ( $p < 0.04$ ) and academic status ( $p = 0.04$ ), with most equestrian athletes and freshman not meeting protein recommendations ( $< 1.2$  g/kg/day). Most athletes (98.7%,  $n=74$ ) reported low CHO intake ( $< 5$  g/kg/day) with 90.7% ( $n=68$ ) of athletes with LEA had inadequate CHO intake. Fat intake was adequately met by 64% ( $n=48$ ) of athletes, however, 26.7% ( $n=20$ ) of athletes with LEA consumed fats above the recommendation.

**Conclusions:** Majority of female athletes demonstrated compromised LEA and macronutrient intake (CHO and PRO). Proper nutritional education, specifically EI and macronutrient intake, is essential for adequate health status and performance in athletes. Healthcare professionals should be aware of recommendations for proper dietary intake, be a resource for education, and implementation of proper nutritional fueling for female athletes.

**lei, libin**

**Mentor(s): Prof. Fanglin(Frank) Chen**

**Intermediate-temperature solid oxide electrolysis cells with robust electrolyte and air electrode**

Proton-conducting solid oxide electrolysis cell (H-SOEC) is a promising device that efficiently converts electrical energy to chemical energy. H-SOEC offers a number of merits over oxygen-ion-conducting solid oxide electrolysis cell (O-SOEC). However, the development of H-SOECs is far behind that of O-SOECs, mainly due to technical challenges such as the stability of the electrolyte and electrode in H<sub>2</sub>O-containing atmosphere at operating conditions and the fabrication of thin electrolyte layer. In this study, Ba-Zr<sub>0.8</sub>Y<sub>0.2</sub>O<sub>3-δ</sub> (BZY) electrolyte and Sr<sub>2</sub>Fe<sub>1.5</sub>Mo<sub>0.5</sub>O<sub>6-δ</sub> (SFM) air electrode, both are stable in H<sub>2</sub>O-containing atmosphere at operating conditions, are evaluated in H-SOECs. In addition, in order to improve the performance of H-SOECs, thin BZY electrolyte layer (about 16 μm in thickness) and nano-scaled SFM-BZY air electrode are fabricated successfully, showing excellent SOEC performance (-0.21 A cm<sup>-2</sup> at 600 oC) and achieving faradaic efficiency of 63.6% at intermediate temperature.

Lowry, Caralee - Mentor(s): Dr. Daniel Fogerty -- The Impact of Cognitive, Linguistic, and Auditory Skills on Performance in Speech In Noise Tasks -- Background: One in three people between the ages of sixty-five and seventy-four and almost half of those over seventy-five have some level of hearing loss. Hearing aids can provide listeners with accessibility to sound by attempting to make sounds more accessible through increasing amplification of the signal delivered to the ear. However, several factors impact individual ability of adult hearing aid users to identify and comprehend speech in noise. Purpose: The current study seeks to investigate the potential interactions between specific demographic information, auditory skills, cognitive skills, and linguistic skills on a listener's performance during high and low context speech in noise tasks. Methods: Forty participants between the ages of eighteen and thirty as well as forty participants between the ages of sixty and eighty-nine performed tasks to evaluate their ability to listen in various contexts. Twenty of the older listeners had a known hearing loss. Each participant completed five sessions of testing to evaluate linguistic knowledge through the Peabody Picture Vocabulary Test, auditory skill through noise modulation detection, and cognitive factors such as attention and working memory. All participants also completed a speech recognition test before and after testing to assess an individual's degree of perceptual learning for speech-in-noise tasks. Hypothesis: We propose an interaction between skill level in the previously mentioned tasks and the ability to identify speech in noise in both low and high context sentences. Implications: Our findings can help improve the ability of speech-language pathologists in individualizing treatment approaches for cognitive and aural rehabilitation to address declines typically associated with cognitive aging and hearing loss.

Lundy, Morgan - Mentor(s): Dr. Amir Karami, Mr. Frank Webb -- Understanding Twitter Research Themes from 2006 to 2018: A Topic Modeling Approach -- Since its creation in 2006, Twitter has become a wildly popular forum for online communication, with effects on processes of information dissemination, marketing, community building and public discourse. Scholars from diverse disciplinary backgrounds have taken advantage of this new wealth of data and information for a wide variety of studies, from sentiment analysis to assessing health needs to defining brand recognition. However, there has not yet been a study (meta-analysis) that analyzes the entire breadth of these twitter-based studies, in part due to the fact that analyzing a large number of research papers is a time-consuming and labor-intensive process. This study instead approaches analyzing a large corpus of twitter-based research papers using natural language processing, specifically latent Dirichlet allocation-- a generative statistical model for topic modelling-- as well as qualitative interpretive methods. This study investigated more than 18,000 research papers to disclose hidden "topics" and their importance through text data mining across papers published between 2006 and 2018. This research is the first study to analyze research papers focusing on Twitter data.

**Ma, Zichen**

**Mentor(s): Dr. Yen-Yi Ho**

**Flexible bivariate correlated count data regression with application in gene coexpression analysis based on RNA-sequencing data**

Coexpression analysis concerns the correlation between the expression levels of two genes. It has been observed that the correlation between two genes may vary according to the levels of a third gene, a pattern referred to as liquid association. Various works on this dynamic correlation pattern have been done in terms of continuous data generated from microarrays, but very little has been done in terms of discrete count data generated from RNA-sequencing. In this work, we propose three Bayesian approaches to modeling bivariate count data regression, taking into consideration of the covariate-dependent correlation structure. The basis of the three approaches is that univariate count data of this type can be flexibly modeled a negative binomial (NB) distribution. We generalize this concept and attempt to model the distribution of over-dispersed bivariate counts in three different manners: (i) through a direct bivariate NB distribution; (ii) through a Poisson-gamma mixture which leads to a marginally NB distributed random variable; (iii) through a Gaussian copula which recasts the NB random variable in terms of an underlying standard normal random variable. In all three approaches, we will regress the mean, dispersion and correlation onto covariates. Directly regressing the correlation makes it straightforward to analyze the existence of liquid association once the posterior distribution of regression coefficients is obtained. To demonstrate the capability of the proposed methods, we conduct two simulation studies, one aimed at comparing the three approaches based on model-fitting criteria, the other aimed at examining the power in identifying liquid association. Lastly, we apply the proposed approaches to RNA-sequencing data from the International Cancer Genome Consortium (ICGC) data portal.

**MacGowan, Laura**

**Mentor(s): Dr. Allison Marsh**

**Books Behind Bars: Libraries in Columbia's Carceral Communities**

Despite proven links between increased reading and lower recidivism rates, libraries are an oft-neglected space in prisons across the country—including those in South Carolina. Books of all types offer important avenues to education and freedom in prison, a setting where both may be in short supply. Non-fiction provides valuable opportunities to build skills and acquire knowledge that may not only help prisoners find employment upon release but give them vision and motivation to seek release while they are still incarcerated. Fiction has a well-documented history of helping prisoners and others with traumatic backgrounds to process difficult experiences, escape from the harsh realities they may face in their daily lives, and reestablish neuropathways for empathy in those whose brain chemistry may have been altered by criminal experiences. This presentation proposes methodology for a needs assessment of libraries in the carceral communities of Columbia, South Carolina, focusing especially on the women's prison, because while libraries in men's and juvenile facilities have at least minimal literacy/library resources, women's prisons tend to be underserved in this area. Focusing these sorts of resources on women's prisons is crucial, not only for the sake of the women themselves but because the well-being of incarcerated women has significant impact on children they may have. Leaning heavily on community partners from multiple sectors—prison officials and administrators, non-profit stakeholders, and volunteers—this needs assessment seeks to clarify the state of prison libraries in the Broad River Prison complex (comprised of two men's prisons, a women's prison, and a juvenile detention center). In future stages of this project, the needs assessment would be a key piece in the push for improved access to books of all kinds for prisoners in Columbia prisons, with the ultimate dual aims of reducing recidivism after release and improving prisoner quality of life before release.

**MacQueen, Blake**

**Mentor(s): Dr. Jochen Lauterbach, Ms. Elizabeth Barrow**

**Optimization of 1,4-Anhydroerythritol and Xylitol Conversion via Heterogeneous ReO<sub>x</sub>-Pd/CeO<sub>2</sub> Catalysts using a Design of Experiments**

Some biomass is rich in sugars that contain hydroxyl groups, which can either undergo deoxydehydration to form double bonds or hydrodeoxygenation (HDO) to remove vicinal hydroxyl groups. HDO via deoxydehydration followed by a hydrogenation step allows for the simultaneous removal of multiple vicinal hydroxyl groups[1]. Literature has shown that ReO<sub>x</sub>-Pd/CeO<sub>2</sub> is a better catalyst for the simultaneous HDO of 1,4-anhydroerythritol as compared to ReO<sub>x</sub>-Pd on other oxide supports[2]. The simultaneous HDO of 1,4-anhydroerythritol, which produces tetrahydrofuran, was used as a model reaction for HDO. Pressure and temperature effects on the system will be explored through a design of experiment in order to elucidate scalable conditions for HDO reactions. Xylitol is another biomass derived chemical that can be upgraded to value-added products through simultaneous HDO, but there is a lack of understanding on how ReO<sub>x</sub>-Pd/CeO<sub>2</sub> catalysts perform for this reaction[2]. Thus reaction condition optimization could benefit this process significantly. In order to obtain a detailed understanding of the optimal conditions for these reactions, a design of experiment was enacted to discern the effects and interactions of temperature, pressure, and catalyst loading. Xylitol was chosen as a reactant to compare to the model 1,4-anhydroerythritol reaction due to it having three vicinal cis-hydroxyl groups and in order to form 1,2,5-pentanetriol and other products by selectively removing hydroxyl groups. The xylitol HDO has been conducted in literature at 80bar and 443K[2]. Reducing the pressure would allow for this process to become more economically favorable and scalable. The findings from the 1,4-anhydroerythritol reaction design of experiments were extended to the xylitol reaction in order to find trends between the operating conditions, resulting in more reasonable operating conditions.

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**Madden, Robert**

**Mentor(s): Dr. Toni Torres-McGehee**

**Examination of Anger Prevalence in NCAA Division I Student-Athletes**

Male collegiate athletes demonstrated a higher risk for anger than female collegiate athletes; however, most athletes displayed moderate risk for anger across different sports. Anger across academic status was not significant, therefore, this may imply anger management and/or coping skills were not learned or taught throughout college. Further examination is necessary to investigate the prevalence of risky behaviors in combination with anger among this population. Considering the high prevalence of anger among collegiate athletes; institutions should work to establish a screening for all student-athletes and direct those at risk to a qualified mental health professional for intervention.

**Mandelbaum, Jennifer**

**Mentor(s): Dr. Lucy Ingram, Dr. Allison Marsh**

**Strengthening Quality Improvement Education Among UofSC Health Degree Students**

Background: Health care research and practice have increasingly focused on improving quality while

decreasing cost as a means to increase value and improve outcomes. Quality improvement involves continuous, systematic actions that contribute to measurable changes within a population and/or health care organization. Despite an emphasis by national institutes on the importance of quality improvement, few studies have examined the adequacy of quality improvement training among health professions students. Those that do have found these programs frequently lack training in theory and methods. The objectives of this research are to (1) assess knowledge and perceptions of quality improvement among health professions students at the University of South Carolina and (2) understand better how these students do or do not engage with the opportunities to learn about quality improvement through the university's chapter of the Institute for Healthcare Improvement.

**Methods:** Data will come from a cross-sectional survey of students in health science graduate degree programs (public health, medicine, nursing, pharmacy, social work, physician assistant, physical therapy, and speech-language pathology). The survey consists of 27 questions measuring the extent to which participants agree with statements assessing their knowledge of, experiences with, and attitudes toward quality improvement in public health. Focus groups will also be conducted to gather collect rich qualitative data about quality improvement education at UofSC.

**Results:** This project will contribute new knowledge to the UofSC community about quality improvement knowledge and perceptions among graduate health science students, which may be used to make recommendations and take steps toward better addressing education and practice. Changes to UofSC quality improvement programming may help to create a culture which facilitates interprofessional collaboration between disciplines in health sciences and between faculty and students.

**Conclusions:** Further research may compare quality improvement education at UofSC with peer and peer-aspirant institutions. Results will show areas where quality improvement education is particularly strong or lacking.

**Marion, Alexandria**

**Supervisor(s): Sarah Twigg, Sarah Gerth**

**Mentor(s): Dr. Suzanne Adlof**

**Orthographic Processing in Children with Language Impairment and/or Dyslexia**

**Purpose:**

Children with language impairment are known to have problems with reading, but their problems may take different forms. Almost all children with language impairment will have problems with reading comprehension, whereas approximately half of these children will have difficulty with word reading. In this study, we examined orthographic processing in children with language impairment (LI), with and without dyslexia, as compared to typically developing children (TD). We hypothesize that differences in orthographic processing may explain the differing word learning abilities of children with language impairment.

**Methods:** Children, grades 3-6, who were typically developing or who had LI and/or dyslexia completed multiple measures of word reading and spelling, including a computerized assessment of orthographic processing in which eye-movements were tracked. In the orthographic processing tasks, the participants were instructed to look at four choices of nonwords and select the one that looked most like a real word. The four nonwords included a high orthotactic probability nonword (e.g., sime), a low orthotactic probability nonword (e.g., gelk), a nonword that began with an illegal digraph (e.g., pjop) and an unpronounceable string of consonants (e.g., kplr). Eye-tracking was used to examine the amount of time participants looked at each response option, as well as their accuracy and speed in identifying the nonwords that were most similar to a real English word.

Results: Analyses will examine group differences in the accuracy of selecting the high probability non-words, and fixation locations and durations for all non-word types. We predict that TD children will be able to quickly and accurately identify the nonword that looked most like a real English word, whereas children with SLI+dyslexia will have difficulty differentiating between non-words with higher and lower orthotactic probability. If orthographic processing is a strength for children with LI who do not have co-occurring dyslexia, they should perform like TD children. Implications for reading assessment and instruction will be discussed.

**Masterson, Margaret**

**Mentor(s): Dr. Crystal Hill-Chapman**

**Exploring Patient Perceptions and Misconceptions: Beliefs Regarding Hereditary Cancer**

Many patients who enter a genetic counseling session have preconceived notions about why they or their family members developed a genetic condition. Often these perceptions are deeply rooted in personal, familial, and/ or cultural beliefs; individuals typically have a personal framework, or schema, into which they incorporate new information. There is limited research on what information patients are retaining during a genetic counseling session and how they are assimilating that knowledge into their existing views. We attempted to characterize these patient perceptions with respect to hereditary cancer, in order to assess how patients are adopting the information presented in a genetic counseling session into their current schemas. We conducted semi-structured interviews along with a true/false assessment with 18 female participants who have had genetic counseling due to a personal or family history of breast cancer. From these interviews, eight major themes emerged: 1) Those who have already had cancer thought their odds of developing the disease were low prior to their diagnosis, 2) Those who have not had cancer think their odds of developing the disease are very high, 3) Participants believe that lifestyle modifications are the best way to prevent cancer, 4) Participants, even those with known mutations, believe that their cancer was caused by lifestyle/ life events, 5) Patients put emphasis on information about risk estimate, 6) A main takeaway from genetic counseling is how a mutation can cause more than one type of cancer, 7) The majority of participants said that genetic counseling changed their perception of cancer, and 8) The change in perception was connected to gaining more information. Analysis of the True/False assessment showed that participants most frequently erroneously believed that hereditary cancer genes can “skip” a generation and that everyone has a different set of genes. Incorporating these themes into a genetic counseling session can provide support and understanding about patient perceptions and facilitate a more effective genetic counseling experience.

**McCain, Richard**

**Mentor(s): Dr. Norma Frizzell**

**Stressing the brain’s immune system: microglial functionality in a model of Leigh Syndrome**

Leigh Syndrome (1:36,000 births) is a subacute necrotizing encephalopathy stemming from genetic defects in the mitochondrial electron transport chain with bilateral lesions of neurons in the basal ganglia and brainstem that show accumulation of activated microglia. The disorder leads to progressive loss of motor and cognitive abilities resulting in death due to respiratory failure after a few years of life.

The mitochondrial electron transport chain is a formation of 5 protein complexes in the mitochondrial inner membrane which generate energy for the cell in the form of ATP using high energy intermediates formed in the Krebs Cycle. Dysfunction of the electron transport chain can lead to backup of intermediates of the Krebs Cycle which further disrupts cellular metabolism.

The NADH dehydrogenase [ubiquinone] iron-sulfur protein 4 (NDUFS4) knockout (KO) mouse is used as a model to study Leigh Syndrome. KO of NDUFS4 removes an 18 kDa protein required for proper assembly of Complex I of the electron transport chain. This inhibition of Complex I reduces the activity of the

entire electron transport chain leading to mitochondrial dysfunction. The presence of phagocytic CD11+ microglia has been documented in the Ndufs4 KO mouse brain in association with disease progression. While the role of neurons in Leigh syndrome has been examined, the role of microglia remains unclear. Microglia comprise the resident immune system of the brain and use phagocytosis to remove debris and dead cells. Stress or immunological challenges can activate them, triggering release of pro-inflammatory and anti-inflammatory cytokines. However, it is unclear why the phagocytic state and pronounced unresolved gliosis persist in affected brain regions over the course of the disease. I investigated if NDUFS4 deletion impacts the response to LPS and overall microglial function. Overall, I found a switch toward glycolytic activity in both basal and activated conditions and increased basal and activated phagocytic activity in Ndufs4 KO macrophages compared to controls. This points to an adaptive metabolic response and overactive phagocytic activity in microglia in Leigh syndrome. With this knowledge, we seek to clarify Leigh syndrome pathogenesis and aid in the development of targeted therapies to prolong patients' lifespans.

**McInerney, Katie**

**Supervisor(s): John Richards, Anzhi Yu, Garima Bhandari, Andrew Kirkland**

**Mentor(s): Dr. John Jensen**

**Continental Tire Supply Chain Optimization**

Continental has an opportunity to improve container visibility within the supply chain for tires moving from Origin Port to Destination Port to RDC and back to 'Destination' Port. Additionally, there is an opportunity to reduce accessorial fees and where appropriate reduce chassis flat fees by reducing negotiated "free days".

**McKeen, Stephanie**

**Mentor(s): Dr. Toni Torres-McGehee, Dr. Erin Moore, Dr. Dawn Emerson, Dr. Kelly Pritchett, Ms.**

**Allison Smith**

**Examination of Low Energy Availability and Macronutrient Intake among Male and Female Recreational Athletes**

Objective: Examine the prevalence of low energy availability (LEA) and macronutrient intakes (protein [PRO], carbohydrate [CHO], and fats) and differences between gender in recreational athletes.

Methods: A sample of recreational athletes (n=103, age: 27.9±7.1 years; males: n=59, height: 175.3±9.5 cm, weight: 77.5±13.2 kg; female: n=44, height: 167.9±8.0 cm; weight: 71.4±15.2 kg). Participants completed anthropometric data, a demographic survey, resting metabolic rate, a dietary log for energy intake (EI), and exercise logs for exercise energy expenditure (EEE). Basic descriptive stats, Chi-squares, and cross-tabulations were used to examine the proportion of participants classified as "at risk" for LEA (males: <20 kcal/kg/FFM; females: <30 kcal/kg/FFM) and met the micronutrient recommendation across gender.

Results: Overall, 48.1% (n=50) of athletes demonstrated the following for males and females, respectively: LEA (26.0±10.4 vs. 28.4±14.9 kcal/kg/FFM; EI: 2287.9±943.4 vs. 1881.9±591.7 kcals, EEE: 589.8±399.1 vs. 423.1±199.8 kcals). Differences were found between LEA and gender (P<0.04), with females (28.8%) displaying higher risks than males (19.2%). No differences were found between LEA and PRO, CHO, or fat intake recommendations across gender. However, males overall consumed more than the recommenda-

tion for protein than females (15.5% vs. 11.7%; > 2 g/kg/day). Most participants (90.3%, n=93) reported low CHO intake (< 5 g/kg/day). Fat intake was adequately met by 64.1% (n=66), however, 35.9% (n=37) of athletes with LEA consumed fats above the recommendation.

**Conclusions:** Recreational athletes are moderately at risk for LEA. They would benefit from proper nutritional education, specifically EI and macronutrient intake, which is necessary for proper nutritional fueling in recreational athletes.

**McLaurin, Kristen**

**Mentor(s): Dr. Charles Mactutus, Dr. Rosemarie Booze**

**S-EQUOL restores the developmental trajectory of temporal processing in the HIV-1 Transgenic rat**

Due to the sustained prevalence of HAND in the post-cART era, and its characterization as a neurodegenerative disease, there is a critical need to develop adjunctive therapeutics targeted to alter the trajectory of neurocognitive impairments (NCI). To address this knowledge gap, the present study examined the utility of S-equol, a phytoestrogen produced by gut microbiota, as an innovative therapeutic strategy. HIV-1 transgenic (Tg) and F344/N control animals were treated with 0.2 mg S-equol or placebo daily following neurocognitive testing during a formative period (i.e., Postnatal Day (PD) 28 to PD90). Temporal processing, a potential elemental dimension of HAND, was assessed using two experimental paradigms every 30 days from PD60 to PD210. First, in visual prepulse inhibition, a shift in the point of maximal inhibition supports faster temporal processing development in HIV-1 Tg animals treated with S-equol (PD120) relative to HIV-1 Tg animals treated with placebo (PD150). Second, in gap-PPI, a difference in the best-fit function (i.e., HIV-1 Tg S-equol: Quadratic,  $R^2=0.97$ ; HIV-1 Tg Placebo: Segmental Linear Regression,  $R^2=0.93$ ) provides further evidence for enhanced development of temporal processing in HIV-1 Tg animals treated with S-equol; an enhancement which resembles the developmental trajectory of temporal processing in control animals. Thus, the present study supports the utility of S-equol as an efficacious therapeutic for altering the trajectory of NCI in the HIV-1 Tg rat, and more broadly, of targeting gut microbiota as a mechanism to modulate NCI in HIV-1.

Funded by NIH grants DA013137, HD043680, NS100624 and MH106392

**Mercadel, Joshua**

**Mentor(s): Dr. Jim Burch**

**Heart Rate Variability Biofeedback among Veterans: Pilot Intervention for Sleep Disturbance**

Healthy amounts of sleep is vital for normal human functions such as daily learning, memory, emotional state and cardiovascular function. Studies conducted previously have shown sleep deprivation to be associated with increases in sympathetic activity contributing to autonomic nervous system (ANS) dysregulation. HRV biofeedback (HRVB) training induces HRV coherence, a condition that maximizes HRV and facilitates autonomic and cardiorespiratory homeostasis.

This randomized, controlled, intervention trial will test the hypothesis that HRVB can improve HRV coherence and increase overall sleep quality. Patients are randomized to previously established HRVB or sham protocols (n=40 each, total planned enrollment N=80). Each participant completes a baseline assessment, 6 weekly training sessions, a post-training assessment, a booster training session and assessment (1-month post-training), and a follow-up assessment (2 months post-training). Wrist actigraphy is used to obtain continuous rest/activity recordings 24-hours per day over three 1-week periods coinciding with the baseline, post-treatment, and follow-up assessments. Subjective sleep symptoms are included at each assessment using the Pittsburgh Sleep Quality Index (PSQI). Outcomes include: 15-minute resting HRV

recordings (HRV Coherence Ratio), as well as subjective (total PSQI and sleep quality scores) and quantitative sleep measures (actigraphic sleep onset latency, duration, efficiency, wake after sleep onset).

To date, 85 patients completed their baseline assessment; 63 completed their post-training assessment, and 50 completed the entire protocol. In preliminary analyses, HRVB patients had elevated mean ( $\pm$ SD) HRV Coherence Ratios at the post-training assessment relative to baseline ( $0.11\pm 0.02$  vs.  $0.27\pm 0.05$ ,  $n=43$ ,  $p<0.001$ ), whereas no differences were observed among controls ( $0.10\pm 0.02$  vs.  $0.12\pm 0.02$ ,  $n=41$ ,  $p=0.97$ ). Compared to baseline scores PSQI Global Score was reduced at Post Assessment ( $12.3\pm 0.5$  vs  $11.1\pm 0.6$   $n=31$ ,  $p=0.02$ ) and at Follow-up Assessment ( $12.3\pm 0.5$  vs  $10.3\pm 0.9$   $n=25$ ,  $p<0.001$ ); no differences among controls. Compared to baseline scores Sleep Duration elevated at Post Assessment ( $436\pm 15$  vs  $465\pm 19$   $n=23$ ,  $p=0.03$ ) and at Follow-up Assessment ( $436\pm 15$  vs  $479\pm 19$   $n=21$ ,  $p=0.02$ ); no differences among controls.

Preliminary results indicate receipt and persistence of intervention among HRVB participants to date. Results show evidence of Subjective (PSQI) and Objective (Duration) sleep improvements. HRVB is a valid, quantifiable, easily-implemented procedure; and previous research suggests that HRVB can improve overall sleep quality.

**Miller, Jessica**

**Mentor(s): Prof. Roozbeh Behroozmand**

**Neural Mechanisms of Speech Sensorimotor Impairment in Post-Stroke Aphasia**

Jessica Miller, Christine Pang, Jacqueline Reagor Wilson, Roozbeh Behroozmand

Speech Neuroscience Lab, Department of Communication Sciences and Disorders, Arnold School of Public Health, University of South Carolina.

Underlying neurological mechanisms of impaired speech function following stroke-induced brain damage are not yet fully understood. In a previous study from our lab, speech sensorimotor responses were examined in individuals with post-stroke aphasia and matched control subjects while they produced steady vowel phonations and their speech auditory feedback was randomly altered by real-time pitch-shift stimuli. Diminished compensatory speech responses were observed in those with post-stroke aphasia, suggesting impaired integration between incoming sensory information and motor production. Specifically, the impairment in mechanisms involved in speech production following stroke-induced aphasia were predicted by mapped brain lesions within a frontal-temporal-parietal network implicated in sensorimotor integration. In the current study, we examined the neurophysiological correlates of sensorimotor impairment in post-stroke aphasia by investigating the activation of two neural response components at different time points: 1) the N1 (sensory processing component), and 2) P2 (sensorimotor integration component), following the onset of real-time pitch-shift stimuli in speech auditory feedback. We found that in neurologically intact individuals, neither N1 nor P2 was diminished suggesting appropriate integration of sensorimotor function. In individuals with post-stroke aphasia, the N1 component was attenuated in the left hemisphere while it was enhanced in the right hemisphere. This finding suggests right-hemispheric compensation for impaired sensory processing in the left hemisphere. In addition, the P2 component was significantly diminished in both hemispheres, reflecting deficits in speech error integration and motor correction as demonstrated earlier using behavioral data. Overall, deficits in sensorimotor integration adversely impacted the speech compensation responses of individuals with post-stroke aphasia. These findings provide new insights into sensorimotor integration deficits and provide new information for targeted treatment of speech impairment in aphasic speakers with stroke-induced brain damage.

**Mir, Fariha**

**Mentor(s): Dr. Sourav Banerjee**

**Development of Acoustic Metamaterials for Simultaneous Noise Filtering and Energy Harvesting**

Conventional method of reducing industrial noise has been the use of traditional acoustic barriers made of solid materials of different types. Main drawback of these classical acoustic barriers is the diffraction around the top barrier edges along with low reduction of noise in the range of 94db, which is not appropriate in current industrial scenario. To overcome the drawback, acoustic metamaterials are proposed as novel building materials that can simultaneously reduce the acoustic noise with ~60% improvement over traditional materials and utilize the trapped energy. These metamaterials can be created by a periodical arrangement of basic elements which produce high attenuation in selective ranges of frequencies related to their lattice geometry. Their unusual physical properties make them capable of trapping the acoustic waves and thus reduces diffraction. The sub-wavelength acoustic metamaterial has a relatively high reflection coefficient near the anti-resonance frequencies, resulting in high sound transmission loss (TL). The filtered noise is actually trapped inside the cell in the form of strain energy. Hence, we argue that if the trapped energy which is any way wasted in the material could be harvested to power the local electronic devices, the new solution could make transformative for 21st century's green energy solution. Strategic placement of smart materials in the cell matrix can help extracting the strain energy in the form of power. This work presents Acousto-Elastic Metamaterial (AEMM) cells which has the capability of isolating noise and reducing diffraction by trapping sound in low frequencies and at the same time recover the trapped abundant energy in the form of electrical potential using piezoelectric materials.

**Miranda, Kathryn**

**Mentor(s): Dr. Mitzi Nagarkatti, Dr. Prakash Nagarkatti**

**Cannabinoid receptor 1 blockade attenuates obesity and adipose tissue type 1 inflammation through miR-30e-5p regulation of Delta-like-4.**

Obesity is characterized by chronic low-grade inflammation that contributes to development of cardiometabolic disorders. Cannabinoid receptor 1 (CB1) antagonists attenuate diet-induced obesity (DIO) and related inflammation, although the precise anti-inflammatory mechanisms involved have not been fully explored. In the current study we used a mouse model of DIO intervention to determine the microRNA (miR)-mediated anti-obesity and anti-inflammatory effects of the CB1 antagonist AM251. DIO mice that were fed high-fat diet (HFD) for 12 weeks were treated with AM251 (10mg/kg) for an additional four weeks. HFD+AM251 mice experienced rapid and prolonged weight loss and reduced inflammatory M1 adipose tissue macrophage (ATM) infiltration. To investigate miRNA-mediated regulation of ATMs, F4/80+ cells from stromal vascular fractions of epididymal fat were subjected to miR microarray analysis. Several miRs were differentially expressed in AM251-treated mice that were independent of calorie restriction. Prominently, miR-30e-5p was upregulated in ATMs from HFD+AM251 mice while the miR-30e-5p target DLL4 was downregulated. Consistent with a decrease in DLL4-Notch signaling, fat storage and pro-inflammatory cytokine/chemokine expression was reduced following AM251 treatment. Furthermore, we demonstrate that AM251-treated macrophages can suppress DLL4-mediated Th1 polarization in CD4+ T cells. Together these data indicate that weight-loss due to AM251 treatment mediates anti-inflammatory effects and amelioration of obesity through miR-30e-5p regulation of DLL4-Notch signaling-induced type 1 inflammation. These data support therapeutic potential of miR-30 in the treatment of cardiometabolic disorders. (Supported in part by NIH grants P01AT003961, R01AT006888, R01AI123947, R01AI129788, and P20GM103641, and a SPARC Graduate Research Grant from the Office of the Vice President for Research at the University of South Carolina.)

**Mitchell, Caitlyn**

**Mentor(s): Ms. Alexis Carere, Ms. Whitney Dobek**

**BRCA1 and BRCA2 mutation-positive patient perspectives on direct-to-consumer BRCA mutation testing**

Direct-to-consumer genetic testing (DTC-GT) has grown rapidly over the past decade and is expected to continue expanding. Recently the FDA authorized one DTC-GT company to begin reporting certain genetic variants in the BRCA1 and BRCA2 genes, which confer lifetime risks for breast and ovarian cancer in women as high as 87% and 62%, respectively. Historically, genetic testing for these mutations has been offered in a clinical setting, where genetic counseling is part of the testing process. Currently, genetic counseling is not routinely a part of the DTC-GT process, and many patients go through DTC-GT without pre- or post-test genetic counseling. This has sparked worry that consumers undergoing DTC-GT for BRCA1/2 mutations may not fully understand what is being tested for, the implications of positive or negative results, or that they may experience psychological distress from receiving a test result that they were not prepared for. The goal of our study was to assess how BRCA1/2 mutation carriers who tested positive through clinical genetic testing feel about DTC-GT for BRCA1/2 mutations using a questionnaire. These patients who have been through formal, traditional genetic testing are in a unique position to offer perspectives on DTC-GT for BRCA1/2 mutations. Preliminary data show that the majority of respondents are in favor of DTC-GT for BRCA1/2 mutations being available, as it increases access to this potentially lifesaving and empowering information. However, the majority of participants also had concerns about the testing being offered in a DTC-manner, with many worried about test accuracy and lack of support for mutation-positive consumers. Data also indicates that respondents rate accessibility of DTC-GT higher than clinical testing, but rate education and support provided lower than clinical testing. Not only does this reveal areas where DTC-GT can be improved, but it also indicates which aspects of clinical genetic testing for BRCA1/2 mutations patients find beneficial and where improvements can be made in the clinical process.

**Mitra, Ayan**

**Mentor(s): Dr. Lucy K. Spence, Dr. Lucy A. Ingram, Dr. Allison Marsh**

**Needs Assessment for Rhyming Instruction in Early Childhood**

Introduction:

Language acquisition and development in early childhood is a major concern for modern educational initiatives. Research on rhymes has already been done to a considerable extent and shown to be beneficial for students' language acquisition; however, there is a need to include teachers' and parents' perceptions of its efficacy and implementation. As the primary disseminators of knowledge for early childhood, teachers and parents are important voices to be included in the research so that curriculum can be created with their expertise in mind. The main objective of the project is to do a needs assessment study of elementary schools and early childhood classrooms in relation to rhyming instruction and to evaluate the integration of these methods within the curriculum.

Research Questions:

1. Is there a need to revisit the curriculum in relation to rhymes in early childhood classrooms?
2. Should nursery rhymes still be a part of early childhood classrooms?
3. Do teachers and parents think rhymes help children learn language?

Methods:

I focused on two elementary schools and collected data in the form of interviews from teachers and parents, classroom observations, and instructional materials. The qualitative data analysis will involve coding and subsequent thematic clustering into analytic memos from the interviews, classroom observations and

instructional materials (triangulation).

Implications:

Study findings could be helpful in restructuring curriculum in early childhood classrooms to include more focused and targeted rhyming instruction in order to facilitate better and faster language acquisition in children.

**Mohammed, Ahmed**

**Mentor(s): Dr. Jason Kubinak**

**Bile Acid Replacement Therapy as a Novel Treatment for Celiac Disease**

Celiac disease is a chronic inflammation of the small intestine that leads to malabsorption, and is thought to be driven by dietary exposure to gluten. However, the microbiota may also play a role in disease pathogenesis through an unknown mechanism. In humans, CD is commonly associated with immunoglobulin A (IgA) deficiency. Under normal conditions, bile acids (BAs), which are critical for fat absorption, are secreted and re-absorbed in the small intestine. However, BAs can also be cytotoxic to gut epithelial cells so their synthesis and re-absorption is tightly regulated. Here, we utilize a spontaneous mouse model of CD (CD19<sup>-/-</sup> mice) recently described in the Kubinak Lab to explore how gut IgA deficiency influences bile acid homeostasis. Our results demonstrate that gut IgA deficiency is associated with elevated fecal concentrations of BAs and altered BA composition. Specifically, CD19<sup>-/-</sup> mice appear to be enriched for deconjugated primary and secondary bile acids. Interestingly, our data indicate that taurine-, but not glycine, conjugated BAs are reduced in CD19<sup>-/-</sup> mice. Microbiota sequencing results demonstrate striking expansion of sulfur-reducing bacteria, and taurine is one of the major sources of host-derived sulfur in the gut. Thus, the decreased pool of taurine-conjugated BAs in the gut of CD19<sup>-/-</sup> mice could be due to an inability of the host antibody response to control the abundance of sulfur-reducing bacteria in the gut, leading to dis-regulated BA pools. Treatment with a medically-approved BA (tauroursodeoxycholic acid (TUDCA)) alleviates gut permeability, IEC apoptosis, and intestinal malabsorption, suggesting that the BA pool composition, rather than overproduction of BAs, is an important driver of disease in our model. In summary, our studies suggest that intestinal malabsorption in CD may in part be driven by expansion of sulfur-reducing bacteria due to IgA deficiency, which enhances the cytotoxic effect of deconjugated BAs on gut epithelial cells. More importantly, this cytotoxic effect may be overcome by dietary supplementation with cytoprotective BAs.

**Mohammed, Amira**

**Mentor(s): Prof. Mitzi Nagarkatti**

**Protective effects of sodium butyrate resulted from reconstruction of altered gut microbiota mediated by SEB-induced acute lung injury**

Inhalation of Staphylococcal Enterotoxin B (SEB) is known to induce acute lung injury (ALI). Sodium butyrate has been shown to have anti-inflammatory effect in some studies. In the current study, we investigated the role sodium butyrate in attenuating ALI. Thus, a dual-dose of SEB was given to C3H/HeJ mice, which were then treated either with vehicle or butyric acid. SEB-administration caused ALI and 100% mortality within 5 days, while all butyrate-treated mice survived and suppressed the inflammation in the lungs by increasing anti-inflammatory cells including T regulatory cell lineage and myeloid derived suppresser cells. Moreover, we investigated the regulatory genes and we found that sodium butyrate activates of PPAR-gamma signaling pathway and Nos1, IL10 and decreases IFN-gamma. Furthermore, lung microbiota was collected and 16S rRNA sequencing was performed. The data were analyzed to determine the alpha and beta diversity. The major phylum was Firmicutes, class Clostrida and order was Clostridiales to the level of genus Ruminococcus in the colon of sodium butyrate-treated SEB group. Further, mouse transcriptome array shows decrease in genes of TNF-alpha and chemokines ccl12, ccl15, ccl19, ccl22, and

cxcr2, besides increasing claudin2, claudin34, defensins- alfa and defensins-beta. Together, our data suggests that butyrate attenuates SEB-induced mortality and ALI by altering the microbiota (Supported by NIH grants P01AT003961, R01AI123947, R01AI129788 and P20GM103641 to PN and MN, and MoHESR fellowship for AKM).

Mohammed, Zahraa - Mentor(s): Dr. Gregorio Gomez -- Resveratrol inhibits miR-155 to regulate mast cell responses -- Background/objective: Mast cells cause allergic reactions and inflammation by releasing preformed mediators such as histamine and serine neutral proteases, biosynthesizing lipid mediators like prostaglandins and leukotrienes, and synthesizing new cytokines. MicroRNAs (miRNAs) are short (21 nucleotide) strands of RNA that negatively regulate gene expression. Previous studies have indicated that miR-155 plays a critical role in mast cell activation and allergic asthma. Resveratrol is a natural polyphenol that has protective properties against many diseases, including allergic inflammation. Recently, we demonstrated that Resveratrol at low concentrations specifically inhibited the FcεRI-induced expression of cyclooxygenase-2 (COX-2) and Prostaglandin D2 (PGD2) biosynthesis in human skin mast cells. Therefore, this study was initiated to determine if miR-155 played a role in the ability of Resveratrol to inhibit PGD2 biosynthesis in mast cells. Methods: Human in situ-matured skin mast cells that were isolated from normal tissue, and bone marrow-derived mast cells (BMMCs) from wild type (WT), miR155 knockout (KO), and miR-155 transgenic (Tg) mice were used as our experimental models. Microarray analysis and qRT-PCR were used to detect the changes in the miR-155 and gene expression. Degranulation was determined by β-hexosaminidase release assay. PGD2 and leukotriene C4 (LTC4) were measured by enzyme immunoassay. TNF-α, IL-6, and IL-13 were measured with ELISA. Results: miR-155 expression was induced following FcεRI crosslinking with multivalent antigen, and FcεRI-induced expression was inhibited with Resveratrol. A positive correlation between miR-155 and COX-2 expression was identified. FcεRI-induced COX-2 expression was defective in miR-155 KO BMMCs, and was not further inhibited with Resveratrol. miR-155 deficiency or overexpression had no effect on mast cell degranulation and LTC4 production. However, TNF, IL-6, and IL-13 production from miR-155 KO BMMCs was diminished following FcεRI crosslinking. Surprisingly, these cytokines were increased following Toll-Like Receptor 4 (TLR4) stimulation with lipopolysaccharide (LPS). Conclusion: Resveratrol inhibits FcεRI-induced PGD2 biosynthesis in mast cells by targeting miR155 leading to suppression of COX-2 expression. miR-155 indirectly inhibits COX-2 expression by targeting an unknown COX-2 repressor. miR-155 is a positive regulator of FcεRI-induced cytokine production, but negatively regulates TLR4-induced production.

**Mohtasebzadeh, Abdul Rahman**

**Mentor(s): Prof. Thomas Crawford, Dr. Erika Vreeland**

**Self-assembly of magnetic nanoparticles on magnetically recorded templates with sub-100 nm feature sizes**

Using the enormous magnetic field gradients at the surface of recording media we demonstrate self-assembly of magnetic nanoparticles (MNPs) into crystalline patterns with feature sizes as small as 50 nm. Monodisperse 25 nm diameter particles colloidally suspended in hexane are assembled onto parallel line templates recorded into perpendicular recording media with varying line spacing. Unlike assembly with aqueous polydisperse MNPs, here we observe hexagonal close packing of the MNPs where 200-300 nm spacings yield features that are 1-3 MNPs wide, while spacings 500 nm or larger yield features that are ~5 MNPs wide. For periods 300 nm and larger, distinct, separate parallel lines are created. However, for periods 200 nm and below, the parallel lines are joined or bridged together at locations where the MNPs protrude into the space between the lines. Destabilizing the colloid by adding a polar solvent such as ethanol reduces the crystallinity of the assembled MNPs at smaller periods, with patterns showing increased defects and larger edge roughness. For smaller periods ~50-100 nm, we observe linear chaining of the MNPs. Possible causes for the lack of separate lines at small periods include jitter in the x-position stability of the recording head during template writing, as well as the decreasing vertical size of the magnetic

force as the lines approach one another. The transition to linear chaining suggests that changing spatial forces from the recorded transitions are competing with dipole-dipole interactions between the MNPs. Our results clearly demonstrate that controlling both the recording process and chemistry of the MNP solution are important factors for achieving patterns with high fidelity and single nanoparticle precision. In addition, the complex, spatially changing nature of the templating force must be accounted for to predict how MNPs will assemble on these templates.

**Momodu, Oluwatosin**

**Mentor(s): Prof. Jihong Liu**

**Reducing Dietary Fat Among Individuals With Self-Reported High Cholesterol: Roles of Receipts of Provider Advice and Individual-level Food Security**

**Objectives:** This study assessed whether (1) provider advice to reduce dietary fat was associated with dietary fat reduction and (2) food security status modifies the association.

**Methods:** Data from the 2007-2014 NHANES were used, restricting to 7,644 participants  $\geq 20$  years reporting high cholesterol diagnosis by their provider. After excluding those with conditions that could influence dietary behavior (e.g. diabetes, heart failure, cancer, overweight) and missing data, the analytic sample included 3,832 participants. Dietary fat reduction was measured as self-reported current efforts to reduce dietary fat/calories. Food security was assessed using Food Security Survey Module questions. Multivariable logistic regression models were used to adjust for race, gender, age, marital status, education, and health insurance.

**Results:** Among participants with high cholesterol, 57.7% reported not receiving provider advice to reduce dietary fat within the past year. Those who received advice to reduce dietary fat were twice as likely to report fat reduction in diet (OR 2.18; CI: 1.98 - 2.40) compared to those who didn't receive advice. Among those not being advised to reduce dietary fat, 49.8% of those who were food secure reported reducing fat compared to 38.7% of those experiencing food insecurity with hunger ( $p < .001$ ). Food security didn't modify the relationship between advice and fat reduction.

**Conclusions:** Providers should advise patients with high cholesterol to reduce fat at every encounter. As reducing food insecurity may also help with dietary fat reduction, provider and health policy decision maker engagement in efforts to improve community food security is encouraged.

**Monalisa, Nazratun**

**Mentor(s): Prof. Edward Frongillo**

**Strategies elementary-school-aged children use to influence their parents' food and drink purchasing decisions in South Carolina**

**Objective**

Parents are the primary food shoppers for their households. Children tend to prefer unhealthy foods and drinks. This study aimed to understand the strategies that the elementary-school-aged children used to influence parents to buy their preferred foods and drinks.

**Methods**

Forty children, aged 6-11 years old from low-and middle-income families in South Carolina were interviewed in this in-depth qualitative study. The interviews were audio-recorded, transcribed verbatim, and open-coded. Coding matrices by age were used to compare children's responses regarding their food and drink requests and strategies they make to influence their parents' decision-making process.

**Results**

The foods and drinks children requested were mostly sweet and savory snacks, sugary drinks, and fruits.

Thirteen strategies were identified from children's responses that they used to influence their parents to purchase their preferred foods and drinks. The strategies included repeated requests, adding the items in the shopping list, writing notes, offering parents to help with sibling cares and household chores, offering to pay for the requested item with their (children's) own money, giving reasons why they wanted the foods, using siblings to pursue the requests, and assuring being careful about portion size. Strategies differed by where the requests were initiated and the child's age. Children perceived that they could influence their parents to buy their requested foods and drinks when they applied these strategies.

#### Conclusion

Children can influence their parents' food and drink purchasing decisions and get their requests met by applying different strategies. Intervention research is needed to investigate whether children's choices can be improved by encouraging children to request healthy foods and drinks."

### **Mook, Nicholas**

#### **Mentor(s): Dr. Christine Pellegrini**

#### **The Acceptability of Fitbits as a Tool for Physical Activity Promotion in Total Knee Replacement Patients**

**Introduction:** Physical activity levels remain at pre-operative levels for individuals following total knee replacement. Fitbits may help to increase physical activity in this population, however it is unknown whether knee replacement patients would wear an activity monitor over a 4 month period of time.

**Purpose:** To examine adherence of wearing a Fitbit activity monitor within a remotely-delivered 4 month physical activity intervention in patients within the first year of a total knee replacement.

**Methods:** Participants were recruited via multiple channels: email and social media blurbs, website postings, word of mouth, or flyers. Participants were 40-79 years of age; had a total knee replacement in the past 12 months; were willing to wear a Fitbit for 4 months; and had a smartphone or computer compatible with the Fitbit. Participants were randomized to either a Fitbit only or Fitbit+Support physical activity intervention. For the purpose of this study, both groups were combined. Participants were mailed a Fitbit and encouraged to wear it over 4 months. Adherence to wearing the Fitbit was calculated as the number of days each participant achieved over 1000 steps over the total days they had the device. Participants use of various features on the Fitbit was assessed at 4 months.

**Results:** Sixteen participants were randomized and 15 completed the 4-month assessments. Participants were 60.6 (8.0) years old with an average BMI of 30.6 (5.3) kg/m<sup>2</sup>. Participants wore the Fitbit for 94% of possible days. The features most commonly utilized by participants were step tracking (93%), distance traveled (60%), and sleep tracking (60%). Most participants (87%) found the Fitbit easy to use and approximately 60% agreed or strongly agreed that the device helped them be more active. The majority of participants (93%) planned to use the Fitbit after the study completed.

**Conclusion:** The use of Fitbits within the context of a minimal remotely-delivered physical activity intervention is acceptable in the total knee replacement population. Future studies should examine the use of Fitbits in the general knee replacement population without the criteria of being willing to wear the monitor as well as over a longer period of time.

**Murphy, Kendall**

**Mentor(s): Dr. Michael Gower**

**Defining the Immune Response to Resveratrol Releasing Polymer Scaffolds Implanted in Adipose Tissue**

Metabolic diseases, such as obesity and type 2 diabetes, are associated with adipose tissue inflammation characterized by accumulation of immune cells and production of inflammatory cytokines. As a therapeutic strategy to combat these metabolic diseases, we investigated resveratrol release from porous poly(lactide-co-glycolide) (PLG) scaffolds which upon implant into the adipose tissue facilitates direct delivery to the target tissue. This work aimed to demonstrate that resveratrol releasing PLG scaffolds promote a local anti-inflammatory response upon implant in healthy fat and that this response is an effective strategy to protect against pro-inflammatory stimuli, for example, in adipocytes challenged with TNF- $\alpha$  and fat pads of mice fed a high fat diet. Resveratrol was encapsulated within PLG microspheres using a single emulsion solvent evaporation technique. Porous scaffolds were fabricated by mixing resveratrol loaded PLG microspheres with NaCl particles and pelleting the mixture in a die. The pellet then underwent gas foaming followed by NaCl leaching. Fabricated scaffolds exhibited high resveratrol loading and an in vitro release assay indicates resveratrol release is biphasic with a burst release in the first 3 days followed by a plateau phase. When implanted into fat, resveratrol scaffolds promote an anti-inflammatory environment characterized by elevated expression of IL10 and IL13 compared to fat pads that do not receive scaffolds. Importantly, neither resveratrol scaffolds nor “empty” scaffolds elevated TNF- $\alpha$  and IL-6 expression compared to control fat pads. Furthermore, resveratrol release from scaffolds decreased monocyte and lymphocyte infiltration compared to “empty” scaffolds. Potential therapeutic efficacy of scaffolds was evaluated in vivo and in vitro. Implant of resveratrol releasing scaffolds decreased MCP-1 expression in visceral adipose tissue in mice fed a high fat diet for six weeks. Furthermore, resveratrol releasing scaffolds decreased TNF- $\alpha$  induced MCP-1 secretion from cultured 3T3-L1 adipocytes, suggesting that the effects measured in vivo are due, at least in part, to resveratrol acting on adipocytes. In conclusion, our work demonstrates resveratrol loaded PLG scaffolds are a promising treatment for adipose tissue inflammation that drives metabolic disease.

**Myat, Khin**

**Mentor(s): Ms. Candace Cooper**

**My Cultural Ambassador Experience at UofSC: A Triple Win**

I have volunteered as “cultural ambassador” in UofSC’s Thinking Globally (TG) program, representing my home country – Myanmar (Burma). Cultural ambassadors reached to students at elementary school, middle school, high school and university. First, I was intimidated to provide talk and presentation in public. It was challenging for an international student with language barriers like me. However, I wanted to embrace this challenge because I see this as a chance to improve: my public speaking and presentation skills, and my research on Myanmar to share with international community. As an ambassador, I learned to study and retell without biases and good evidences. My experience was a win-win situation. One “win” is that I understand more about my country, and I am now confident to present in public with improved English speaking and presentation skills. Another “win” is that my audience will realize how fortunate they are, compared to the vulnerable populations in Myanmar. I sincerely shared about my country’s vulnerabilities to inform my audience. We do not actually realize our resources and strength unless we encounter hardship and struggles. Students in Myanmar cannot have free school lunch and bus, and their class-room communication is more on one-way communication rather than student-centered education; I hope this information will help the students value what they have and be more contributive to their society. The additional third “win” is that I encourage the students to work for Myanmar because there are needs and gaps in health, education, peace building, etc. They will gain great experiences working there, whereas Myanmar will benefit their international expertise. With this volunteering, I was selected

to participate in a panel discussion – “Balancing modernization and preserving tradition.” This is my first experience of participating in a panel discussion; I was a bit nervous before, yet I gained self-esteem after participating. Each and every experience with TG program is epic. It gives me skills for my present works (both academic and community), and it also cultivates philanthropic spirit for my future endeavors. I am now planning to volunteer and contribute to the needy communities in Columbia.

**Myers, Rebekah**

**Mentor(s): Dr. Maryah Fram**

### **The Subjective Experience of Food Insecurity and Health Problems**

Food insecurity occurs when a household does not have consistent access to a sufficient quantity or quality of food for each of its members. 9.3 million households in the United States are food insecure, and within the last three years, roughly 240,000 households in South Carolina, alone, experienced food insecurity. Beyond the nutritional consequences of having inconsistent access to food, food insecurity is related to acute and chronic health problems. However, most studies exploring the relation between food insecurity and health problems are correlational and quantitative, and little is known about the subjective, lived experiences of how food insecurity and health problems play a role in family life. This study addresses this gap by qualitatively exploring how health problems and food insecurity conjointly impact South Carolina families' well-being, and discusses implications for policy-makers and practitioners who work with food-insecure families.

Twenty-five adults at-risk for food insecurity were interviewed in their homes using a semi-structured interview guide addressing finances, food management, and the USDA 6-question Household Food Security Module. The sample was predominantly Female (96%), Black (60%), and rural (56%). 64% of the sample identified having a medical problem, and amongst those with medical problems, 31% were food secure, 6% had marginal food security, 19% had low food security, and 44% had very low food security. Qualitative findings indicate that, compared to households with no medical problems, those with medical problems paid more for groceries and other health-related bills, for instance, buying healthier, more expensive foods to manage their diabetes and blood pressure, and paying for diabetes testing materials. Food insecure households with medical problems differed from food secure households with medical problems by making lower incomes, and having multiple medical problems requiring additional investments of time, effort, and finances. Also, some food insecure participants reported that other material needs, such as car and refrigerator repairs, exacerbated their inabilities to access both food and healthcare. Overall, results suggest that effective solutions to food insecurity should identify and address health and medical problems, and the material conditions necessary for families to access both food and health resources.

**Neamah, Wuood**

**Mentor(s): Prof. Mitzi Nagarkatti**

### **TCDD alters gut microbiome and induces colonic myeloid-derived suppresser cells through cysteine depletion**

Myeloid-derived suppressor cells (MDSCs) are a heterogeneous population of cells that are defined by their myeloid origin, immature state, and ability to potently suppress T-cell and B-cell responses. Murine MDSCs are characterized by the expression of CD11b and GR1 cell markers and can be subdivided into two groups, Monocytic and Granulocytic based on the expression of Ly6C and Ly6G molecules. Previously, we found that one of the persistent environmental pollutants that induces MDSCs and MDSC subset expansion is 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD). In the current study, we observed that injecting C57BL/6 mice with 10µg/kg TCDD alters gut microbiome by increasing of Lactobacillus abundance when compared to vehicle after three days. Increase in Lactobacillus is related to T-reg and MDSC induction. After fecal transplantation, we found mice that received feces from TCDD-treated mice have higher perito-

neal MDSCs and MDSC subset compared to mice that received feces from vehicle-treated mice. TCDD-induced MDSCs and monocytic MDSCs led to reduction in splenic IL-17 and IFN- $\gamma$  levels in these mice. Furthermore, 16S rRNA analysis of gut microbiota reveals reduction in cysteine metabolism pathway in the microbiome of treated mice. It is known that MDSC block T cell activation by sequestering cystine and limiting the availability of cysteine. Our results from 3H-thymidine assay shows TCDD-induced MDSCs inhibit ConA-induced T cell activation when cultured with MDSCs whereas culturing with cysteine enhances T cell activation. Also, we found that TCDD-induced MDSCs have less ASC expression, neutral amino acid transporter that is important to export cysteine as well as less cystathionase, which converts methionine to cysteine when compared to vehicle. In summary, our data shows TCDD alters microbiome by increasing Lactobacillus enrichment that induced MDSCs. MDSCs suppress T-cell activation through depleting cysteine in the environment. (Supported by NIH P01AT003961, P20GM103641, R01AI129788, R01AI123947, and MOHESR, Iraq)

**Nelson, Peter**

**Mentor(s): Dr. Amit Almor**

**Animacy and Unaccusativity in Sentence Processing**

Language processing consists of recognizing and combining words into meaningful sentences. However, temporarily ambiguous sentences lead to multiple competing interpretations for how the words combine, which creates difficulty at the point where the ambiguity is resolved. This study extends previous research on how a) a tendency to interpret animate nouns as agentive and b) a tendency to expect transitive, rather than intransitive sentence structures, influence the processing of such temporarily ambiguous sentences. Using a moving-window self-paced reading paradigm, the study was divided into two experiments: one manipulating animacy of the subject noun and the second experiment manipulating the animacy of a potential object noun. Each subject noun was followed by an unaccusative verb, which assign a non-agent role to their subject, thus allowing us to test whether inanimate nouns led to expectations for intransitive structures and how this relates to an overall bias towards transitivity. In my 3MT talk I present the results of these studies, which support the hypothesis that noun animacy influences expectations for transitive constructions. The findings are consistent with a “surprisal”-based model of sentence processing, in which all types of contextual information are used to continuously update expectations for upcoming words.

**Nguyen, Trang**

**Mentor(s): Dr. Sue Levkoff**

**“So it is not just normal aging?”: Vietnamese family caregivers’ perspective on dementia and caregiving in a changing context**

This presentation focuses on exploring Vietnamese family caregivers’ perception of dementia, and caregiving roles in the process which they adjust to their caregiving role for a relative with dementia. Adopting constructivist grounded theory, 30 face-to-face, semi-structured interviews, including ten follow-up interviews, were conducted with 20 primary family caregivers of patients with dementia. Participants were recruited from a geriatric hospital in Northern Vietnam. Most of the participants revealed very limited understanding of dementia and they used folk terms to refer to dementia. The most common term was ‘being confused/confusing mind’ (lẫn), followed by other terms, including ‘forgetfulness/memory loss/absence minded’ (quên/giảm trí nhớ/đãng trí), ‘brain shrinkage’ (teo não), or ‘mental illness’ (tâm thần/thần kinh). Existing studies on family caregivers who were Vietnamese immigrants in the U.S. and Australia also reported the use of exactly the same terms/labels regarding dementia. Regarding participants’ perception of caregiving, participants revealed that they took on their caregiving role inherently as part of their norm, as well as to fulfill their perceived responsibility/obligation as a spouse or an adult child. In addition to responsibility/obligation, participants carried out the caregiving role based on their key

family values of affection and gratitude (tình nghĩa). They also associated their caregiving with filial piety (báo hiếu), compensation (bù đắp), conscience (lương tâm), morality (đạo đức), and role-modelling (làm gương) for other people in the family. Their perception of caregiving is culturally rooted in the Confucianism's concept of filial piety and familism in Vietnam's traditional society. This study closes the knowledge gap of Vietnamese family caregivers' perception of dementia and caregiving in their own context. The study results also implies culturally competent service development for this specific population.

**Nichols, Rachel**

**Mentor(s): Dr. Subrahmanyam Bulusu**

**Decadal changes in Arctic Ocean circulation and climate**

The global climate has been going through extensive changes, especially evident within the past few decades. These changes are particularly observable within the Arctic region, as evidenced by the loss of sea ice and the Greenland ice sheet. In this study we will be using satellite observations, models, and reanalysis products to study variability in the Arctic region in regard to temperature, ocean heat content (OHC), winds, sea surface height (SSH), salinity, and fluxes. We have found increases in both temperature and OHC in the Arctic likely due to rising air temperatures and the pole-ward distribution of heat. Increasing SSH anomalies are due to thermal expansion and the melting of ice sheets and glaciers. We also see freshening within much of the Arctic region due to sea ice loss and circulation changes. In addition, we will be comparing the years 2007, 2011, 2012, and 2016 to the long-term trends, as these years represented the lowest years on record for sea ice extent and volume. The changes seen in the Arctic are expected to influence global circulation and climate, so monitoring of these variations is critical.

**Nielson, Samuel**

**Mentor(s): Dr. Caroline Nagel**

**Locality and Belgian Identity**

Approximately 18% of Belgium's population is foreign born, but only 10% do not have Belgian citizenship. The state demands immigrant "integration" as a condition of citizenship, yet Belgian natives' emphasis on locality inhibits immigrant integration regardless of the citizenship rules or an individual's legal status.

**O'Connor, Kyle**

**Mentor(s): Prof. Steven Rodney**

**CANDELS Survey SN Rates and Data**

Data catalogs of the SNe detected in the different CANDELS fields are presented. With these the volumetric rates for the Ia and CC are determined. These rates in comparison with cosmic star formation history are able to provide information on SNe progenitor models, initial mass function, and binary fraction for massive stars. These SNe are also each matched to a likely host and lightcurves are generated using sn-cosmo.

Similarly, data catalogs are presented for the CLASH and FF SNe and lightcurves generated. Any cases of lensing are also presented.

**Odahowski, Cassie**

**Mentor(s): Dr. Jan Eberth**

**Rural Disparities in Overall and Lung Cancer-Specific Survival in the United States: A SEER-Medicare Analysis**

**Introduction**

Despite declining smoking rates nationwide, lung cancer remains the leading cause of cancer-related death among both men and women in the United States. Lung cancer survival differs by stage at diagnosis, race, and sex. The five-year survival rate for localized cases is 54%, compared to only 4% for distant tumors that have spread to other organs. For all stages combined, the five-year survival is 18%. Research regarding lung-cancer survival by rurality or potential interactions of race and rurality are limited. Our objective was to use survival analysis to investigate the relationship of rurality with overall survival and lung cancer-specific survival, adjusting for clinical and demographic factors.

**Methods**

We examined 135,627 cases of non-small cell lung cancer diagnosed between 2003-2011 from SEER-Medicare data. We defined rurality using Rural Urban Continuum Codes from the US Department of Agriculture. We used the Kaplan Meier estimator and Log Rank test to examine the relationship of rurality with overall survival and lung cancer-specific survival. We then tested for a trend in survival by increasing rurality and multiple comparisons with a Bonferroni adjustment. We implemented a stratified, time-dependent Cox Proportional Hazards (PH) model to examine the relationship of rurality, stratified by race, with overall survival and lung cancer-specific survival controlling for patient and clinical characteristics: race, sex, region, age, marital status, Medicaid enrollment, stage at diagnosis, year of diagnosis, comorbidities, and treatment types (surgery, radiation, and/or chemotherapy). Based on our final models, we produced survival curves and hazard ratios stratified by race.

**Results**

Rurality was significantly related to differences in survival ( $p < 0.0001$ ). The trend test was significant for decreasing survival with increasing rurality for both overall and lung cancer-specific survival ( $p < 0.0001$ ). Age, sex, region, marital status, Medicaid enrollment, year of diagnosis, stage at diagnosis, and treatment types were significant in our final time-dependent Cox PH models, stratified by race.

**Conclusions**

Overall and lung cancer-specific survival were lowest among lung cancer patients in rural counties. Future research should focus on identifying factors for intervention to improve health equity between urban and rural populations such as improvements in access to care.

**Ozigbu, Chamberline E.**

**Mentor(s): Dr. Nicole Hair**

**Beyond Vaccination Coverage: A Critical Look at Never-Vaccinated Children in Ethiopia**

**Background:**

Nearly 2.5 million deaths are averted each year in under 5 children through the use of vaccines. However, one in five children dies every 20 seconds from vaccine-preventable diseases (VPDs) in sub-Saharan Africa (SSA). Ethiopia contributes to the high number of unvaccinated children and under 5 mortalities globally, and have not yet met the Global Vaccine Action Plan target of 90% coverage or greater. Much attention is given to social determinants of vaccine coverage, reasons for complete, incomplete or low vaccination coverages in SSA. Nevertheless, little is known or studied about the population of never-vaccinated children.

**Aim:**

This study aims to examine the trend and key determinants of never-vaccinated children in Ethiopia and describe geographic dispersion of never-vaccinated children in Ethiopia.

#### Method:

Data from Ethiopia Demographic and Health Survey will be used for this study. The sample for analysis will include 34,051 children aged 12-59 months (1-5 years), whose mother responded to the immunization questionnaire from 2000 - 2016. Chochrane-Armitage trend test and ArcGIS analyses will be performed unadjusted and adjusted for different predictors. To ensure the analysis is nationally representative, survey weight will be applied.

#### Anticipated Outcomes:

Characteristics and geographic distribution of never-vaccinated children will help evaluate vaccination program performance in Ethiopia over time. Also, it will provide vital information on the impact of individual as well as community factors on vaccination. If trends are downward, it may be a strong indication of a persistent population that never-receives vaccination, which could be potentially growing. If trends are upward, it might be an indication that programs are improving and campaigns are effective.

#### Conclusions:

Understanding the characteristics and location of children who are never-vaccinated is important to redirect resources and focus community programs to help these disadvantaged Ethiopian children who may never be vaccinated and are likely to die from VPDs.

#### **Page, Katherine**

**Mentor(s): Ms. Lisa Johnson, Dr. Alexandra Basilakos, Dr. William Matchin, Dr. Julius Fridriksson, Ms. Kelly Stillwagon**

#### **Gestural Communication and its Relationship to Language in Post-Stroke Aphasia**

**Background:** Gestures have potential to provide an alternative to verbal communication in people with aphasia (PWA) (Niloofar et. al., 2018). This study investigated gestural use in PWA prior to, and after language treatment.

**Aims:** The purpose of the present study was to determine if gestural communication indeed supplements verbal production on a naming task, and if gestural production improves following speech-language therapy. In addition, it examined correlations between successful gesture use with phonological and semantic language abilities.

**Methods:** To investigate this, we scored gestures from pre- and post-treatment Philadelphia Naming Tests (PNT) of a subset of individuals participating in a larger treatment study. 10 PWA were included (3 female) with a mean stroke age of 56.3 years (SD=13.4). Proportion of meaningful gestures (M), non-meaningful gestures (NM), and no gestures (NG) were calculated and used in subsequent analysis. Paired t-tests were conducted to see if there was a significant difference in gesture use between pre- and post-treatment assessments. Pearson correlations were conducted to investigate potential relationships between gesture use and language abilities; p-values less than .05 were considered significant.

**Results:** Overall, our scoring paradigm reflected significantly greater scores correct across all participants compared to the standard scoring method. A significant difference was found between the proportion of gestures from pre-treatment (M=.49, SD=.33) and post-treatment (M=.32, SD=.30) (p=.046). Across language measures, a significant correlation was found between proportion of NG used and phonological errors produced verbally on the PNT (R=.67, p=.035). Of note, our multimodal paradigm revealed a stronger correlation with aphasia severity (R=.57, p=.08) compared to standard PNT scoring (R=.46, p=.18).

**Conclusion:** Results from this study provide novel information on the use of gestural communication in chronic aphasia recovery, thus offering support of utilizing multimodal communication methods to clinical professionals.

**Patel-Viswanath, Reena**

**Mentor(s): Dr. Michelle Bryan, Mrs. Margo Jackson**

**Exploring the effects of a cohort-based program on URM student's first-year academic success.**

The purpose of this study is to explore the effects of a cohort-based program on academic success of under-represented minority students at a predominately white institution (PWI). The cohort structure allows students to experience college together, build relationships with faculty and staff, and create a community on campus (Brooks, 1998; Fenning, 2004). Furthermore, researchers have found African American students thrive when attending a historically black university (HBCU) compared to their peers attending a PWI (Allen, Epps, & Haniff, 1991; Negga, et al., 2007; Palmer et al, 2010). Research has shown certain institutional characteristics and practices, such as the opportunity to participate in a cohort-model, foster academic success. The common characteristics are social connectedness, approachability to staff and faculty, mentor or advisor relationship, learning experiences, and student support services (Bean, 2005; Kuh et al., 2008; Pascarella & Terenzini, 2005). Students who are academically successful tend to have a strong sense of belonging on campus, engage in extra-curricular activities, describe professors as approachable, and are motivated to succeed. These variables become increasingly important when considering the academic success of underrepresented students at a predominately white institution as their college experience is noticeably different from their white peers (Bennett, Cole, & Thompson, 2000; Cuyjet, 1998; Negga et al., 2007).

The first research question is to assess the relationship between frequency of engagement and academic success. Is there a correlation between number of activities completed and first semester GPA? The second research question is to assess the relationship between sense of belonging and academic success. Does a greater sense of belonging result in higher first semester GPA? The final research question will focus on their experience in college to gain their perception of the campus climate. A purposeful analysis of narratives collected via journal entries, questionnaires, and meeting notes with their academic success coach will provide a more nuanced understanding of their lived first-year college experience. A mixed-method purposeful investigation allows the richness and complexity of the lived experiences of ten under-represented minority students at a PWI during their first year to be explored.

**Pierce, Allison**

**Mentor(s): Dr. Jessica Green**

**Inhibition of return in visual search: Disentangling overlapping processes with event-related potentials.**

Inhibition of return (IOR), slowed responding to items at previously attended locations, is described as reflecting a mechanism that facilitates efficient visual search. However, most studies examine IOR within cue-target, rather than visual search, paradigms. Previously, using EEG during a target-target visual search paradigm, we observed IOR and a reduced N2pc for targets appearing at previously searched locations, reflecting an attentional bias away from previously attended locations. We also observed IOR throughout the entire previously attended hemifield. Here, we adapted our paradigm, in which the first and second search displays contained a target and multiple colored distractors (search target), to include conditions in which the first display could contain either a pop-out target or a pop-out non-target. The latter was designed to be analogous to cue-target paradigms, in which the first display is a salient, irrelevant item to be ignored. We found evidence of an attentional bias throughout the previously attended hemifield in the search target and pop-out target conditions. However, in the pop-out non-target condition, IOR was restricted to the previously attended location. Our results suggest the attentional bias away from previously attended locations and inhibition of locations previously containing a salient distractor produce distinct behavioral and electrophysiological signatures.

**Pilarzyk, Katy**

**Mentor(s): Dr. Michy Kelly**

**Deletion of PDE11A Improves Remote Long-term Social Memory Despite Blocking Recent Long-term Memory For That Same Event**

System consolidation (SC) is a process by which certain types of information (e.g., social experiences) require the hippocampus for recent long-term memory (LTM) but then become increasingly independent of the HIPP and more dependent on the cortex for remote LTM. Here, we identify the first molecular manipulation—namely deletion of the phosphodiesterase 11A (PDE11A)—capable of enhancing remote LTM despite blocking recent LTM for that same event. PDE11A4, which degrades cAMP/cGMP and regulates glutamate signaling and protein synthesis, is selectively expressed in neurons of the subiculum, the superficial layer of CA1, and the adjacently connected amygdalohippocampal region. Thus, PDE11A4 is biochemically and anatomically positioned to regulate SC of social memories. In social odor recognition and social transmission of food preference (STFP), PDE11 mutant mice show normal short-term memory 15 minutes to 1 hour after training, no recent LTM 24 hours after training, and spontaneously improved remote LTM 7 days after training relative to WT littermates. At least in the case of STFP, the impaired recent LTM observed in adult PDE11A KO mice appears to correspond to weaker activation of ventral CA1; whereas, the improved remote LTM corresponds to stronger activation of SC-related extrahippocampal brain regions. An upregulation of NR1 and NR2A subunits in prefrontal cortex of PDE11A KO mice vs WT littermates, yet a downregulation of NR2A subunits in HIPP of KOs. We discuss our findings in the context of a working hypothesis: deletion of PDE11A produces transient amnesia by virtue of temporarily “misplacing” the memory (i.e., PDE11A deletion strengthens SC within the cortex ahead of schedule at the expense of prematurely erasing the memory from the HIPP).

**Poudel, Suraj**

**Mentor(s): Prof. Varsha Kulkarni**

**Constraining the first ~1 billion years of cosmic chemical evolution using gas-rich galaxies**

Metal abundance measurements throughout the cosmic ages track the history of galaxy formation and evolution from the initial pristine stars and galaxies to the present day metal-rich galaxies. Measuring abundances during the first ~1 billion years is especially important, as they are influenced by the nucleosynthetic signatures from the early stars. Evolution of metallicity of Damped/sub-Damped Lyman-alpha Absorbers (DLAs/sub-DLAs) detected in the spectra of quasars, which provide the neutral gas reservoirs for star formation at high redshift, is a powerful tracer of the cosmic star formation history. A sudden drop in DLA metallicity at  $z > 4.7$  was reported in some recent studies. Given the potentially interesting implications of a sudden drop in DLA metallicity at  $z \sim 5$  and the conflict such a drop would produce with existing chemical evolution models, it is especially important to check with a larger sample of weakly depleted elements whether or not such a sudden drop in metallicity actually exists. With this goal, we have been expanding measurements of S and/or O in DLAs at  $z > 4.5$ . We combine these new measurements with measurements from our previous works as well as from the literature to estimate the NH I-weighted binned mean metallicity and find it to be in excellent agreement with the prediction from lower redshift DLAs, suggesting that the metallicity evolution is smooth at  $z \sim 5$ , rather than declining suddenly at  $z > 4.7$ . Furthermore, the metallicity evolution trends for the DLAs and sub-DLAs may be similar at this early epoch. Additionally, using [C/O] and [Si/O] to constrain the nucleosynthesis models, we estimate that the probability distributions of the progenitor star masses for three relatively metal-poor DLAs are centered around  $12 M_{\odot}$  to  $17 M_{\odot}$ .

**Pourhoseini, Sahar**

**Mentor(s): Prof. Jamie Lead**

**A comparative uptake and toxicity study of silver nanoparticles on human peripheral blood mononuclear cells**

Silver nanoparticles (AgNPs) are one of the most commercialized NPs on the market. Due to their anti-bacterial properties, AgNPs are widely used in medical products such as bandages, wound dressings and ointments which considerably adds to exposure. AgNPs can enter the human body through ingestion, inhalation, injection, as well as dermal and ocular contact. As soon as AgNPs enter the body, they are translocated to the circulatory system and come in direct contact with human peripheral blood mononuclear cells (PBMCs) before ultimately being distributed to and accumulating in the main organs. Despite the increased use, and likely increased exposure of AgNPs, there is a lack of quantitative analysis of bio-uptake and potential cytotoxicity of well-characterized AgNPs on PBMCs. There are limited studies on bio-uptake and exposure of AgNPs on PBMCs and few, if any, pay attention to procurement and characterization of NPs, especially in exposure media over the duration of exposure, or the use of proper controls or the use of relevant exposure concentrations. In this study we have used tightly constrained NPs, which have been more fully characterized, including their transformations during exposure, and we have quantified bio-uptake and toxicity to PBMCs at concentrations relevant to human exposure. PBMCs were exposed to AgNPs coated with polyvinylpyrrolidone (PVP), or controls (Ag nitrate (AgNO<sub>3</sub>), PVP and AgNO<sub>3</sub>-PVP). Cells were cultured with AgNPs or controls for 24 hours. The supernatant and cell pellets were collected for analysis and were examined for Ag concentration by ICP-MS. Subsequently, cell toxicity after exposure to different concentrations of AgNPs and controls was measured by an MTS assay. AgNP dissolution in exposure media was obtained by ICP-MS coupled with centrifugal ultrafiltration. Scanning transmission electron microscopy and EDX images of the PVP-AgNPs were acquired using HD2000 microscope.

**Price, Justin**

**Mentor(s): Mr. Justin Price**

**Landing Zones - On Target and Transfer**

Current philosophical discussion targets model transfer as a phenomenon in need of analysis. Such discussion has so far analyzed what are called transferable models - i.e. models applicable in multiple scientific domains. My dissertation specifically examines the transfer of models from physics to chemistry to highlight an important but unrecognized dynamic between the thing that is transferred, and the thing to which the transferrable parts of models apply. In order to depict this dynamic, and the conceptual development that follows from successful model transfer, I introduce the notion of a 'landing zone'. This notion identifies a conceptual feature of scientific modelling that functions to make possible the use of a transferable model across domains.

**Raber, Sabrina**

**Mentor(s): Dr. Allison Marsh, Dr. Lucy Ingram**

**Find Your Beat: The Impact of Music on Underresourced Youth Via Recycled Objects**

Music education has been proven to be a catalyst in positively impacting children in impoverished situations; however the cost of running music programs in Title One schools and/or purchasing expensive traditional musical instruments deters many from incorporating these programs into their curriculum. In order to combat this issue, I began a music education program for under-resourced students, aged four through ten, living in Columbia, South Carolina. I partnered with Ezekiel Ministries, a local after-school program, which has provided a volunteer staff, student enrollment, and facilities. The program used only recycled, percussive products, such as buckets, pieces of wood, soda bottles, and other items found in the community. In classes, students learned basic musical principles such as rhythm, form, and time. Rehears-

als were led in the Samba School style: a form of pedagogy that consisted of the student being taught a repeating rhythm on their individual instrument. In addition to music courses, students also took part in leadership centered games as well as design courses, where they created their instruments. The fall semester culminated in both a concert and holiday parade performance. To measure the effectiveness of the program, students took part in individual interviews, group surveys, and focus group sessions in which they were asked their opinions on curricular choices. Members of my community partner, Ezekiel Ministries, were also interviewed on their opinion of program effectiveness. Throughout the semester, there was a marked change in the students' attitudes towards music, their experiences with leadership and teamwork, and their musical skills.

**Raygoza, Alyssa**

**Mentor(s): Dr. Melissa Duffy**

### **Mindfulness, Learning, and Performance: A Systematic Review of Interventions in the College Setting**

**Background:** Mindfulness-a practice or skill of intentional, non-judgmental awareness- (Kabat-Zinn, 2003) has gained increasing attention for its application within educational settings. In particular, mindfulness-based interventions (MBIs) have been used in schools to enhance well-being and academic experiences. Although evidence of its impact is accumulating within K-12 settings (Zenner et al., 2014; Felver et al., 2016), the impact of MBIs on learning and performance within university settings is less evident. Given that university students face unique stressors and challenges, the purpose of this research was to conduct a systematic literature review to examine the impact of mindfulness-based interventions on academic achievement among undergraduate students.

**Methods:** The search involved entering select keywords into 3 databases (ERIC, Education Source, PsycINFO) to identify published and unpublished studies (from 2000-2019). Studies met inclusion criteria if they implemented a mindfulness intervention for a sample of undergraduate students and included either learning or achievement as an outcome. Eleven studies were included for analyses.

**Results:** Studies were coded and analyzed according to 4 elements: (1) mindfulness definition; (2) research design; (3) intervention characteristics; and (4) reported outcomes. Studies often described mindfulness in terms of an individual's attentional processes and attitude or disposition. The research designs included: experimental (n = 5), quasi-experimental (n = 3), and descriptive (n = 3). Intervention duration ranged widely across studies from 30 minutes to 15 weeks. Intervention activities were diverse and included mindfulness meditation via audio recording, breathing exercises, and attentional instructions to present moment. Outcome measures for learning and achievement were diverse across studies. All studies reported some degree of positive outcomes associated with the intervention, although some studies did not include objective measures of achievement.

**Conclusions:** The systematic review findings indicate that mindfulness-based interventions have had a positive impact on learning and achievement within university. However, there was a great deal of variability in the intervention methods (practices, duration) and quality of research design (use of random assignment and control condition), which preclude firm conclusions about the generalizability of this effect. For future work, we suggest researchers test mediating psychological variables that may account for the effect of MBIs on achievement.

**Regan, Elizabeth****Mentor(s): Dr. Stacy Fritz, Dr. Jill Stewart, Dr. Sara Wilcox, Dr. Lee Pearson****Preliminary Results from a Pilot Feasibility Study: Integrating Stroke Survivors into Cardiac Rehabilitation**

Background: Impairments after stroke result in a sedentary lifestyle which increases stroke recurrence risk and the development /worsening of comorbid health conditions. Cardiac Rehabilitation (CR) is a medically supervised community exercise program for people with cardiac dysfunction. Stroke is currently not a covered diagnosis. The study examines the feasibility of integrating stroke survivors into an existing hospital-based CR program and evaluate the program's potential participant impact.

Purpose: The two aims of the study are to (1) determine the feasibility of integrating survivors of stroke into an existing CR program through assessment of feasibility measures (recruitment, safety, adherence, retention, process) and (2) evaluate participant impact of an existing CR program through identification of appropriate outcome measures for physical function (cardiovascular endurance, functional strength, walking speed), and for other variables (quality of life, balance confidence, depression, fatigue, exercise self-efficacy).

Methods: A single group pilot phase I feasibility study is being conducted at Novant Health's Charlotte, NC CR facility. Potential participants are screened for inclusion criteria and mobility concerns by primary researcher (PI) (physical therapist) and enter the standard 3 x week 12 weeks CR program with aerobic fitness focus.

Preliminary Results: There are 39 referrals to date, with 20 starting the program (rate of uptake = 51%). Four participants have dropped out, six participants completed the program/final evaluation and 10 remain active with a retention rate of 80%. Of the 6 participants completing the program, the average session adherence rate was  $68 \pm 12\%$ . There have been three safety issues: 2 episodes of atrial fibrillation (continued program), and 1 additional stroke (unrelated to program). There were no falls.

Six participants (50% male; age:  $59.5 \pm 15.9$ ) greater than 6 months post-stroke have completed the study to date. The six-minute walk test (walking capacity) improved by an average of  $81 \pm 42$  meters ( $p=0.005$ ). The Stroke Impact Mobility Subscale improved by  $12 \pm 9\%$ , ( $p=0.019$ ). No other outcomes had statistically significant changes.

Conclusion: Initial findings suggest benefits in walking capacity and self-perception of mobility for stroke participants. Feasibility shows promise with a retention rate (80%) greater than the cardiac participants retention rate (63.3%).

**Resciniti, Nicholas****Mentor(s): Dr. Matthew Lohman, Dr. Daniela Friedman, Dr. Lucy Ingram, Dr. Allison Marsh****Perceived Mental Health and Caregiver Knowledge of Dementia Caregivers: A Focus Group and Qualitative Analysis**

Introduction: Over 5 million Americans have Alzheimer's disease and related dementias (ADRD), and approximately 2.4 million have preclinical ADRD or mild cognitive impairment (MCI). With anticipated growth of the older adult population, the prevalence of ADRD is expected to nearly triple by 2060. South Carolina has the highest AD mortality rate of any state in the US. In addition, South Carolina's Medicaid costs related to ADRD are expected to increase by 40.2% by 2025, a 10% greater increase than the national average. Regional disparities in the impact of ADRD suggest there is a need for comprehensive local and state resources to support caregiving for management of individuals with ADRD. Although South Carolina

is heavily impacted by ADRD, there are few state-specific, evidence-based resources focused on sustaining brain health and mitigating the long-term impact for ADRD caregivers. A notable exception, Memory Matters (MM) is a 22-year-old nonprofit organization dedicated to improving community brain wellness, culminating in professional memory care services. MM also provides respite care and support groups for caregivers of loved ones entering mild- to moderate-stage disease through its advanced Compass-level programs. However, perceived mental health and knowledge of caregivers has not been evaluated in MM. By conducting this evaluation through a focus group, a greater understand of how caregiving impacts health and how knowledge may benefit health can be identified.

**Methods:** In concordance with Memory Matters, caregivers of individuals with dementia that attend Memory Matters will be recruited to participate in a focus group. Questions related to perceived mental health changes due to caregiving and knowledge about caregiving will be asked. Data will be qualitatively analyzed to evaluate trends related to perceived mental health status, how this may be related to caregiving knowledge, and how potential knowledge improvement can influence mental health.

**Future work:** Collected data will be used to create an education program to provide gaps in knowledge identified through the focus group. Evaluation of this program on knowledge acquisition and how improvement of knowledge influences mental health status in dementia caregivers will be conducted.

**Roberts, Alex**

**Mentor(s): Dr. Nicole Zarrett**

### **A Brief Mindfulness-Based Intervention (bMBI) to Decrease Stress and Burnout in Secondary School Teachers**

Teaching has been defined as a highly-stressful occupation driven by the consistent attentional control and executive functioning demands required to effectively educate students with varying needs and skill-sets. Chronic stress results in teacher burnout, which together and in isolation impact teachers' regulation and coping abilities, in addition to their physical and psychological health. Mindfulness training (MT) is one validated way to promote the development of stress management skills and increased overall health and well-being in teachers. However, of the few teacher-focused MT studies that have been conducted, most have involved teachers at the elementary school level, enacted burdensome training models, and have not been tailored for direct teacher implementation in classroom settings. Given that secondary school teachers have been identified as particularly prone to stress/burnout and increased time constraints, a less burdensome, cost-effective alternative is ideal.

The current study utilized a randomized waitlist control design to pilot a brief mindfulness-based intervention (bMBI; 6 total contact hours) to decrease stress and burnout in a sample of secondary school teachers (N=23). Stress and burnout were measured using self-report (Teacher Stress Inventory; Maslach Burnout Inventory-Educators Survey) and objective measurement of cortisol awakening response (through saliva samples using Salivettes®).

Results indicated significant decreases in self-report symptoms of stress,  $t(10)=5.03$ ,  $p<.01$ , and burnout,  $t(10)=3.01$ ,  $p=.01$ , from pre- to post-intervention in teachers who received the intervention. There were no significant differences observed for controls. A small to medium effect ( $d=.46$ ) of salivary cortisol was observed at post-intervention for teachers in the intervention compared to controls at 30 minutes upon awakening. There was both qualitative and quantitative support (e.g., 88% attendance rate) for feasibility and acceptability of the intervention.

The poster presentation will outline aspects of the bMBI curriculum, both qualitative and quantitative findings related to outcome variables, and future research directions for MBIs for teachers in the context

of existing literature. The current findings provide evidence for the effectiveness of briefer MBIs in their ability to reduce teacher stress and burnout. Recommendations for future studies include accounting for intervention feasibility/acceptability while identifying a minimally-effective dose that maximizes cost-effectiveness.

**Roberts-Pierel, Justin**

**Mentor(s): Dr. Steven Rodney**

### **Turning Gravitationally Lensed Supernovae into Cosmological Probes**

Recently, there have been two landmark discoveries of gravitationally lensed supernovae: the first multiply-imaged SN, 'Refsdal', and the first Type Ia SN resolved into multiple images, SN iPTF16geu. Fitting the multiple light curves of such objects can deliver measurements of the lensing time delays, which are the difference in arrival times for the separate images. These measurements provide precise tests of lens models or constraints on the Hubble constant and other cosmological parameters that are independent of the local distance ladder. Over the next decade, accurate time delay measurements will be needed for the tens to hundreds of lensed SNe to be found by wide-field time-domain surveys such as LSST and WFIRST. We have developed an open source software package for simulations and time delay measurements of multiply-imaged SNe, including an improved characterization of the uncertainty caused by microlensing. We describe simulations using the package that suggest a before-peak detection of the leading image enables a more accurate time delay measurement by  $\sim 4$  days compared to an after-peak detection. We also conclude that fitting the effects of microlensing without an accurate prior often leads to biases in the time delay measurement and over-fitting to the data, but that employing a Gaussian Process Regression (GPR) technique is sufficient for determining the uncertainty due to microlensing.

**Roman-Stork, Heather**

**Mentor(s): Prof. Subrahmanyam Bulusu**

### **Quasi-biweekly Oscillations in the Bay of Bengal in Observations and Model Simulations**

Intraseasonal oscillations (ISOs) significantly contribute to the variability and strength of rainfall associated with the Indian Summer Monsoon. The westward-propagating, 10-20-day, quasi-biweekly ISO (QBWISO), in association with the zonal double cell structure, contributes to an increase in momentum and moisture from the western Pacific Ocean and South China Sea to the Bay of Bengal (BoB) and Indian subcontinent that intensifies monsoonal rainfall rates. The QBWISO also has a meridional double cell structure positioned over 15-20°N and 0-5°N, with the northernmost cell significantly contributing to monsoonal precipitation. The atmospheric systems associated with this QBWISO, particularly the northernmost cell, induce shifts in circulation that directly impact the strength and timing of active and break monsoon periods, which are respectively characterized by wet and dry conditions.

Here we conduct a multivariate analysis of the atmospheric QBWISO to both assess its overall characteristics in multiple oceanic variables and analyze how this atmospheric signal interacts with the underlying ocean. We utilize a combination of satellite observations and the NEMOv3.4 ocean model simulated temperature, salinity and mixed layer depth to examine the characteristics of QBWISO for the 2016-2018 Indian Summer Monsoon seasons. This study reveals that both the zonal and meridional double-cell structures in QBWISO precipitation are phase-locked during the southwest monsoon and positively enhance/suppress the precipitation over northern BoB leading to higher amplitudes in QBWISO sea surface salinity, compared to those in the central and southern BoB. The NEMO SSS also supports the occurrence of higher SSS anomalies at QBWISO period in the northern BoB. We find that NEMO temperature has a strong biweekly signal in the central and southern BoB down to 250 m depth, with the mixed layer temperature showing a marked decrease after the QBWISO precipitation maximum. Comparatively, at subsurface depths the QBWISO signal in NEMO salinity shows a slight increase in thermocline in the central and southern BoB, suggesting that the subsurface Arabian Sea high salinity water mass is affected by the

QBWISO.

**Saba, Kat**

**Mentor(s): Dr. R. Davis Moore, Mr. Brett Gunn**

**Progressive Sub-Symptom Threshold Exercise and Biofeedback Intervention for Persistent Concussion Symptoms**

Mild traumatic brain injury, or concussion, induces physiological and behavioral deficits which typically resolve within 7-10 days. However, 20-30% of concussed individuals will experience a debilitating cluster of cognitive, somatic and affective symptoms known as post-concussion syndrome (PCS; Bazarian et. al, 2005). Currently, there is no validated treatment for PCS, but accumulating evidence suggests that moderate aerobic exercise may facilitate recovery (Kurowski et. al, 2016). Further, research has identified heart rate variability biofeedback (HRVB) as potential therapy to restore autonomic function (Lagos et. al, 2015). Although both aerobic exercise and HRVB therapy are promising, neither completely resolve PCS. Therefore, a unimodal approach may be insufficient to completely address the deficits suffered by those with PCS. Accordingly, we developed a combined aerobic exercise and biofeedback intervention to alleviate PCS. Participants are randomly assigned to either an exercise protocol, biofeedback therapy, or a combined group. Participants in the exercise intervention complete a validated 40-day progressive aerobic exercise intervention in which they exercise 3 days a week. Participants in the HRVB group are trained to modulate their breathing to synchronize the rhythm of their respiration and heart rate and improve HRV. This group completes 20-minutes of digitally paced breathing 3 times a week. The combined group adheres to both protocols, with HRVB conducted on days which they do not exercise. Measures of physiological, cognitive and affective health are assessed pre-, mid-, and post- intervention. We predict that all participants will experience benefits from their respective intervention. However, we predict that benefits will be greatest in the combined aerobic exercise and HRVB intervention.

**Saha, Sudipta**

**Mentor(s): Dr. Tanvir Farouk, Dr. Jamil Khan**

**Investigation on Sweating Boosted Cooling in Thermal Power Plant Application**

Cooling section is one of the major key elements that defines the overall efficiency of a thermal power plant. Specially, low heat transfer coefficient (HTC) at air-fin side is a roadblock to the efficient cooling. Water cooled condenser (WCC) and water evaporating condenser (WEC) are widely used for cooling purpose in power plants and other industries. To enable green economy the US federal government requires a reduction of annual water usage by ~2% which emphasizes the necessity of finding alternatives of water cooled condensers. Forced convective heat transfer augmented by evaporative cooling has been found to be a very effective way to boost up the heat transfer of a system in affordable cost. This study presents a multi-dimensional multi-physics model of a simultaneous heat and mass transfer system with a view to having a higher heat transfer coefficient. In this study, we have modeled a system that undergoes this dual mode cooling process where both convection and evaporation contribute to heat transfer. The computational domain is comprised of a thin liquid film that undergoes evaporation with constant heat flux provided from the bottom and a convective loading of laminar air flow above it. Evaporation takes place at liquid-gas interface and the evaporated mass is being carried away by the incoming air, hence supplementing the convective cooling. A two-dimensional numerical model consisting of mass, momentum and energy conservation together with a species transport of air and water has been developed to understand the key feature of this hybrid cooling system. The evaporation flux has been calculated from the classic Hertz-Knudsen expression. To resolve the receding of the liquid film as mass is being taken away from it through evaporation, a moving mesh "Arbitrary Lagrangian-Eulerian" technique has been adopted. It has been found that dual model heat transfer performs significantly better than the pure convective mode, resulting in an increase of overall heat transfer by four to five times.

**Sajjad, Mohsin**

**Mentor(s): Mr. Joshua Kleppinger, Prof. Krishna Mandal**

**Fabrication and characterization of Cd(0.9)Zn(0.1)Te pixelated detectors for high energy gamma ray detection**

Large area Cd(0.9)Zn(0.1)Te (CZT) pixelated nuclear radiation detectors have been fabricated and characterized for high energy gamma ray detection. Large volume CZT single crystal ingots have been grown by vertical Bridgman technique using a tellurium solvent method. Several 10×10 guard-ring pixelated detectors have been fabricated on ~20×20×5 mm<sup>2</sup> crystals cut out from the grown ingots. The pixel dimensions were ~1.3×1.3 mm<sup>2</sup> and were pitched at ~1.8 mm. Guard grids were used to reduce inter-pixel/inter-electrode leakage current and cross-talk. The crystals were also characterized in planar configuration using electrical, optical, and optoelectronic methods prior to the fabrication of pixelated geometry. Current-voltage (I-V) measurements revealed very low leakage current ( $\leq$  nA) at an operating bias voltage of 1000-1200 V and a resistivity of  $\sim 6 \times 10^{10}$  ohm-cm. Infrared transmission imaging revealed an average tellurium inclusion/precipitate size  $\sim 8 \times 10^{-6}$  m. The mobility-lifetime product in this crystal was calculated to be  $\sim 10^{-2}$  cm<sup>2</sup>/V using our front-end electronics and alpha ray spectroscopic method. Gamma spectroscopy using Caesium-137 radiation source (662 keV) on the pixelated structures showed fully resolved 662 keV gamma peaks for all the 100 pixels, with resolution (FWHM) as high as 1.5 %. Further, a digital correction scheme has been developed and was applied to recover the effect of charge (electron) – loss.

**Salman, Azzam**

**Mentor(s): Prof. Jamil Khan**

**Numerical Modeling of Heat Transfer Process During Spray Cooling**

In this work, a three-dimensional multi-phase numerical model was proposed to simulate the heat transfer process in a spray cooling system. Measuring the spatial characteristics of the liquid film, which plays a major role in the thermal performance of a spray cooling system, is one of the most challenges and requires advanced technology. Therefore, STAR-CCM+ version 13.04 was employed as a computational fluid dynamics solver to perform this study, and Eulerian-Lagrangian and Eulerian-Eulerian approaches were combined to simulate the entire process at different spray conditions. The predicted results were compared with experimental results at the same operating conditions. The comparison showed that between numerical and experimental heat transfer coefficients was less than 15%. The results showed that the volumetric flow rate and nozzle to surface distance have a significant effect on the liquid film velocity, liquid film thickness, and local heat transfer coefficient. Increasing the volumetric flow rate increase the film velocity and decrease the film thickness, and eventually enhances the spray cooling thermal performance. Also, decreasing nozzle-to-surface distance decrease the liquid film thickness within the impingement zone, but decrease it in thick film zone.

**Schomaker, Rachel**

**Mentor(s): Dr. Jeffry Dudycha**

**Hungry algae: Diversification of trophic strategies in cryptophytes**

Organisms capable of producing their own organic compounds are considered autotrophic, while heterotrophic organisms must acquire external organic carbon sources either via phagotrophy, engulfing particles, or osmotrophy, absorbing nutrients. Mixotrophic organisms are capable of both autotrophy and a form of heterotrophy. Given these definitions, we can consider strict heterotrophs and autotrophs as trophic specialists, whereas mixotrophs are trophic generalists or opportunists. With the ability to both assimilate their own resources and consume those available in their habitat, mixotrophs play a dynamic

role in determining community structure and influencing food webs. Mixotrophs also impact patterns of nutrient and carbon cycling, which are directly related to the balance between trophic strategies within ecosystems.

Cryptophytes are microscopic algae that evolved via secondary endosymbiosis between a hypothesized heterotroph and an autotrophic red algal cell. Even though cryptophytes evolved via the assimilation of two different trophic strategies, most are considered obligate autotrophs. Known exceptions include one strictly heterotrophic genus (*Goniomonas*) and two unique heterotrophic species within the *Cryptomonas* genus. However, studies suggest that mixotrophic function exists in some cryptophyte species, though its phylogenetic breadth, degree of mixotrophic function, and its consequences are unknown. Because cryptophytes are widespread members of marine, freshwater, and brackish ecosystems, this leaves a gap in our understanding of how mixotrophic cryptophytes impact resource availability, nutrient cycling, and community dynamics within these systems.

The overall goals of this project were to further our understanding of the consequences of mixotrophy in aquatic communities, and to elucidate the evolutionary history of trophic strategies in cryptophytes. Two representatives of each cryptophyte clade were grown in total darkness (0hr:24hr light:dark) and in a 12hr:12hr light:dark environment with and without added bacterial prey, and their growth rates, pigment concentrations, and cell volumes were measured. Preliminary results suggest that cryptophyte trophic strategies may be variable depending on environmental stimuli.

**Sheng, Jingxi**

**Mentor(s): Dr. Demetrius Abshire**

**Weight Loss Interventions Among Asian Americans: A Systematic Review**

**Purpose/Aims:** To examine the effectiveness of weight loss interventions for Asian Americans and to determine intervention components that should be used in future studies that target overweight/obesity in this population.

**Rationale/Conceptual Basis/Background:** Asian Americans have the highest proportion of undiagnosed diabetes among all ethnic and racial subgroups. The prevalence of diabetes in Asian Americans is about 21 percent. However, more than half of Asian Americans with diabetes was undiagnosed. Asian Americans tend to develop type 2 diabetes with a low body mass index (BMI), which puts them at higher risk of developing undiagnosed diabetes. Modifiable factors for type 2 diabetes are overweight/obesity and physical inactivity. Effective interventions are needed to prevent and reduce overweight/obesity and increase physical activity among Asian American populations to reduce risk of diabetes and associated co-morbidities. There is a gap in knowledge of effective behavioral interventions among Asian Americans since they likely have lower BMIs compared to other racial groups. Interventions to prevent and reduce obesity and increase physical activity in this population are necessary and can improve the long-term health of this population.

**Methods:** This literature review is being conducted using the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed databases to identify behavioral weight loss intervention programs that target Asian Americans. Articles will be included if they meet inclusion criteria of being published since 2008, include Asian American populations, are written in English, and report changes in body weight or BMI. Searches include combinations of the following keywords: obesity, overweight, BMI, weight loss, diet, nutrition, physical activity, exercise, self-measurement, Asian Americans, and ten groups of Asian Americans by nation origin.

**Results:** The review of articles is ongoing. Initial results of a PubMed keyword search using the terms "Asian Americans AND weight control" resulted in 207 articles that will be screened for eligibility. This number decreased to 120 articles when limited publish date within ten years. Other keyword combinations yielded fewer results.

Implications: This systematic review will provide better understanding of effectiveness of weight loss interventions among Asian Americans and bring potential knowledge gaps in light that could help future studies.

**Shonibare, Zainab**

**Mentor(s): Dr. Mythreye Karthikeyan**

**Molecular mechanism and impact of Bone morphogenetic proteins (BMP)-mediated Sox2 down-regulation in Ovarian Cancer**

Sex determining region Y-box 2 (Sox2) is a transcription factor essential for maintaining self-renewal and pluripotency of undifferentiated embryonic stem cells. Sox2 is involved in multiple processes of cancer cells, however, regulation of Sox2 expression and the consequences of that regulation in cancer remains elusive. Tumor cells have a repertoire of signaling molecules especially from the Transforming Growth Factor (TGF)- $\beta$  superfamily. Notably, BMP-9, a member of the largest subgroup of the TGF- $\beta$  superfamily (BMPs), was previously reported by our lab to be significantly reduced in expression in several cancer cells and patient tumors as BMP9 suppressed anoikis (cell death) resistance in breast and ovarian cancer (OVCA) cells. In an effort to identify genes downstream of BMP9 that may provide survival advantages under anchorage independence during metastasis, transcriptomics was performed leading to the identification of Sox2 to being significantly downregulated in response to BMP9. My project examines if the effect of BMP9 on Sox2 expression is broad amongst the BMP family and the mechanism and consequences of this repression. We find that Sox2 repression is broadly mediated by BMP members BMP2, BMP4 and BMP9 both at the protein and mRNA level in OVCA cells in a time and dose dependent manner. Biochemical studies indicate that Inhibition of the BMP Type I Alk receptor using Dorsomorphin (Alk 2,3 and 6 inhibitor) resulted in a rescue in Sox2 expression in response to BMP, while treatment with SB431542 (Alk 4,5 and 7 inhibitor) had no effect on BMP-mediated Sox2 downregulation. Data from Sox2 promoter reporter assay suggests the involvement of the promoter as the regulatory region involved in BMP-mediated Sox2 downregulation. To further test the role of DNA methylation and histone modifications in BMP-mediated Sox2 repression, DNMT modifiers and HDAC inhibitors were tested. The effect of Sox2 on BMP-induced anoikis was then studied by performing Live-Dead assay, which was analyzed using confocal microscopy. Our findings suggests that BMP-mediated Sox2 downregulation occurs via SMAD1/5 dependent epigenetic modifications occurring in Sox2's promoter and this is required for BMP-induced cell death during ovarian cancer metastasis.

**Shoup, Casey**

**Mentor(s): Prof. Subrahmanyam Bulusu**

**New Approaches to Understanding MJO Dynamics**

The Madden-Julian Oscillation (MJO) is a climate fluctuation found in the equatorial regions of the world oceans that affects precipitation patterns and has influences over many different weather phenomena. Generally, there is a 20-30 day period of enhanced thunderstorm activity, which propagates eastward followed by 20-30 days of reduced activity and clearer skies. The MJO is responsible for creating drought and flooding conditions across Indonesia and initiating and affecting other climate events, such as El Niño/La Niña and the Indian Ocean Dipole. Depending upon which period of the MJO is occurring, the paths and intensities of cyclones in many tropical oceans can be altered by the effects of the MJO. In the tropical oceans there are large waves (Kelvin and Rossby waves) that affect the structure of the surface ocean and change how the ocean heats and cools as well as how it interacts with the atmosphere. The MJO has been shown to initiate, and be initiated by, these waves, which are generally observed using satellite altimetry. In recent years, the scientific value of satellite altimeter data has grown dramatically over time in oceanographic studies but has not been fully utilized in climate-related studies. Salinity is often neglected but is an important component in ocean dynamics and thermodynamics. The MJO and its

interaction with ocean temperature has been documented and studied since its discovery. Understanding the implications of the MJO on Sea Surface Salinity (SSS) fluctuations during each stage of the propagation is important. Salinity may influence surface ocean dynamics and will provide better representation of the MJO in climate models if considered.

**Shull, Emily**

**Mentor(s): Dr. Russell Pate**

### **South Carolina Parents' Perceptions of their Children's Physical Activity**

**Objectives:** Parents play a critical role in supporting and encouraging their children's physical activity (PA), but little is known about how parents perceive factors that may influence their children's PA. This study describes parents' perceptions of their children's PA behaviors, in a representative, statewide sample.

**Methods:** Items from the 2013 statewide Children's Health Assessment Survey pertaining to children's PA, sport participation, outdoor activity, screen time, recreational time and coordination were analyzed for a total of 711 parent-reported children (342 males, 369 females) ages 5-17 years. Weighted percentages were calculated for the total sample and population subgroups (age, parent education, race, and weight status) and for the children's PA-related behaviors items; weighted percentages for reported children's PA-related behaviors stratified by meeting PA requirements. Age, parent education, race, and weight status were controlled in the analyses.

**Results:** Over half of the youth were reported as being active on  $\geq 5$  d/wk. Males were reported accumulating  $\geq 60$  min/d of PA as compared to females (80.5% and 72%;  $p < .05$ ). Parents also reported that the 5-10-year-old age group had significantly a higher percentage of accumulating  $\geq 60$  min/d of PA (90%), choosing PA during recreational time (64%), and a higher percentage (80%) spent  $< 120$  min/d engaged in screen time compared to the other age groups. For the total group, parents reported that children meeting the guideline were more significantly more likely to be active 5 or more days per week (47%), choose physical activity during recreational time (44%), participate in sports and/or physical activity classes (52%), and spend 60 or more minutes outside on weekdays (70%) and weekend days (64%). Both the younger (74% vs 16%) and middle age groups (64% vs 11%) who reportedly met the 60 min of PA guideline were more likely to spend  $\geq 60$  min outside on weekends ( $p < .05$ ) compared to the oldest age group.

**Conclusions:** Parents who reported that their children met the PA guidelines, were more likely to engage in other PA-related behaviors. Physicians and healthcare professions should encourage parents and their children to be more physically active, engage in sports and outdoor time."

**Siddiqi, Khairul**

**Mentor(s): Dr. Bankole Olatosi**

### **Does Aging of People Living with HIV Increase Hospital Resource Utilization? Evidence from Largest National Inpatient Sample, 2015**

**Objectives:**

Literature shows that rates of hospital admission and readmissions increase as people living with HIV (PLWH) age. Few studies have investigated inpatient resource utilization for aging with HIV. We test the hypothesis that inpatient stay by older PLWH results in increased inpatient resource utilization.

**Methods:**

For this cross-sectional study, we used National Inpatient Sample (NIS) 2015 data from the Healthcare Cost and Utilization Project (HCUP). We examined inpatient resource utilization trends between PLWH

and non-PLWH inpatient visit by age group. We used survey weighted multivariable loglinear Poisson and zero-inflated Poisson regression models to produce national level estimates. All analyses were conducted using SAS statistical software 9.4.

Results:

Among 26 million hospitalizations, a weighted total of 163,705 (0.61%) hospitalizations were made by PLWH. Controlling for associated demographic, facility-level factors and comorbidities, multivariable analyses showed that number of procedures and length of stay (LOS) were significantly lower for visits among PLWH of all age groups (<40, 40-49, 50-64, 65+ years) compared to non-PLWH. When compared to younger PLWH aged <40 years, number of procedures performed was higher for the visits of PLWH aged 65+ ( $\beta = 0.13$ ,  $P < 0.0001$ ). LOS for hospitalization of PLWH aged 40-49 ( $\beta = 0.02$ ,  $P < 0.0001$ ) and 50-64 ( $\beta = 0.007$ ,  $P < 0.01$ ) had higher than that of PLWH aged <40 years.

Conclusion:

Preliminary trend analysis shows more resource utilization for PLWH as they age. This holds implications for the health system, as proper planning is needed to meet increased medical demand as the PLWH population gets older.

**Sikder, Mithun**

**Mentor(s): Dr. Mohammed Baalousha**

**Effect of size and natural organic material on the uptake of platinum nanoparticles in freshwater snail, *Lymnaea stagnalis***

Environmental concentrations of Platinum (Pt) has been increasing because of the emission from catalytic converters. Recent studies demonstrated that Pt in road dust occurs as platinum nanoparticle (PtNPs). Platinum emission is principally located in the vicinity of the roads but can be transported to aquatic bodies through urban run-off. Despite evidence of environmental Pt emissions, very little is known about the environmental fate, bioavailability, and toxicity of PtNPs. Bioavailability of dissolved Pt ( $H_2PtCl_6$ ) and in house synthesized monodispersed polyvinylpyrrolidone coated PtNPs (PVP-PtNPs) of different sizes (e.g., 8.7, 10.4, 18, 44, and 72 nm) were investigated using a model freshwater species, the snail *Lymnaea stagnalis* in controlled laboratory experiments. The studied PtNPs showed limited dissolution and aggregation in moderately hard water. Although both forms of Pt appeared bioavailable to *L. stagnalis*, the PtNPs were more bioavailable ( $kuw = 0.139 \pm 0.007$  L/g/d) compared to dissolved Pt ( $kuw = 0.055 \pm 0.003$  L/g/d). Furthermore, Pt influx rate increased with increasing PtNPs size (from  $kuw = 0.092 \pm 0.011$  to  $0.751 \pm 0.343$  L/g/d). Natural organic material (NOM) isolates suppressed the uptake of 72 nm PtNPs, but not that of 8.7 nm PtNPs. Pt influx rate decreased (from  $kuw = 0.456 \pm 0.037$  to  $0.075 \pm 0.050$  L/g/d) with the decrease in NOM sulfur (S) and nitrogen (N) content. However, no such correlation between Pt uptake rate and S and N content for dissolved Pt and 8.7 nm PtNPs was observed. These results suggest that both particle size and NOM chemical composition influence the environmental fate and bioavailability of PtNPs.

**Sindt, Ammon**

**Mentor(s): Dr. Linda Shimizu**

**Azobenzene Photoisomerization in Co-crystals for Light Controlled Release of Fragrances**

Many fragrances require an external element to induce release or have a short aroma lifetime. Consequently, either heat (flame) or electricity needs to be present to induce release or the aroma has to repetitively applied. In the former case many additional compounds can be released as well during application, some of which are quite harmful and toxic even in low amounts. One solution to this issue is to use co-crystalline assemblies of azobenzenes and fragrances to regulate the release of aromas using light. Using the light induced trans to cis isomerization of azobenzenes to break the crystalline solid apart, fragrances co-crystallized with azobenzene units can be released in a controlled, greener manner. This presentation will highlight how these assemblies are made, how they are assembled in the solid-state,

and how they interact with light under a number of conditions. Additionally, a few examples of new co-crystals such as 1,2-di(pyridin-4-yl)diazene and vanillin will be examined more closely to see how they are held together in the solid-state. Overall, this presentation will highlight a new method for fragrance release.

**Soltanmohammadi, Elham**

**Mentor(s): Prof. Hippokratis Kiaris, Ms. Vimala Kaza, Prof. Ioulia Chatzistamou**

**Coordination of the Unfolded Protein Response in different species and tissues of *Peromyscus***

The vast majority of proteins first enter the endoplasmic reticulum (ER) for folding and assembling and only properly assembled proteins advance from the ER to the cell surface. The ER responds to the burden of unfolded proteins in its lumen (ER stress) by activating intracellular signal pathways termed the unfolded protein response (UPR). The activity of the UPR is attained by overexpression of chaperones and other UPR-associated genes that assist in protein folding.

While the role of several ER stress-associated genes in the UPR has been established, if the UPR is variable among individuals and how it is coordinated in genetically diverse populations remains poorly understood. To address these questions we studied the correlations in the expression between different UPR genes in diverse populations and closely related species of deer mice (*Peromyscus*). Specifically, we evaluated the expression of the chaperones BiP/GRP78, GRP94 and calnexin and of the ER stress-associated transcription factor ATF4 in the liver, lungs and brain of 6 weeks old *Peromyscus leucopus* and *Peromyscus maniculatus*. Our results showed that despite the high variation between individuals in the expression of various UPR components, a stunningly high degree of coordination is maintained between different chaperones in 6 weeks old *P. leucopus* and *P. maniculatus* with some animals exhibiting uniformly high and others exhibiting lower response. Furthermore, we found that different tissues possess unique resilience to stress. In example in *P. leucopus*, the brain displayed the tightest coordination in the expression of different chaperones that implies lowest resilience, which in turn satisfies the requirement of this tissue for enhanced homeostatic performance. Furthermore, we recorded a higher degree in coordination in the tissues of the long living *P. leucopus* that lives up to 8 years in captivity as compared to *P. maniculatus* that lives in captivity for up to 4 years. How the degree of coordination changes during metabolic stress or aging will be discussed. Our results suggest that that the maintenance of coordination in the expression of UPR genes is biologically relevant and reflects the resilience of different tissues and species to stress.

**Spencer, Matthew**

**Mentor(s): Dr. Andrew Lemieux**

**Problem-Oriented Wildlife Protection: Poaching Prevention on U.S. Federal Lands**

Problem-oriented policing (POP) is a concept for analyzing specific crime problems, implementing tailored interventions, and evaluating their success. While this process has largely been applied by urban police forces to reduce crime problems such as burglary of single-family houses, robbery at ATMs, and other forms of disorder, the process can be applied widely, including to problems in rural areas. Over the years, the Center for Problem-Oriented Policing has produced a collection of guides that help lead law enforcement agencies through the problem-solving process. This project is the first attempt to produce a guide for wildlife crime, namely poaching on protected federal lands in the United States. By combining the resources and knowledge of traditional POP practice and theory, the guide explores how wildlife protection agencies can restructure their thinking on poaching prevention by adopting a crime specific approach to problem-solving. Keeping with the specificity aspect of POP, this guide does not cover wildlife poaching outside of the United States, the illegal trade in wildlife products, or wildlife poaching on private or state lands. The guide is meant to be a useful tool for anyone working in conservation law enforcement

or wildlife conservation.

### **Squires, Courtney**

**Mentor(s): Dr. Krystal Werfel, Dr. Lesly Wade-Woolley**

#### **Expressivity During Oral Read-Alouds: What are we emphasizing? A Comparison of Readings by Graduate and Certified Speech-Language Pathology Clinicians**

Exposure to text and particularly the process of shared book-reading through oral read-alouds have been shown to support the development of children's language and literacy skills both at home and in the classroom (Neuman & Dickinson, 2011; National Institute of Child Health and Human Development, 2001). Emerging studies have also indicated that the prosody of these oral readings, or the melody and expressivity of language through varied pitch, tone, volume, and pace, may affect students' listening comprehension and engagement (Mira & Schwanenflugel, 2013; Moschovaki, Meadows, & Pellegrini, 2007; Goldman et al., 2006). Specifically, Mira & Schwanenflugel (2013) found that the more expressive an oral reading was, the better students performed on cued recall tasks, which are similar to questions that students are presented with in academic settings (i.e. "What does X mean?") (Mira & Schwanenflugel, 2013). Because oral read-alouds are a task that graduate speech-language pathology clinicians (G-SLPs) often find themselves engaged in, this study sought to investigate the naturalness of expressivity in oral readings in the absence of explicit training and, furthermore, the elements of sentence structure that are most frequently acoustically highlighted. Oral readings of short text passages by G-SLPs and certified speech-language pathologists (CCC-SLPs) were recorded and analyzed using PRAAT, a computer software used for analyzing and synthesizing the speech stream. The results indicated that expressivity, or variations in prosody, occurred two times as frequently for CCC-SLPs than G-SLPs. Further analysis also showed that both CCC-SLPs and G-SLPs acoustically highlighted adjectives more than any other parts of speech. The findings of this study suggest that while G-SLPs emphasize similar parts of speech as experienced clinicians, training may be warranted to develop a higher frequency of expressivity during oral readings. Future studies should investigate how various doses of prosodic change during oral read-alouds affect children's listening comprehension outcomes.

### **Stansbury, Melissa**

**Mentor(s): Dr. Delia West, Dr. Jean Harvey, Dr. Rebecca Krukowski, Dr. Colleen McBride**

#### **Positive Affective Response to Exercise Among Individuals Entering a Behavioral Weight Control Program**

**Introduction:** Affective response to exercise has been suggested as a behavioral phenotype associated with obesity. Identifying meaningful behavioral phenotypes among individuals seeking weight control treatment can inform intervention refinement and improve outcomes, advancing personalized obesity treatment efforts. Therefore, the purpose of this study was to explore affective response to exercise among adults entering a behavioral weight loss program.

**Methods:** At baseline, participants in an online behavioral weight loss program completed the 12-item Physical Activity Affect Scale (PAAS) and rated intensity of different feelings experienced after physical activity or exercise. Average scores (range: 0-4) were calculated for positive affect, negative affect, tranquility, and fatigue subscales. Participants were weighed and measured, and self-reported their demographic information.

**Results:** Participants (N=79) were identified as predominantly white (73%) college-educated (81%) females (89%) with a mean BMI of 36 (85% obese). On average, PAAS subscale scores were as follows: positive affect  $2.5 \pm 0.8$ ; negative affect  $0.3 \pm 0.5$ ; fatigue  $1.3 \pm 0.9$ ; tranquility  $2.1 \pm 1.0$ . There were no differences in subscale scores between blacks and whites or those living in the South compared to the Northeast. However, individuals with moderate/severe obesity (BMI > 35; 48%) reported significantly lower positive affect following exercise than those with overweight/mild obesity (2.3 vs 2.7,  $p=0.046$ ) and

significantly more fatigue (1.6 vs. 1.0,  $p=0.006$ ).

Conclusions: Dimensions of affective response to exercise are associated with weight status of individuals entering a weight control program. If this behavioral phenotype proves predictive of weight loss outcomes or physical activity changes, the phenotype may be a promising target for intervention tailoring, particularly for those with moderate/severe obesity.

**Steiner, Alex**

**Mentor(s): Dr. Charles Mactutus**

### **Hippocampal cell loss in HIV-1 Tg rats: A Role for Impaired Neurogenesis?**

The Tat viral protein has been previously shown to decrease neuronal cell counts in the granular layer of the hippocampus; however, differences have not been shown in the HIV-1 Tg rat. We investigated the effects of S-equol treatment on hippocampal neurogenesis and morphology. Male and female HIV-1 Tg ( $n=42$ ) or control ( $n=44$ ) animals were orally given either 0.2 mg S-equol or a placebo from postnatal days 28 to 90. Brains were extracted and prepared for alternating sections at 300 $\mu$ m of either Nissl or doublecortin (DCX) stain. DCX is expressed by immature neurons and is indicative of neurogenesis. Nissl stained hippocampal slices at approximately bregma 3.24mm were chosen to be analyzed under a light microscope to determine percent area of the dentate gyrus relative to the entire hippocampus, as well as the length and thickness of the dorsal and ventral blades of the granular layer. Total DCX neuron counts were found in the granular layer by taking 4 sequential hippocampal slices and using the optical fractionator probe to cover 100% of the region. An ANOVA statistical analysis revealed a significant 3-way interaction between Sex, genetic condition, and treatment group  $p\leq.05$  for the percent area of the dentate gyrus. A sex difference was also found for the thickness of the granular layer  $p\leq.05$ . DCX neuronal counts resulted in impaired neurogenesis in the HIV-1 Tg rat compared to controls regardless of treatment group. S-equol failed to deter HIV neurogenesis impairments despite the increased synaptic connectivity previously reported.

**Sultan, Muthanna**

**Mentor(s): Prof. Mitzi Nagarkatti, Prof. Prakash Nagarkatti**

### **Upregulation of endocannabinoids in fatty acid amide hydrolase (FAAH) knockout mice prevents staphylococcal enterotoxin B (SEB)-mediated acute lung injury through changes in the microbiome, immune cells and metabolic profiles**

Endogenous cannabinoids are considered key regulators of biological systems as they have been shown to exhibit anti-inflammatory properties, while the fatty acid amide hydrolase (FAAH) enzyme plays a role in degrading the endogenous cannabinoid, anandamide. Staphylococcus Enterotoxin B (SEB) is a superantigen that can cause acute lung injury (ALI) through inhalation. In this study, we found that FAAH knockout mice (FAAH $^{-/-}$ ) were more resistant to developing SEB-induced ALI 48 hours after intranasal administration dose of 50  $\mu$ g SEB compared to wildtype (WT) mice. The SEB-treated FAAH $^{-/-}$  mice had similar clinical parameters and upregulation of endogenous anandamide as naïve FAAH $^{-/-}$  mice. The results from assessing the clinical profile by plethysmography showed unlike with WT groups, there were no significant changes in the functions of the lung in FAAH $^{-/-}$  exposed to SEB when compared to naïve FAAH $^{-/-}$ . Immune profiling by flow cytometry revealed there were also no changes in T cells subsets or cytokine levels among vehicle or SEB-treated FAAH $^{-/-}$  mice. Furthermore, after MiSeq sequencing of the V3-V4 region of the 16S rRNA of colon/cecal flush and lung samples, both the bacterial phylogenetic and short chain fatty acid (SCFA) profiles showed no significant differences in naïve FAAH $^{-/-}$  mice compared to those treated with SEB, unlike WT groups that had significant differences in these profiles. Lastly, further investigation of the metabolic profile by glycolysis rate assay (GRA) of splenocytes from both experimental groups showed no significant differences in this metabolic pathway. Collectively, these data suggest that inhibition or knockout of the FAAH enzyme may lead to increased endogenous cannabinoid, anan-

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damide, thereby preventing SEB-induced ALI.

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**Sutherland, Melanie**

**Mentor(s): Dr. Angela Liese**

**Depressive Symptom Trajectories among Youth and Young Adults with Type 1 Diabetes**

**Purpose:** The purpose of this study is to characterize the burden of depressive symptoms over time in youth and young adults (YYA) with type 1 diabetes (T1D) by identifying subgroups that have similar trajectories of depressive symptoms and assessing baseline demographic predictors of these trajectories.

**Methods:** YYA with T1D between the ages of 10.0 and 20.6 years, diagnosed between 2002 and 2005, who were enrolled in the SEARCH for Diabetes in Youth Study Phase 1 were included (n = 879, 47.6% female, 76.3% non-Hispanic white). During SEARCH Phase 2, participants provided between two and four measures of depressive symptoms using the Center for Epidemiologic Studies – Depression scale over a five-year period from baseline. Group-based trajectory modeling was used to identify trajectories of depressive symptoms, and multinomial logistic regression was used to assess predictors of trajectories. Trajectories were interpreted based on established cut-offs for adolescents: minimal (0-15), mild (16-23), and moderate/severe (24-60).

**Results:** Five depressive symptom trajectories were identified: little to no depressive symptoms (63.2%), chronic minimal (22.2%), increasing from mild to moderate (4.6%), decreasing from mild to minimal (6.7%), and chronic moderate (3.3%). There were no significant differences in age at baseline among the groups. Significant demographic predictors of trajectories include sex, race/ethnicity, parental education, family income, and health insurance status. For example, the increasing mild to moderate trajectory had a greater proportion of Hispanic participants, with lower parental education, who receive public health insurance compared to the little to no symptoms trajectory.

**Conclusion:** Among YYA with T1D, unique trajectories of depressive symptoms show meaningful differences in demographic characteristics. These results provide insight into the identification of high-risk groups and pose potential targets for prevention of chronic depressive symptoms.

**Tabury, Kevin**

**Mentor(s): Dr. Mythreye Karthikeyan, Dr. Tarek Shazly**

**Long non-coding RNA PVT1, a hope in fighting ovarian cancer**

Ovarian cancer, fifth cause of cancer related death in women, has a 5-year survival rate of only ~36%. The low survival rate results mainly from a lack of effective early detection methods and inefficient treatment at the time of diagnosis. Paving the route for novel therapeutic targets or early detection biomarkers are therefore pivotal.

Here, we present the long non-coding RNA PVT1 (lncRNA PVT1) as a potential solution. Long non-coding RNAs are RNA sequences of more than 200 nucleotides that do not code for proteins. These have received increasing interest in the last decade as masters of gene expression regulators.

We have found that lncRNA PVT1 plays a crucial role at the early stage of ovarian cancer and during metastasis. In particular, the expression of lncRNA PVT1 is modulated through cellular stress in addition to its interactions with two central tumorigenic pathways, the TGF-beta and Hippo pathway.

Elucidating the mechanistic of lncRNA PVT1 in ovarian cancer development and metastasis has the potential to improve early detection methods and the survival rate of patients with ovarian cancer.

**Taylor, Emily**

**Mentor(s): Ms. Lisa Johnson, Dr. Alexandra Basilakos, Dr. William Matchin, Dr. Julius Fridriksson**  
**Using Neuroimaging to Explore Gestures in People with Aphasia**

Background:

People with aphasia (PWA) can increase communication effectiveness by utilizing gestures to compensate for language impairment, aid in lexical retrieval, and provide social cues (Akhavan et al., 2018). Research suggests individuals employ similar strategies when using pantomimes to depict objects, possibly indicating people have common underlying mental schemas influencing gesture production (Nispen, 2017). The present study investigates associations between lesion location, resting state functional connectivity (RFC), and use of gestures in PWA post language therapy.

Aims:

We sought to examine how lesion location and RFC in the brain affect 1) use/non-use of gestures in people with chronic aphasia and 2) success of those gestures for meaningful communication at pre- and post-treatment.

Methods:

10 participants were chosen from a larger study investigating treatment outcomes in PWA. This large-scale study involved baseline testing, 6 weeks of treatment, and post-treatment testing. Gesture production was examined during pre- and post-treatment using the Philadelphia Naming Test (PNT). Raters viewed videos of testing and scored verbal and gestural productions, utilizing principles from Nispen (2017). All participants underwent a high-resolution MRI to obtain T1/T2 scans and resting state functional connectivity. Brain lesion analysis was conducted using pre-treatment scans with NiiStat.

Results:

Overall, proportion of gesture use significantly decreased post-treatment ( $p=.05$ ). Lesion analyses suggest the importance of left inferior temporal gyrus in the production of gestures at initial testing, indicating that those who were more likely to gesture did not have damage to this area. RFC analysis indicated importance of intact connections between left inferior temporal gyrus and left lingual gyrus in producing meaningful gestures at post-treatment, suggesting that those who do not produce meaningful gestures have less connectivity between these two areas ( $z=4.89$ ). Meaningful gesture use post-treatment was associated with greater RFC between left superior parietal gyrus and right thalamus ( $z=4.90$ ).

Discussion/Conclusion:

Our results provide neuroanatomical data which may explain why some PWA are better at producing gestures and using them for communication. This data could be used to guide the integration of gestures into treatment for PWA. However, further research is needed to confirm our findings.

**Teapole, Brianna**

**Mentor(s): Ms. Janice Edwards**  
**Amish Perspectives of Genetic Counseling**

The Amish are a population with a high concentration of genetic disorders who have informed our understanding of several genetic conditions. This culturally unique group has special need for genetic services.

While clinics have been established to care for Amish individuals, such as the Community Health Clinic in Indiana, little research has been done on Amish perspectives of these services, specifically genetic counseling. Amish individuals who received genetic counseling from the Community Health Clinic were sent recruitment letters and a questionnaire via mail. The questionnaire consisted of demographic questions, a 7-item adapted Genetic Counseling Satisfaction Scale (GCSS), and open-response questions. Thirty-three individuals completed the questionnaire. The majority of participants were aware they were receiving genetic counseling (81.8%), and most participants received genetic counseling from a genetic counselor (54.5%) versus a geneticist (39.4%). The mean satisfaction scores for each 5-point Likert-scale question showed that overall, participants were satisfied with their experience with genetic counseling, with mean scores ranging from 4.58 to 4.77. Descriptive and univariate statistics showed some statistically significant differences in satisfaction when comparing males versus females, referral type, and whether the participant saw a genetic counselor or a geneticist. Open-ended responses also showed that participants were satisfied with their genetic counseling. These responses centered around three themes: rapport-building aspects of the session, cultural appropriateness of the session, and the impact of the session on medical decision making. In this first study to explore Amish perceptions of a genetics clinic tailored to their particular way of life, we found that the Amish served by the Community Health Clinic felt respected, that their care was culturally sensitive, and they were satisfied with the genetic services they received.

**Thorp, Dylan**

**Mentor(s): Dr. Dirk-Bart den Ouden**

**Measuring sentence-level variables in aphasic discourse**

Dylan Thorp, Master of Speech Pathology student, Dept. of COMD, ASPH

Carolyn Loescher, Master of Speech Pathology student, Dept. of COMD, ASPH

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Measuring sentence-level variables in aphasic discourse

Introduction

This project aimed to identify sentence-level changes in aphasic discourse after therapy, including mean length of utterance (MLU), type-token ratio (TTR), and noun/verb ratio (N/V-ratio) post-intervention. This poster will discuss these outcomes and give suggestions for keeping interrater differences to a minimum when manually delimiting utterances.

Methods

In marking utterance boundaries, we used Content Units, because these provide nuanced information critical to making a decision as to where an idea begins and ends. To minimize the level of subjectivity involved in identifying these nuances and manually delimiting utterances, training, reliability testing, and communication between raters was important.

Results

Analyses comparing pre-therapy to post-therapy discourse measures are currently in progress and will be presented at the conference.

Conclusions

To minimize interrater differences, skills our team found to be useful were:

☐ Differentiating sentences from fragments between which the prosodic/intonation pattern indicated the end of a complete thought;

- ☒ Recognizing that utterances which do not obviously represent a complete thought may still stand alone as individual utterances, which we see in more severe cases of language loss.
  - ☒ Treating repeated units as a series of attempts at producing a target word instead of treating them as separate, unrelated utterances.
- Further conclusions based on results are forthcoming.

**Thors, Helga**

**Mentor(s): Dr. Julius Fridriksson**

**Analysis of functional connectivity furthers understanding of spontaneous speech and auditory comprehension in chronic stroke.**

Lesion-behavior analyses in post-stroke aphasia have been core for identifying areas crucial for language processing. But, language likewise relies on areas functionally communicating as a network, and this too is interrupted post-stroke. Therefore, resting state fMRI (rsfMRI) may provide complementary and supplementary information about functional connections required for language processing. Here, we compare rsfMRI and lesion analyses in the prediction of language impairments in chronic aphasia due to stroke.

We retrospectively analyzed 92 participants with a stroke to the left hemisphere. Aphasia was identified using the Western Aphasia Battery-Revised. We acquired structural and rsfMRI scans, lesions were demarcated manually. We assessed brain damage and reduced functional connectivity associating with impairments on two subtests of the WAB: auditory word comprehension and spontaneous speech. To do this, we predicted normalized behavioral scores using multivariate support vector regression within a leave-one-participant-out framework from (a) binary lesion maps and (b) resting-state functional connectomes. Functional connectomes were computed using the AICHA parcellation and subsequent analyses were restricted to only cortical regions.

Both spontaneous speech and auditory word comprehension impairments were significantly predicted by reduced functional connectivity. Impaired spontaneous speech was predicted by reduced ipsilesional connectivity between supramarginal and precentral gyrus and by interhemispheric connections between frontal, frontoparietal and temporoparietal connections. Impaired auditory word comprehension was predicted by reduced ipsi- and contralesional connectivity between temporoparietal cortex. Lesion damage in insula, posterior superior temporal gyrus and inferior frontal gyrus was significantly predictive of spontaneous speech impairment and damage to temporal (anterior, posterior) and angular gyrus predicted auditory word comprehension impairment. Spontaneous speech impairment was significantly better predicted by reduced functional connectivity, but lesion damage was a better predictor of impaired auditory word comprehension.

Spontaneous speech likely relies on ipsilesional and interhemispheric connectivity. In line with the dual stream model, impaired auditory word comprehension was predicted by decreased interhemispheric connectivity but in our study more accurately predicted by regional damage. These results suggest a role for left hemisphere temporoparietal cortex in language comprehension and suggests that spontaneous speech relies on dorsal stream ipsilesional connectivity but also on the recruitment of the bilateral dorsal stream areas.

**Thurstin, Ashley**

**Mentor(s): Dr. Holly LaVoie**

**Effect of hTIMP4 overexpression on maternal cardiac function in mice during pregnancy and early postpartum**

Pregnancy creates a volume overload condition in the maternal heart, which enlarges to accommodate the increased blood volume. During the postpartum period, the heart gradually returns to its pre-pregnancy size and function. Remodeling of the heart during this time involves changes in the left ventricle's (LV) extracellular matrix. Defects in postpartum cardiac remodeling are associated with postpartum cardiomyopathy. Our laboratory recently reported that wildtype C57Bl6 mice have a transient decrease in the mRNA for TIMP metalloproteinase inhibitor 4 (TIMP4) in the LV during the immediate postpartum period. To understand the importance of TIMP4 during postpartum cardiac remodeling, we utilized mice with cardiac-restricted overexpression of the human TIMP4 gene (hTIMP4-OE mice; source: Dr. Spinale) to evaluate cardiac function during pregnancy and early postpartum. Heart function parameters were assessed using echocardiography in FVB wildtype and TIMP4-OE mice at diestrus (virgin), pregnancy days 10 (ed10), 12 (ed12), 17/18 (ed17/18), and postpartum day 2 (ppd2). LV internal diameters during systole and diastole (LVIDs and LVIDd) were measured. Fractional shortening (FS), stroke volume (SV), ejection fraction (EF), end systolic volume (ESV), and end diastolic volume (EDV) were calculated. We collected data on 5-17 mice per time point and analyzed parameters within genotype by ANOVA and Tukey's tests. We then compared genotypes at each time point by t-test. A  $P < 0.05$  was considered significant. In wildtype and hTIMP4-OE mice, LVIDs and ESV were significantly increased on ppd2 compared to virgin mice; hTIMP4-OE mice were also increased at ed17/18. Compared to virgin mice, LVIDd and EDV were increased in both genotypes on all pregnancy and postpartum days except ed17/18 for wildtype mice. When comparing genotypes, virgin hTIMP4-OE mice had higher EF and FS than virgin wildtype mice. EF and SV were also increased on ppd2 in hTIMP4-OE mice compared to wildtype mice. In summary, both wildtype and hTIMP4-OE mice had increased LV size and function during late pregnancy and/or early postpartum. Differences between wildtype and hTIMP4-OE mice were mostly observed in virgin and ppd2 mice. Funding: SC-INBRE-5P20GM103499.

**Tikadar, Amitav**

**Mentor(s): Prof. Jamil A. Khan**

**Enhanced Thermal-Hydraulic Characteristics of Inter-Connected Mini-Channel Heat Sink- An Experimental Study**

An experimental investigation of an inter-connected parallel and counter flow mini-channel heat sink was performed to quantify the enhanced thermal and hydraulic characteristics compared to the conventional mini-channel heat under laminar flow regime. The heat sink was fabricated from oxygen free copper. The aspect ratio (height/width) and the hydraulic diameter of the mini-channel were 0.33 and 750 $\mu$ m respectively. De-ionized water was employed as coolant, and a constant heat flux of 100000 W/m<sup>2</sup> was applied on the bottom surface of the heat sink. To enable transverse flow between two adjacent channels, two inter-connectors were fabricated in the middle wall. The height and width of both inter-connectors were same as mini-channel. Bottom surface temperature, Nusselt number (Nu), friction factor, thermal resistance, pumping power, and overall performance evaluation criteria (PEC) were calculated to address the effect of inter-connector on the overall performance. Negligible effect of the inter-connector was evident for the parallel flow heat sink whereas, for counter flow heat sink, a substantial effect of the inter-connector was recorded.

**Trott, Corinne**

**Mentor(s): Dr. Subrahmanyam Bulusu**

**Eddy-induced Temperature and Salinity Variability in the Arabian Sea**

The eddy field in the Arabian Sea experiences seasonal wind-driven intensification during the summer monsoon season from June through September. These strong eddies strengthen local currents like the Somali Current and strongly impact regional upper-level vertical and lateral advection. To investigate the multivariate response to eddying, we apply a closed-contour eddy-tracking algorithm to sea level anomaly maps and then examined sea surface temperature and salinity of the identified eddies to infer whether they are surface or subsurface intensified in the Arabian Sea during the summer monsoon. A complete understanding of the temperature and salinity signatures reveals how Arabian Sea eddies alter upper-ocean stratification. Though both intensification types were identified, we find an unmistakable dominance of likely surface-intensified eddies characterized by relatively warm and fresh cores for anticyclonic eddies and relatively cool and saline cores for cyclonic eddies, particularly in the northwestern Arabian Sea and Somali Current region.

**Tryon, Sarah**

**Mentor(s): Dr. David Mott**

**Cholinergic modulation selectively filters glutamatergic transmission to the basolateral amygdala in an input-specific and activity-dependent manner.**

The neuromodulator acetylcholine (ACh) is important in attention and memory, in part, by acting presynaptically to regulate glutamate release from excitatory inputs in hippocampus and cortex. The basolateral amygdala (BLA), a brain region critical for emotional memory, receives strong cholinergic innervation. However, the role of cholinergic input in modulating synaptic transmission in BLA is not fully understood. In this study we used optogenetics and slice electrophysiology to examine cholinergic modulation of excitatory afferent inputs to BLA from prelimbic cortex (PL), thalamus (THAL), and ventral subiculum (vSUB). Field and whole-cell electrophysiological responses were recorded from BLA pyramidal neurons. Muscarinic receptors were activated by endogenously released ACh or by application of muscarinic agonists (10 $\mu$ M muscarine). We found that muscarinic receptor activation differentially suppressed PL, THAL, and vSUB inputs. Near-complete inhibition was seen at PL (81.24%  $\pm$  2.57) and vSUB (82.62%  $\pm$  2.28) inputs, while thalamic input was only partially inhibited (54.34%  $\pm$  4.76). Suppression of PL and THAL pathways was produced by a M3 mAChR-mediated mechanism, as muscarinic suppression of these inputs was completely reversed by the M3 mAChR antagonist 4-DAMP (1 $\mu$ M). This M3-mediated inhibition was produced by an endocannabinoid-independent mechanism at the PL input, but an endocannabinoid-dependent mechanism at THAL input. Stimulation of afferent inputs at different frequencies revealed pathway specific differences in muscarinic inhibition attributable to the distinct mechanisms of inhibition at different inputs. Muscarinic inhibition at PL inputs failed during high frequency stimulation in the gamma range (40 Hz), while muscarinic inhibition at thalamic inputs remained intact. These findings suggest that during periods of high cholinergic tone, low frequency input will be nearly completely inhibited at PL pathway and only partially inhibited at THAL pathway. However, cortical neurotransmission will overcome this muscarinic inhibition at higher frequency (gamma) input. We suggest that this mechanism may enable gamma frequency cortical input to activate BLA, while suppressing low frequency, spurious signals. Supported by the NIMH (R01MH104638 to DDM and AJM), T32-GM081740, and partially supported by a SPARC Graduate Research Grant from the Office of the Vice President for Research at the University of South Carolina.

**Tucker, Will**

**Mentor(s): Dr. Abbi Lane-Cordova**

**Sodium Consumption and Blood Pressure in Women 6 Months- 3 Years After Delivery**

Sodium Consumption and Blood Pressure in Women 6 Months- 3Years After Delivery

Will Tucker, Katie O'Byrne, Paige Wilbanks, Nicole Hoffner, Chloe Caudell, Abby Heinichen, Abbi Lane-Cordova, Ph.D.

**Introduction:** Dietary sodium consumption and blood pressure have been found to be positively correlated in non-pregnant adults. Blood pressure may be insensitive to dietary sodium consumption in pregnant women. Whether blood pressure remains insensitive to sodium in the period shortly after pregnancy is unclear.

**Purpose:** The purpose of this investigation was to determine whether self-reported sodium consumption was associated with blood pressure in women 6 months to 3 years after giving birth.

**Methods:** Values of sodium consumption were obtained using a validated questionnaire. Brachial systolic and diastolic blood pressure were measured using an oscillometric cuff after a 5-minute rest period. Aortic blood pressure was obtained using arterial tonometry with a validated transfer function. Relations of sodium with central and peripheral blood pressures were assessed using Pearson correlations.

**Results:** 18 participants completed the study (mean age=33±1 yrs, BMI=27±2 kg/m<sup>2</sup>). Mean blood pressure was 110±3/70±2 mmHg. Neither systolic brachial blood pressure (r=0.051, p=0.84) or aortic systolic blood pressure (r=0.035, p=0.89) were correlated with sodium consumption survey scores. No relation was found between brachial diastolic blood pressure (r=0.19, p=0.44) or aortic diastolic blood pressure (r=0.19, p=0.44) and sodium consumption. This lack of association persisted when we adjusted for age and race in separate analyses.

**Conclusion:** Sodium consumption was not related to brachial or aortic blood pressure in women 6 months to 3 years after delivery. This lack of association could be because of carry-over of the renal and cardiovascular adaptations that occurred during pregnancy and contributed to maintained sodium insensitivity of blood pressure.

**Uddin, Md Majbah**

**Mentor(s): Dr. Nathan Huynh, Mr. Fahim Ahmed**

**Assignment of Freight Traffic in Large-Scale Intermodal Networks under Uncertainty**

This research presents a methodology for freight traffic assignment in a large-scale road-rail intermodal network under uncertainty. A stochastic model is formulated to obtain the user-equilibrium freight flows. To solve this challenging problem, an algorithmic framework, involving the sample average approximation and gradient projection algorithm, is proposed. For network uncertainty, five natural disaster cases are considered: earthquake (high risk), earthquake (high and moderate risk), hurricane, tornado, and flood. For all of these disaster cases, the developed methodology is tested on the U.S. intermodal network by using the freight demand for truck, rail, and road-rail intermodal from the Freight Analysis Framework. A key finding is that under the flood risk, the increase in freight ton-miles is the highest compared to the base case without uncertainty. The proposed methodology can be used by freight transportation planners and decision makers to forecast freight flows and to evaluate strategic network expansion options when the intermodal network is subject to uncertainties, such as natural disasters or disruptions.

Uriegas, Nancy

**Mentor(s): Dr. Toni Torres-McGehee, Dr. Dawn Emerson, Dr. Susan Yeargin, Dr. Cormac Cannon, Ms. Ally Smith**

### **Perceived Gastrointestinal Distress Symptoms among University Marching Band Musicians**

**Purpose:** The purpose of this study was to examine perceived Gastrointestinal (GI) distress symptoms in marching band (MB) musicians during activity.

**Methods:** Nineteen participants from two university MB (MB1: n = 10; MB2: n = 9; male: n=6, female n=13, age=20.5±0.9 yrs; weight=73.3±18.9 kg; height = 164.9 ± 6.8 cm; body fat = 27.5 ± 11.4%). Data collection occurred during 3 rehearsals and 2 football game performances. At pre- and post-activity, participants completed a previously developed GI symptom index divided into 3 sections: 1) upper abdominal (e.g., heartburn, reflux, nausea, vomiting), 2) lower abdominal (e.g., pain/cramping, flatulence, diarrhea), and 3) systemic problems (e.g., dizziness, headache, urge to urinate). Symptoms were scored on a 10-point scale (0 = no problems; 9 = worst it has ever been). Scores > 4 were considered “serious”. Statistical analysis included descriptives and Wilcoxon signed-rank, Mann-Whitney U, and X<sup>2</sup> tests to determine differences in symptom frequency and % serious overall, between rehearsal and games, and between and within musicians at MB1 and MB2. Significance was set at alpha < 0.05.

**Results:** No significant differences in overall pre- and post-activity GI symptoms. Headache and urge to urinate received the highest scores (7/10). Dizziness was the only significantly different symptom between event (rehearsal or game performance), with 4.5% considered serious and all occurring at a game performance (X<sup>2</sup> = 6.78, P = 0.009). No significant differences found in upper and lower symptoms pre- or post- between MB1 and MB2. However, systemic GI scores were significantly higher for MB2 than MB1 at pre- (U = 477.5, z = -2.023, P = 0.043) and post-activity (U = 628.0, z = -3.642, P < 0.001). Within MB2, dizziness was reported as serious 6.7% of the time and more frequently at post-game (X<sup>2</sup> = 4.82, P = 0.028). Within MB1, systemic symptoms occurred more often post-games than post-rehearsals (U = 184, z = -2.122, P = 0.034).

**Conclusions:** Although there were no differences between groups, it is important to note that MB musicians reported GI distress. Healthcare professionals working with this population should be aware of minimizing risks associated with GI distress.

**VanderVeen, Brandon**

**Mentor(s): Dr. James Carson**

### **The regulation of skeletal muscle fatigue during the progression of cancer cachexia**

Cachexia is the unintentional loss of body weight secondary to chronic disease and is prevalent in roughly 50% of cancer patients. The loss of body weight, specifically skeletal muscle mass, is associated with reduced functional independence and life quality resulting in increased morbidity and mortality. The etiology of cachexia is multimodal and complex; however, cachexia has been linked to several systemic and behavioral changes that compound to accelerate muscle mass and body weight loss. While several inflammatory cytokines are associated with cachexia's disease progression, our laboratory has established that Interleukin-6 (IL-6) is a key regulator of skeletal muscle mass maintenance in tumor-bearing ApcMin/+ (MIN) mice. Additionally, we have shown that reduced volitional activity and increased skeletal muscle fatigue occurs prior to significant wasting and exercise training is able to prevent IL-6-induced cachexia in the MIN without affecting muscle inflammatory signaling. While the efficacy of exercise to improve skeletal muscle's metabolic health during aging and disease has been well described, the effects of volitional activity on cancer-induced skeletal muscle fatigue, oxidative metabolism, and muscle inflammatory signaling is not well understood. The overall purpose of this study is to determine the regulation of skeletal muscle fatigue by activity and muscle inflammatory signaling during the progression of cachexia. Our central hypothesis is that cancer-induced skeletal muscle fatigue develops prior to significant weight loss concomitant with decreased muscle use and disrupted muscle oxidative metabolism which occurs through chronically activated muscle gp130 signaling. Our results suggest that the onset of skeletal

muscle fatigue developed prior to significant weight loss in MIN mice. Furthermore, elevated circulating IL-6 accelerated skeletal muscle fatigue and reduced muscle oxidative metabolism through muscle gp130 signaling; however, loss of muscle gp130 signaling was unable to improve skeletal muscle fatigue in MIN mice. Last, we demonstrate that there is a direct relationship between activity and skeletal muscle fatigability in healthy and tumor-bearing mice. Together, these results suggest that inactivity and chronic inflammation together disrupt oxidative metabolism and accelerate skeletal muscle fatigue and increasing muscle use through exercise may alleviate the onset of cancer-induced fatigue.

**Viado, Hildehardo**

**Supervisor(s): Margaret Carson, James Winstead, Katya Altman**

**Mentor(s): Dr. Geoff Scott, Dr. Dwayne Porter**

**Development of an Object Detection and Enumeration Program with an Artificial Intelligence Imaging Data Collection Application Tool (AI2DCAT)**

**Background / Purpose:**

Little is known about the number of people using recreational swimming beaches annually and how these anthropogenic activities impact the environment. Researchers will develop a geographically transferable feature recognition tool to count and assess human beach and water activities by utilizing an established network of Southeast Coastal Ocean Observing Regional Association (SECOORA) web cameras in the coastal vicinity. The purpose of the project is to develop a video analysis tool that quantifies beach utilization and populates a database of beach related activities. Artificial Intelligence Imaging Data Collection Application Tool (AI2DCAT) project aims to improve the understanding between beach utilization and the issuance of public health advisories, rip current advisories, and temperature extremes. The database will determine if people are following issued advisories and can directly benefit coastal communities, state and federal agencies, and industries.

**Methods:**

The video source for the project originates from the SECOORA Web Camera Applications Testbed (Web-CAT) dataset. A deep learning algorithm (DLA) will be applied to quantify beach utilization by determining the category of an object in a video. Image location will be calculated by placing a bounding box around it. Algorithm codes that mimic the human brain will be developed to create a convolutional neural network (CNN) system that will recognize large quantities of patterns and data points to categorize the objects. A discriminative object detection program will be developed to create the imaging CNN. Validation of the data images will be performed using a non-parametric background subtraction method with the Statistical Analysis System (SAS) software (Version 9.4).

**Results:**

Video object analysis will begin in March 2018. Significant findings and results will be available and annotated on the poster presentation.

**Conclusion:**

The AI2DCAT can assist regulatory agencies and policymakers in the decision-making process to benefit local-level economic development, increase public health and safety awareness, and aid in environmental monitoring. The AI2DCAT is designed to be geographically and thematically transferable.

**Vickery, Alexandra**

**Mentor(s): Dr. Jessica Klusek**

**Relationship between anxiety and disfluency in mothers with the fragile X permutation**

**Introduction:** Mothers with the fragile X premutation have been shown to have executive function deficits, including increased language disfluencies, as part of their phenotype. Similarly, mothers of children with autism spectrum disorder are also at an increased risk for executive function and language difficulties due to the broad autism phenotype. This study examined the relationship between mothers' language disflu-

encies and anxiety.

**Methods:** We conducted a between-group design study of three groups of mothers: mothers of a child with autism spectrum disorder (ASD) (n=39), mothers of a child with Fragile X syndrome (FXS) (n=41), and control mothers of typically developing (TD) children (n=29). Language samples were elicited and coded for various language disfluencies (revisions, repairs, and filled pauses). Generalized anxiety symptoms were assessed via the Beck Anxiety Inventory.

**Results:** A general linear model tested anxiety, group membership, and their interaction as predictors of disfluency. A group interaction was detected, where revisions and repairs increased with higher anxiety symptoms in the control mothers but not in the other groups (revisions;  $p=0.0034$  and repairs;  $p=0.0058$ ). Age was also found to be a predictor of language disfluencies in mothers, with disfluencies increasing as age increases.

**Conclusion:** Elevated anxiety symptoms were associated with higher rates of certain types of disfluencies in control mothers of TD children, but this relationship was not observed in mothers of children with ASD and FXS. This suggests that different mechanisms may underlie disfluency in at-risk parent groups.

**Vu, Nguyen**

**Mentor(s): Dr. David Mott**

### **Differential Cholinergic Modulation of Projection Neurons in the Basolateral Amygdala**

Emotion is a crucial component of the decision-making process. The amygdala, known as the “orchestrator” of the emotion circuit, associates emotional valence with incoming sensory stimuli and thus contributes to decision-making. Within the basolateral nucleus of the amygdala (BLA) spatially segregated and genetically distinct pyramidal neurons (PNs) have been identified based on their correspondence to distinct behavioral stimuli. These PNs project to several brain regions mediating different aspects of the emotional spectrum. For example, BLA PNs projecting to prelimbic (PL) and infralimbic (IL) cortex are involved in fear acquisition and fear extinction, respectively. However, the mechanism by which these distinct PNs are modulated and whether this modulation differs depending on their projection targets remains unclear. The BLA is densely innervated by cholinergic fibers from the basal forebrain, and the contributions of acetylcholine (ACh) to selective attention, emotion, and other cognitive functions suggest a modulatory role of this neurotransmitter in the BLA. Here, we have used confocal immunofluorescence to examine the anatomical distribution of cholinergic markers across the BLA relative to PNs, including those projecting to PL and IL, to establish an anatomical basis for cholinergic modulation of different PNs. Immunoreactivity for both postsynaptic M1 muscarinic receptors and vesicular ACh transporter (vAChT), a marker of cholinergic terminals, was significantly greater in the dorsal intermediate region of the anterior BLA (BLAa) compared to other regions of the BLA or other amygdalar subnuclei (n=6). M1R immunoreactivity was preferentially localized to magnocellular PNs in the BLAa (n = 6). These magnocellular PNs have previously been found to be responsive to stimuli of negative valence. In contrast, parvocellular PNs, which are responsive to stimuli of positive valence, were located in posterior BLA (BLAp), exhibited significantly less M1R immunoreactivity and were associated with significantly less cholinergic innervation. PNs projecting to PL (PL-projectors), which were prominently found in BLAa, expressed higher M1 intensity than those projecting to IL, which were more equally distributed between BLA subnuclei. Altogether, these data provide an anatomical basis for preferential cholinergic modulation of negative valence-encoding PNs in the BLA. Supported by the NIMH (R01MH104638 to DDM and AJM).

**Walgren, Andrew**

**Mentor(s): Dr. Lauren Sklaroff**

**Media Combat: The Great War and the Transformation of American Culture**

My dissertation examines the consolidation of an emergent American mass media into a national cultural apparatus during the United States' involvement in the First World War (1917-1919). This is a pioneering study that treats World War I-era American cultural productions as critical benchmarks in the creation of a national media audience, rather than as ancillary projects in the service of diplomacy or mobilization. Specifically, this project examines two major cultural arenas – film and musical theater – by looking at the institutions and actors that transformed them. During the war, a set of ideas coalesced around a dynamic admixture of popular entertainers, industry functionaries, producers, distributors, exhibitors, and, perhaps most importantly, an energetic state bureaucracy. For the first time in American history, the federal government intervened in the culture industry and became a major cultural producer itself. Under the auspices of the Wilson administration, the Committee on Public Information (CPI) and the Commission on Training Camp Activities (CTCA) were organized in the spring of 1917 to direct federal, state, and municipal recruitment efforts. Entertainment was a crucial aspect of the government's attempts to forge a united, homogeneous citizenry in the crucible of war. The federal government also produced, distributed, and exhibited propaganda films, plays, music, and cartoons, demanding unswerving patriotism from private citizens and cultural institutions utilizing a variety of coercive measures. In turn, these private entities recognized the government as a critical ally in their respective institutional developments. Examining this period is thus crucial for understanding not only the dialectic between war and culture, but for providing an interdisciplinary understanding of American mass media during its formative years. By treating the Great War as a seminal moment in the history of American popular culture, this project extends the chronology of cultural production traditionally associated with World War II.

**Warden, Deborah**

**Mentor(s): Dr. Ronda Hughes**

**Differences in Voluntary and Involuntary Turnover among Nurse Leaders**

**Background:** Little is known about differences among nurses in administrative specialty practice in acute care facilities. Previous work on intent to leave and characteristics focused on either managers or executives. Director-level administrative positions are usually the next career advancement step for managers and a direct source of candidates for nurse executive vacancies. Since stability in the nursing workforce is associated with improved patient outcomes, examining the experiences with previous leadership positions among all three types of these nurse leader groups by census region has implications for recruitment and leader development.

**Methods:** A nation-wide survey of acute care nurse managers, directors, and executives from 45 states and the District of Columbia participated in an electronic survey (n=1908) via state nursing and hospital organizations. The survey included questions about experiences related to voluntary and involuntary turnover with the explicit purpose of comparison among leader types. Descriptive analysis was completed by census region and by position type.

**Results:** There was a significant difference in intent to leave by census region among the overall population of nurse leaders. Intent to leave a current position within the next 5 years was highest in the West (57.2%) and lowest in the South (46.1%). However, there were no significant differences by position within the Midwest, South, and West. In the Northeast, 62.9% of nurse managers planned to leave within 5 years as compared to directors (48.5%) and executives (45.1%). Incidence of involuntary turnover also differed both across and within census regions by job type. In all regions, executives were most likely to

have experienced job loss. The West had the highest rates of involuntary job loss for all position types. In addition, the proportion of leaders with graduate education differed across all four regions with the highest proportion in the Northeast and the lowest in the South.

Conclusion: Characteristics and experiences of voluntary and involuntary turnover vary across the nation, by region and position type. Findings have implications for succession planning, recruitment, and leader development.”

**Watson, Brittany**

**Mentor(s): Dr. Melissa Moss**

### **Development of a cell-based biosensor for early Alzheimer’s disease detection**

Alzheimer’s disease (AD) is a neurodegenerative disease characterized by progressive cognitive decline and is a leading cause of dementia in people over the age of sixty. Accumulation of amyloid plaques that contain aggregates of small amyloid- $\beta$  protein ( $A\beta$ ), blood brain barrier (BBB) breakdown, and neuron death characterize AD. Evidence has shown that an earlier diagnosis leads to more effective treatment, in part as a result of the irreversible death of neurons. However, a cost-effective method for early diagnosis does not exist. The 2019 Alzheimer’s Facts and Figures Report states family or unpaid caregivers provide 18.4 billion hours of care, which is valued over \$234 billion per year. If an early diagnostic tool became available, 7.9 trillion dollars is the estimated potential cost savings for the current US population.

The BBB is formed by a tight monolayer of endothelial cells, which is characterized by tight junctions, the absence of openings, and few pinocytotic vesicles. Tight junctions are required for a healthy, intact monolayer and render relatively high transendothelial electrical resistance (TEER). An intact monolayer prevents unwarranted particles, which could be toxic, from entering the brain. As permeability of the monolayer increases, the TEER values decrease.

Previous studies have shown that introduction of physiologically active  $A\beta$  oligomers can cause an increase in permeability of an endothelium monolayer, lowering TEER values. In contrast, non-pathogenetic monomer is inert. We introduced  $A\beta$  protein to monolayers of human brain microvascular endothelial cells (HBMVECs) and observed the TEER measurements. This data support previous results showing that small soluble aggregates are uniquely responsible for inducing endothelial monolayer permeability. Future work will leverage this selectivity to develop a cell-based biosensor to detect the presence of  $A\beta$  oligomers. Experiments will entail finding the lowest  $A\beta$  oligomer concentrations which affect TEER measurements to establish sensor sensitivity. Our project lays the groundwork for the development of early AD detection.

**Weber, Samantha**

**Mentor(s): Dr. Toni Torres McGehee**

### **Examination of Eating Disorder and Depression Across Collegiate Student-Athletes**

Context: Male and female collegiate student-athletes are at risk for various mental health disorders. Sport and academic stressors may place pressures on these athletes to perform at their best.

Objective: To estimate the prevalence and relative risk of eating disorders (ED) and depression by sex, sport type, and academic status.

Design: Cross- Sectional

Setting: NCAA Division I, II, III, NAIA, and NCCAA Institutions

Patients or Other Participants: Male (n= 367) and female (n=800) collegiate student-athletes (age:  $19.6 \pm 1.4$  years).

Intervention: An online survey was distributed to student-athletes containing self-report measures for demographics and mental health constructs (e.g. ED, depression).

Main Outcome Measure(s): Participants self-reported height, weight, and sport. ED risk behaviors were

assessed with Eating Attitudes Test and depression risk with the Center for Epidemiologic Studies Depression Scale. Chi-square analyses were used to examine prevalence of ED and depression and examine differences among sex, sport type, and academic status.

Results: ED risk prevalence was 15.7% (n=183); where within the total, females and males respectively were 12.1% (n=141) and 3.6% (n=42). The type of ED risk (EAT risk, Behavior Risk, and Both) was significant by sex ( $p < .003$ ) with females higher than males, but not by academic status or sport-type. Depression prevalence was 21.4% (n=250), where within the total, females (16.5%) were higher than males (5.0%) with significant differences for sport type ( $p < .01$ ) with “ball sports” at the highest risk (9.3%). Conclusions: Findings highlight females are at a higher risk than males for eating disorders and depression and at a lower risk for low self-esteem. The sex differences illustrate both females and males are at risk for mental health disorders, and furthermore athletic trainers should be vigilant in recognizing these signs and symptoms. These findings further emphasize the importance of mental health screening and encourage medical professionals to be proactive in identifying those at risk.

**Wehbe, Roudy**

**Mentor(s): Dr. Ramy Harik**

### **3D Towpath Characterization for Automated Fiber Placement**

Automated Fiber Placement (AFP) is a manufacturing process used to fabricate large composite structures for aerospace applications. During the process, finite width pre-impregnated carbon fiber tows are laid on a prescribed path on the tool surface. The mismatch in length between the laid material and the actual path leads to manufacturing defects such as wrinkling or folding especially when steering fibers on flat surfaces or when placing fibers on curved surfaces. This poster highlights the ongoing research to characterize the tow deformations during the AFP process. Several deformation mechanisms are suggested to absorb the differential length: (a) strain deformations (tensile, compressive, and shear), (b) large in-plane deformations (fiber waviness and bunching), and (c) large out of plane deformations (wrinkling and folding). In an initial step to the modeling effort, only geometrical considerations are taken into account, where colored maps can be generated for AFP layups to highlight potential regions for defect occurrence. In a second step, material properties of the uncured tow are considered, and possible deformations can be expected based on a mechanics model minimizing the energy of the system. Measurements of tow deformations when placed on curved paths is also accomplished using the Digital Image Correlation (DIC) technique.

**Wertz, Autumn**

**Mentor(s): Prof. Pam Bowers**

### **Contemporary Political Art & Women**

Contemporary political art challenges, comments and documents the governance of our nation. Since the 2016 presidential election, I have felt a drive to capture the events and feelings of American women toward this ever-changing climate for personal and unifying purposes. Two questions I posed for myself were: how can I be an innovative, effective and successful political artist in the world as it is today? and how can I incorporate the political opinion(s) of Columbia’s population as well as a global perspective into my artwork?

Using my SPARC Grant, I was able to travel to collect information and experience what the political climate is like not only in South Carolina, but Tennessee, North Carolina and Pennsylvania. I attended several protests and rallies, visited contemporary political art exhibitions as well as national archives. I was also able to use my grant to fund the materials and supplies used to create all the artwork.

Using this data, I was able to visually illustrate the interplay of electronic media, young women and the

current American political climate, by depicting ways the administration's oppressive actions and policies toward women penetrate the private sphere.

The administration's choice to use electronic media as means of communicating to the country has further eroded the boundary between the public and the private; news and social media convey constant information and are part of what would otherwise be a private space. My studio research explores effective elements of relationships between American women, politics and the position of electronic media within private spaces. I project my personal experiences and abjection with these exchanges onto my illustrations. In doing so, I attempt to capture the moment where a disembodied set of policies pervades a fleshy body. My goal is to convey my experiences within this triad, depicting moments in which public and private, the personal and political, collide through electronic media.

**West, Alyssa**

**Mentor(s): Prof. Parastoo Hashemi**

**Comparing Environmental and Genetic Models of Autism via Behavioral and Neurochemical Analysis**

Autism Spectrum Disorder (ASD) is one of the fastest growing developmental disorders and currently affects 1 in 68 children in the United States. Despite the increased prevalence, a single etiology has not been identified, but many experts agree that serotonin is a reproducible biomarker as roughly 1/3rd of individuals with ASD having high blood serotonin levels. A clear correlation between serotonin levels in the periphery and the central nervous system does not exist since serotonin cannot cross the blood brain barrier. To accurately assess serotonin neurotransmission, we use fast-scan cyclic voltammetry which allows us to make in vivo serotonin measurements in real-time in both genetic and environmental risk factor exposure models. The genetic models used here have previously been verified to have behavioral phenotypes associated with ASD mouse models. Likewise, to verify our model of perinatal lead exposure, we implement behavioral testing to evaluate the ASD behavioral phenotype. Preliminary results suggest the genetic models exhibit alterations in the transporters that remove serotonin from the extracellular space. The lead exposure model has demonstrated alterations in behavior as well as disruptions in serotonin neurotransmission. Results from this study may provide new insights into the common effects of genetic and environmental risk factors, particularly on serotonin signaling, leading to new therapeutic targets.

**White, Ashley**

**Mentor(s): Dr. Emily Mann**

**Going off label: Recognizing college women's motivations for contraceptive use extend beyond pregnancy prevention**

Background: The non-contraceptive benefits of hormonal contraception use are well established but remain under-examined in the literature on contraceptive use. The study results capture college women's motivations for contraceptive use besides pregnancy prevention.

Methods: We conducted four focus group interviews with female undergraduate students (n=46), ages 18-24, at a large state university in the Southeast in April 2017. Participants were recruited for a 120-minute focus group session using social media and flyers on campus. Two female facilitators lead each focus group using a semi-structured guide that explored participants' contraceptive knowledge, attitudes, and experiences with various methods. The groups were audio-recorded, professionally transcribed, and analyzed using a modified approach to grounded theory.

Results: While participants did discuss motivations to use contraception for pregnancy prevention, many used hormonal contraception for off-label health benefits. These benefits included management of con-

ditions such as acne, bleeding, cramping, ovarian cysts, and endometriosis. Many prioritized the management of these conditions more so than pregnancy prevention when making decisions about contraceptive method use. Participants expressed frustration that contraceptive use remains taboo for young women and there is little recognition of its off-label health benefits among their sexual partners, peers, and parents, as well as politicians.

**Conclusions:** The findings suggest that college women frequently use contraception, particularly the oral contraceptive pill, for reasons besides pregnancy prevention. Those working with college students should ensure their services are receptive to these motivations. At the same time, broader efforts should be made to educate the public on the benefits of off-label use.

**White, C. Nicole**

**Mentor(s): Dr. Amir Karami, Dr. Suzanne Swan**

**Unwanted Advances in Higher Education: Digging Sexual Harassment Experiences in Academia with Text Mining**

The literature suggests that sexism and harassment, particularly against women, are still present and pervasive in academia. In order to address this issue, we must better understand the experiences of sexism and harassment in academia; however, the existing literature is limited in scope and sample size. The current study works to fill these gaps and add to the literature by utilizing online posts to get a fuller and more nuanced understanding of sexual harassment experiences in academic environments. We developed a mixed method approach using computational and qualitative methods to analyze more than 2,300 sexual harassment experiences. This approach allows us to tap into the general population and is the first to use methods from both data science and psychology to analyze higher education sexism and harassment data from the Internet.

**Whitlatch, Hays**

**Mentor(s): Dr. Joshua Cooper**

**Genome Reversals and Graph Pressing Sequences**

In the 1930's, two biologists, Dobzhansky and Sturtevant, introduced the idea that the degree of disorder between the genes in two genomes is an indicator of the evolutionary distance between two organisms. This has inspired extensive work in the fields of computational biology, bioinformatics and phylogenetics. In particular, researchers have pursued the question of how a common ancestral genome may have been transformed by evolutionary events into distinct, yet homologous, genomes. In mathematics, we often represent genomes as signed permutations, and evolutionary events are encoded as operations on signed permutations. Hannenhalli and Pevzner famously showed that sorting such sequences can be done in polynomial time and that they are essentially equivalent to a certain sequences of operations - "vertex pressing" - on bicolored graphs.

**Whitmore, Courtney**

**Mentor(s): Ms. Jessica Fairey**

**Evaluating the Social Informational Needs of Emerging Adults with Genetic Conditions**

**Purpose:** This study evaluated the healthcare provider's role during the social development of emerging adults with a genetic condition. The study also identified the type and ways that these adolescents hope to receive information on the potential side effects or complications from engaging in risk taking behaviors and lifestyle choices.

**Methods:** Participants included both males and females aged 18-26 with achondroplasia, sickle cell anemia, cystic fibrosis, or Marfan syndrome. Respondents were recruited to complete an anonymous online

questionnaire via social media support groups or email notification.

Results: There were 103 total respondents that completed the questionnaire and met the study's inclusion criteria. Preliminary results show that approximately half of the respondents are receiving information from their provider about tobacco, smoking, alcohol, and drug use. A majority indicated they have not discussed the topics of sexual activity, birth control, and independent living. Additionally, respondents indicated ways in which providers could improve communication of these sensitive topics which will be investigated using thematic analysis.

Conclusion: These results suggest that this patient population is experiencing gaps in care when it comes to anticipatory guidance in regard to making informed decisions about risk taking behaviors and their genetic condition. The patients who reported they did receive some of this information suggested that the timing or manner in which it was discussed with a provider was not preferred. Overall, there are improvements to be made to aid in the transition care of the emerging adult population which could empower their ability to make educated decisions about their genetic condition and lifestyle, thus improving their quality of life.

**Wilson, Lara**

**Mentor(s): Prof. Jacob Wilson**

**Bel Canto to Punk and Back: Lessons for the Vocal Cross-Training Singer and Teacher**

Cross-training is the ability for a singer of classical music and commercial styles to cross into more than one style and back, training his or her instrument to be the healthiest and most flexible possible.

According to Susan Kane, about 30,000 trained classical singers vie for jobs every day. In 2014, Musical America said only 2000 are professionally managed and 94 percent of classical singers are unemployed or underemployed. According to Meyer's 2013 market summary, "...looking at only live performance, we find that 4.5% of the live performance market place appears to be comprised of classical singers while the remaining 95.5% is comprised of contemporary commercial music styles."

Obviously, the need for cross-training exists. Norman Spivey and Mary Saunders Barton suggest that "Looking forward, teachers will feel seriously handicapped if they lack competency in vernacular techniques and only the rare voice studio will be genre specific. Let us bid a fond farewell to the antiquated definition of 'crossover singing' and embrace cross training for the next generation of singing actors." Curriculum in higher education will have to adjust to teach this non-traditional student. The vast majority of college music programs in the United States exclude these types of musicians. Increasing music school enrollment and preparing our students to make a living can only be accomplished by altering conventional ways of thinking and by developing new curriculum and teaching methods to include them.

**Winstead, James**

**Mentor(s): Prof. Jim Burch, Dr. JP Ginsberg**

**Randomized Trial of Heart Rate Variability Biofeedback for Improved Cognitive Function**

Over-modulation of the sympathetic nervous system and reduced heart rate variability (HRV) are commonly overlooked components of poor cognition, which includes decreased attention, recall, and cognitive processing. HRV biofeedback (HRVB) training induces HRV coherence to balance the autonomic system. Paced breathing (~6 breaths/minute) increases HRV coherence. This randomized, sham-controlled intervention trial will test the hypothesis that HRVB can improve HRV coherence and cognitive function. Patients are randomized to previously established HRVB or sham protocols (n=40 each, total planned enrollment n=80). Each participant completes a baseline assessment, 6 weekly training sessions, a post-training assessment, a booster training session and assessment (1-month post-training), and a follow-up assessment (2-months post-training). Outcomes include: 15-minutes resting HRV recordings (HRV Coherence Ratio), Hopkins Verbal Learning Test-Revised (HVLTR), Paced Auditory Serial Addition Test (PASAT), and Psychomotor Vigilance Task (PVT). To date, 85 patients completed baseline, 63 com-

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pleted post-training assessment, and 50 completed entire protocol. In preliminary analyses, patients in the HRVB group had elevated HRV Coherence Ratios at post-training assessment relative to baseline ( $0.11 \pm 0.02$  vs.  $0.27 \pm 0.05$ ,  $p < 0.001$ ), whereas no differences were observed among controls ( $0.10 \pm 0.02$  vs.  $0.12 \pm 0.02$ ,  $p = 0.97$ ). Compared to baseline scores Reciprocal Mean Reaction Time was elevated at Post Assessment ( $0.002317 \pm 0.000093$  vs  $0.002402 \pm 0.000103$   $p = 0.13$ ) and at Follow-up Assessment ( $0.002317 \pm 0.000093$  vs  $0.002454 \pm 0.000107$ ,  $p = 0.04$ ); no significant differences were noted among controls. No significant differences have been yet found between groups over time for PASAT or HVL. The intervention was received, coherence was statistically significant in the intervention group as compared to the control group and was sustained overtime. Those in the intervention group improved their reaction time as compared to the control group. Non-pharmacological therapies that improve cognition would benefit Veterans. Preliminary results indicate that participants with naturally high HRV Coherence Ratios before HRVB training had better sustained attention and more response inhibition, indicated by quicker reaction time. HRVB is a valid, quantifiable, easily-implemented intervention. Results from mixed effects statistical models testing study hypotheses concerning cognitive tests indicate the potential benefit of Heart Rate Variability Biofeedback in this ongoing preliminary trial.

**Witt, Colby**

**Mentor(s): Dr. Parastoo Hashemi**

### **A Voltammetric Study of Ambient Extracellular Serotonin Oscillations**

The brain is a complex and dynamic system that uses neurotransmitters for communication. A particularly important neuromodulator is serotonin, which is involved in regulating mood, sleep, and appetite. Abnormally low levels of serotonin are associated with depression, anxiety, and migraines. As such, there is much pharmaceutical focus on targeting serotonin. However, high levels of serotonin are toxic and potentially fatal (serotonin syndrome), thus there are many simultaneous physiological processes that aim to restrict the window of extracellular serotonin. The key to better understanding and treating the disorders in which this modulator is implicated is to decipher the mechanisms that control the extracellular serotonin levels. In recent years, we have developed and applied a niche analytical toolbox for characterizing in vivo serotonin dynamics. Utilizing fast-scan controlled-adsorption voltammetry (FSCAV) we investigated ambient serotonin fluctuations in anesthetized animals. Our preliminary data demonstrates that there are oscillations in basal serotonin levels in vivo that are not present in vitro experiments. We believe this is telling us about the mechanisms that regulate serotonin. A pharmacological study was performed to investigate the synaptic mechanisms that control the frequency, amplitude, and the average levels of this ambient serotonin oscillation. This important finding will allow us to decipher the mechanisms of fine-tuning of extracellular serotonin levels.

**Wright, Duncan**

**Mentor(s): Dr. George Androulakis**

### **Dynamical Entropy in Quantum Data Compression**

We will introduce the notions of dynamical entropy and quantum random walks. We will show that these ideas can be used in quantum data compression, compressing data using qubits, and discuss the importance of the results obtained.

**Xiong, Xiaomo**

**Mentor(s): Dr. Kevin Lu**

### **Cost-Effectiveness Analysis of a Community Pharmacy Enhanced Service program: Should the Managed Care Organization Reimburse Enhanced Pharmacy Services ?**

Background: The Joint Commission of Pharmacy Practitioners (JCPP) recognizes the need for pharmacist

involvement in improving the quality of care in community pharmacies. However, no studies have been published on the cost-effectiveness of the Community Pharmacy Enhanced Service program (CPESP). Objective: To determine the cost-effectiveness of Community Pharmacy Enhanced Services Program (CPESP) provided by independent pharmacies vs. traditional services provided by chain pharmacies from the payer's perspective using claims data, and to apply the results to guide third-party payers' decision-making. Methods: A Markov Cost-Effectiveness model with annual cycles and 10-year time horizon was run from a U. S. managed care perspective. Both a cohort-based analysis and bootstrap simulation were implemented for the incremental cost-effectiveness ratio (ICER) of the CPESP program in terms of survival time and patient clinical outcomes. In addition, CEAC was carried out at different willingness-to-pay levels. The modeled population represented the demographics, clinical characteristics, and outcomes based on the real-world claims data from either independent pharmacies that provide CPESP or traditional services by chain pharmacies. The comparative effectiveness of pharmacy services was obtained from a longitudinal observational cohort from Jan 1, 2017 to December 31, 2017. The Markov model was implemented to simulate patients receiving either CPESP or traditional pharmacy services moving between health status, stable to mild disease, advanced disease, and death. Transition probabilities, survival time (in life years) and costs were derived from the claims data and the literature, where appropriate.

Results: From the managed-care perspective, the Community Pharmacy Enhanced Service program could extend patients survival time by 0.12 years/person over a 10-year period (The incremental cost-effectiveness ratio, ICER, for enrollees was \$16,809 per life year gained) and could reduce hospitalizations by 6.9/person over a 10-year period (ICER=\$290.61 per hospitalization reduced). As a result, a cost offset of \$19,994/person could be obtained for patients receiving CPESP vs. those who did not over 10 years.

Conclusions: Community Pharmacy Enhanced Service Network is a cost-effective or even a cost-saving program in the managed care perspective. Third-party payers should consider reimbursing fully or partially the cost of these community pharmacies enhanced services, which would result in cost-savings over the long run.

**Yelverton, Jeffrey**

**Mentor(s): Dr. Sarah Williams**

**Romanticism and Ruslan and Lyudmila**

Mikhail Glinka's second opera *Ruslan and Lyudmila* (1842) is usually categorized as an example of musical Nationalism. While this approach is widely accepted, I propose instead to explore the work's musical characteristics as an expression of Romanticism. Musicologists Richard Taruskin and Marina Frolova-Walker have illuminated the convoluted history revolved around the importance of Glinka's opera to the Russian National School. A 2018 article by Anna Giust is a recent attempt to widen the scope of methods used to examine Russian music outside of the traditional Nationalistic ideology. My paper will expand on this type of research. This work examines Glinka's second opera *Ruslan and Lyudmila* outside of its idyllic role in Russian Nationalistic mythos as a work of Romanticism understood as a Pan-European movement.

Most historical studies of Russian music begin by examining the Russian National School of composition inspired by Glinka, propagated by Mily Balakirev, and manifested through the work of the Kuchka. Even though the Romantic qualities of *Ruslan and Lyudmila* are often attributed to its role in the development of Russian Nationalism, little attention has been paid to the influence of Romanticism on its overarching ideas. In order to address this gap, I propose to analyze the musical and extra-musical qualities of the opera within the framework of philosophical elements that define Romanticism including the works of Novalis (1772-1801), Friedrich Schlegel (1772-1829), and E.T.A Hoffmann (1776-1822). While the opera has been criticized for its fragmented nature and lack of motivic cohesion, these perceived 'weaknesses' can be understood as manifestation of Romantic ideas. Likewise, I interrogate the opera's extra-musical elements including the libretto and its relationship to Pushkin's literary poem of *Ruslan and Lyudmila*

(1820) from the vantage point of non-musical Romantic ideologies.

This contextual approach is significant in that it adds an interpretative layer to existing rich body of studies on Glinka's opera. My intent is to allow for a more comprehensive view of Russian music that helps mitigate the ambiguous beginnings of the Russian National school and deepen our understanding of this important movement.

**Yildiz Spinel, Melek**

**Mentor(s): Ms. Nicole White, Ms. Kayla Ford, Dr. Suzanne Swan, Dr. Amir Karami**

**A Computational Literature Review of Sexual Harassment from 1977 to 2017 with Text Mining**

A literature review process is an essential part of research projects. This process provides a macro level analysis of the existing research. However, analyzing a large number of research papers is a time-consuming and labor-intensive process. Therefore, applying computational techniques to identify patterns in the literature offers promise. This study employed a mixed method including text mining methods and a qualitative approach to investigate more than 3,500 papers related to sexual harassment to explore research topics from 1977 to 2017. This study has research and educational applications for sexual harassment experts.

**Zeng, Yuleng**

**Mentor(s): Prof. Timothy Peterson**

**Bluff to Peace: How Economic Dependence Promotes Peace Despite Increasing Deception and Uncertainty**

Trade-conflict studies have shown that economic dependence can promote peace by costly signaling resolve. However, with higher economic integration, targets also become more vulnerable to coercion and potential challengers are incentivized to bluff. In return, target states may resist more, raising the question of whether trade still promotes peace. I theorize that bluffing does not stoke conflict in this context because the bargaining environment allows states to inform and coerce simultaneously: the factor that renders a threat less credible also restrains states from further escalation. I test this theory's implications with a structural estimation method and find supporting results.

**Zgodic, Anja**

**Mentor(s): Dr. Whitney Zahnd, Prof. Jan Marie Eberth**

**Evaluating disparities in lung cancer screening uptake using the Behavioral Risk Factor Surveillance System**

**Background:** In 2010, the National Lung Screening Trial found that low dose computed tomography (LDCT) reduced lung cancer mortality in high risk individuals. Since then, annual LDCT screening has been recommended for high-risk adults: age 55-80 years with a 30 pack-year smoking history and currently smoking or quit within the past 15 years. We aimed to explore factors impacting LDCT screening uptake among these individuals.

**Methods:** We leveraged the Behavioral Risk Factor Surveillance System (BRFSS) dataset, the largest population-based behavioral health survey in the US and its optional Lung Cancer Screening module that was disseminated by 10 states representing 18% of the U.S. population. We conducted a mixed effects logistic regression analysis in which we accounted for participant clustering by state with random intercepts and included the following fixed effects: age, race, marital status, insurance status, respiratory conditions, and past/current cancers.

**Results:** 4359 survey participants were eligible for screening per recommendations. The lack of insurance

and belonging to age groups ineligible for Medicare was associated with lower LDCT screening utilization. The odds of LDCT screening utilization were 72% lower [Odds Ratio (OR)=0.28; 95% Confidence Interval (CI)=0.12-0.65] in the screening eligible population without health insurance compared to the population with health insurance. We also found age disparities. Participants ages 65-69 had odds of screening 25% higher (OR=1.25; 95% CI=1.07-1.46), 70-74: 19% higher (OR=1.19; 95% CI=1.05-1.37) higher, respectively, than the youngest age group (55-64).

Conclusion: We found disparities in insurance status and age in LDCT screening utilization. Future research should focus on quantifying the relationship between employment, income, and insurance status to further understand the interactions between these factors and their impact on LDCT lung cancer screening uptake.

**Zhang, Youwen**

**Mentor(s): Prof. Hippokratis Kiaris, Prof. Ioulia Chatzistamou, Ms. Vimala Kaza**

**Variations of the Unfolded Protein Response in Outbred Deer Mice Affect the Regulation of Appetite**

The unfolded protein response (UPR) is a conserved biochemical pathway that aims to restore tissue homeostasis when the endoplasmic reticulum (ER) experiences stress. Several *in vivo* and *in vitro* studies showed that intrinsic factor to the regulation of appetite and the onset of metabolic pathologies is the UPR. For example, it has been established that ER stress is induced by high fat diet which then stimulates a proinflammatory response causing appetite reduction. However, how potential variations in the regulation of the UPR are integrated in the regulation of appetite and whether these have implications in the adaptation at different environments remains unknown. We recently showed by using outbred deer mice as our model that altitude adaptation involves regulation of the UPR with high altitude mice being high UPR responders and low altitude animals being low responders. In this study, we explored if the profile of the tunicamycin-induced UPR in fibroblasts affects appetite regulation and metabolic diseases later in life by using outbred deer mice (*Peromyscus maniculatus*) as a model. Under regular chow diet, no considerable differences were seen in body weight gain and food consumption between high and low responders. However, during high fat diet administration, high responders gained significantly more body weight and consumed more food than the low responders, which was apparently related to their elevated appetite. Also, the low responders consuming high fat diet had considerably elevated levels of several proinflammatory cytokines despite of the absence of inflammation in peripheral tissue. Our data are consistent with a model at which adaptation at high altitudes is associated with more efficient resolution of the diet-induced stress due to the elevated abundance of chaperones. In turn, this results in reduction of inflammation and maintenance of appetite at high levels which is eventually manifested as increased body weight gain. Collectively, these results identify variations in the UPR as an important regulator of high altitude adaptation and appetite.

**Zhong, Jingwen**

**Mentor(s): Prof. Matthew Brashears**

**Social Influence Network Model of Performance Expectations**

How do people in a work group decide who is more or less competent given initial disagreement? This research answers this question, by integrating two sociological theories of interpersonal influence: status characteristics theory and social influence network theory. Prior research in this stream (e.g. Kalkhoff et al. 2010; Dippong et al. 2017) has been restricted by the assumption that everyone in a task group would rank the group members' competence in exactly the same order. This study proposes self-serving bias (i.e. the tendency to think highly of oneself) as a factor contributing to idiosyncratic competence evaluations, and develops a dynamic model mapping how initial disagreements evolve into a consensual, or at least stable, hierarchy of performance expectations.



# **Postdoctoral Scholars**

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# **presentations**

**Albetel, Angela-Nadia**

**Mentor(s): Prof. Caryn Outten**

**Monothiol Glutaredoxins Grx3/4 and the BolA Protein Bol2 Modulate Iron Sensing and Regulation in Yeast *S. cerevisiae***

An elaborate cascade of iron-sulfur cluster-dependent cellular interactions are employed in the yeast *S. cerevisiae* in order to maintain adequate iron levels. Currently available data indicate that under iron deplete conditions, the two paralogous transcription factors, Aft1 and Aft2, are primarily localized in the nucleus, and activate the transcription of iron uptake and transport genes. Under iron replete conditions, Aft1/2 undergo conformational changes and nucleocytoplasmic shuttling upon interacting with CGFS monothiol glutaredoxins Grx3 and Grx4 and the BolA protein Bol2, resulting in subsequent deactivation of the iron regulon. Iron-sulfur clusters have been chosen by nature as signaling molecules to accomplish the inhibition of Aft2 (and presumably Aft1), as the dimerization occurs via direct ligation of a [2Fe-2S] cluster acquired from the [2Fe-2S] cluster-bridged Grx3/4-Bol2 heterodimer. However, the mechanistic details of iron regulation at the molecular level in the baker's yeast are not fully understood, and defining the functional interactions of each component in the iron signaling pathway remains to be elucidated. We are currently using complementary biophysical and molecular genetic methods to probe the iron-sulfur cluster-dependent interaction between [2Fe-2S]<sub>2</sub><sup>+</sup>-Grx3/4 and Bol2, and [2Fe-2S]<sub>2</sub><sup>+</sup>-Grx3/4-Bol2 and Aft2 to gain a better understanding of their in vivo functions. The results indicate rapid interaction between [2Fe-2S]<sub>2</sub><sup>+</sup>-Grx3 and Bol2, followed by a fast iron-sulfur cluster transfer to Aft2, with second order rates above previously reported rates for reactions involving iron-sulfur clusters. Furthermore, we are showing that mutations in the amino acid residues ligating the iron-sulfur cluster in the [2Fe-2S]<sub>2</sub><sup>+</sup>-Grx3-Bol2 heterodimer, or in the CxC iron-sulfur cluster binding motif of Aft2 have a significant impact on the rate of interaction and cluster transfer, respectively. Since several key proteins in this pathway are conserved in humans and essential for viability, exploiting the yeast system to define their functional and physical interactions will provide a fundamental understanding of their roles in human iron metabolism.

**Alghetaa, Hasan**

**Mohammed, Amira**

**Mentor(s): Dr. Mitzi Nagarkatti**

**Protective role of resveratrol against lung dysbiosis in SEB-induced acute lung injury**

While the lungs were believed to be sterile, recent studies have demonstrated the presence of lung microbiota. Any pulmonary disease, therefore, will affect the commensal bacterial communities. This study focuses on the alteration of the lung microbiota during acute lung injury (ALI). To achieve this goal, C3H/HeJ mice were administered by intranasal and intraperitoneal doses of Staphylococcal enterotoxin B (SEB) to induce ALI. Resveratrol (RES), an anti-inflammatory agent at a dose of 100mg/kg or vehicle (VEH, 1% carboxyl methylcellulose) were administered twice orally as preventative. Forty eight hours later, blood, broncho-alveolar lavage (BALF), spleen and lung tissues were collected for evaluation. RES-treated mice survived when compared to VEH-treated mice having SEB-induced ALI. Furthermore, lung microbiota was collected and 16S rRNA sequencing was performed. The data was analyzed to determine the alpha and beta diversity. We found that major phyla of the lung microbiota, Firmicutes and Proteobacteria were markedly changed when exposed to SEB. RES treatment caused a significant decrease in Proteobacteria phylum, particularly families, Oxalobacteraceae and Pasteurellaceae as well as *Rheinheimera* spp., but resulted in a significant increase in the beneficial genus of *Lysobacter* which produces  $\beta$ -lactam, a novel antibiotic with effects on other microorganisms, in comparison with VEH-treated mice. Moreover, RES treatment led to elevate Firmicutes phylum because of increase in the beneficial genus, *Lactobacillus*. Lipopolysaccharide (LPS), gram negative bacterial endotoxin was found at significantly higher concentration in the BALF of VEH-treated group in comparison with RES-treated mice. Beneficial metabolome levels were significantly higher in the serum of RES-treated mice versus VEH-treated mice,

specifically propionic and acetic acids. Together, resveratrol has a major impact as a prebiotic in reverting pulmonary homeostasis during severe inflammation caused by the superantigen, SEB. (Supported by NIH grants P01AT003961, R01AT006888, R01ES019313, R01MH094755 and P20GM103641).

**Bam, Marpe**

**Mentor(s): Prof. Mitzi Nagarkatti**

**Inflammation in PTSD is a consequence of dysregulated WNT signaling orchestrated by long non-coding RNA LINC00926 and lysine methyltransferase MLL1.**

Posttraumatic Stress Disorder (PTSD) patients experience chronic inflammation, in addition to their psychiatric imbalance. It is not known whether immune dysregulation causes PTSD or the psychiatric imbalance occurs first and, later initiates immune dysregulation leading to chronic inflammation. Moreover, very little is known about the molecular mechanisms involved in the immune dysregulation. Our past work indicates the involvement of epigenetic mechanisms such as histone methylation in the regulation of inflammation in PTSD. By employing RNA-Seq, we identified upregulated expression of WNT10B and LINC00926 in the PBMCs of PTSD patients. Thus, we hypothesized that LINC00926 overexpression in PTSD results in increased H3K4me3 around the promoter region of WNT10B leading to upregulation of WNT10B. Furthermore, upregulated WNT10B contributed to the elevated expression of inflammatory cytokines like IFN $\gamma$  and IL17. To support our hypothesis, we first confirmed the interaction between LINC00926 and the histone H3K4 methyltransferase, MLL1. Then, by in vitro knockdown of LINC00926 we confirmed lowered expression of WNT10B implying that the interaction between LINC00926 and MLL1 possibly leads to increased H3K4me3 on WNT10B promoter and thereby its upregulated transcription. Following this, we confirmed increased H3K4me3 around WNT10B promoter of PTSD patients by ChIP-Seq. Finally, we confirmed that upregulated WNT10B indeed contributed to the elevated expression of IFN $\gamma$  and IL17. In conclusion, our data implies that upregulation of LINC00926 in PTSD leads to inflammatory state by a mechanism that involves interaction with MLL1 which results in increased level of the gene activating histone methylation H3K4me3 around WNT10B promoter and, eventually leads to elevated expression of proinflammatory cytokines. Our report is the first to show that WNT10B is involved in the regulation of inflammation in PTSD as a result of altered epigenetic mechanism involving LINC00926. (Supported by NIH grants P01AT003961, P20GM103641, R01AT006888, R01MH094755, R01AI129788 and R01AI123947)

**Busbee, Philip**

**Mentor(s): Dr. Mitzi Nagarkatti**

**Indole-3-carbinol prevents murine colitis development via an IL-22-dependent mechanism that regulates anti-microbial peptides and mucus production**

Philip B. Busbee, Haider Alrafas, Nicholas Dopkins, Mitzi Nagarkatti, and Prakash Nagarkatti

Department of Pathology, Microbiology, and Immunology, University of South Carolina School of Medicine, Columbia, SC 29208, Columbia, SC, Columbia, SC 29208, USA

Colitis is an inflammatory bowel disease (IBD) characterized by acute or chronic inflammation within the colon. In our previous work, we showed that indole-3-carbinol (I3C), a naturally-occurring plant product found in a number of cruciferous vegetables, was able to prevent development of colitis in murine models. I3C prevented colitis-associated microbial dysbiosis characterized by an overabundance of potentially pathogenic gram-negative bacteria (e.g. *Bacteroides acidifaciens*), in addition to increasing anti-inflammatory gram-positive butyrate-producing species (e.g. *Roseburia* spp.). This increase in butyrate by I3C, validated by metabolomics analysis, leads to a decrease in the pro-inflammatory T cell response (Th17) and an increase in anti-inflammatory Tregs, which was confirmed by sodium butyrate supplementation

experiments. In the current study, we further defined the mechanisms by which I3C was able to prevent colitis-associated microbial dysbiosis and dysregulation of gut microbial metabolome by evaluating expression of key intestinal regulatory genes in immune cells and colonic epithelial cells (CECs). Transcriptome analysis and PCR validation of CECs showed mucus production (e.g. *Muc2*) and colonic anti-microbial peptides (AMPs; e.g. beta-defensins) were significantly increased after I3C. I3C was also shown to, in a butyrate-independent manner, increase expression of colonic bacterial defensive interleukin-22 (IL-22) by epigenetic regulation. Lastly, in vivo IL-22 neutralization experiments negated the beneficial effects of I3C, thus proving this cytokine was crucial in I3C-mediated prevention of colitis development and regulation of key intestinal regulatory components such as mucus and AMP production.

The studies were supported in part by NIH grants P01AT003961, R01AT006888, R01AI123947, R01AI129788, and P20GM103641.

**Chakrabarti, Mrinmay**

**Mentor(s): Prof. Mohamad Azhar**

**Role for TGF $\beta$ 1 in Marfan Syndrome-associated aortopathy**

Aortic aneurysms and dissection in Marfan Syndrome (MFS) is caused by mutations in fibrillin 1 (*FBN1*) gene. Increased TGF $\beta$ 1 and TGF $\beta$  signaling is thought to be involved in the pathogenesis of MFS-associated aortopathy. MFS mice (*Fbn1*C1039G/+) were crossed to *Tgfb1* heterozygous mice and the *Fbn1*/*Tgfb1* double heterozygous mice were produced. In 14-months-old MFS mice with and without heterozygous deletion of *Tgfb1*, we measured aortic diameter (via echocardiography), histopathology (via elastin staining), TGF $\beta$  signaling pathways (via western blotting), and changes in aortic wall gene expression (via qPCR). *Fbn1*C1039G/+ mice had ascending aortic dilation and significant disruption of aortic medial elastin fiber architecture. Both aortic dilation and disrupted medial elastin fiber architecture were not rescued by heterozygous deletion of *Tgfb1*. Heterozygous deletion of *Tgfb1* in *Fbn1*C1039G/+ mice significantly decreased activation of the TGF $\beta$  signaling pathways (via SMAD3, p38, ERK1/2). This is consistent with the decreased gene expression of the three TGF $\beta$  ligands and *Pai1* (TGF $\beta$ -SMAD target gene). Interestingly, heterozygous deletion of *Tgfb1* in *Fbn1*C1039G/+ mice significantly increased expression of molecules involved in smooth muscle cell function (*Myh11*, *Acta2*) and contractility (*MLCK*), and collagen 1. Finally, gene expression of elastin (*Eln*) was significantly decreased by superimposed heterozygous deletion of *Tgfb1* in *Fbn1*C1039G/+ mice, which was consistent with the disrupted aortic medial elastin fiber architecture. In conclusion, the partial reduction of TGF $\beta$ 1 in vivo is unable to rescue MFS-associated aortopathy. Our data support an important role for increased TGF $\beta$ 1 in the maintaining the elastin and collagen fibers architecture and suppressing smooth muscle cell function in the aortic wall as a productive compensatory mechanism involved in MFS-associated aortopathy.

**Davis, Catherine**

**Mentor(s): Dr. Claudia Benitez-Nelson**

**Tracking Changes in the Eastern Tropical Pacific Oxygen Minimum Zone Using Planktic Foraminiferal Geochemistry and Morphology**

The Earth's climate is currently undergoing a massive shift. Global change encompasses alterations in temperature, weather patterns, and changes specific to the oceans including increasing acidity and loss of oxygen. In step with this, global oxygen minimum zones (OMZs) are expanding and intensifying. However, instrumental records of oxygenation tend to be limited to years or decades, far too short to put long-term change into context, making it necessary to rely on proxy records to understand long-term change in OMZ environments. The shells of planktic foraminifera, single-celled marine calcifiers, are some of the most widely used marine proxies; however the suite of species most frequently used in paleoceanography tend to occupy shallow and well-oxygenated surface waters. We show evidence that at least one species

of planktic foraminifera, *Globorotaloides hexagonus*, is living within the OMZ. The geochemistry (trace element to calcium ratios) and morphology of this species from modern depth-stratified plankton tows varies with temperature, oxygenation, and depth. While non-biogenic overgrowths continue to pose a problem for fossil interpretation of geochemistry, laser ablation mass spectrometry and morphological analyses present important first steps for using fossil *G. hexagonus* to generate records of environmental change in the OMZ on long timescales. We use observations from modern shells to interpret a record of morphological and geochemical changes in *G. hexagonus* from the Panama Basin in the Eastern Equatorial Pacific.

**Deming, Michelle**

**Mentor(s): Dr. Xiaoming Li**

**Health Care Providers' Knowledge, Attitudes, and Delivery of Postexposure Prophylaxis (PEP) for the Prevention of HIV after Sexual Assault**

Sexual violence committed against women produces a multitude of mental and physical traumas, as well as the risk for HIV acquisition. Women living in the Southern United States face higher rates of both sexual violence and HIV. Specific recommendations for health care providers' post-sexual assault care have been established, which include the provision of PEP as indicated to prevent HIV acquisition. However, no studies have yet evaluated the extent to which these recommendations are currently being implemented in South Carolina. Understanding the care and treatment that sexual assault survivors receive post-assault is critical to identify best practices for reducing risk for HIV. Therefore, 20 interviews were conducted among health care providers (e.g., doctors, victim advocates, emergency department nurses) in South Carolina to determine current practices of HIV prevention mechanisms after sexual assault. Key findings from the current study indicate Sexual Assault Nurse Examiners (SANE) play a crucial role in reducing HIV risk in post-sexual assault care.

**Johnson, Kaitlin**

**Mentor(s): Prof. Theodore Besmann**

**Phase Characterization in Uranium Silicide Fuel with Simulated Fission Products**

Fission products are created in nuclear fuels during reactor operation, generating a large number of differing elements. Such fission products can build up in the fuel, potentially leading to the development of secondary phases which can result in swelling and changes to the thermophysical properties of the fuel. To develop models for more accurate prediction of fuel behavior during operation, it is necessary to study fission product solubility and secondary phase development in a simulated fuel. In particular, the impact of fission products on advanced fuels under development, such as  $U_3Si_2$ , is of interest, as there is very limited information on its behavior.  $U_3Si_2$  has been proposed for use as a safer, "accident tolerant" fuel to decrease the likelihood of fuel failure under accident conditions and increased fuel efficiency over current fuels due to a higher thermal conductivity and uranium density.

Six metals (Ca, Gd, Mo, Ru, Y, Zr) were chosen as surrogate fission products to represent the variety of metallic elements predicted to evolve during operation. A simulated fuel or "SIMFUEL" representing buildup of a high concentration of fission products was fabricated by doping  $U_3Si_2$  with up to 10 at% of the model fission products. Pressed pellets of these compositions were treated at high temperatures to promote reactions and formation of likely compounds. The SIMFUEL pellets were characterized by x-ray diffraction and scanning electron microscopy with energy-dispersive spectroscopy to identify structural changes, phase formation and compositions, and thus the solubility limits of the various fission products in the  $U_3Si_2$ , is being determined. This data will be used in the development of thermodynamic models through the CALPHAD (CALculation of PHase Diagrams) method to describe the in-reactor behavior of  $U_3Si_2$  fuels.

This research is being performed using funding received from the DOE Office of Nuclear Energy's Nuclear Energy University Programs.

**Monavarian, Mehri**

**Mentor(s): Prof. Esmail Jabbari**

**Engineering a 3D in vitro tumor model for drug screening**

Drug resistance is an inevitable phenomenon that leads to recurrence of cancer with more invasive properties. Cancer stem cells (CSCs), a small subpopulation of tumor cells, are shown to play a pivotal role in tumor resistance to drugs. In this study, we developed an in vitro 3D hydrogel system to enrich CSCs and investigated the response of CSCs to a range of drugs. MDA-MB-231 (breast cancer) cells were encapsulated in a polyethylene glycol (PEG)-based hydrogel and incubated in CSCs medium for 7 days to form tumor spheroids. In the next step, Paclitaxel as a non-CSCs targeting drug and Salinomycin as a CSCs targeting drug were added to the culture medium for 48 hours. Cell viability and marker expression were measured by MTS assay and RT-PCR respectively. In 3D culture that was enriched in CSCs, cell viability decreased from 94% to 43%, when Salinomycin concentration increased from 1 to 10 $\mu$ M while in 2D culture that had small CSCs subpopulation, Salinomycin at its highest concentration (10  $\mu$ M) decreased the viability to 75%. EGFR and ABCG2 fold difference decreased from 24 and 17 in the control group to 2.2 and 5.5 in samples with 10 $\mu$ M Salinomycin concentration. On the other hand, Paclitaxel that preferentially targets the non-CSCs population decreased the cell viability to 34% in 2D and 62% in 3D culture at its highest concentration (1000nM). Furthermore, gene expression results showed that paclitaxel in 3D culture not only did not have any effect on cancer stem cells but also increased the population of CSCs relative to non-CSCs in the culture system. EGFR and ABCG2 fold difference increased from 24 and 17 in the control group to 36 and 24 in samples with 1000nM paclitaxel. Cancer cell-laden PEG-based hydrogel can be used as a 3D in vitro tumor model to screen chemotherapeutic drugs against cancer stem cells.

**Porter, Ryan**

**Mentor(s): Dr. Jennifer Trilk**

**The Effect of Exercise is Medicine Greenville® (EIMG®) on Body Weight and Blood Pressure**

Non-communicable diseases (NCD) such as type-2 diabetes mellitus and cardiovascular disease are largely affected by lifestyle. According to the World Health Organization (WHO), by 2020, approximately 2/3 of disease will be a result of poor lifestyle choices such as physical inactivity. Exercise is Medicine Greenville® (EIMG®) is a 12-week exercise program to which physicians refer patients not currently meeting national physical activity guidelines and/or have or are at-risk for NCDs. Of particular interest for this study were at-risk patients with body weight issues and/or hypertension (BP > 130/80) upon referral to EIMG®.

**Purpose:** To investigate the effect of the EIMG® exercise training program on body weight, systolic and diastolic BP (SBP and DBP, respectively) in individuals referred to the program.

**Methods:** Patients at-risk of NCD were referred by their physician to the 12-week EIMG® exercise training program. Each participant underwent a supervised, personalized exercise training program developed by an EIM certified professional. A single group pre-test, post-test experimental design was utilized when collecting body weight and BP measurements before and after the exercise training program. A paired sample t-test was utilized to determine statistically significant changes ( $p < 0.05$ ) in each variable due to the exercise intervention.

**Results:** A total of 115 participants have finished the 12-week intervention. Approximately 41% ( $n=51$ ) of the participants were hypertensive prior to beginning the program. Analysis of the whole group resulted in a significant decrease in body weight (2 lbs,  $p=0.002$ ) and SBP (4 mmHg,  $p=0.014$ ). The subgroup of hypertensive participants lost 2 lbs ( $p=0.024$ ) and significantly decreased SBP by 10 mmHg ( $p < 0.001$ ) and DBP by 5 mmHg ( $p=0.003$ ).

Conclusions: These results demonstrate that the EIMG® program may be beneficial in assisting patients at-risk of NCD to lower risk of future disease by assisting in body weight loss and decreasing SBP. Greater cardiovascular benefit may be recognized in those referred to the program with hypertension by decreasing both SBP and DBP. Since previous research indicates that exercise does not account for body weight loss, further research is needed to better understand the results of body weight loss observed during the EIMG® program.

**Silvestre, Joao**

**Mentor(s): Dr. Ho-Jin Koh**

### **ER Stress and TRB3 are induced by different atrophy models in C2C12 cells**

Muscle atrophy contributes to a poor quality of life in several pathophysiological conditions, including metabolic/hormonal disorders, sepsis, inactivity and fasting. TRB3 has been associated with different conditions such as insulin resistance, tumorigenesis and Endoplasmic Reticulum (ER) stress, and our recent study showed that 48h of fasting increased ER stress and TRB3 expression in mouse skeletal muscle. Here, we sought for an in vitro muscle atrophy model that mimics the in vivo activation of ER stress/TRB3/atrophy pathway.

In order to induce muscle atrophy, C2C12 cells were differentiated for 4-5 days and incubated with palmitate (0.75mM; 17h and 24h), serum-free media (12h and 48h), low glucose media (5mM; 12h and 48h), PBS (3h and 6h), or Dexamethasone (1uM and 2uM; 24h). We analyzed the myotube area and the mRNA expression of ER stress markers, TRB3 and atrogenes, Atrogin1 and MuRF1.

The myotube area, a marker of skeletal muscle cell atrophy, was significantly reduced by all treatments (Palmitate 24%; Serum free-media 36%; Low glucose 43%; PBS 83%;  $p < 0.05$ ) except low glucose media (12h) and Dexamethasone. The mRNA expression of ER stress markers was also significantly increased by all the treatments except serum-free media (48h), low glucose media (48h) and Dexamethasone. The TRB3 mRNA expression was only induced by Palmitate (17h and 24h;  $p < 0.05$ ) and PBS (6h;  $p < 0.05$ ). The mRNA expression of Atrogin1 and MuRF1 was induced by serum-free (12h;  $p < 0.05$ ), PBS (6h;  $p < 0.05$ ) and Dexamethasone (1uM and 2uM;  $p < 0.05$ ). Thus, among the protocols analyzed, PBS 6h was the unique model that induced all markers related to ER stress/TRB3/Atrophy pathway. Our next steps include analyzing whether the blocking of ER stress or the TRB3 knockout could improve the atrophy condition, and also if the TRB3 overexpression could impair the atrophy condition.

**Wang, Pengtao**

**Mentor(s): Prof. Chen Li**

### **A Lab-Scale Air Cooled Heat-Pipe Condenser for Green Power Plants**

The air cooled condensers (ACCs) in thermal power plants are more competitive than the water-cooled condensers (WCCs) owing to global water crisis. The state-of-art ACCs need emerging heat transfer enhancement technologies, therefore, hybrid wet/dry cooled condensers (HCCs) are employed to compensate the low efficiency of ACCs. To overcome the high capital and operating cost of conventional HCCs, we propose a heat pipe air-cooled condenser (HPACC). HPACC combines traditional heat pipe technology with unique sweating-boost air cooling strategy. Its architecture is similar to that of most effective once-through WCCs, but conventional water tubes are replaced with high performance heat pipes. A lab scale HPACC is built by scaling down the prototype of HPACC. This research focuses the heat transport and rejection process within a HPACC. The thermal performance of a HPACC is characterized under various thermal loads and air velocities, and finally the sweating-boost effects on the HPACC is investigated. It demonstrates that there is a saturated thermal load for the HPACC at a given air-cooling condition. The

minimum value of total thermal resistance of HPACC is 0.10 K/W per meter achieved at the effective thermal load of 1553.8 W with an air velocity of 3.0 m/s. The air cooling is further boosted by sweating process on the fined surface integrated with superwetting  $\text{Cu}_2(\text{OH})_3\text{NO}_3$  wicks. It demonstrates that HPACC with a sweating boosting (HPACC-SB) significantly improves the total effective thermal load and reduces the total thermal resistance. The proposed HPACC are promising in replacing current cooling equipment of thermal power plants, and the substantial water saving will help relieve the water crisis facing the US and the world.

**Wang, Jingjing**

**Mentor(s): Dr. Mohammed Baalousha**

### **Size-dependent uptake and depuration of platinum nanoparticles in *Leptocheirus Plumulosus***

Mainly used in catalytic convertor in vehicles, platinum (Pt) shows a steadily growth in global production with an annual demand of 249 tons in 2017 [1, 2]. The large scale of production leads to inevitable increasing in Pt release into the environment, with some of it in nanoparticle form [1, 3-5]. Despite the exciting growth of Pt NPs industry, its potential ecological impact is not well understood. Numerous studies have focused on toxicity of Pt NPs to a wide range of organisms [6-10], but the in-depth analysis of toxicity mechanism is still lacking. As the toxicity of nanoparticles may be related to their size, stability, and aggregation state, it is imperative to apply advanced techniques to thoroughly investigate the effects of Pt NP size on their uptake in environmental organisms.

Three different sizes (20 nm, 40 nm, and 70 nm) of Pt NPs were synthesized in lab and characterized for size and size distribution using transmission electron microscopy (TEM) and single particle inductively plasma mass spectrometry (spICP-MS). The uptake of PtNP20, PtNP40 and PtNP70 in *L. Plumulosus* were analyzed using sp-ICP-MS. *L. Plumulosus* is a widely distributed estuarine crustacean along the east seaboard of the US [11]. For all three Pt NPs, platinum mass influx increased during the 72-h exposure. As particle size decreased, *L. Plumulosus* showed a significant increase in mass influx of platinum at the end of the 72-h exposure,  $47.4 \pm 16.6 \text{ mg}\cdot\text{g}^{-1}$  for 20 nm particles comparing to  $15.8 \pm 4.5 \text{ mg}\cdot\text{g}^{-1}$  for 40nm, and  $8.3 \pm 1.8 \text{ mg}\cdot\text{g}^{-1}$  for 70 nm particles. The amphipods were unable to excrete all the particles taken up after 48 h depuration, even for 70 nm particles, there's 15.8% of the influx still retained in the amphipods. *L. Plumulosus* had more smaller size particles retained after depuration. Overall, this study demonstrated that smaller size Pt NPs are more likely to be taken up and to bioaccumulate in *L. Plumulosus*.

**Weaver, Cory**

**Mentor(s): Dr. Fabienne Poulain**

### **Dystonia 16-associated PACT expression alters the development and stability of motor neuron axon arbors**

Primary dystonias are characterized by uncontrolled muscle contractions resulting in repetitive movements and abnormal body postures. Dystonia 16 (DYT16) is one of only a few primary dystonias to affect children with a mean age of onset around 9 years old. Patients typically present with tremors in the extremities progressing to the trunk. Ultimately, patients can experience painful torsion of the trunk, limbs and neck along with difficulty speaking and reduced mobility. Mutations in a double-stranded RNA binding encoding gene called PACT have been linked to the disease, but how mutations cause neuromuscular dysfunction in patients is still unknown. No vertebrate models of DYT16 currently exist, and PACT null mice die during implantation, making the study of PACT function and DYT16 etiology challenging. The zebrafish ortholog of PACT (zPACT) shares 51% identity with human PACT, including residues known to be mutated in DYT16. As zebrafish are fertilized externally, they are not susceptible to implantation defects that are lethal in mice. We generated two mutant variants of zPACT similar to DYT16-associated mutations in humans, zPACT-T10S and zPACT68. Cell-type specific expression of zPACT variants in motor neurons (MNs) does not affect early axonogenesis. However, expression of either variant decreases

the complexity of MN axon arbors at 5 days post-fertilization (dpf). Time-course imaging of single MNs shows that zPACT-T10S affects arbor complexity as early as 3 dpf and even leads to branch retraction by 5 dpf. We also tested the effect of zPACT variants on sensory neurons and myocytes and found that DYT16-like zPACT variants do not affect the development or stability of these cells, suggesting that the effects caused by zPACT variants are specific to MNs. Finally, we tested the effects of human wild-type (WT) and DYT16-associated mutant PACT expression on MNs. The human truncation mutant PACT88-21 phenocopies the arbor defects observed in zPACT, suggesting functional conservation of PACT in both species and validating the use of zebrafish as a new vertebrate model for DYT16. We are currently investigating potential mechanisms that underlie MN arbor defects, including a dysregulation of the integrated stress response that has been implicated in other primary dystonias.



# **Medical Scholars**

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# **presentations**

**Angermayer, Megan**

**Mentor(s): Dr. Shanna Williams, Dr. Asa Black, Ms. Hope Conrad**

### **Endometriosis Foci Relating to Sciatic Neuropathy**

#### **INTRODUCTION**

Endometriosis is a painful reproductive disorder in which endometrial-like tissue is found outside of the uterus. This tissue is associated with heavy periods as well as pelvic pain and chocolate cysts. Proliferation and migration of endometrial-like tissue into the lumbosacral plexus and its associated branches causing pelvic neuropathy has been noted in the literature.

#### **OBJECTIVE**

One might assume the sidedness of endometrial tissue invasion around lumbosacral nerve roots should be bilateral. In reality, the preponderance of presentations are right-sided. Our aim is examine the sidedness and presentations of endometrial lesions of the lumbosacral plexus and associated branches within the literature and provide anatomical explanations for these findings. One hypothesis for right-sided sciatica due to endometriosis is that the sigmoid colon and sigmoid mesocolon serve to obstruct the passage of endometrial tissue on the left side.

#### **METHODS**

We conducted a PubMed search using the search terms “cyclic sciatica”, “sciatic nerve” “sacral nerve” and “endometriosis” and found 45 articles related to endometriosis and sciatica. Twenty-three of these articles, dating from 1955 to 2018, contained case reports of sciatica (n=30) caused by endometriosis, and we evaluated the sidedness of each case.

#### **RESULTS**

Twenty case reports identified right-sided lesions, while the remaining ten were left sided.

#### **CONCLUSION**

There seems to be preferential involvement of the right side, but it is not absolute. Retrograde menstruation does not fully explain the possibility of left sided sciatica. In order to migrate past the sigmoid colon, the ectopic tissue would potentially have to pass through the peritoneum and travel from the Pouch of Douglas to the lumbosacral nerve roots. Another possibility is the genesis of endometrial tissue from Müllerian rest cells in the ovary. Since the ovaries are retroperitoneal in origin, this course of migration of the endometrioid tissue would be much more plausible. Involvement of these two pathophysiologies can explain the sidedness. Half bilateral from Müllerian rest cells and half due to retrograde menstruation would lead to an overall distribution of 75% right sided and 25% left sided which is close to the distribution we found in the literature.

**Armstrong, Amber**

**Mentor(s): Dr. Christine Turley, Dr. Lisa Knight**

### **Comparison of Traditional and Novel Recruitment Methods in Pediatric Research**

**Introduction:** It is often difficult to engage participants in clinical research, and this is an important barrier to advancing medical knowledge. Barriers include fear, mistrust, access to investigators, time, and geographic distance. Historically, face-to-face recruitment has been found to be most successful, however, novel methods are used, such as texting and emailing, to inform patients about research opportunities. Little is known about the relative success of these methods.

**Aim:** This study evaluates the effectiveness of using novel recruitment methods to engage parents in a low risk, low intensity, high interest, research study.

**Methods:** A research survey for parents regarding an almost universally appealing topic (Access to

Healthcare) was developed. Parents who had enrolled in the Child Health Research registry were contacted by text, mail, or email on 2 separate occasions. Each individual in the registry was contacted twice, spaced 1 week apart. Secure REDCap links were provided that were specific to each type of contact. A traditional in-person recruitment approach was used as a control group.

Results:

1,418 parents were approached: Text (n=450), mail (n=418), email (n=450) and in person (n=100). In person recruitment was highly successful (96/100), while response rates for text (10/367), mail (11/364), and email (10/374) were low. Differences were noted by parental age, with higher number of responses by email (>42 years), mail (30-42 years), and text (18-29 years). Response modality by race showed a higher number of responses by non-Hispanic Whites via email or text, non-Hispanic Blacks via mail, and Hispanics via mail and text with no responses via email.

Discussion: Overall, traditional in-person recruitment, although more resource-intensive, remains the most successful method of recruiting healthy pediatric subjects. Novel use of targeted technology may not be a successful accelerator of research engagement that is not disease specific.

Future Directions: Future research can be used to determine the success of recruitment through social media platforms, advertisements, video messaging, and applications. The use of alternative recruitment methods for a disease focused research protocol could yield different levels of engagement, and should also be studied, in an effort to accelerate advances in medical knowledge and improve health outcomes.

**Augsburger, Allie**

**Mentor(s): Dr. Francis Spinale**

**Effect of Localized Shear-Thinning Hydrogel Injections on Early Post-Myocardial Infarction Left Ventricular Remodeling**

Allie Augsburger, Lisa Freeburg, Heath Doviak, William Torres, Josh Mealy, Jason A. Burdick, Shayne Barlow, Francis G. Spinale

Cardiovascular Translational Research Center, University of South Carolina School of Medicine and the Columbia Veteran Affairs Medical Center, Columbia, SC

Objective: A common cause for the development of heart failure is the events which follow a myocardial infarction (MI). Specifically, left ventricular (LV) remodeling, defined as changes in LV geometry and pump function. An approach which has been promulgated to attenuate post-MI remodeling is biomaterial injections in the MI region. However, translation of this approach in terms of clinical relevance have not been addressed. The present study tested the hypothesis that novel shear-thinning hydrogel injections at a clinically relevant time point (~5 days post-MI) would attenuate LV remodeling and failure in a porcine model of MI.

Method: Mature pigs (15-20 kg; n=16) underwent catheter mediated ischemia-reperfusion to produce a consistent MI and ~5 days post-MI, randomized to undergo a minimally invasive procedure for targeted MI injections (5 injections -100 mL each; MI-gel; n=6). The sheer-thinning hydrogel allowed for injection through a syringe and self-assembly at the injection site. The remaining pigs served as controls (MI only; n=10). Using echocardiography, LV end-diastolic volume (LVEDV), ejection fraction (LVEF), were measured to reflect indices of LV remodeling, and pulmonary capillary wedge pressure (PCWP) computed as an index of LV failure.

Results:

At 28 days post-MI, LVEDV increased in both groups, but the magnitude of LV dilation was approximately 50% lower in the MI-gel group (p<0.05). LVEF fell in both groups at 28 days post-MI, but LVEF was 30% higher in the MI-gel group (p<0.05). At this same time point, PCWP increased by 90% in the MI only

group and only by 25% in the MI-gel group ( $p < 0.05$ ).

**Conclusions:** This project demonstrates the feasibility of targeted injections of a novel shear-thinning hydrogel within the MI region at a clinically relevant post-MI time point. Targeted delivery of this hydrogel favorably altered the trajectory of LV post-MI remodeling and interrupted progression to LV failure. The use of self-assembling hydrogels in conjunction with therapeutics would be a future direction.”

**Avalos, Yesenia**

**Supervisor(s): MariClare Martin**

**Mentor(s): Dr. Alyson Browning**

**Time to administration of first dose of IV antibiotics in the Palmetto Health/Prisma Health-Midlands Children’s Hospital Emergency Department**

**Abstract:** Sepsis is a potentially devastating condition that can quickly progress from initial symptoms of infection to organ failure and death. Because each hour of persistent shock increases the odds of mortality, current American College of Critical Care Medicine-Pediatric Advanced Life Support (ACCM-PALS) Guidelines emphasize aggressive IV fluid resuscitation and administration of broad-spectrum IV antibiotics within 1 hour of presentation. However, prompt recognition of septic shock in pediatric patients in the emergency care triage setting has been challenging, possibly leading to delays in therapy and poor adherence to guidelines.

Recent quality improvement efforts have focused on implementation of electronic sepsis alerts and bundles, which promote prompt assessment and timely treatment. The goals of this strategy are to reduce delays in therapy and ultimately improve outcomes.

Prior to initiation of pediatric sepsis bundle at Prisma Health-Midlands Children’s Hospital in spring 2019, we will determine the current average time to administration of the first dose of IV antibiotics in the pediatric emergency department. This pre-intervention data will later be compared to that following the launch of the sepsis protocol. In addition, we hope to identify possible barriers to delivery and administration in order to prevent these delays in care in the future.

**Methods:** Retrospective, chart review of pediatric patients in Children’s Hospital Emergency Department who have at least one dose of IV antibiotics ordered in the ER during December 2018.

Data collection: Ongoing

**Barrera, John**

**Supervisor(s): Steven Greene**

**Mentor(s): Dr. John Cull**

**Reported Rationales for HPV Vaccination vs. Non-vaccination Among Undergraduate and Medical Students in South Carolina**

Human papillomavirus (HPV) vaccination is a crucial aspect of preventative medicine and population health through prevention of cervical and oropharyngeal cancers. Various barriers to vaccination, ranging from cultural to socioeconomic, have threatened the widespread acceptance and utilization the vaccine.

**Background/Objectives:** To identify sociodemographic and psychosocial factors that influence (HPV) vaccination rates in young adults at a large public undergraduate university and a medical university in South Carolina.

Participants: 1007 students with a mean age and standard deviation of  $20.3 \pm 3.3$  were recruited from September 2018 to December 2018.

Methods: A cross sectional analysis was performed using a self-reported 13-question survey administered electronically to students at a large public undergraduate university and a medical university in South Carolina. The survey assessed HPV vaccination rates, demographic data, as well as rationales for vaccination vs. non-vaccination.

Results: Of the 1007 respondents, HPV vaccination was reported in 700, 165 had not been vaccinated, 75 received some but not all of the vaccination series and the remaining 138 did not know their vaccination status. Of those vaccinated, 85% reported completion of vaccination before becoming sexually active. The most common rationales for vaccination were parental influence (68%) and physician recommendation (58%). Of non-vaccinated individuals, 37% reported "never thinking about vaccination," 32% reported lack of perceived need for vaccination, and 31% reported concerns about vaccine safety as reasons for not receiving the HPV vaccine. HPV vaccination was more common in females ( $p=0.037$ ), individuals who received the standard childhood vaccinations ( $p=0.04$ ), and the individuals who were born outside of SC ( $p<0.001$ ).

Conclusions: HPV vaccine promotion efforts may benefit from concentrating on SC residents, males, and individuals who are under-vaccinated or unvaccinated as a whole. This study also supports efforts to encourage SC physicians to perform HPV counseling for their patients.

**Behnke, John**

**Mentor(s): Dr. Neal Burkhalter**

**Conservative Management of Petrositis due to Mycobacterium abscesses**

Mycobacterium abscessus is a rare, but increasingly frequent cause of petrositis and otomastoiditis. Over the last 40 years, the therapeutic focus of petrositis has shifted from surgical to medical modalities; however, M. abscessus infections provide a distinct challenge to the medical management of petrositis due to the species' predilection for extensive drug resistance. We describe a case in which petrositis due to M. abscessus is effectively managed in a patient with significant comorbidities through conservative medical therapy, demonstrating the potential for such management in a traditionally morbid disease process.

**Belk, Madeline**

**Mentor(s): Dr. Christopher Goodman, Dr. Stephanie Shealy, Dr. Catherine Lopez, Dr. McKenzie Sorrell, Dr. Emily Ridley**

**Impact of inpatient interprofessional rounding with transitions of care focus on outpatient medication discrepancies**

Objective: To decrease medication discrepancies at outpatient hospital follow-up appointments in a medicine resident-based clinic through the introduction of interprofessional rounding with transitions of care focus prior to hospital discharge.

Method: After daily inpatient rounds, the attending physician, resident physicians, and clinical pharmacist discuss discharge medications for patients expecting to discharge within 24 hours. The clinical pharmacist identifies high risk medications, including insulin, anticoagulants, and antibiotics. The pharmacist proposes plans for discharge prescriptions, taking into account inpatient insulin requirements and total days of anticoagulants and antibiotics. If the patient meets criteria, a hospital follow-up appointment is scheduled in the resident-based clinic within two weeks of hospital discharge. A clinical pharmacist routinely assesses and documents medication discrepancies at hospital follow-up appointments. Medication

discrepancies were categorized as follows: omission, discontinued medication, duplicate therapy, dose changes, drug interaction or contraindication, wrong medication, and access.

Results: Through implementing our change, the mean total medication discrepancies per patient decreased by 2.74 (5.85 vs 3.11). There was a decrease specifically in mean medication discrepancies due to access (0.93 vs 0.59), dosing (1.32 vs 0.67), omissions (2.0 vs 0.59), continuation of discontinued medications (0.40 vs 0.19), and patient taking wrong medication (0.53 vs 0.26). There was no change in mean medication discrepancies due to adherence (0.66 vs 0.70). Medication adherence was the most common reason for a medication discrepancy after the introduction of systematic discharge rounding.

Implications: In order to further minimize medication discrepancies, future directions should focus on combatting medication discrepancies due to patient adherence. Action to incorporate motivational patient interviewing in the hospital discharge process is currently being explored.

**Berry, Davis**

**Mentor(s): Dr. Divya Ahuja**

### **Diagnostic Dilemma of Acute Transverse Myelitis without MRI Evidence**

Background:

Acute Transverse Myelitis is a rare, rapidly progressive inflammatory neurological condition characterized by limb weakness, dysesthesia and sensory deficits with a defined sensory level.

Etiology remains unclear in 50% of cases. Some causes include infection by herpes virus, listeria monocytogenes or Varicella zoster virus.

The Transverse Myelitis Consortium Working Group (TMCWG) has refined criteria for diagnosis of transverse myelitis to include:

1. Clearly defined sensory level
2. Sensory, motor or autonomic dysfunction attributable to spinal cord
3. Bilateral symptoms, progression to peak of symptoms between 4 hours and 21 days without evidence of cord compression.
4. Inflammation defined by either cerebrospinal fluid analysis or elevated IgG index or gadolinium enhancement must be confirmed.

Case Presentation:

This report describes an unusual presentation in a 62 year-old female who presented to emergency department with severe burning sensation and allodynia of her right lower quadrant that rapidly evolved into complete paralysis of her right lower extremity. Multiple magnetic resonance imaging (MRI) studies of her spinal cord were negative for neither a compressive nor a vascular etiology of her myelopathy.

Without evidence of spinal cord disease on imaging or suggestive abnormalities of the cerebrospinal fluid, the extreme pain on light touch, an ascending sensory level on physical exam presented a diagnostic dilemma. Without a clearly confirmed diagnosis, based on some suggestive clinical manifestations, empiric treatment for transverse myelitis was initiated with high dose pulse steroids and intravenous immunoglobulins. Patient's symptoms and sensory level stabilized and repeat MRI imaging 2 weeks later demonstrated new eccentric spinal cord abnormality without enhancement at the T9 level of the spinal cord confirming the diagnosis of acute transverse myelitis. Patient was discharged to a rehabilitation facility and continues to make functional recovery.

Conclusion:

Transverse myelitis usually presents with diagnostic changes on MRI. The lack of spinal cord signal abnormality in T2-weighted MRI imaging through the acute phase of transverse myelitis is a rare, atypical presentation and although this case did not fulfill all diagnostic criteria it reinforces Occam's Razor, which

is defined as the simplest explanation is usually the correct one.

**Brett, Catherine**

**Supervisor(s): Blair Chance, Stephanie Lee**

**Mentor(s): Dr. Olabisi Badmus, Dr. Mark Humphrey**

### **Increasing Resident Awareness of Employee Primary Care Resources to Improve Resident Wellness**

#### Background

Physicians are at higher risk for burnout, depression, and suicide compared to non-medical peers. The prevalence of burnout is greatest in resident and fellow trainees. A JAMA study found presenteeism, defined as working while sick, a major issue contributing to burnout among residents.

Interventions must be developed to optimize resident wellness and prevent burnout. ACGME recognizes the importance of resident wellness and mandates that programs address this with Common Program Requirements. Little is specified in these requirements regarding providing primary care resources for residents during their training. Prisma Health-Midlands has over 24 training programs with over 250 residents and fellows. It is currently unknown what percent of Prisma Health residents can identify having a local primary care provider (PCP).

The objectives of our study are to gather baseline data and develop an effective intervention to increase the identification of a PCP by residents, a component of increasing resident wellness.

#### Methods

Anonymous questionnaires, used as both needs assessment and pre-test, were distributed to Prisma Health residents of one specialty (n=30) to gather preliminary data. An educational intervention will be developed and performed. A post-intervention survey will be used to measure improvement in resident PCP identification and awareness of Prisma Health primary care and wellness services.

#### Results

Of the 20 respondents, 22% of residents had an established primary care provider, 53% reported working ill, 15% of residents were aware of the Prisma Health employee wellness clinic, and 10% of the Prisma Health employee same-day urgent care clinic.

#### Conclusions

Preliminary data indicates the need for an intervention to address the establishment of primary care among residents and increase awareness of medical services available at Prisma Health. We will distribute the survey to all residents in the Prisma Health system to evaluate what the current state among residents is and to assess barriers to care. Our next step is to initiate an educational program to address these identified needs.

**Brett, Catherine**

**Mentor(s): Dr. Divya Ahuja, Dr. Olabisi Badmus**

### **Provider Adherence to Cervical Cancer Screening in HIV Patient Populations: A Quality Improvement Initiative at the Immunology Center**

#### Background

Human papillomavirus (HPV) is the most common sexually transmitted infection in the US. Although most HPV infections are transient, persistent infection strongly predicts subsequent risk of cervical intraepithelial neoplasia (CIN) 3 or cervical cancer. Known cofactors that increase the likelihood of persistent HPV infection include cigarette smoking, a compromised immune system and human immunodeficiency virus (HIV) infection.

In the US, women with HIV have significantly higher rates of cervical cancer than women in the general population. Antiretroviral therapy has dramatically improved life expectancy in persons living with HIV, however, prolongation of life leads to increasing cumulative incidence of tumors over time, as well as a longer duration of HPV persistence.

Screening guidelines for HIV infected women differ from women without HIV. Most cases of cervical cancer occur in women who were either never screened or were screened inadequately. However, over-screening for cervical cancer can lead to unnecessary stress and procedures, as well as adding increased and unnecessary costs to the patient and to the healthcare system.

The central aim of this project is to evaluate provider adherence to cervical cancer screening guidelines and to identify factors (patient and provider factors) associated with over and underscreening.

## Methods

A retrospective chart review assessing cervical cancer screening rates from January 1, 2015, to December 31, 2017 will be performed. Charts will be abstracted until 200 charts are identified that meet inclusion and exclusion criteria. The proportion of patient encounters in which the provider adhered to the cervical screening guidelines will be computed, along with a 95% confidence interval.

## Results

Of the 803 patient charts identified, 320 charts met inclusion criteria. Results will be available for presentation at Discover USC.

## Conclusions:

The results of this study will help us better understand provider practices and adherence to screening guidelines for cervical cancer at the Immunology Center. This information will guide educational needs and the development of training interventions tailored to the factors discovered and lead to improved quality of care for the patients, appropriate utilization of health care resources and reduced adverse outcomes for patients as a whole at the Immunology Center.

## **Brown, Kelly**

**Mentor(s): Dr. Bryan Love, Dr. James Hardin**

## **Influenza Vaccination Coverage in Pediatric Patients with Inflammatory Bowel Disease**

**Background:** Children with chronic health conditions, including inflammatory bowel disease (IBD), are at especially high risk for influenza infection and complications. The Crohn's & Colitis Foundation's Top 10 Quality Process Indicators for IBD and American College of Gastroenterology's clinical guidelines for preventative maintenance recommend that IBD patients should receive annual influenza vaccination. The aims of this study were to evaluate influenza vaccination coverage over time and identify predictors of flu vaccination in pediatric IBD and non-IBD patients.

**Methods:** We utilized longitudinal data (2000 to 2016) from South Carolina Medicaid to conduct a

matched cohort study. The primary exposure of interest was IBD diagnosis based upon ICD-9/10 diagnosis codes. Children with IBD were matched 1:4 to children without IBD on birth year and sex. Vaccination coverage for IBD and non-IBD groups for each season were calculated as [# receiving vaccine] / [# eligible]. We calculated 95% confidence intervals using nonparametric bootstrap replications adjusted for clustering. A multivariable random effects logistic regression model was used to identify predictors of vaccination.

Results: 1,184 IBD subjects and 4,736 matched non-IBD subjects were identified during the study period. Among the IBD patients, 698 were diagnosed with ulcerative colitis, 348 were diagnosed with Crohn's disease, and 138 patients had indeterminate disease. The average age was 9.5 years and the majority of patients were male (52.7%). Among IBD patients, vaccine coverage increased from 2% in 2001 to 40% in 2016. For each year into the study, children had higher odds of vaccination (OR=1.24, p<0.01). Children with IBD had higher odds of vaccination (OR=1.22, p<0.001) than non-IBD patients. Children in urban locations had higher odds of vaccination (OR=1.56, p=0.001) than children from rural locations. Compared to white females, black females (OR=0.85, p=0.017) and black males (OR=0.84, p=0.012) had lower odds of vaccination. Children receiving corticosteroids had higher odds of vaccination (OR=1.21, p<0.001). Conclusion: Flu vaccination for both IBD and non-IBD children significantly increased from 2001 to 2016. IBD patients were more likely to get vaccinated than non-IBD patients, although vaccination coverage in SC remains below target levels. Efforts to increase influenza vaccination in pediatric IBD patients are needed.

**Bryan, Alyssa**

**Supervisor(s): Julia Brown**

**Mentor(s): Dr. Morgan Adams**

**Retrospective analysis of Hepatitis C cure rates in family medicine clinic**

With the advancements in the treatment of Hepatitis C, cure rates of patients with a previous diagnosis have improved over time and now reach over 90%. The availability and simplicity of treatments allows for patients to manage their disease in various settings, including in the outpatient setting with a primary care physician. Primary care providers are well-equipped to provide better access to hepatitis C care and are able to collaborate with specialists via telemedicine, such as Project ECHO. Most graduates (85%) from the Palmetto Health – USC Family Medicine residency program go on to practice in a Health Professional Shortage Area (HPSA) where access to specialist care is even more limited. In an effort to provide the residents with experience treating hepatitis C during residency, our residency program increased the training on hepatitis C and began treating eligible patients. A previous study found that primary care physicians were able to achieve a sustained virologic response (SVR) rate of 86.9%, with specialists achieving 83.8% in the same study. To date, no study has addressed the cure rates of hepatitis C in a primary care residency program.

This retrospective analysis will evaluate the cure rates of hepatitis C patients (with a prior positive screening) who were treated at the Palmetto Health – USC Family Medicine Center. This study will evaluate the SVR rate for both attending and resident family medicine physicians. Data collection is currently ongoing and will continue to include patients in the study that are diagnosed and treated at the Family Medicine Center. This study aims to further document the ability of primary care providers, including trainees, to treat hepatitis C.

**Catala-Fuster, Jaime**

**Mentor(s): Dr. Kamla Sanasi**

**Is Transient Elastography Safe in Pregnancy? Preliminary Data from a Proof of Concept Study.**

Background

Transient elastography (TE) is an essential tool in the management of chronic liver disease. Due to limited data in the US, TE is not recommended in pregnant women. TE measures shear wave or transverse wave velocity which increases with liver inflammation/fibrosis. During pregnancy, providers often use serum biomarkers instead of liver biopsy, an invasive procedure. TE, a noninvasive approach, could improve staging of liver disease in pregnancy, further validation and safety data are warranted.

#### Methods

Serial TE have been performed in pregnant (2nd and 3rd trimester) and post-partum (6-8 weeks post-delivery) women, > 18 years at a Tertiary Care Center. Inability to lay flat or those unable to consent were excluded. Data collected include demographics, comorbidities, prior liver disease, liver enzymes, alcohol and drug use, TE score, adverse pregnancy outcomes, and any adverse events (pain or bruising). Study aims include validity and safety of TE in pregnancy. Descriptive statistics, used to analyze variables and study end points.

#### Results

17 patients were included. Average age 31 years, 65% (n=11) black, average weight of 82kg in 2nd trimester and 90kg in the 3rd. Comorbidities included HIV (n=5), alcohol use (n=5), tobacco use (n=5) and illicit drug use (n=3). None of the patients had chronic viral hepatitis or known cholestatic liver disease. Median TE scores during the 2nd trimester (n=7) was 4.7 kPa (range 2.3- 17.1 kPa) and 3.8 kPa (range 3.1 – 7.9 kPa) during the 3rd trimester (n=9). Four persons (24%) had scores >7.5kPa, none had transaminitis, one reported alcohol use and 2 were HIV-infected. No maternal or fetal adverse events were observed.

#### Conclusion

TE appears safe and could be useful for the management of suspected liver disease in pregnant women. Additional data will better delineate the utility and reproducibility of the test as well as the safety for the fetus. While preliminary, the finding of 24 % of our cohort having TE scores of >7.5kPa is similar to German (20%) and Dutch (22%) reports. Pilot data suggest that TE in pregnancy may have utility as complementary technology to serum biomarkers.

### **Cielonko, Luke**

**Mentor(s): Dr. Lisa Knight**

### **Making a Healthier Shift: Implementation of a Childhood Obesity Management Curriculum in a Pediatric Residency Program**

**Introduction:** Medical providers in all stages of training recognize a deficit in education on topics that address childhood overweight and obesity. Currently at Palmetto Health/USC pediatric residency program there is not a childhood overweight and obesity curriculum. In addition it is unknown the attitudes, perceived proficiency, and knowledge of members in the program on providing nutritional guidance and the prevention/treatment of overweight/obesity.

**Aims:** The goal of this project is to increase the mean knowledge assessment score from 27% (15 out of 55) to 80% (44 out of 55) through the implementation of a childhood obesity curriculum by March 31,2018.

**Methods:** Resident's attitudes and perceived proficiencies towards nutrition and obesity treatment were evaluated using previously validated questionnaires. Resident's knowledge was evaluated with a 55-question knowledge assessment.

**Results:** A total of 35 residents participated during the entirety of the study. There was a significant difference between the pre-test score (M= 15.7, SD= 3.44) and the post-test score (M=36, SD= 5.47);  $t(23)=20.7$ ,  $p=(0.001)$ .

**Conclusion:** The implementation of a childhood overweight and obesity curriculum was a success. This curriculum provided residents with additional knowledge that they can now utilize in clinical practice.

**Crandall, Rebekah**

**Supervisor(s): Kristina Pond**

**Mentor(s): Mrs. Julie Murray, Dr. Christopher Goodman**

**A quality improvement project to decrease undertriage rates by evaluation of the adult trauma alert process.**

According to the Resources for Optimal Care of the Injured Patient, a trauma center should strive for an undertriage goal of  $\leq 5\%$  as determined by the patient's final cumulative Injury Severity Score (ISS). Any patient with an ISS  $\geq 16$ , indicative of a moderate to severe trauma, should have a 911 alert, the highest level. Undertriage occurs when a trauma page was indicated and not activated or a lower level alert was used inappropriately. This creates a dangerous situation for the patient by mismatching providers to anticipated patient needs. Prisma Health Richland (PHR) of Columbia, South Carolina has been scoring above the 5% threshold for undertriage rates, so an attempt was made through a Quality Improvement Education and Systems Training (QuEST) initiative to bring them within goal. First, the current adult trauma alert notification sheet was uploaded to the hospital's website and taped to the charge nurse's desk outside the trauma bay. This sheet contains a list of criteria that determines whether the trauma team should be activated and is filled out by the hospital's communication center with patient information provided by Emergency Medical Services (EMS). Next, Positive (PPV) and Negative Predictive Values (NPV) were calculated for criteria already included within this alert sheet in an attempt to find criteria that was potentially incorrectly categorizing patients. Of the evaluated criteria, all were either  $\geq 95\%$  sensitive or specific when evaluated against an ISS  $\geq 16$ . A Glasgow Coma Scale (GCS) of  $\leq 8$  was identified as being the best predictor of trauma as determined by a PPV  $\geq 0.5$  and an NPV  $\geq 0.75$ . The most significant statistic analyzed was that 21-27% of trauma patients from 2018 were missing at least one of their vital signs and 19% were missing all. A handout with a list of the five most important patient characteristics to relay to the communication center was created for local EMS, including the patient's GCS, age, mechanism of injury, heart rate, blood pressure, and respiratory rate. This list was chosen based on PPV, missing vital signs, and communication center recommendations. Data on the full impact of this change are to follow.

**Crutchfield, Anna**

**Mentor(s): Dr. Matt Orr**

**Will the Implementation of a Resident Wellbeing Committee Improve Resident Burnout Score?**

Abstract

Introduction

Burnout is characterized by emotional exhaustion (emotional overextension and exhaustion), depersonalization (negative, callous, and detached responses to others), and reduced personal accomplishment (feelings of competence and achievement in one's work). In 2018 alone, at least 2 residents in Prisma Health-USC residency programs experienced burnout and one lost her life due to compounding factors dealing with mental health. Between 2000 and 2014, 324 individuals (220 men, 104 women) died while in residency. For male residents the leading cause was suicide. Deaths by suicide were higher early in training, and during the first and third quarters of the academic year. ACGME notes that periodic monitoring of physician fatigue and burnout is essential to identifying vulnerabilities. Once these vulnerabilities are noted, there must a focused effort to design and implement actions to enhance resident safety, thus improving patient safety. AAMC notes that fortunately, resiliency building is becoming more common in residency programs. Multiple other medical societies note the need for focused burnout interventions. As the medical community continues to improve on this issue, we will hopefully be able to prevent deaths of many residents to come, thus practicing safer medicine.

Methods

To improve resident burnout, the Family Medicine Residency at Prisma Health created a team of residents

and behavioral health faculty to help address resident resilience and vitality. The team implemented multiple events targeted at improving resident wellbeing and monitored resident burn out via periodic surveys. The aim of this study is to measure resident resilience by implementing activities, events, mentoring, and brief professional consultations with the program's behavioral health faculty. We hypothesize that implementation of such a committee aimed at improving resident vitality will improve perceived wellbeing and burnout scores. We will be measuring resident wellbeing periodically via surveys that address burnout measures. The surveys will be deidentified to preserve resident anonymity.

**DeMarco, Grace**

**Supervisor(s): John Behnke, Christopher Zust, MD**

**Mentor(s): Dr. Ravish Kothari**

### **A Successful Case of Endovascular Thrombectomy in a Distal Intracranial Occlusion Stroke**

While endovascular therapy (ET) is the treatment of choice for proximal large vessel occlusion strokes, there is limited evidence supporting the same endovascular interventions for distal intracranial occlusions. However, distal strokes can lead to significant patient morbidity and permanent neurological deficit. A multi-center randomized clinical trial for distal occlusion endovascular therapy has yet to be attempted due to a myriad of factors (from restrictive patient selection criteria to a small effect size), leading to many practitioners' reluctance to attempt such interventions. We describe a case in which an MCA-M3 endovascular thrombectomy was successfully performed and resulted in a dramatic decrease in the patient's morbidity. Our case is notable in that the intervention decreased not only the patient's penumbra on neuroimaging, but also her NIH score, and contributes to a body of literature supporting more aggressive endovascular intervention in distal intracranial occlusion strokes.

**Desai, Shyam**

**Mentor(s): Dr. Suan Lessner**

### **Calcification and Risk Stratification in Femoral Artery Stenosis**

**Purpose:** Peripheral arterial disease (PAD) is a growing concern in older populations. About one in every 20 Americans over age 50 has PAD, which is heavily linked with an increased chance of having a myocardial infarction or stroke. Vascular calcification, which is commonly observed in PAD patients with co-morbid diabetes or chronic kidney disease, complicates interventional treatment and correlates with increased morbidity and mortality. The specific aim of this project was to compare calcium levels in atherosclerotic plaques measured using a biochemical approach to calcification volume calculated using image analysis of computed tomographic angiogram (CTA) scans. By developing a validated calcium score for the lower extremities, we aim to better stratify PAD patients undergoing femoral endarterectomy according to risk of future disease progression.

**Methods:** Preliminary studies were performed on samples from patients undergoing carotid endarterectomy (CEA). Plaque samples were lyophilized and weighed to calculate calcium content as a fraction of dry weight. A colorimetric assay for calcium was performed on a plate reader to measure the total calcium content. To estimate extent of calcification in lower extremity CTA scans, calcified areas in non-contrast enhanced images were segmented and measured using Fiji image analysis software, while total vasculature volume was obtained using ITK-SNAP in contrast-enhanced CTA scans.

**Results:** Two samples from the same plaque had calcium content of 0.77 mg/mg dry wt and 0.31 mg/mg dry wt, demonstrating considerable intraplaque variability. Estimates for fractional volume of calcification throughout the lower extremities were 0.74% and 3.62% in two CTAs.

**Discussion/Conclusion:** We successfully demonstrated a biochemical method to measure total calcium content in human plaque specimens. We also developed an approach to quantify calcification volume from CTA images. Future work will focus on automating the analysis of CTA scans, and on comparing biochemical results to image analysis results in the same specimens.

**Edmonds, Bradley**

**Mentor(s): Dr. Kristina Hotz**

### **Catatonia Following Synthetic Cannabinoid and MDMA Use in a Young African-American Male with No Past Psychiatric History**

Synthetic cannabinoids (SC) and MDMA are synthetic drugs with few case reports of catatonia resulting from their use. Also rare are case reports of catatonia occurring as a result of neuroleptic use. In this article, we describe a case of catatonia in a young male with no previous psychiatric history possibly related to SC/MDMA use or neuroleptic use. Psychotic symptoms including auditory hallucinations and delusions as well as stupor and stereotypy occurred following SC and MDMA use. Patient received haloperidol (total of 75 mg PO and 20 mg IM) over his first nine days of hospitalization and thereafter developed mutism and posturing as well. Haloperidol was discontinued at this point. He failed to respond to lorazepam (reaching maximum dosage of 5 mg PO TID). Due to systems issues and refusal to consent on the part of the caretaker due to perception of electroconvulsive therapy (ECT) as dangerous, ECT delivery was delayed until fifty-three days after the emergence of catatonia. In the hours following his first ECT treatment, the patient's catatonic symptoms completely resolved, and other psychotic symptoms improved dramatically.

**Ergen, Thomas**

**Mentor(s): Dr. John Walsh**

### **Scaphoid Fractures Treated with a Two Headless Compression Screw Technique**

**HYPOTHESIS:** We hypothesize that the two headless compression screws will have a higher union rate than a single headless compression screw. Scaphoid fractures are a common injury of the hand. It is a unique, intercalated bone that is mostly covered by cartilage and has a precarious blood supply. Therefore, fractures can lead to poor bone healing and nonunion, especially ones that involve the proximal pole. The gold standard of treatment is with a single headless compression screw placed down the center of the scaphoid. However, a single screw technique does not provide rotational stability that is needed in a wrist that moves in multiple planes. Biomechanical studies have shown that two headless compression screws have greater stability, stiffness, and energy absorption than a single headless compression screw. The two headless compression screw technique was used for greater construct stability and stiffness.

**METHODS:** A retrospective chart review was completed of all patients who underwent scaphoid fracture fixation by a single surgeon over a 5 year period resulting in 39 patients. We then reviewed the type of fracture (nonunion, acute, waste, proximal pole) and ultimately their surgical outcome from the chart and radiographic measures.

**RESULTS:** Twelve patients underwent the two screw surgical technique. Eight patients had initially a nonunion, while the other four were acute injuries. Two patients did not follow up. Three patients ended up having a clinically stable pain free fibrous nonunion, while the remaining seven had an average of 100.5 days to radiographic union. Of the initial nonunion group, five had radiographically healed fractures, two had fibrous nonunions, and one was lost to followup.

**SUMMARY:**

- Treating scaphoid fractures, especially nonunions of the proximal pole, are difficult injuries to treat
- A two headless compression screw technique is a viable option in treating these difficult fractures and should be placed in the surgeon's armamentarium.

**Ergen, Thomas**

**Mentor(s): Dr. Earl McFadden**

**Oral Tranexamic Acid Decreases Blood Loss after Reverse Total Shoulder Arthroplasty**

**INTRODUCTION:** Reverse total shoulder arthroplasty (R-TSA) may result in significant blood loss and complications during the procedure. Tranexamic acid (TXA) has shown to significantly reduce blood loss, wound hematomas, decrease postoperative transfusion rates, and shortening operative times in total joint arthroplasty. There have been studies showing similar results in total shoulder arthroplasty with IV TXA. Furthermore, it is estimated that the appropriate dose of oral TXA is \$14 versus \$47 to \$108 of IV TXA. However, there are no studies evaluating the use of oral TXA in reverse total shoulder arthroplasty. Our hypothesis is that oral TXA will show a decrease in perioperative blood loss, postoperative drain output, total blood loss, postoperative drop in hemoglobin, length of hospitalization, operative time, and postoperative pain scores when compared to no TXA.

**METHODS:** A retrospective analysis of oral TXA versus no TXA prior to reverse total shoulder arthroplasty was completed on 202 patients (69 TXA, 133 no TXA). Preoperative hemoglobin, operative time, operative blood loss, hemovac output postoperatively, total blood loss, post operative pain score, hospital length of stay, and postoperative hemoglobin drop were recorded. A linear regression analysis was completed on the variables.

**RESULTS:** There was a 70 cc decrease in hemovac drain output postoperatively and a 76 cc decrease in the total blood loss in the oral TXA group compared to the control group. However, there was no statistically significant difference in the other categories.

**DISCUSSION and CONCLUSION:** Our findings show that oral TXA can decrease postoperative blood loss and total blood loss when compared to a control group. Our data shows similar outcomes with previous studies that focused on the use of IV TXA in R-TSA. As we move towards a healthcare system that focuses on cost savings, oral TXA may have similar enough outcomes to warrant its use.

**Finney Inabinet, MD, Chandler**

**Mentor(s): Dr. Kerry Sims, MD, Dr. Berry Campbell, MD, Dr. Bo Cai, PhD**

**Preterm Labor Assessment Toolkit (PLAT) Pilot Study At Prisma Health Richland Hospital**

**Background:** Preterm birth, defined as delivery between 20 weeks and 0 days gestation and 36 weeks and 6 days gestation, is the leading cause of neonatal mortality and is the most common reason for antenatal hospitalization. In the United States, roughly 12% of all births occur preterm. The purpose of this study was to implement a Preterm Labor Assessment Toolkit, or PLAT, at Prisma Health Richland Hospital to standardize the assessment and management of patients presenting to Labor and Delivery (L&D) triage with complaints of preterm labor (PTL). By streamlining the triage process, it was hypothesized that it would allow for more efficient evaluation and management of patients presenting with complaints of PTL in an effort to improve quality and outcomes of both mothers and neonates.

**Methods:** A retrospective chart review was conducted on patients presenting to L&D triage over a two month period with signs and symptoms of PTL, both before and after the implementation of the PLAT protocol. A total of 46 patients were included in the pre-implementation data and a total of 37 patients were included the post-implementation data. In addition, pre-implementation and post-implementation surveys were sent to all obstetricians and L&D nurses.

**Results:** Following the implementation of the PLAT protocol, patients presenting to L&D triage with complaints of PTL were less likely to receive antenatal corticosteroids and magnesium for fetal neuroprotection during the assessment period. The number of patients admitted for PTL, who were eventually discharged home undelivered was not statistically significant between the two groups. There was no difference in the examination tools used to evaluate patients for PTL.

Discussion: Implementation of the PLAT protocol on L&D led to a statistically significant decrease in the amount of unnecessary medications patients received prior to the diagnosis of PTL, presumably leading to decreased cost. The study revealed that even though less medications were provided, there was no difference in the number of patients that were admitted and discharged home eventually undelivered. Thus, by streamlining evaluation and management, patients presenting with PTL may be more efficiently and appropriately triaged.

**Fleming, Samuel**

**Mentor(s): Dr. Spencer Robinson**

**Intralipid use in Cardiac Arrest due to Doxepin and Wellbutrin Overdose**

A 41 year old male patient with a past medical history of depression was brought to the Emergency Department after an intentional overdose of an unknown quantity of Doxepin and Wellbutrin. On arrival he was actively seizing and in respiratory arrest. His initial EKG showed a wide-complex tachycardia with abnormally prolonged QRS and QT intervals. Shortly after arriving the patient decompensated and went into PEA arrest. Resuscitation was initiated according to ACLS protocol and in consultation with a medical toxicologist from the Palmetto Poison Center. Doxepin is a tricyclic antidepressant (TCA) notorious for causing seizures, and it classically causes Na-channel blockade--leading to wide-complex tachycardia and unstable dysrhythmias. Wellbutrin is a monocyclic antidepressant which also precipitates seizures and wide-complex tachycardia. At toxic levels both drugs exert deleterious synergistic effects, each enhancing the other's lethal neuro and cardiotoxicity. The patient in this case had a poor initial response to resuscitation measures, and the decision was made to administer Intralipid. Central venous access was established, allowing for delivery of the large volumes of lipid emulsion necessary to treat his dual toxicity. The patient's clinical course improved dramatically after administration of bolus and continuously infused Intralipid. ROSC was achieved and the patient's stabilized. Intermittent seizures ensued but were ultimately controlled. Serial EKGs demonstrated prolonged QRS and QT intervals, however these corrected with continued treatment. The patient was admitted to the ICU and required continued administration of Intralipid and sodium bicarbonate infusions. Remarkably the patient's course improved, and he was discharged from the hospital 2 weeks later with intact neurocognitive and cardiovascular function.

**Funderburke, Erin**

**Supervisor(s): Brittany Page**

**Mentor(s): Dr. Julia Balance**

**"Is This Too Much? Improving Parent's Confidence in Dosing Tylenol: A Quality Improvement Study"**

A recently published study in Pediatrics Journal in September 2016 found that over 80% of parents made one or more dosing errors with liquid medication, and that over 20% gave more than twice the appropriate dose. The pediatric residents at Palmetto Health Richland Children's Hospital (PHR CH) receive multiple calls about Tylenol dosing. This study aimed to improve parent's confidence in administering anti-pyretics correctly by 20%. Parents of 2 and 4 month old patients at their respective well child check (WCC) were taught how to administer Tylenol with a syringe marked with the appropriate dose and given a handout with the same information. Two months later, parents were contacted for follow up survey. All reported that they felt "more comfortable" with dosing Tylenol after teaching. Results showed that 10 out of 13 parents surveyed (76.9%) had a 20% increase in their Likert scale score indicating caregiver confidence. The additional 3 parents had no change in their score before and after. In conclusion, teaching parents Tylenol dosing at their clinic appointments seems to help improve their confidence and therefore should be discussed at each clinic appointment.

**Gehris, John**

**Mentor(s): Dr. Francis Spinale, Mrs. Lisa Freeburg, Dr. Robert Gorman**

**Divergence in a Novel Fibroblast Specific Protease in Heart Failure Phenotypes**

**Background and Purpose:** A leading cause of death and disability in South Carolina is the development and progression of heart failure (HF). Similar to that of cancer, it is becoming recognized that phenotyping the specific forms of HF can hold relevance in terms of prognosis and treatment response. The predominant HF phenotypes are HF with a reduced ejection fraction (HFrEF) which commonly arises following a myocardial infarction (MI) and HF with a preserved ejection fraction (HFpEF) which commonly arises with hypertension. In both HF phenotypes, significant changes in left ventricular (LV) structure and function occur, particularly within the extracellular matrix. Again, cancer research has identified a unique protease that emerges in matrix remodeling in heart failure (HF) specific to fibroblasts- Fibroblast Activation Protein (FAP). We tested the hypothesis that shifts in FAP expression would occur in a large animal models of HFrEF and HFpEF.

**Methods and Results:** Adult pigs underwent MI and the development of HFrEF (n=21) and another cohort underwent aortic banding to induce HFpEF (n=9). With HFrEF, LV mRNA levels for FAP increased by over 100-fold at 7 days post-MI ( $p < 0.05$ ), but mRNA levels in HFpEF either remained unchanged or were reduced from referent control values. In additional studies, plasma profiles for FAP appeared to mirror these changes at the transcriptional level.

**Summary and Conclusions:** This study is the first to identify changes in FAP induction occur in HF progression, and the pattern of induction is distinctly different in HF phenotypes. Since small molecule chemotherapeutics targeting FAP exist, then these findings hold relevance to novel HF treatment.

**Gibson, Lauren**

**Supervisor(s): Sofia Markee**

**Mentor(s): Dr. Stephanie Gibson, Dr. Julie Balance**

**Educating mothers of newborn infants on appropriate use of car safety seats: a collaborative between Palmetto Health Richland Newborn Nursery and Palmetto Health Children's Hospital Outpatient Center, a qualitative improvement project.**

**Introduction:** Over 5,000 infants under one year of age are injured in motor vehicle collisions (MVC) every year, many of which are fatal.<sup>1</sup> Appropriate use of car safety seats (CSS) decreases MVC related deaths by 71% in infants <1 year of age.<sup>2</sup> Unfortunately, 85% of discharged newborns are sent home in an inappropriately installed CSS.<sup>6</sup>

**Aims:** This resident-driven quality improvement project aimed to obtain a 50% improvement in parental CSS knowledge (as a means of reducing CSS misuse) by May 1st, 2018, using a six-minute video and illustrative handout to educate mothers of newborns prior to discharge on CSS installation/use, as well as upcoming Buckle Buddies CSS inspections and classes.

**Methods:** Mothers of all newborn infants designated as patients of Children's Hospital Outpatient Center, were quizzed on baseline knowledge of car safety seat use. The educational intervention was then started, first with a six-minute video by Children's Hospital of Philadelphia, on the basic principles of car safety seat installation. The mother was then supplied with an illustrative handout on common CSS installation and usage mistakes. The intervention was assessed using a post-test quiz which was administered to all newborn follow ups and two-week old well child encounters, in the Children's Hospital Outpatient Center setting.

Results: The average pre-test score was 71%, with 54% of participants passing. Post-test analysis revealed an average score of 58%, among those receiving the full intervention (video and handout) and 55% among those who received the handout only intervention. Only 25% of each of these groups passed the test.

**Conclusions:**

Although inferences and conclusions concerning the efficacy of this intervention are difficult to formulate considering the low power of the interventional post-test analysis group, there was profound information obtained from the baseline data gathered. At baseline, only 57% of CHOC parents are able to pass the quiz, thus they likely are misusing or have incorrectly installed their CSS.”

**Gordon, Caroline**

**Supervisor(s): Erika Jansen**

**Mentor(s): Dr. Morgan Adams, Dr. Mark Humphrey**

**Increasing Hepatitis C Screening Rates in Patients of the Family Medicine Center**

The Palmetto Health – University of South Carolina (USC) Family Medicine Center (FMC) is part of a group that serves the Midlands region as the largest multispecialty, clinically integrated medical group, serving approximately 12,000 patients at FMC alone. The FMC is a combined resident and attending clinic and serves patients of all ages. From 2013 – 2016, there were approximately 36,100 people living in South Carolina with chronic hepatitis C. With hepatitis C now a curable disease, there is room for quality improvement (QI) in increasing the screening rates of hepatitis C in those patients eligible for screening. The United States Preventative Services Task Forces gives a grade B recommendation in screening patients at high risk for infection, including a one-time screening for hepatitis C infection to adults born between 1945 and 1965. In fall 2018, a survey was sent to attending and resident physicians at FMC determine their understanding of screening and comfort in treating hepatitis C to assess barriers to physicians ordering the initial HCV-antibody screening test. A second survey was sent out in January 2019 to the Family Medicine Department. All physicians who took the initial survey recorded that forgetting to screen was the most likely potential barrier of hepatitis C screening tests, with time constraints as a second potential barrier. To address this, a hepatitis C order set has been created for use. This will allow physicians to place a group of orders, instead of placing individual orders. This initiative is ongoing and will focus on the implementation of this hepatitis C order set and education to physicians to increase hepatitis C screening rates.

**Grate, Deirdre**

**Mentor(s): Dr. Andrew Vaughan**

**Mind the Gap: Are Transition of Care Measures Decreasing Readmission Rates for Medicare Patients**

**INTRODUCTION:**

Patients with complicated illnesses are often at risk for readmission to the hospital. This has been found to occur most frequently within 30 days of discharge. Historically, one of the leading causes of readmission is a breakdown in care in which patients do not receive follow-up leading to gaps in care. Transitional Care Management (TCM) appointments were developed as a billable service to combat the issue. The goal of these appointments is to aid the patient in transition from inpatient to the community setting. The Palmetto Health USC Family Medicine Center began implementing these measures in 2016. It is expected that this did, in fact, reduce the frequency of readmission when compared with those who did not attend. Distance from the follow up clinic is a likely contributor to gaps in care. It is also expected that higher risk diagnoses such as poorly controlled chronic obstructive pulmonary disease or congestive heart failure will have higher rates of readmission.

## **METHODS:**

Medicare patients admitted and discharged from the family medicine teaching service were identified for chart review. Factors with the potential to affect follow up and readmission were also identified, including discharge diagnosis and proximity to clinic. These factors including discharge diagnosis and proximity to the follow up clinic were reviewed along with whether patients attended their follow up appointments. Patients who attended their appointments were then compared with those who did not. Charts were reviewed further to assess whether any of the subjects were readmitted to the hospital within 30 days of discharge. Readmission rates between both groups were then compared to determine whether Transitional Care Management appointments led to a statistically significant decrease in readmission rates.

**Gupta, Avigeet**

**Supervisor(s): Jaron Pettis, Michael Patetta**

**Mentor(s): Dr. Richard McCarroll, Dr. Zeid Keilani, Dr. Fernando Navarro**

### **Thyroid Surgery Outcomes at a General Surgery Training Program**

Thyroidectomy is a commonly performed surgical procedure that is considered to be relatively safe in the modern surgical era. In the United States, general surgery residents have some required training in thyroid surgery by the American Council of Graduate Medical Education, but this training requirement does not align with the increasing demands for thyroidectomy procedures that are being performed annually by surgical subspecialists. Surgeons who perform more thyroidectomy procedures annually are known to have superior outcomes when compared to their low-volume counterparts. Our institution reviewed 111 records of patients that underwent either partial or total thyroidectomies in order to compare institutional complication rates to established literature values. Senior general surgery residents with close attending supervision had complication rates for hypocalcemia, hematoma, seroma formation, surgical site infection, and nerve injury that were lower than the reported literature, highlighting the fact that thyroidectomy procedures performed at academic residency programs are generally safe. There is a greater need for general surgery programs nationwide to increase exposure to thyroid procedures and endocrine surgery to residents in order to best serve the increasing demand for these procedures while maintaining and increasing patient safety.

**Hamill, Jenna**

**Mentor(s): Dr. Christine Turley**

### **The State of Neonatal Abstinence Syndrome Identification and Treatment in South Carolina**

#### **Introduction:**

One baby with Neonatal Abstinence Syndrome is born every 15 minutes in the United States. Babies with NAS, which includes neonates with opioid withdrawal syndrome (NOWS), present with high-pitched crying, poor feeding, seizures and even death 2-3 days after birth. NAS/NOWS prevalence has increased rapidly in the past 10 years, while evidence has lagged to guide treatment. This has created a need to assess the current state of diagnosis and treatment, in order to better understand opportunities for improving outcomes.

#### **Aims:**

We aim to identify the extent of the NAS/NOWS problem in South Carolina, as well as describe identification and treatment protocols of NAS used in the state.

#### **Methods:**

Birthing centers in South Carolina were identified by the SC DHEC. A survey was created using REDCap and sent via email, inviting them to participate. The survey included: total number births, # birth with prenatal drug exposure, level of care, scoring tools for identification of NAS/NOWS, as well as the pharmacological and nonpharmacological treatment practices at each institution.

#### Results:

15/38 sites responded to the survey. Responding sites estimated 24,613 total # births in a year, accounting for 43% of the statewide births in 2017 (57,029). Sites estimated that 1900 babies (7%) in the responding institutions were born with NAS, with a high degree of variability between sites. All 15 responding sites had established NAS identification protocols. 73% of the birthing centers had established NAS treatment protocols. The # of non-pharmacological options varied by the Level of Care provided at the institution.

#### Discussion:

Statewide hospitals estimated a 7% incidence of NAS in comparison to the nationally reported 0.36% in 2013. There was high variability in NAS incidence rates with certain sites reporting up to 28% of births at their hospital being NAS births. It is important to identify areas in our state with high numbers of NAS births and ensure standard identification and treatment protocols across the state.

#### Future Directions:

This survey can help inform further research in the state in all areas from identification and treatment of NAS babies, to prevention of prenatal opioid exposure.

#### **Hardy, Eliza**

**Supervisor(s): Julia Moss**

**Mentor(s): Dr. Ann Blair Kennedy**

#### **Creating Space for Meaningful Dialogue: the Between Two Palms Event Program**

Diversity initiatives in medical education have traditionally focused on recruiting underrepresented minorities (URMs); however, it is simultaneously necessary to increase awareness and foster community among medical students to educate physicians that are not only diverse but also inclusive. At the University of South Carolina School of Medicine Greenville, student leaders formed the Student Advocates for Diversity and Inclusion (SADI) committee to identify areas for improvement within the curriculum and to influence the school culture regarding diversity training and cultural awareness. SADI prioritized an innovative program that would foster dialogue on issues surrounding diversity and inclusion with the aim to inform and inspire the next generation of physicians. SADI organized an event entitled *Between Two Palms*, loosely based on the popular talk show “*Between Two Ferns*”, in which guests responded to anonymous student questions on diversity topics. Guests included physicians and other community leaders, many of whom are URMs, who shared their experiences, challenges, and perspectives with students. *Between Two Palms* created a space for meaningful dialogue on diversity and inclusion. Previous guests have discussed race, gender, religion, politics, Affirmative Action, admission policies, and school demographics and how each of these affects health outcomes and physicians’ interactions with patients and other providers. Exit polling following the first three installments demonstrated successful engagement among students with at least 94% of attendees positively rating the event. Diversity and inclusion initiatives in education and medicine traditionally focus on statistics, but innovative programs such as *Between Two Palms* offer a different approach to promoting diversity and learning cultural awareness among students. Engagement with diverse leadership helps students to appreciate their differences, to question their assumptions, and to strengthen their connections in order to become more diverse and inclusive physicians.

#### **Hayes, Edwin**

**Mentor(s): Dr. Sharon Weissman, Dr. Caroline Derrick**

#### **Effect of Antiretroviral Therapy on Stool Microbiome in HIV Infected Adults**

The effect of Human immunodeficiency virus (HIV) on the gut microbiota had become the subject of research in recent years and data suggest that microbial dysbiosis -in gut or genital tract- can influence HIV transmission and/or disease progression. It has been shown that HIV infection induces a compositional

shift in the gut microbiota, with enrichment of bacterial populations, that are either pro-inflammatory or potentially pathogenic, and whose abundance correlated with immune status. The persistent immune activation induced by HIV infection leads to high levels of CD8+ T cell infiltration and cellular damage. Translocation of gut microbiome into the circulating blood occurs when mucosal damage disrupts the integrity of the epithelial tissues and this has been linked to the development of acquired immunodeficiency syndrome.

Antiretroviral therapy has been shown to partially restore this loss of CD4+ T cells in the gut but only to roughly 50% when compared to non-infected controls.

This prospective, observational, single center study will compare changes in stool microbiome of treatment experienced vs. treatment naïve HIV positive subjects' pretreatment, at 12 weeks after initiation of ART. Patients were excluded if pregnant, had gastrointestinal diseases, or chronic immunosuppressive agents including systemic corticosteroids or cytotoxic agents. Our goal was to recruit 21 patients, and thus far 7 samples have been collected. Six of the seven samples were from different subjects. Two were treatment naïve and three had been off therapy for over one year. Five were African American. Mean age 32.

Fecal samples were collected using DNA Genotek OMNIgene GUT system for easy self-collection and stabilization of microbial DNA from stool. Microbial diversity analysis will be performed with Genotek service providing Manual V3+V4 16S library preparation w/QC (Bioanalyzer spot checking), 16S Sequencing on the MiSeq, OTU Picking, Bioinformatics standard shotgun report including taxonomic classification. Baseline characteristics, BMI, CD4 count, time on ART, HIV viral load will be compared using chi-square or Fisher's exact test for categorical variables and t-test for continuous variables. Multivariable logistic regression will be performed to identify factors that independently influence differences in microbial diversity.

Data collection is ongoing and therefore further results are pending.

### **Hittson, Aaron**

**Supervisor(s): Chetak Patel, Matt Bowser, Zachary Hardy**

**Mentor(s): Dr. Laura Nolting**

**Prehospital Point of Care Ultrasound: F.A.S.T. and Feasible?**

Clinical decision making in the emergency department often hinges on the information gathered from Emergency Medical Services (EMS). This primary information is precious, but it is limited by the austerity of the environment. EMS depends on reliable, portable equipment that can give functional data. Historically these tools have been simple; EMS relies on stethoscopes, manual sphygmomanometry, and portable vital sign monitors. Our study hopes to lay a foundation for the movement of a (relatively) new imaging modality to the field: Point of Care Ultrasound (PoCUS).

Traditionally, ultrasound machines have been bulky, expensive, and therefore limited to the hospital setting. With advances in ultrasound technology in parallel with portable wifi and smartphone/tablet technology comes the possibility of bringing ultrasound on to the ambulance. Thanks to Clarius Mobile Health, the PRISMA Health Richland Emergency Department has been able to provide introductory training to Kershaw EMS regarding ultrasound image obtainment. We foresee images obtained in the field, transmitted via stable internet connection to the emergency department, to augment communication and expedite patient care in the field where seconds count.

### **Homer-Bouthiette, Collin**

**Mentor(s): Dr. Anna Kathryn Burch**

**Case Report of Pulmonary *Actinomyces odontolyticus* in an Immunocompetent Pediatric Patient**

*Actinomyces* is a bacteria commonly found in normal oral flora. It can rarely present as pathologic, most

commonly in the cervicofacial distribution as abscesses and can create sinus tracts. The disease can extend from the facial abscesses into the lungs as well as cause pulmonary manifestations after episodes of aspiration or surgical/dental procedures. This case report describes the clinical course of a 15 year old male patient presenting with fever, cough, congestion and mild chest pain of approximately a week in duration with worsening symptoms over the 4 days prior to presentation. The patient presented for hospital workup from PCP after concerning radiographic findings in the right hilar/mediastinal mass and lack of symptomatic improvement after a short course of antibiotics. This immunocompetent patient without any predisposing risk factors was diagnosed with pulmonary *Actinomyces odontolyticus* by BAL culture and treated with appropriate antibiotics resulting in rapid clinical improvement.

“Howard, Shannon - Mentor(s): Dr. Sangita Dash, Dr. Julie Ann Justo -- Impact of Sequential Clinical Decision Support Alerts on Inappropriate *Clostridium difficile* Testing at a Multisite Health System -- Purpose: To evaluate the impact of sequential clinical decisions support alerts on the local rate of inappropriate *C. difficile* NAAT order attempts.

Methods: This was a retrospective observational cohort study including all hospitalized patients with inappropriate *C. difficile* order attempts at three Prisma Health hospitals between July 1, 2016 through May 31, 2018. Post-intervention occurred in three phases: Phase 1 included a soft stop alert for prior negative *C. difficile* test within 7 days and a hard stop alert for prior positive *C. difficile* test within 14 days; Phase 2 included a soft stop alert for laxative use within previous 24 hours; Phase 3 included a hard stop alert for patients aged  $\leq 12$  months and conversion of prior negative test alert to hard stop. Descriptive statistics and Student's t test were used to compare the primary outcome, rate of inappropriate *C. difficile* NAAT order attempts per 10,000 patient days, pre- vs. post-intervention. Interrupted time series analysis was utilized to evaluate impact of each phase of alert implementation. Secondary outcome included quarterly Standardized Infection Ratio (SIR) for *C. difficile* infection (CDI).

Results: There was a total of 1,382 inappropriate *C. difficile* order attempts in the pre-intervention period (July 2016-May 2017) vs. 766 in the post-intervention period (July 2017-May 2018) ( $p < 0.001$ ). There was a decreased rate of inappropriate *C. difficile* order attempts per 10,000 patient days from an average 44.6 (range 30.1-60.3) during pre-period to 25.4 (14.3-36.7) during post period ( $p < 0.001$ ). Interrupted time series analysis demonstrated a numerical decline in the level coefficient for inappropriate order attempt rate across all phases with greatest decline demonstrated in Phase 2 with the laxative alert (beta coefficient -13.99 attempts per 10,000 patient days,  $p = 0.12$ ). There was a decrease in SIRs for CDI from an average 0.98 in the pre-period to 0.71 in post period ( $p = 0.009$ ).

Conclusion: Rate of inappropriate *C. difficile* order attempts significantly decreased following sequential implementation of clinical decision support alerts. Largest impact was seen with the laxative use within 24 hours alert. This data compares the relative utility of various computerized alerts to improve stewardship of diagnostic tests in clinical practice.

## **Huff, Logan**

**Mentor(s): Dr. S. Wendell Holmes**

**Post-operative MRI follow up in patients who have undergone medial meniscal root reconstruction using hamstring autograft.**

Introduction:

Numerous techniques to repair medial meniscus posterior root tears (MMPRT) have been published. Current methods have failed to restore the normal anatomy and function of the meniscus root and resulted in the rapid progression of arthritis. Reconstruction of MMPRT by the addition of auto-graft tissue may improve the healing rates and prevent long-term sequelae of MMPRTs.

#### Methods:

A novel arthroscopic technique consisting of reconstruction of the meniscal root with gracilis autograft and reinforcement using collagen coated suture tape has been utilized to reconstruct medial meniscal root tears in a sub-set of patients. After arthroscopic reconstruction, patients have been followed closely in the clinical setting with post-operative magnetic resonance imaging (MRI) to assess for biologic healing of the meniscal root reconstruction.

#### Results:

Patients who have undergone this arthroscopic meniscal root reconstruction using autograft have been followed for greater than 1 year post-operatively with clinical evaluation and MRI. There is promising biologic healing using a grading scale in patients in their post-surgical MRI and in their clinical evaluation.

#### Discussion:

The healing rates of repairs and/or reconstructions of MMPRTs is suboptimal and current techniques need improvement. Direct repair of the torn meniscus back to the tibia without biologic tissue may result in a non-anatomic and a biologically weak construct long-term. The novel reconstruction technique creates an anatomic construct with suitable load to failure and characteristics with potential for improved healing over time. Clinical and post-operative MRI follow up in a sub-set of patients in which this technique has been used are currently showing promising results in biologic healing post-operatively.

**Hughes, Daniel**

**Mentor(s): Dr. J. Benjamin Jackson**

#### **Awareness of Thiazolidinediones and Fracture Risk in Type 2 Diabetes Mellitus Patients in an Orthopaedic Setting**

The Type 2 Diabetes Mellitus (T2DM) epidemic in America affects 9.4% of the population and has been increasing as obesity has increased. This is a marked increase from 1960, when only 0.9% of the population had T2DM. High rates of T2DM has contributed to rising healthcare costs and has added complexity to disease management.

Pharmacologic treatment of T2DM is complex, and there are many available drugs with different mechanisms of action. The variety of options enables patients to take the drugs that they tolerate and respond to best. Metformin is typically used as a first line therapy, but if HbA1c is initially >9% or if metformin does not resolve a high HbA1c after three months, second-line therapies, such as thiazolidinediones (TZDs), are then used.

The TZD drug class, which includes pioglitazone (Actos) and rosiglitazone (Avandia), is highly effective at increasing insulin sensitivity via transcription factor activation. TZDs are agonists for the transcription factor peroxisome proliferator-activated receptor-g (PPAR-g), which primarily acts on adipocytes to increase insulin receptors on adipocytes. PPAR-g is also expressed in bone marrow, which leads to TZDs causing a net effect of increasing bone resorption and decreasing bone formation, leading to increased bone fragility.

With the established evidence that TZDs increase fracture risk in post-menopausal patients with T2DM, it is important to assess whether orthopaedic surgeons are aware of this risk. We predict a knowledge gap exists between current published data and orthopaedic surgeon knowledge. Our goal is to assess both the knowledge and practices of orthopedists with regard to TZDs in T2DM patients by surveying the orthopedists and Fellows of the American Orthopaedic Association (AOA).

**Johnson, Catelin**

**Supervisor(s): Saif Alimohamed**

**Mentor(s): Dr. Rebecca Huggins**

**Targeting Metered Dose Inhaler (MDI) Waste at Prisma Health System**

This project aims to identify and optimize MDI waste in the Prisma Health System at the Richland, Parkridge and Baptist campuses, specifically between floor transfers and duplication of therapy.

**Johnson, Logan**

**Mentor(s): Dr. Rodney Alan, Dr. Jenna Swindler**

**Reducing the Economic Burden of Home Medications During Outpatient Total Knee Replacement Surgery**

Introduction: In January 2018, the Center for Medicare and Medicaid Services (CMS) removed total knee replacements from the inpatient only list allowing the procedure to be performed on an inpatient or outpatient status. During the hospital stay, certain drugs may be covered Medicare Part B, however home maintenance medications generally are not covered while in outpatient status. Patients generally are forced to pay out of pocket for these medications, then submit a claim for reimbursement.

Research question: By holding non-critical medications, can we reduce the economic burden of home medications for outpatient total knee replacement?

Study Design: Single system, multi-site, retrospective cohort study

Methods: Adults admitted for outpatient or inpatient total knee or hip replacement from October 2018 and January 2019 were eligible for inclusion. Home medication and admission reconciliations were reviewed. Non-critical medication classes were defined as vitamins, allergy medications, as well as medications only given as needed. Further cost savings analysis is to be completed.

Results: Pending completion.

Conclusions: Future analysis will help determine the most effective way to reduce the economic burden of home medications for Medicare patients undergoing outpatient total knee replacement.

**Juneja, Vinay**

**Mentor(s): Dr. Morgan Adams**

**Computer-Based Algorithm Effect on Inpatient Glycemic Measures**

Introduction

Computer-directed management in patient care is currently being integrated into traditional physician-led management models. When applied to complex tasks such as glycemic management in hospitalized patients, these systems have the potential to improve outcomes while reducing the burden of patient care on managing providers. Severe hypoglycemia has been widely studied in these populations, with evidence suggesting avoidance of hypoglycemia is associated with improved mortality, length-of-hospital-stay, and overall costs [1]. The goal of this study is to determine the effects of one such computer-directed management system on rates of severe hypo- and hyperglycemia in hospitalized patients.

Methods

This study is a retrospective analysis utilizing de-identified blood glucose data from Prisma Health Midlands Richland Hospital from fiscal year 2017 (before implementation of computer-based management)

and fiscal year 2018 (after implementation of computer-based management). The study was completed by comparing rates of severe hypoglycemia (<50) and severe hyperglycemia (>300) during these time periods. Study groups included blood glucoses from all patients excluding infants, children, and teenagers.

## Results

The overall rate of severe hypoglycemia from fiscal year 2017 (pre-intervention) was 0.50% and the rate from fiscal year 2018 (post-intervention, all patients) was 0.44%, a difference of 0.060% (95% CI 0.0246-0.0967; P=0.001). This represents a relative risk reduction of 12.10% (RR 0.879; 95% CI 0.815-0.948; P=0.001). Furthermore, the average rate of hypoglycemia from those on this software during fiscal year 2018 (post-intervention, computer-based management patients only) was 0.37%, a difference of 0.1348% (95% CI 0.0963-0.1733; P<0.001) which represents a relative risk reduction of 26.90% (RR 0.731; CI 0.667-0.801; P<0.001).

The overall rate of severe hyperglycemia from fiscal year 2017 (pre-intervention) was 3.37% and the rate from fiscal year 2018 (post-intervention) was 3.28%, a difference of 0.0916% (95% CI -0.0021- 0.1852; P=0.055) which is a relative risk reduction of 2.70% (RR 0.973; CI 0.946-1.000; P=0.054). The post-intervention rates of both severe hypo- and hyperglycemia represent statistically significant improvements. Results were drawn from approximately 300,000 blood glucoses per year, with 2/3 of those from patients on computer-based insulin therapy management (10,000 total patients per year).

## Discussion

The results of this study imply that this type of computer-directed management is effective in significantly improving rates of severe hypoglycemia in hospitalized patients when compared with traditional physician-directed models, preventing a remarkable 1 in every 4 severe hypoglycemic episodes when utilized exclusively. At this time these benefits must be weighed against the costs associated with development and implementation of such systems. If further research continues to demonstrate similar results, this type of system has the potential to save countless lives while reducing the economic burden of hospitalized patients on the US health care system.

## References

1) Curkendall S, Natoli J, Alexander C, Nathanson B, Haidar T, Dubois R. Economic and Clinical Impact of Inpatient Diabetic Hypoglycemia. *Endocrine Practice*. 2009;15(4):302-312. doi:10.4158/ep08343.or

**Kattine, Tara**

**Supervisor(s): Nancy Hart Wicker**

**Mentor(s): Dr. Aye Aung**

**Having Conversations that Matter**

### Background:

Advance care planning (ACP) has been linked to improved patient outcomes. The goal of this project was to increase the level of confidence with ACP resulting in an overall increased number of conversations about ACP and completion of advance directives.

### Methods:

The ACP team held education sessions for a variety of healthcare team members between September 2018 and February 2019. Trainings consisted of didactics, role play, debriefing, and open dialogue. We gathered data about their discipline and experience with ACP.

The ACP team also held community education forums to increase awareness and knowledge. We gathered their demographic data.

Self-assessment using 5-point scales were used to measure all participants' comfort and community members' knowledge related to having ACP conversation before and following training.

Using the electronic medical records, we tracked the number of ACP conversations completed by the trained physicians and nurse practitioners at our tertiary, academic medical center and clinics during the study period.

#### Results:

All 131 health care team members who participated in the sessions completed the ACP Education Evaluation for Clinicians as a self-assessment of comfort with the maximum score of 60. The average total score before training was 32 of total of 60 (53%) and 46 of 60 (77%) after training.

Of the 122 community members who participated in educational training, 77 completed the ACP Education Evaluation for Community Members self-assessment surveys. Community members indicated their levels of comfort before and after ACP education as 10 out of a maximum score of 20 (50%) and 13.5 out of 20 (67%), respectively. They rated their level of knowledge before and ACP education at 2.9 out of maximum score of 5 (57%) and 4.6 of 5 (92%), respectively.

#### Conclusions:

Our study showed improved comfort in having ACP discussions for both the clinicians and the community members.

This project trained members of the entire health care team, including potential patients from the community. It educated all on how to have valuable ACP conversations.

The improvement in comfort conducting and participating in ACP interactions could lead to earlier and more frequent conversations.

#### **Kellett, Whitney**

**Supervisor(s): Scott Lanci, John Plante, Amy Hartman, Kylie Stevens**

**Mentor(s): Mr. Sean Grumbach, Mr. John Behnke, Dr. Morgan Adams**

#### **Implementation of Quality Improvement in the Medical Education Curriculum: Decreasing the Rate of Uncontrolled Diabetes at the Family Medicine Center**

We present a proof of concept of the use of a student-structured quality improvement venture at the Palmetto Health-USC Family Medicine Center (FMC) in Columbia, South Carolina. Richland County has a higher rate of diagnosed diabetes, across all age groups and socioeconomic indicators, than any other county in the state. With this statistic in mind, the FMC, with partnership from the University of South Carolina School of Medicine in Columbia, undertook a medical student-led quality improvement project to address the rate of uncontrolled diabetes for current clinic patients who had been previously identified as diabetics. Patients were selected based on Hemoglobin A1Cs, (a time-sensitive measure of generalized diabetic control), with an inclusion criterion of A1C greater than 8.0%. The project was designed such that medical students who were on a family medicine rotation at the FMC were tasked with assessing the previous student teams' contributions towards this quality improvement project and with continuing, modifying, or initiating new directions within the paradigm of a curriculum-integrated PDSA cycle. Since the beginning of the academic year in July 2018, with the participation of approximately 70 medical students with an average of 16 work hours invested per week, the rate of uncontrolled diabetes fell from 33 to 24%. In addition to the favorable response and success of the project, as indicated by a decrease in the rate of uncontrolled diabetes, the implementation of this quality improvement project serves as a proof of concept for integrating meaningful quality improvement ventures in the context of the medical school curriculum.

**Klar, Charles**

**Supervisor(s): Peter Vandersteenhoven**

**Mentor(s): Dr. William Richardson, Dr. Troy Privette**

**Rattlesnake Envenomation with Airway Compromise from Anaphylactoid Reaction**

Crotaline envenomations in the US from pit vipers such as rattlesnakes, copperheads, and water moccasins most commonly cause local tissue injury (pain, edema, ecchymosis), hemotoxicity (thrombocytopenia, coagulopathy, hypofibrinogenemia), and other systemic effects. These systemic effects can include nausea and vomiting, diaphoresis, weakness, hypotension, muscle fasciculations, and paresthesias. In rare instances, patients have developed allergic-type reactions to the venom causing rapid airway compromise. Some of these rare cases involving rapid airway compromise can be explained by anaphylaxis, an IgE antibody immune-mediated reaction to an antigen from previous envenomation or venom exposure. However, we report a 59-year-old male who developed systemic symptoms including airway compromise with no previous envenomation or exposure to rattlesnakes. The patient presented to the ED approximately one hour following a canebrake rattlesnake bite to the right index finger. Prior to arrival, a tourniquet had been placed on the patient's proximal arm by an off-duty firefighter. Shortly following tourniquet removal by paramedics, the patient developed tachycardia, hypotension, urticaria, tongue edema, and vomiting. He received intravenous fentanyl 50 mcg, ondansetron 4mg, and diphenhydramine 25 mg in route and arrived with hemodynamic compromise and worsening airway obstruction due to soft tissue edema. The patient required immediate airway management including intubation utilizing video laryngoscopy, where severe epiglottic and vocal cord edema were noted to be causing airway obstruction. Six vials of crotaline Fab antivenom (CroFab™) were initially administered along with intravenous methylprednisolone, ranitidine, diphenhydramine, and a continuous epinephrine infusion. Six additional vials of crotaline Fab antivenom were administered following the initial bolus of antivenom in the ED. The patient's hospital course included successful extubation and tapering of the epinephrine infusion and ultimately discharge home. With no history of previous exposure, it is likely that the patient developed an acute anaphylactoid reaction to the crotaline venom, rather than anaphylaxis although the clinical pictures are similar. It is unknown what role, if any, the removal of a tourniquet played in the patient's acute systemic reaction. It is however, a reminder of the potential severity and complexity of acute pit viper envenomations and the importance of early, aggressive treatment in the emergency department.

**Kozik, Michael**

**Mentor(s): Dr. Renu Pokharna**

**Case Series: NMDA Receptor Encephalitis**

NMDA Receptor (NMDAR) Encephalitis is an autoimmune encephalitis that presents as a multistage illness, starting with a flu-like prodrome, followed by manifestation of neuropsychiatric symptoms, and culminating in a catatonic-like stage. Since its discovery in 2007, recognition of NMDAR encephalitis has led to improved understanding of the natural history of this disease and its treatment strategies. While incidence and prevalence of NMDAR encephalitis are not yet known, the disease has been associated with paraneoplastic syndromes of ovarian teratomas and with pregnancy. First-line treatment starts with initiation of corticosteroids plus intravenous immunoglobulin (IVIG) or plasma exchange (PLEX). Identification and removal of a source, such as an ovarian teratoma, significantly enhances the efficacy of treatment. While near complete recovery occurs in 75% of patients, with relapse occurring in 20-25%, hospitalization for NMDAR encephalitis tends to last for as long as 3-4 months.

This study is a case series of 4 patients presenting with NMDAR encephalitis at a level 1 trauma and stroke center in the South Carolina Midlands region. These patients ranged from 18 to 27-years-old, 3 were female, and two presented with an ovarian teratoma on trans-vaginal ultrasound (TVUS).

**Kozik, Michael**

**Mentor(s): Dr. Renu Pokharna**

**Case Report: Bow Hunter Syndrome**

Bow Hunter Syndrome (BHS) classically involves transient, position-dependent vertebrobasilar insufficiency (VBI) that occurs when an extra-vascular lesion (e.g. osteophyte or fibromuscular band) compresses a dominant vertebral artery with turning of the head to one side. Our patient presented with VBI associated vertigo, dizziness, and lightheadedness that occurred when her head was turned to the right. BHS was initially suggested by transcranial doppler ultrasound (TCD) changes that were not supported by initial catheter angiography. After her symptoms worsened over a course of two years, the diagnosis was confirmed with repeat angiography with head rotation. Further imaging with computed tomography and magnetic resonance demonstrated spondylosis at the C5-C6 vertebrae and an osteophyte near the C5 transverse foramen, which caused position-dependent extra-vascular compression. She was treated with surgical decompression and anterior discectomy and fusion at C5-C6. The unique anatomical pathology of this case combined with the diagnostic discrepancy between early TCD and angiography make it an interesting contribution to the otherwise limited body of literature on BHS.

**Kozik, Michael**

**Mentor(s): Dr. Renu Pokharna**

**Bilateral Thalamic Stroke Due to Artery of Percheron Infarct**

The Artery of Percheron (AOP) is a rare anatomic variant in which the blood supply to both thalami are supplied by a single vessel, a unilateral branch off the right or left posterior cerebral artery (PCA). The exact prevalence of this variant is unknown. Infarct in the territory of AOP leads to bilaterally symmetrical thalamic infarcts, causing a triad of decreased consciousness, oculomotor or pupillary reflex abnormalities, and impaired memory.

In this case report, we present an 86-year-old male with bilateral thalamic stroke. He presented to our facility with altered mental status concerning for wake-up stroke. At the time of admission, he was responsive to commands, though with impaired memory, concentration, and fund of knowledge. His symptoms later progressed to unresponsiveness and respiratory distress, with waxing and waning pupillary abnormalities throughout admission. MRI confirmed bilaterally symmetric thalamic stroke consistent with AOP infarct.

**Leaman, Madden**

**Mentor(s): Dr. Dietrich Jehle**

**Prehospital antibiotics improve morbidity and mortality of Emergency Medical Service patients with sepsis**

**Introduction:** Severe sepsis is a major cause of mortality in patients evaluated in the emergency department. Early initiation of antibiotic therapy and IV fluids in the Emergency Department is associated with improved outcomes. We investigated whether early administration of antibiotics in the prehospital setting improves outcomes in these patients with sepsis.

**Methods:** A retrospective study comparing outcomes of patients meeting sepsis criteria in the field by EMS were treated with IV fluids and antibiotics and compared with controls where fluids were administered prehospital and antibiotics were initiated in the emergency department. We compared morbidity and mortality between these groups.

**Results:** We demonstrated that early antibiotics and fluids significant improvement in outcomes in the patients meeting sepsis criteria treated in the prehospital setting. The average age for sepsis patients re-

ceiving antibiotics in the prehospital setting was statistically higher than that for patients in the historical control group, 73.23 years and 67.67, respectively ( $p < 0.036$ ), and there was no statistically significant difference of Charlson Comorbidity Index between the groups ( $p$  two-tail = 0.28). Average intensive care unit length of stay was 2.51 days in the in the prehospital antibiotics group and 5.18 days in the historical controls, and the prehospital antibiotics group received fewer blood products than the historical controls ( $P < 0.05$ ). Mortality was 8.51% in the prehospital group versus 25.50% in the historical controls ( $p = 0.0003$ ).

**Conclusions:** Early IV administration of antibiotics in the field significantly improves outcome in EMS patients who meet sepsis criteria based on a modified qSOFA score.

**LeClair, Rachel**

**Mentor(s): Dr. Celeste Caulder, Dr. Brandon Bookstaver, Dr. Megan Seddon, Dr. Matthew Haldeman, Dr. Jeff Hall**

### **Antibiotic Prescribing Practices in Tanzania**

**Background:** Bacterial resistance is a growing problem in Sub-Sahara Africa. Antimicrobial stewardship efforts are absent in this region and prescribing patterns are poorly documented. However, Tanzania does have a manual for standard treatment guidelines to guide antimicrobial prescribing. Currently, it is unknown if prescribers adhere to these standard treatment guidelines in clinical practice.

**Methods:** We retrospectively evaluated the medical charts of 100 patients who were prescribed antibiotics at Mbeya Zonal Referral Hospital (MZRH) in Tanzania. Our primary objective was to assess the overall adherence to Tanzania Standard Treatment Guidelines for infectious diseases. For each chart, we compared the prescribed antibiotic course(s) (medication indication and duration of therapy) to what the standard treatment guidelines recommend for the matching indication. We analyzed based on overall therapy, according to which antibiotic course the patient was on (first, second, third, or fourth), and the documented infection.

**Results:** The results showed that current antibiotic prescribing at MZRH was consistent with the guidelines only 8% of the time; however, when duration of therapy was not considered for guideline adherence, the rates increased to 24%. Adherence was analyzed for the 7 most commonly documented infections. For the first antibiotic prescribed, it was consistent with the guidelines 11% of the time and 5.8% with the second antibiotic prescribed. The third and fourth antibiotics were not consistent (0%) with the guidelines. For community-acquired pneumonia, prescribing was consistent 7.1% of the time. Prescribing was consistent 9.5% of the time for bacterial meningitis. For colitis/enteritis, prescribing was consistent 35% of the time and prescribing was consistent 20% of the time for urinary tract infections. For typhoid fever, prescribing was consistent 16.6% of the time. Prescribing was not consistent for sepsis (0%).

**Conclusions:** There was low adherence to the Tanzania Standard Treatment Guidelines. It is worth noting, however, that many cases required deviation from the recommended course. The adherence rate to the national guidelines increased significantly when duration of therapy was not accounted for. Prescribers were selecting the correct drug but not treating for an adequate amount of time.

**Lee, Stephanie**

**Mentor(s): Dr. Abdoulaye Diedhiou, Dr. Olabisi Badmus**

### **Factors Affecting E-cigarette Susceptibility Among South Carolina Youth**

**Background:** Public health advocates and physicians have growing concerns about the increasingly popular use of electronic cigarettes (e-cigarettes) among adolescents, due to harmful nicotine content and po-

tential respiratory sequelae. This study's objective was to analyze factors that may affect susceptibility to e-cigarettes in never e-cigarette users. Understanding the driving forces behind this epidemic may better inform tobacco use prevention strategies.

**Methods:** 2782 South Carolinian students in grades 6 through 12 were surveyed on e-cigarette use. Weighted logistic regression was performed assessing relationships between predictors and the outcome, modeled as susceptible or not to e-cigarettes. Demographic variables included gender, grade, and race/ethnicity. Social variables included e-cigarette marketing exposure, positive peer perception of e-cigarettes, involvement in tobacco prevention activities, and available monetary allowance. Recollection of healthcare providers inquiring about tobacco use was also examined. Odds ratios with 95% confidence intervals were generated as the measure of association.

**Results:** High school students had higher odds of e-cigarette susceptibility than middle school students (OR=1.49 [1.12-1.99]). Hispanics had higher odds of e-cigarette susceptibility than Non-Hispanic whites (OR=1.83 [1.17-2.85]). After adjusting for demographic characteristics, youth exposed more often to e-cigarette marketing had higher odds of e-cigarette susceptibility (OR=1.38 [1.03-1.85]). There was an increasing trend toward higher odds of e-cigarette susceptibility based on a student's allowance per week; those with more than \$50 allowance had higher odds than students without any allowance (OR=1.76 [1.10-2.82]). Those who participated in youth-led tobacco prevention activities had lower odds of e-cigarette susceptibility (OR=0.56 [0.34-0.92]).

**Conclusions:** Key factors that affect susceptibility to adolescent e-cigarette use include race/ethnicity, e-cigarette marketing, student allowance, and youth involvement in tobacco prevention programs.

**Public Health Implications:** These findings can better inform youth tobacco prevention campaigns and healthcare provider anticipatory guidance regarding e-cigarettes, now a popular alternative tobacco product choice among youth.

**Martin, Savanna**

**Supervisor(s): Vanessa Ermani**

**Mentor(s): Dr. Cynthia Phillips**

**Impact of an Interdisciplinary Team Mediated Intervention on Post-Discharge Readmission Rates**

According to the World Health Organization, medication errors harm approximately 1.3 million people in the United States every year. Prescribing errors are 70% more likely to occur at the time of hospital admission, and pharmacists can help reduce this number through transitions of care (TOC) services. Up to 20% of patients discharged from a hospital have experienced an adverse event. Adverse events not only lead to discontinued medications, but a study reports that over 70% of adverse events result from medication discrepancies.

Do ambulatory care pharmacists, as part of an interdisciplinary team, reduce unplanned healthcare utilization after patient discharge with a TOC service?

An IRB approved, single-health system, retrospective, observational cohort study.

Adult patients admitted to the Internal Medicine teaching service at Palmetto Health Richland between June 1, 2015 and June 3, 2018 were included. Patients were divided into control and treatment groups pending their follow-up status post discharge. Patients in the treatment group were seen in clinic by the TOC team, which included an Internal Medicine resident, a PHUSC clinic pharmacist, and a social worker. Patients within the control group were not followed up post-discharge by the PHUSC Internal Medicine

interdisciplinary team. All patients included in this study were on specified high-risk medications and live in Lexington or Richland counties. The primary objective is to determine if a pharmacist embedded within an interdisciplinary team in a physician-based medical group reduces unplanned healthcare utilization (ER visits associated with patient's main disease state, inpatient readmissions, above average hospital length of stay, and ICU admission) for patients on select high-risk medications within 30 and/or 90 days post discharge. The secondary objective is to identify health interventions in patients taking high-risk medications.

A total of 102 patients have been evaluated and included in this study, 51 in each group. Patients had a mean age of 57.5 years (range 18-89), 54% were female, and had an average hospital length of stay of 5.5 days. Patients who followed up in the clinic experienced fewer 90-day readmissions (27.5% vs. 31.4%) and 78% benefited from a pharmacist intervention.

Data analysis is ongoing.

**Masters, Taylor**

**Mentor(s): Dr. James Cook**

**QI: Labor and Delivery Eye Protection Compliance**

OSHA has established standards regarding protection from blood-borne pathogens to ensure the safety of healthcare providers while performing any procedure. Included in these standards are the usage of protective eye equipment for attending a vaginal delivery. On the Labor and Delivery unit, we question the compliance of these eye protection standards during vaginal deliveries. To assess provider usage of eye protection during these cases, we employed a "secret shopper" technique to observe and gather data about the adherence to eye protection usage. Our data over the course of 50 vaginal deliveries revealed that only roughly 20% of our providers (OB/GYN and Family Medicine attendings, residents and students) and less than 2% of our nursing staff used eye protection appropriately. We then sought to understand the reason why our providers and staff are not using the protective equipment by interviewing members of the Labor and Delivery team. We have identified three primary barriers to eye protection usage in our unit: perception of minimal risk of exposure, ease of access to protective equipment, and the often-rushed nature of vaginal deliveries that renders minimal time for providers to properly apply protective equipment. While we cannot change the underlying characteristics that make these deliveries timely, we can address the culture of eye protection usage on our unit and provide better access to equipment. Our goal is that by tackling these variables that we can control, we can better ensure the safety of our providers and staff, even in the hastiest vaginal delivery cases.

**McCaskill, Ashley**

**Mentor(s): Dr. Judith Burgis, Dr. Kristl Tomlin, Dr. Chandler Inabinet**

**Pre-pubertal genital bleeding: Examination and differential diagnosis in pediatric female patients**

Abstract:

Background-

Prepubertal genital bleeding can be caused by a variety of etiologies including trauma, infection, structural, hematologic disorders, precocious puberty, and malignancy. Urethral prolapse can be seen in prepubescent girls due to a relative estrogen deficiency. Urethral prolapse classically presents with urethral mass and vaginal bleeding, often associated with constipation.

Case Report-

A healthy 6-year-old Caucasian female presented to the Pediatric Emergency Department (ED) with vaginal bleeding for one day preceded by a few months of constipation. In the ED the patient's phys-

ical exam was remarkable for a tender, non-mobile mass at the vaginal introitus. Transabdominal pelvic and renal ultrasounds were unremarkable. The emergency physician's working diagnosis was a vaginal mass concerning for sarcoma botryoides. Pediatric and Adolescent Gynecology (PAG) was consulted. They performed an examination under anesthesia (EUA) with cystoscopy and vaginoscopy. The EUA confirmed a urethral prolapse approximately 2 cm in diameter. The patient was treated with conjugated estrogen vaginal cream. At her 1 month follow-up the urethral prolapse had resolved.

#### Discussion-

Performing a proper pelvic examination of a prepubescent girl presenting with vulvovaginal bleeding is crucial to form an accurate diagnosis in the emergency department setting. By placing the young girl in the frog-leg or knee-chest position and using both lateral and downward traction of the vulva, one can adequately visualize the external genitalia and outer 1/3 of the vagina. This can help streamline diagnosis and avoid unnecessary examinations and anxiety.

**McElveen, Michaela**

**Mentor(s): Dr. Christine Turley, Dr. Lisa Knight**

#### **Barriers to Healthcare Access among Pediatric Patients in South Carolina**

Introduction: Missed scheduled medical appointments are a national health care concern. Missed appointments can lead to negative consequences for patients including poor health outcomes. Many patients experience barriers to healthcare which contribute to this problem. In pediatric populations, the extent to which there are similarities and differences in access to health care has not been well explored.

#### Aims:

The current study aims to identify barriers which prevent patients from keeping pediatric specialty medical appointments. We investigate if perceived barriers differ based on the race/ethnicity and socio-economic status.

#### Methods:

From July 2018 to February 2019, surveys were distributed to parents of patients in a South Carolina pediatric specialty care clinic in a non-scheduled manner based on staff availability. Results were pooled and analyzed by frequency for the whole population, as well as based on race/ethnicity and insurance type reported to health care provider.

#### Results:

96/100 Parents completed the in-clinic survey. Racial/Ethnic breakdown of respondents consisted of Non-Hispanic White respondents (57%) Black (27%), Hispanic (5%), Other (10%). Additionally, 41% of respondents reported Medicaid as their primary insurance, 46% private insurance, 8% TriCare, 5% other insurance.

The most cited barrier for all populations was forgetting about appointments, followed by "could not miss work" in whites, and "loss of pay from missed work" in blacks. Forgetting about appointments was also the most reported barrier for subjects in all insurance categories, but work-related issues [inability to get off work/loss of pay from missed work (Medicaid)] and visit/co-pay costs (Private) were also commonly reported. Variances in barriers were observed based on demographic information provided by participants.

#### Discussion:

Ethnic minorities and families with lower socioeconomic status perceive different barriers to health care than Non-Hispanic White families. Identification of specific barriers is the first step in creating solutions in healthcare that can meet the needs of diverse populations.

**McManus, Crystal**

**Mentor(s): Dr. Charles Schwartz**

**A retrospective analysis of Fragile X testing at Greenwood Genetic Center**

Fragile X Syndrome is one of the most common causes of inherited intellectual disability. It is caused by a CGG trinucleotide expansion (>200 repeats) in the Fragile X Mental Retardation-1 gene (FMR1) on the X chromosome resulting in promoter DNA hypermethylation and gene silencing. This change disrupts synaptic plasticity and maturation. Ordering a Fragile X test has become a standard of care for males with intellectual disability, but current tests for Fragile X are time consuming and may involve the use of hazardous chemicals. Our study examines the results of Fragile X testing performed at the Greenwood Genetic Center over a five year span and discusses a possible alternative testing method that is sensitive and specific for Fragile X while also ruling out other common causes of intellectual disability. Implementation of a new screening technique could provide a safer, cost efficient, and less labor-intensive way to diagnose Fragile X Syndrome as well as other common genetic disorders.

**Merritt, Christopher**

**Mentor(s): Dr. Keith Barron**

**Applications of Ultrasound: Utilizing POCUS for Diagnosis and Management of Necrotizing Fasciitis**

Introduction: Necrotizing Fasciitis (NF) is a life threatening disorder that is difficult to diagnose. The disease is the result of a toxin producing bacteria and NF often has nonspecific clinical findings of local swelling/erythema, fever, pain and tenderness. The bacteria quickly destroys soft tissues and patients requires prompt debridement or amputation to prevent further spread. The authors hope to show that point of care ultrasound (POCUS) in combination with the STAFF protocol may be used for early detection and better patient outcomes.

**Mick, Sydney**

**Mentor(s): Dr. Marlene Wilson, Mr. Devin Kellis, Mr. Eric Witherspoon, Ms. Kris Kaigler**

**Individual differences in cholinergic modulation during fear conditioning and extinction: Modeling PTSD-like behaviors in rats**

Although many people will experience traumatic events, only a small portion will develop post-traumatic stress disorder (PTSD) after such an event. This suggests that neurobiological factors are involved in resiliency or risk of the long term effects of traumatic stressors. Through previous experiments, our lab has demonstrated individual differences in fear learning and extinction in Long-Evans rats (extinction competent versus extinction resistant groups), which represents a useful model of PTSD. Because of the known role of the cholinergic system in attention, cognition, and learning, we conducted several experiments to investigate the involvement of the cholinergic system in fear extinction. We hypothesized that rats would show individual differences in freezing behavior as well as in 22 kHz ultrasonic distress vocalizations (USVs), that scopolamine, a muscarinic antagonist, would attenuate freezing and 22 kHz USVs during fear extinction, that acetylcholine release in the basolateral amygdala (BLA) would be increased during conditioned cue (tone) presentation, and that freezing behavior during extinction would be related to brain acetylcholinesterase (ACHE) levels. In our experiments, we recorded 22 kHz USVs and freezing behavior during fear acquisition, re-exposure to the fearful context, and recall of cue-conditioned fear. Scopolamine (SCOP, 1.0 mg/kg, i.p.) was given 30 min prior to cue-conditioned recall and extinction learning to examine effects on freezing behavior and 22 kHz USVs. In separate groups of rats, microdialysis was used to sample acetylcholine levels during tone presentation or brains were harvested immediately after extinction recall to measure ACHE levels in brain punches. Administration of scopolamine before extinction learning decreased freezing and the percentage of rats vocalizing to the conditioned cue in extinction competent rats but did not attenuate freezing or USVs during extinction learning in extinction resistant

rats. Additionally, acetylcholine levels increased relative to baseline levels following conditioned cue presentation. Finally, extinction resistant rats showed reduced ACHE activity compared with extinction competent rats. Our findings support the notion that muscarinic activation is involved in modulating cue conditioned freezing behavior and 22 kHz USVs, but potentially to a different degree in extinction resistant and extinction competent rats.

**Milgrom, Alexander**

**Supervisor(s): Christopher Ruggiero**

**Mentor(s): Dr. Sharon Weissman, Dr. Caroline Derrick**

**Implementation of Rapid HIV Engagement Program in the Palmetto Health USC Immunology Clinic**

In 2017, Columbia, SC ranked 5th in AIDS diagnoses and 9th in HIV incidence for metropolitan areas. Recent data suggest that rapid initiation of antiretroviral therapies (ART) is associated with improved short-term adherence and virologic suppression. In response, clinics are adapting rapid ART programs both nationally and internationally. As a quality improvement project, the Palmetto Health Immunology Clinic (PH ICC) implemented a rapid engagement program in October 2018. An interdisciplinary team of providers, pharmacists, case managers, and Ryan White funded laboratory services collaborate in these efforts to evaluate patients in an outpatient setting. Inclusion criteria are those with new HIV diagnoses, patients who are returning to care after an absence from treatment, and those who are transferring care from other providers. These latter two groups must have been off ART >6 months. This initiative set out to create an ICC protocol outlining the clinic processes to have patients seen within 2 business days of notification and to have the option of starting ART the same day. Patients are assessed for safety of doing so from a medical perspective as well as the patient's readiness and willingness to start. This program has facilitated same day ART initiation regardless of payer status. Part of the quality improvement process is ongoing evaluation and feedback, both from patients and staff members. Future outcomes to be evaluated are time to ART initiation and viral suppression in addition to retention in care at 6 and 12 months when compared to a historical cohort. The PH ICC hopes to show the significance of rapid ART programs as an important HIV prevention intervention in South Carolina, a deep-south state where HIV incidence, morbidity and mortality remain high despite ongoing treatment and prevention programs.

**Miller, Lydia**

**Mentor(s): Dr. Brandon Bookstaver**

**Risk Factors Associated with Clostridium difficile Infection Recurrence; a Retrospective, Multi-center Study**

Risk Factors Associated with Clostridium difficile Infection Recurrence; a Retrospective, Multi-center Study

Lydia Miller, PharmD Candidate<sup>1,2</sup>; Tyler Wagner, PharmD Candidate<sup>1,2</sup>; Kevin Lu, PhD<sup>1,2</sup>; Madison Salam, PharmD Candidate<sup>3</sup>; P. Brandon Bookstaver, PharmD, FCCP, FIDSA, BCPS, AAHIVP<sup>1,2</sup>

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Background:

Clostridium difficile infection (CDI) is one of the most frequent causes of healthcare-associated infections. Several studies suggest that recurrence rates range from 18 - 28% and are associated with significant increases in morbidity, mortality, and treatment-related costs. Associated risk factors are broad and there is limited consensus on the primary factors associated with recurrence. To our knowledge there are no published studies on CDI recurrence rates and related risk factors in South Carolina.

#### Methods:

This is an IRB approved multi-center, observational, retrospective cohort study among hospitals in Columbia, South Carolina. Adult patients with a positive *C. difficile* Toxin B PCR admitted between January 1, 2014 and December 31, 2016 were included. The primary outcome was 90-day CDI recurrence rate. Recurrence was defined as a positive PCR and symptoms (after previous documented cessation of diarrhea) within 90 days of initial infection and at least 2 weeks after the index episode. Host demographics, comorbid conditions, CDI index case information including treatment and other commonly noted factors associated with CDI, and recurrence were collected. Index cases were also classified as community-acquired or hospital-acquired. Factors associated with increased risk of recurrence were evaluated.

#### Results:

A total of 366 index episodes of CDI were evaluated. Patients had a mean age of 62 years (range 18 - 99 years), 58% were female, and 59% were on a PPI prior to CDI diagnosis. Antibiotic exposures were identified in 79.7% of index cases. The primary outcome of 90-day recurrence was documented in 17.5% of cases. On average, patients had a hospital length of stay of 23.6 days, with 57.9% of the index cases being hospital-acquired CDI. Further examination of factors associated with recurrence is underway.

#### Conclusions:

To be presented at Discover USC.

#### **Mills, Baker**

#### **Mentor(s): Dr. Erika Blanck**

#### **Return to Play Following Platelet-Rich Plasma Injection of the Ulnar Collateral Ligament Based on Injury Severity**

#### Background

UCL injuries of the elbow are uncommon in the general population. However, such injuries are becoming increasingly prevalent in the athletic community, particularly amongst baseball players. As a means to reduce recovery time and avoid surgical intervention, PRP injections have become a popular non-operative alternative treatment for such injuries. This study examined the potential benefits of using PRP injections in the treatment of UCL injuries.

#### Methods

Fifty patients with UCL injuries, diagnosed by elbow MRI arthrogram, underwent PRP injection therapy. The UCL injuries were classified by their appearance on MRI as low-grade partial tear (Type I), high-grade partial tear (Type II), complete tear (Type III), or tear in more than one location (Type IV). Failure of PRP therapy was indicative of the need for surgical intervention or cessation of sport.

#### Results

Twenty-four out of 39 (61.5%) Type I & II tears responded to UCL PRP injection, allowing patients to return to play without surgery. Three out of 3 (100%) Type III tears responded to UCL PRP injection, permitting the return to the patient's previous level of activity, without surgical intervention. One out of 8 (12.5%) patients with Type IV tears, responded to UCL PRP injections and returned sport without surgery. Ten patients required subsequent UCL PRP injections, of which 3 (30%) were able to return to sport without surgery.

## Conclusions

UCL PRP injections appear to be a safe and beneficial-alternative for conservative management of partial UCL tears. PRP treatment of Types I & II UCL tears, shows promise and may reduce the need for surgical intervention. Type III UCL tears demonstrated a high rate of success; however, with low cohort numbers. Type IV UCL tears do not respond well to PRP injections, often requiring surgical intervention or cessation of sport. PRP therapy demonstrates the potential to be an alternate modality of non-operative management of UCL injuries.

Keywords: PRP; UCL; ultrasound; baseball; platelet rich plasma; ulnar collateral ligament

Level of Evidence: Level III

### **Mills, Baker**

**Supervisor(s): Kevin Williams**

**Mentor(s): Dr. Benjamin Jackson**

### **Prevalence of Asymptomatic Posterior Tibial Tendinopathy**

#### Introduction:

Posterior tibial tendinopathy (PTT) is a common pathological condition that can lead to failure of the posterior tibial tendon. Initially, patients with PTT are often asymptomatic, making the early identification and treatment of PTT challenging.

As the popularity of ultrasonography continues to increase, sonographic characteristics have been shown to indicate the presence of tendinopathy, but their frequency has yet to be assessed in PTT. The purpose of this study was to identify and report on the frequency of finding abnormal sonographic characteristics in the PTT.

#### Methods:

Following IRB approval, 160 participants underwent a bilateral-comprehensive ultrasonographic assessment. The resulting images were subjected to an extensive review process and assessed for pre-established criteria to identify the presence of PTT.

#### Results:

In total, 320 posterior tibial tendons (160 patients) were assessed for PTT. Thirteen participants reported symptomatology associated with PTT and were excluded. Of the 294 tendons scanned, 138 (46.6%) were determined to have at least one pathological trait (i.e. fluid, thickening, heterogeneity, hyperemia, or calcification) consistent with tendinopathy. Specifically, 56 (18.9%) had circumferential fluid, 73 (24.7%) had non-circumferential fluid, 24 (8.45%) had tendon thickening, 36 (12.2%) had heterogeneity, 22 (7.43%) had hyperemia, and 1 (0.338%) had calcifications.

#### Discussion and Conclusion:

Sixty-six percent of the participants and 46.6% of the tendons evaluated had at least one pathologic feature. The most common finding was non-circumferential fluid, which could likely be an incidental finding, as it was present in 43.5% of participants. Additionally, circumferential fluid was the second most common finding, which may represent an early marker for pathology of the tendon itself.

Aside from non-circumferential fluid, the most prevalent pathologic traits, observed in participants, were circumferential fluid (29.9%), heterogeneity (21.8%), and thickening (13.6%), which may be consistent with the presence of PTT and aid in the earlier identification and treatment of asymptomatic PTT."

**Moreland, Hannah**

**Mentor(s): Dr. Francis Spinale**

**Plasma Profiling of Pro-Inflammatory Signaling/Proteolytic Cascades in Sarcoidosis With and Without Cardiac Involvement**

**Introduction:** Sarcoidosis is a multi-organ system inflammatory condition that can involve any organ, including the heart (cardiac sarcoidosis; CS). While current practices exist to diagnose and assess patient risk for CS (e.g. cardiac biopsy and MRI), these methods are not readily available nor well-suited for screening. In addition, current treatments focus on generalized anti-inflammatory actions for heart failure and are non-specific for CS. Therefore, plasma biomarkers of sarcoidosis may provide insights into disease pathogenesis and response to treatment.

**Hypothesis:** Highly-sensitive biomarker arrays will reveal distinct inflammatory signaling pathway activation in patients with active sarcoidosis including cardiac involvement, and patients with active sarcoidosis without cardiac involvement, as compared to referent normal patients without sarcoidosis.

**Methods:** Plasma samples were collected from patients with biopsy-confirmed sarcoidosis (n=47; age range 32-75, median age 60) prior to undergoing Rb/FDG PET scans and compared to referent normal subjects (n=6). Sarcoidosis activity measured by the FDG PET revealed the presence of cardiac involvement, if any, in these patients. Optimized high-sensitivity, high-throughput plasma biomarker profiles for several functional pathways were tested: human soluble cytokine and receptor, MMP, and TIMP.

**Results/Conclusions:** Soluble cytokine levels and receptor profiling in sarcoidosis patients reveals activation of IL-1 and IL-2 pathways, TNF- and VEGF-mediated pathways, and MMPs. Novel findings from this study include the identification of increased activation of a cluster of plasma biomarkers in patients with CS, including soluble IL-1/IL-2 and TNF receptors. In addition, levels of soluble TNF and several MMPs were induced in CS patients, facilitating the characteristic inflammation and granuloma formation that is a hallmark of sarcoidosis. Finally, decreased activation of TIMP pathways in CS patients suggests a potential target for therapeutics.

**Moss, Julia**

**Supervisor(s): Eliza Hardy**

**Mentor(s): Dr. Page Bridges**

**Implementation of Free Clinic Service as a Training Opportunity for Emergency Medicine Residents**

The approximately 8.7% of adults in the United States who lack health insurance often utilize emergency departments or free clinics to receive health care. Free clinics rely on volunteer physicians to provide primary care for an estimated 1.8 million patients annually. While resident physician involvement in free clinics is not uncommon, little research to date documents the impact of this experience on physicians. As EM physicians in particular are guaranteed to encounter these medically and socially vulnerable patients in their careers, increased exposure during training may improve their ability to care for them. This study examines the early phases of implementing a free clinic service opportunity into an EM residency curriculum. In Greenville, SC, a pilot program in Fall of 2018 introduced "Resident Nights" at the Greenville Free Medical Clinic, a charitable organization that provides medical and dental care at no cost to low-income, uninsured Greenville County residents. On resident nights, EM residents at Prisma Health – Upstate, supervised by volunteer attending physicians, provide primary care services to patients at the Free Clinic. During the pilot, 20% of EM residents volunteered and the feedback from the clinic staff, residency program director, resident physicians, and attending physicians was very positive. Resident Night was adopted as an ongoing program and expanded to include residents in other departments at Prisma Health – Upstate. Resident Night introduces physicians to free clinics, emphasizes the importance of volunteerism in their chosen career, and increases exposure to the uninsured, low-income population during training. This model demonstrates that academic medical centers can further contribute to meeting the health

needs of local uninsured patients by partnering with existing community free clinics.

**Murray, Hanna**

**Mentor(s): Dr. Alan Spies**

**Over the Counter: Gauging First-Year College Students' Confidence and Competence in Treating Themselves**

This study was done to evaluate the effectiveness of an already established pharmacy student-led educational program on first-year college students' competence and confidence in selecting over-the-counter (OTC) medications for common ailments.

The goal was to show that the presentation series, called "Treat Yo'self Care," significantly increases students' knowledge about proper OTC medication therapy for typical illnesses impacting first-year college students, such as the common cold, tension headache, and fever. The intention was to further educate students on identifying warning signs when the situation has progressed enough to warrant a visit to the doctor. By increasing the student's knowledge, the goal was to also significantly increase their confidence in choosing the correct OTC medication therapy for common treatable ailments.

Students completed surveys immediately before and after attending the presentation. The presentations took place in either residence halls on campus or in University 101 classrooms, lasting for an hour. Questions gauged their accuracy in choosing the right OTC medications for each ailment (or appropriately choosing to see the doctor instead), and were immediately followed by a question rating their confidence in their choice on a scale, ranging from one to 10. Ten represented 100% confidence that the student made the correct choice, and one represented a total lack of confidence that they made the correct choice. The represented illnesses were sinus pressure headache, eye strain headache, mild insomnia, allergy symptoms, productive cough, common cold, sinus infection, fever, and diarrhea with mild dehydration. The changes in accuracy and confidence were compared between the two surveys, with 62 students completing the pre survey, and 58 students completing the post survey. The data was then analyzed using two-sample t-tests for parametric data and Mann-Whitney U tests for the non-parametric confidence data. Changes were considered to be significant if they achieved a p-value of <0.05.

This study demonstrated a significant increase in both confidence and competence after participating in the presentation. This implies that pharmacy student-led education can significantly increase first-year college students' knowledge on OTC medications and recognizing when it's appropriate to see a doctor. This can further amplify students' confidence in treating themselves safely.

**Myers, Conor**

**Mentor(s): Dr. Celeste Caulder**

**Outcomes for Emergency Department Patients Diagnosed with Sepsis**

Background: Early Goal Directed Therapy is recommended to reduce morbidity and mortality associated with sepsis/septic shock. This includes initiation of antibiotics within three hours of a diagnosis of sepsis and one hour of septic shock. A Sepsis PowerPlan was developed and implemented to facilitate early and aggressive treatment in patients diagnosed with sepsis/septic shock.

Methods: In this retrospective non-interventional study, adult patients (> 18 years) admitted to the ED at 3 different hospitals within the health system and identified by a corresponding sepsis DRG code during the study period, January 2016 – June 2017, were included. Patients were excluded if they were pregnant, traumatic injury, direct admissions and were boarded in the ED until admission. Data collected included patient demographic information, antimicrobial therapy prescribed, time of order entry and administration, concomitant medications, comorbidities, laboratory data, and Glasgow Coma Scale and APACHE II scores if known. The data was managed using Research Electronic Data Capture (REDCap).

Results: For the primary mortality outcome, the rate of mortality was higher in the group that did not have the PowerPlan vs those patients that did receive the PowerPlan (27.27% vs. 22.33%; OR 0.819; 95% CI 0.505 to 1.327, p=0.422). For the time analyses, there was a significant delay in time to antibiotic administration for those who did not receive the PowerPlan, compared to those that did (284 minutes vs. 148 minutes, p<0.001). Approximately 18% of patients who were coded with a DRG of sepsis met the SEPSIS-3 criteria, of these 18%, 57% received the PowerPlan.

Conclusions: Although it was not statistically significant, there was a clinically significant 5% decrease in mortality associated with the initiation of the Power Plan. While only 18% of patients that were initiated on the Power Plan, it is evident that if patients are suspected to be presenting with sepsis, they are receiving adequate attention and streamlined care via utilization of the Power Plan. There was statistically significant decrease in time to first antibiotic administration in the Power Plan group compared to those who did not receive the Power Plan.”

**Myers, Michaela**

**Mentor(s): Dr. Kamla Sanasi-Bhola**

**Perceptions Regarding HIV Pre-Exposure Prophylaxis Among Medical Trainees**

Importance

Human Immunodeficiency Virus (HIV) incidence remains high, especially in Southern states with approximately 50% of HIV patients being virologically suppressed in some states. HIV Pre-Exposure Prophylaxis (PrEP) has been shown to be 90-92% effective in preventing HIV, but expanded implementation into clinical practice requires systemic efforts to improve education among providers early in their careers.

Objectives

To investigate medical trainees’ perceptions, knowledge, and attitudes regarding HIV PrEP.

To improve knowledge with a brief interventional education session.

Design

A ten-minute, 23 question survey was created with RedCap® software and distributed to medical trainees via email and social media beginning in June 2018.

Setting/Participants

Trainees were affiliated with the University of South Carolina School of Medicine or its academic hospital Palmetto Health in Columbia, South Carolina. Survey participants included students (medical, physician assistant, and pharmacy) and residents (Internal Medicine, Family Medicine, and Obstetrics/Gynecology). 166 trainees with an average age of 25.7 years responded.

Main Outcome and Measure

Trainees’ knowledge and attitudes were measured based on responses to multiple-choice questions about PrEP and its’ implementation. Their beliefs were measured by Likert scale questions about risk compensation, side effects, HIV resistance, and patient adherence.

Results

84% of trainees (n= 136) have heard about PrEP prior to intervention. PrEP utility for HIV prevention was known by 82% of trainees (n=126). Only half of them, mainly medical students and residents, (n=81; 50%) had formal PrEP education as part of their curriculum but 60% identified an inappropriate regimen (n=61). Trainees’ concerns included non-adherence (n= 98, 65%), side effects (n=93, 62%), development of resistance (n=83, 55%), and poor risk reduction practices (n=57, 37%). Of trainees, 34% (n=54) felt confident evaluating a patient’s eligibility for PrEP and 48% (n=77) felt comfortable recommending PrEP

in the future.

#### Conclusions/Relevance

The inconsistency of formal PrEP education in the curriculum leads to misconceptions amongst medical trainees, barriers in their future prescribing practices, and an increasing public health burden from a preventable disease. A post-intervention survey will be distributed and the survey will be expanded to include additional trainees.

#### **Nagle, Megan**

**Mentor(s): Dr. Richard Frierson, Dr. Kaustubh Joshi, Dr. Martin Durkin**

#### **South Carolina Psychiatrists' Knowledge and Attitudes About Gun Rights in Persons with Mental Illness**

South Carolina psychiatrists were surveyed using anonymous surveys asking about their knowledge and attitudes regarding gun rights with mental illness. We had 33% response rate which showed a knowledge deficit in our field regarding gun rights. Several demographics were also asked to determine if there were any factors that affected a responders knowledge or attitude regarding gun rights.

#### **Pacana, Matthew**

**Mentor(s): Dr. Gregory Grabowski**

#### **Efficacy of the Standardized Letter of Recommendation and Evaluation of the Orthopedic Resident Applicant**

Purpose: To create normative data regarding the information present in the AOA standardized letter of recommendation (SLOR). The American Orthopedic Association released the SLOR form to provide improved information to evaluators of orthopedic residency applicants. We analyzed the responses submitted by the evaluators of applicants who utilized and didn't utilize the SLOR.

Methodology: Criteria including rank, AOA status, STEP scores, and all SLOR questions were evaluated. Letter writers from home and away institutions were compared. Additionally, correlations between program leaders and other letter writers were analyzed.

Results: All 559 applications for the 2018 match to a single orthopedic residency program were included. These 559 applications included 1841 letters which were evaluated. Of these, 1376 (75.2%) utilized the SLOR. 52.4% of recommenders knew the applicant for one month or less. Applicants were highly ranked or guaranteed to match 88.3% of the time. Personal characteristics showed that the 90-100th percentile was chosen greater than 57% of the time. There were significant correlations seen between away and home letter writers favoring home evaluations as stronger evaluations. Program directors and chairs wrote more critical evaluations with program directors at away institutions writing the most critical evaluations.

Conclusion: Our evaluation shows that most letter writers are utilizing the SLOR. SLOR writers provide a very favorable evaluation of most applicants. There was not significant differentiation of the applicants on the SLOR. This data can be utilized by those evaluating applications as more experience is gained with this specific tool.

**Patetta, Michael**

**Supervisor(s): Jaron Pettis**

**Mentor(s): Dr. Phillip Prest, Dr. Christopher Goodman**

**Improving the Surgical Clerkship At USCSOM**

Introduction:

It is well known that the surgery clerkship is among the most difficult rotations for medical students in the United States. Students usually express dissatisfaction with demanding duty hours, lack of hands on experiences, and malignant culture.

At USCSOM, student satisfaction had been historically poor, and ranked lower than other U.S. programs. Realizing that the current practice may affect students' education and their career path, the department of surgery began this QI project in 2017 to optimize its clerkship experience.

Methods:

All third and fourth year USCSOM medical students, who completed their general surgery rotation at Prisma Health Richland (PHR), were surveyed from 01/17/2018–04/15/2019. Students submitted an overall rating of the rotation on a scale of 1-10, along with other categories pertaining to their specific clerkship experience. Free response options were included to solicit potential solutions. No answers were excluded. Problems were then analyzed and categorized. Students' evaluation pre and post-implementation of clerkship changes were compared and descriptive analysis was used to identify the frequency of each variable being investigated.

Results:

Our 2017 pre-change results featured 128 students from the USCSOM classes of 2018 and 2019 who completed the rotation at PHR, 26 students responded (20.3%). The overall rating of the surgical rotation was  $5.38 \pm 2.17$ .

The most frequent complaints were "issues relating to attendings", followed by "issues that related to residents", followed by "rotation organizational issues". The post-implementation results are only partial to date, but have demonstrated improvement in all areas including the aforementioned three categories.

Conclusion:

Our project is a continuation of our investigation which started in 2017 by the department of surgery to investigate reasoning behind student dissatisfaction, and to implement solutions that will improve the clerkship. We hope to demonstrate that applying these changes will lead to higher satisfaction. Additionally, we believe this project has the potential to serve as a model for other surgery programs.

Our future aim is to continue surveying to quantify any differences in student satisfaction and to continue our generation of feedback from students.

**Patrick, Kristen**

**Supervisor(s): Mollie Hamilton**

**Mentor(s): Dr. Melanie Blackburn**

**Improving caregiver's understanding of the roles of the medical personnel caring for their children on the general pediatric floor of Palmetto Health Children's Hospital**

Many of the children's hospitals in the United States have accompanying residency programs in which there are multiple levels of trainees caring for patients. The physician team involved in patient care at these hospitals can include medical students, interns, senior residents and attending physicians. For many patients and caregivers, the roles of the different levels of physicians is often confusing and unclear. The aim of this study is to improve this understanding of the roles and responsibilities of physicians and trainees as they apply to patient care through the use of a simple and cost effective educational tool. In

doing so, we also hope to improve caregiver confidence in their understanding of these roles. This study was conducted at Palmetto Health Children's Hospital and utilized a questionnaire to assess caregiver knowledge and confidence with the terms: "medical students", "interns", "senior residents" and "attending physicians". Baseline data was collected over a 1 month period, followed by implementation of intervention and one PDSA cycle to assess the impact of the intervention. PDSA cycle 1 consisted of a one page educational handout that was placed on the wall in each patient room on the general pediatric floors, with post-interventional questionnaires collected. Following this intervention, there were improvements in knowledge scores with the terms. The impact of the intervention of caregivers' confidence in their knowledge of these terms was variable. In conclusion, results indicate that a caregivers understanding of the different roles of physicians and trainees can be improved through the use of a simple and cost-effective means of providing education. Further studies should be done in order to determine best way to continue to maximize these results.

**Pecorella, Jason**

**Mentor(s): Dr. Susan Wood, Dr. Lawrence Reagan**

**Cardiovascular Effects of Pyridostigmine Bromide and Stress Interaction: A Gulf War Illness Model**

Amid heightened threat of chemical warfare during the Gulf War, troops were rationed Pyridostigmine Bromide (PB), an acetylcholinesterase inhibitor, as nerve gas prophylaxis. PB had FDA approval. Unfortunately, 5 years after returning from the Gulf War, veterans began presenting with a multi-organ system constellation of symptoms suggestive of autonomic dysregulation, specifically blunted vagal tone.

The present study aimed to examine the effects of vehicle versus PB exposure in the presence or absence of repeated restraint stress (RRS), on cardiovascular and autonomic functioning. It was hypothesized that PB-stress interaction would have negative impacts on cardiovascular function, which emerges over time. To test this hypothesis, male Sprague Dawley rats were assigned to one of four treatment groups: vehicle-control, PB-control, vehicle-RRS, PB-RRS. Subjects were treated with either saline or PB (1.3 mg/kg) daily for 14 consecutive days. On days 5-14 of treatment, rats were exposed to either 6 hours of RRS or non-stressed control handling. Nine days following the last stress/treatment, all subjects were challenged with an immunologic stressor, lipopolysaccharide injection (LPS, 100 $\mu$ g/kg), and 24 hours later were challenged with an acute restraint stress (ARS, 60 min). LPS and ARS were repeated at a delayed time point (3 months post stress/treatment) to examine this syndrome's progressive nature. Cardiovascular telemetry was used to measure blood pressure (mean arterial pressure; MAP), heart rate (HR), autonomic nervous system regulation (heart rate variability; HRV), and quantify arrhythmic burden, at both early and delayed time points.

Results demonstrate that PB blunts acute cardiovascular stress response as expected, while history of PB treatment exacerbates the sympathetic response when challenged at the delayed time point. History of stress may increase resting MAP later in life, which is exacerbated if co-exposed to PB. High frequency (HF) HRV was used as a measure of vagal tone, which was reduced in stressed animals exposed to PB. Arrhythmic burden, measured from EKG was increased by the interaction of PB and stress. These findings suggest that PB/stress co-exposure may explain some of the symptoms associated with autonomic dysfunction observed in Gulf War Illness. Future analysis of the molecular adaptations within cardiac tissues is planned.

**Peller, Lindsey**

**Supervisor(s): Kara Barlow**

**Mentor(s): Dr. Deborah Greenhouse**

**A quality improvement project incorporating an education sheet regarding the outpatient services available through a pediatrician's office to reduce unnecessary emergency department traffic**

Background: Every year millions of children visit the emergency department seeking medical care. In an effort to ensure continuity of care and minimize the volume in the emergency department to true emergency scenarios, pediatrician's can utilize an education sheet to help families decipher a true emergency from ones that can be followed in the outpatient setting.

Aim: The aim of this study was to decrease the number of visits from patients at the Palmetto Pediatric and Adolescent Clinic downtown office to the Palmetto Health Children's Emergency Department with the goal of achieving a 10% decrease in visits by March 31, 2018.

Methods: Data was obtained using spreadsheets generated by our hospital system, which showed patients who had visited the Palmetto Health Children's Hospital Emergency Department beginning January 2017 from the Palmetto Pediatric and Adolescent Clinic private practice group. Our project looked specifically at February and March 2017 when compared to February and March 2018 after implementing the education sheet in November 2017 at one particular practice location. The practice's electronic medical record was then utilized to determine several factors including the status of the patient, if a hospital note was present in the chart and if there was a follow-up appointment or a phone message regarding the symptoms.

Results: From the pre-intervention phase in 2017 to post-intervention phase in 2018, there was a decrease in the number of emergency room visits by 18% with 156 patients seen between the two months in 2017 and 128 patients between the two months in 2018.

Conclusion: Overall, this study showed the importance of patient education to help reduce emergency room visits and better utilize the outpatient pediatrician's office. The study also shows a need for future studies to attempt to improve the rate of follow-up appointments after an emergency room visit as well as the role of care plans for medically complex patients.

**Pinkney, Jodian**

**Supervisor(s): Shannon Faulkenberry**

**Mentor(s): Dr. Divya Ahuja, Dr. Caroline Derrick, Dr. Christopher Goodman**

**A Quality Improvement (QI) project aimed at increasing the screening rates of Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) through the implementation of routine "opt-out" testing at an Urban Primary Care Clinic in South Carolina (SC)**

Background:

SC has some of the highest rates of HIV and Chronic HCV in the U.S. In 2017, SC ranked 9th among all U.S. states, District of Columbia and U.S. dependent areas for new HIV cases with the rate of new HIV cases quoted at 16.9 per 100,000. SC ranked 16th for chronic HCV with an estimated 65,000- 234,000 South Carolinians affected. Studies show that 15 % of persons living with HIV and 50% of persons living with HCV are unaware of their status. Routine screening through implementation of "opt-out" testing at all patient encounter types is an effective strategy to diagnose infected individuals that would otherwise be missed.

Methods:

We plan to conduct a single center quality improvement (QI) project at the University of South Carolina (USC) Internal Medicine 1801 Resident Clinic between February 2019 and August 2019. We will incorporate the following statements on the general intake triage form:

1. We test everyone ages 18-65 for HIV. You will be tested today unless you say no.

2. We test everyone ages 18-74 for Hepatitis C. You will be tested today unless you say no. If patients say no, that will be documented as “opt out” and the patient will not be tested. If patients did not decline that will be documented as “opt in” and the physicians will order the test. Patients who only refuse testing because of inability to cover costs will be documented as “cannot afford”. All staff members will be sensitized to the project protocol via a presentation. Members of the QI team will also take part in a “patient -shadowing” experience. Printed copies of the new workflow and testing algorithms will be placed at key area in the clinic. Patient education posters will be placed in the clinic waiting area. Data regarding screening rates of HIV and HCV before and after QI- implementation will then collected using a medical record- based review.

#### Expectations:

We expect that implementation of routine “opt out” testing will lead to a 50% increase in screening rates of both HIV and HCV by the end of the QI project period.

#### **Pinkney, Jodian**

**Supervisor(s): Ashley Duke**

**Mentor(s): Mrs. Cindy Merrow**

#### **Implementation of the Maternal Fetal Triage Index to decrease obstetric triage time.**

##### Purpose

Decrease labor and delivery triage times by 50% by June 30, 2019 through the utilization of the Maternal Fetal Triage Index (MFTI).

##### Background

The MFTI is a standardized method of assigning an acuity score to pregnant women presenting for care at the hospital. MFTI is a five level triage index tool utilized to prioritize patient by acuity. Triage tools are used in nearly all Emergency Departments, but are not routinely utilized for OB patients. The American College of Obstetricians and Gynecologists (ACOG, 2016) and the Association of Women’s Health, Obstetric, and Neonatal Nurses (AWHONN) recommend developing guidelines for triaging pregnant women using a validated OB acuity system in contrast to traditional first come first served processes.

##### Methods

The Labor and Delivery Unit Based Council (UBC) and OB providers decided to implement the MFTI and assign all patients an acuity level. All team members completed mandatory education modules and the UBC distributed unit resources. The MFTI was implemented in March 2018. In response to a negative trend line after implementation, staff interviews were conducted revealing resistance to change and lack of engagement in the process. The UBC began posting monthly data and coaching staff in the moment. Additionally all staff were retrained in January 2019 using a patient story to reconnect staff to the purpose of initiative.

##### Outcomes

Prior to MFTI implementation patients on the unit were seen on first come first serve basis. The initial triage time after implementation was 32 minutes. Data initially improved but did not sustain. After additional interventions, triage time decreased to a sustained 18 minutes.

##### Implications for Nursing

On average, OB triage volume is 20% to 50% higher than birth volumes. Women that present for triage are often not included in volumes or productivity, which causes staffing and fiscal challenges. Perinatal referral services with larger volumes of high-risk patients may have much higher triage volumes. The utilization of a validated OB acuity triage tool such as the MFTI may assist in improving the efficacy and quality of care patients receive and resource allocation. The triage process also aids in prediction accuracy for staffing needs.

**Plascencia, Jennifer**

**Supervisor(s): Travis Hawkins**

**Mentor(s): Dr. Firas Mussa**

**The effect of perioperative statin therapy for patients undergoing EVAR for AAA repair on one-year post-operative mortality: a systematic review and meta-analysis**

**Background:** There is no consensus on the effect of statin therapy on mortality after endovascular repair (EVAR) for treatment of abdominal aortic aneurysm (AAA). The objective was to determine the effects of statin therapy administered before and after surgery in AAA patients undergoing EVAR on one-year post-operative mortality by performing a meta-analysis of existing published data.

**Methods:** PubMed, the Cochrane Library, and Web of Science were searched for all studies assessing mortality after EVAR for AAA patients on perioperative statin therapy. Outcomes were selected based on their inclusion in two or more studies: one-year postoperative mortality. The data from several studies was extracted and meta analysis for odds ratio (OR) was used to calculate the overall OR with its confidence interval (CI). SAS 9.4 was used for analysis.

**Results:** Four cohort studies were selected for inclusion involving 21 441 individuals. Meta-analysis of all-cause one-year postoperative mortality showed a significant difference with statin therapy (odds ratio (OR) 1.48, 95% CI 1.35 to 1.62;  $P < 0.0001$ ).

**Conclusion:** Statin therapy did appear to improve all-cause one-year mortality after EVAR. The results suggest that it may be beneficial for providers to prescribe statins for AAA patients undergoing EVAR and for post-operative patients. However, these findings relied on data from retrospective and prospective cohort studies.

**Price, Courtney**

**Mentor(s): Dr. Christine Turley, Dr. Stuart Cramer**

**Pediatric Pancreatic Acinar Cell Carcinoma: A Case Report**

**Introduction:**

Personalized medicine is a means of providing customized care for an individual, and may be particularly valuable for rare or unusual conditions. Pediatric pancreatic cancer is quite uncommon, accounting for less than 0.2% pediatric malignancy deaths, and pediatric pancreatic Acinar Cell Carcinoma (ACC) comprises less than 1% of all pediatric cancer cases annually.

In all populations, one of the most common molecular signatures found among pancreatic cancers is the BRAF V600E mutation. BRAF is a proto-oncogene in the MAP Kinase pathway, which serves an integral role in signaling cell growth and proliferation. There are 2 different gene inhibitor agents that have been used singly and in combination to treat adult melanoma, anaplastic thyroid cancer, and non-small cell lung carcinoma with the BRAF V600E mutation. There is very limited use of this treatment for pancreatic cancer patients to date.

**Methods:**

The patient is a 15 year-old girl who was diagnosed with pancreatic ACC. Tumor markers performed at the outset of therapy revealed the BRAF V600E mutation. Targeted gene therapy with Dabrafenib and Trametinib was implemented as an experimental treatment, after standard of care chemotherapy was given with no response. Tumor size and alpha-fetoprotein (AFP) levels were used to monitor response to treatment. The patient experienced a complete response defined by resolution of her PET avid disease and decrease in AFP levels from 1200 to  $<2$  after 4 months of treatment.

**Discussion:**

This case report demonstrates the benefits of identification of genetic markers early in the course of

treatment. Following failure of conventional chemotherapeutic approaches, targeted gene therapy focused on the identified BRAF mutation. This enabled decreased toxicity with improved treatment outcomes, and made possible full remission at one year

#### Conclusion:

This case represents an unusual cancer in a pediatric patient, along with a genetic target not previously identified in pediatric pancreatic ACC. Targeted gene therapy was highly successful, and demonstrates the value of a personalized approach to cancer treatment.

#### **Robertson, Nzinga**

**Mentor(s): Dr. James Selph**

#### **Transient Comatose state and Burst Suppressive EEG pattern, following a Mirtazapine overdose**

Mirtazapine is an alpha-2 adrenergic antagonist which first came onto the market in 1994 as a class of antidepressant whose major side effect profile included drowsiness, sedation, dry mouth, increased appetite and weight gain. As such, Mirtazapine had previously been marketed as a fairly benign medication, even in cases of overdose. At least 10 prior publications since Mirtazapine's submission onto the market had previously evaluated Mirtazapine in cases of overdose, however none of them had documented any significant adverse reactions to the medication outside of most of those which had previously been discussed. This case-report describes a patient who was admitted to the hospital within a comatose state after having ingested at least 19 pills of Mirtazapine a day. The overdose resulted in a significant change to her EEG pattern consistent with a burst suppression pattern which eventually resolved after a few days of monitoring. The patient was back to baseline, by the time of discharge.

Russell, Danielle - Mentor(s): Dr. Rodney Alan -- Evaluation of the Average Length of Stay for Select Pediatric Psychiatric Services and the Potential use of Synchronous and/or Asynchronous Telehealth Services to improve outcomes. -- While on my pediatrics rotation at McLeod Regional Medical Center in Florence, SC, I noticed that patients who qualified for pediatric psychiatry services remained on the floor for longer periods of time than other diagnoses that did not require this sub specialist. Patients requiring pediatric psychiatric services would end up staying on the floor for weeks at a time with not treatment, waiting for inpatient placement. I realized that this is not just a local problem, but a national one. The current national need for pediatric psychiatric services exceeds 15 million children and adolescents with the current workforce being only 6,800 child and adolescent psychiatrists nationwide. After learning about the various utilizations of synchronous Telehealth services, I wondered if I could utilize synchronous or asynchronous telepsychiatry services to treat patients while they are on the floor to improve patient outcomes and decrease length of stay. So the questions I am trying to answer with this project include are our pediatric psychiatric diagnosis LOS significantly higher than the national average or recommended standard of care; and can tele-psychiatry services improve standard of care and decrease LOS at McLeod Children's Hospital? This quality improvement project is ongoing with no concrete answers to these questions as of yet.

#### **Rutland, Dillon**

**Mentor(s): Dr. Pavel Ortinski**

#### **Ways to Improve Animal Neuroscience Research: MATLAB-based Analysis of Ca<sup>2+</sup> Imaging in Astrocytes' and How Rats' Cortisol Levels Correlate with the Color of Their Environment**

There are many important factors when conducting animal research and data collection that can make the findings of research more reliable and efficient. The first of two goals of this research was to explore how MATLAB can be implemented to make neuroscience research more efficient. Neuroscience labs can use fluorescence imaging to identify activity within the brain. This usually involves targeting calcium

since it has been shown that calcium is released in areas of activity. The analysis of Ca<sup>2+</sup> signals in neurons is straightforward because a single signal occupies the entire cell body of the cell. However, in astrocytes, Ca<sup>2+</sup> signals occur independently within subdomains of individual cells. This makes automated approaches substantially more difficult. We demonstrated several modifications to a published MATLAB script that could be used to automate segmentation of Ca<sup>2+</sup> signals within a single astrocyte. The second goal of this research is to consider how the environment of a rat's cage may alter its stress levels. Cortisol and sucrose preference were used to quantify how rats may respond to different color cages including red or white. The results showed that rats in white group showed more preference for sucrose than those in red group given the outlier rats, but variance is too high to prove a relationship. The white group tended to have higher cortisol levels throughout the experiment. Considering the low starting levels of red group, it is hard to tell what change is due to the variable starting position and those due to color cages. Future studies into color effects on environment can increase power, time, and stratify factors to make a stronger correlation to hormonal and behavioral changes in rats. The MATLAB code and the color cage experiments demonstrate ways to improve future animal research involving the cage environment of the rats and fluorescence neural imaging of rats.

**Ryland, Blair**

**Supervisor(s): Will Burns**

**Mentor(s): Dr. James Gambrell**

### **A Quality Improvement Project to Improve Safe Sleep Practices in Hospitalized Infants**

**Introduction:** Each year, approximately 3500 infants die suddenly due to strangulation, SIDS, and ill-defined deaths. The "Back to Sleep" campaign initiated in 1994 based on Task Force guidelines resulted in a significant decrease in the amount of deaths due to SIDS and sleep-related deaths. However, during family centered rounds, residents and attending physicians have noted concern about the safety of our infants' cribs during their inpatient stay in our hospital.

**Project Aim:** This resident-led quality improvement project aimed to increase the number of infants in the hospital exhibiting safe sleep practice to 80% or greater from November 2017 to March 2018 to include position on their back in the crib and with no additional items in the crib.

**Methods:** Sleep environments of hospitalized infants aged 6 months and younger were audited using forms from the EASE project prior to the intervention to obtain baseline data regarding position, location, additional items in the crib, and patient's sleep status. Nursing was provided education about safe sleep practices, and sleep sacks were introduced hospital-wide. Post-intervention data was collected using the same audit form, and data was then compared.

**Results:** Prior to the intervention, 81.4% of infants were found with additional items in their cribs. Following our PDSA cycle, only 44.7% of infants had miscellaneous items in their cribs. There was also a decrease in the number of patients found on their stomach and sleeping on their couches during post-intervention compared to pre-intervention.

**Conclusion:** While we did not reach our goal of 80% or more infants exhibiting safe sleep practices, we believe our project made a positive impact on safe sleep in our hospital. Introduction of sleep sacks and providing nursing education lead to a decrease in the number of infants 6 months or younger sleeping in the crib with additional items, which are correlated with an increased risk for SUID. There were, however, limitations to our study including a small sample size and introduction of sleep sacks simultaneously following nursing education. Further expansions of our project are recommended.

**Scalise, Matt**

**Supervisor(s): Benji Smith, Nic Osborne**

**Mentor(s): Dr. John Cull**

### **The Relevance of Personality and Resilience in Medical Students' Choice of Medical Specialty**

Understanding one's own personality traits is crucial to career fulfillment and success. In addition to skills and qualifications, companies are actively seeking employees with personalities that fit their company environment. Similarly, employers are seeking emotionally robust, resilient individuals that are more likely to be motivated and engaged in what they do. The medical field is no different, as residency directors are likewise seeking doctors who can bring a positive and productive attitude to the clinical setting. Recent studies have emphasized the importance of this phenomenon, as it has been shown to reduce the incidence of burnout. While burnout has been well documented in medicine, there is little data on the etiology of burnout in medical students. Thus, the objective of this study was to determine if an individual's resiliency and personality profile correlated with their choice of medical specialty. We hoped to gain further insight into the components that determine resiliency to help prospective physicians better understand how they fit within a medical specialty's culture. Therefore, we performed a survey-based study among third and fourth year medical students at a single medical university based in the Southeastern United States. The survey included demographic information along with two well-validated instruments – the Brief Resilience Scale and IPIP Big Factor Five personality scale. Results showed that there was a significant relationship between an individual's resiliency and their personality profile ( $p < 0.05$ ). Interestingly, the "emotional stability" personality profile was associated with the highest resiliency while the "intellect/imagination" profile was associated with the lowest. As to be expected, there was a significant relationship between resiliency and academic success, measured by Step 1 score and GPA; there was no significant relationship, however, between personality profile and academic success. In addition, there was no significant relationship among individuals' resiliency and personality profiles when choosing a procedural or non-procedural specialty. Nevertheless, further investigation with a larger data set could uncover these trends. This study underscores the importance of elucidating the various factors associated with choosing a medical specialty, which could, in turn, reduce burnout and promote personal and professional success.

**Seymour, Zachary**

**Mentor(s): Dr. Laura Nolting, Dr. Brent Boyer**

### **Delayed Presentation of Empyema with Diaphragmatic Erosion and Peri-Hepatic Pseudoaneurysm Following Laparoscopic Cholecystectomy: Ultrasonographic Findings and Review**

Pseudoaneurysm formation of the cystic or hepatic arteries is a rare but well-described complication that can have a delayed and variable presentation. The etiology can include iatrogenic following laparoscopic surgery, infection, and trauma. With the advent of laparoscopic cholecystectomy, iatrogenic factors have become a leading cause in the formation of visceral artery pseudoaneurysms. These factors can include mechanical injury in surgery, mechanical injury from the adjacent positioning of surgical clips, excessive or inappropriate use of thermal cauterization, or leakage of bile due to an inadvertent injury to the biliary tree. Given that visceral artery pseudoaneurysms are potentially life-threatening complications, a rapid diagnosis is desirable. However, given the potentially delayed nature of their presentation and often non-specific clinical manifestations, diagnosis and intervention are often delayed. Although CT angiography remains the gold standard for imaging, ultrasound evaluation at the bedside by an experienced operator can rapidly and non-invasively identify the well-described "ying-yang" sign characteristic of a pseudoaneurysm. Here we present an interesting case of a hepatic artery pseudoaneurysm that developed following laparoscopic cholecystectomy and was concomitant with peri-hepatic infection, diaphragmatic erosion and empyema of the right lung. In this case, the use of point-of-care ultrasound in the emergency department proved extremely valuable in identifying and characterizing these pathologies as well as their

interconnected nature to one another.

**Shah, Zalak**

**Supervisor(s): Forrest Wrenn**

**Mentor(s): Dr. Renu Pokharna**

**The Effects of Vitamin D on MS Relapse Progression**

Multiple Sclerosis (MS) is an immune-mediated inflammatory disease that affects the myelin around CNS axons. The clinical presentation of the disease can vary greatly and is, therefore, classified into different types based on the patterns of relapses. Past research has shown that Vitamin D may have a protective component to MS progression, but much of that research has been limited in scope. Our hypothesis is that MS patients who are taking Vitamin D supplements will have lower relapse rates and less disease progression compared to those who are not taking Vitamin D supplements. We conducted a retrospective, cross-sectional chart review of 392 patients from Palmetto Health-USC Neurology. All types of MS, genders, ages, and races were included. Chi-square and Mann-Whitney statistical analyses were performed to examine the relationship between Vitamin D usage and relapse number. The Chi-square analysis found the relationship between these variables to be statistically insignificant,  $\chi^2(1, N = 392) = 0.05, p = 0.821$ . The Mann-Whitney analysis also found that the number of relapses were not significantly different for patients on Vitamin D (median relapse = 1, range = 0-10) than for those not on Vitamin D (median relapse = 0.5, range = 0-12)  $U = 18627, p = 0.743$ . Overall, our study failed to show a statistically significant relationship between Vitamin D and MS relapse progressions. Our results indicate that more research needs to be performed regarding the relationship between Vitamin D and MS relapse progression, specifically with prospective studies that can include controlled variables, checking Vitamin D levels, and larger sample sizes that include patients with all types of MS.

**Simpson, Trisha**

**Mentor(s): Dr. Joseph Myslinski, Dr. William Richardson**

**Intentional Laundry Detergent Pod Ingestion Requiring Emergent Airway Management.**

Laundry Detergent Pods (LDP's) have been shown to cause acute injury after ingestion, primarily minor caustic injury to the oropharynx and esophagus. Although most ingestions have been accidental and in the pediatric population, there recently was a social media fad called the "laundry detergent challenge" where teenagers video recorded themselves intentionally ingesting LDPs. Fortunately, the vast majority of accidental ingestions have resulted in only minor injuries. Less common, but much more harmful, is the purposeful ingestion of LDP's for the purpose of self-harm and suicide. In this case report we examine the ingestion of LDP's by a 20-year-old male in a suicide attempt, who presented to our emergency department. In this patient, LDP ingestion caused nausea, vomiting, drooling, decreased neurological status and metabolic acidosis, which have also been reported in the medical literature. What was unusual in our patient was the degree of posterior oropharynx edema and erythema, the amount of drooling and difficulty in controlling his secretions. In addition, he rapidly developed some voice changes. Because of these findings, we emergently managed his airway using rapid sequence intubation. He remained intubated for three additional days due to the degree of persistent oropharyngeal edema. He then went on to have an uneventful recovery. Emergency Department physicians and staff should be aware of the potential for LDPs to cause significant oropharyngeal injury and be ready to emergently intervene with endotracheal intubation if indicated.

**Smith, Kelsey**

**Mentor(s): Dr. Shilpa Srinivasan**

**The Benefits of Art Therapy in the Treatment of Psychiatric Disorders**

This literature review looks at the effects of art therapy and potential benefits in aiding treatment of psychiatric disorders. The review initially explores art therapy as a whole, first setting a clear definition of the therapeutic techniques and various entities that the practice encompasses before exploring the positive impact exhibited in patients. The review then focuses on the application of art therapy in various personality, mood, and psychotic disorders. The ultimate goal is to examine the previous literature regarding the use art therapy in each of these three categories of psychiatric disorders with the purpose of investigating the potential added benefits of this therapeutic practice and proposing an increased integration of art therapy alongside the standard of care for psychiatric disorders.

**Sorokin, Alexander**

**Mentor(s): Dr. Thomas Ergen, Dr. Corey Hamilton, Dr. Earl McFadden**

### **Tranexamic Acid Decreases Blood Loss after Reverse Total Shoulder Arthroplasty**

Introduction:

Reverse total shoulder arthroplasty (R-TSA) may result in significant blood loss and complications during the procedure. Tranexamic acid (TXA) has been studied extensively in total knee arthroplasty and total hip arthroplasty. It has shown to significantly reduce blood loss, wound hematomas, decrease postoperative transfusion rates, and shortening operative times. There have been studies showing similar results in total shoulder arthroplasty with IV and topical TXA. Furthermore, it is estimated that the appropriate dose of oral TXA is \$14 versus \$47 to \$108 of IV TXA depending on the formulation. However, there are no studies evaluating the use of oral TXA in reverse total shoulder arthroplasty. Our hypothesis is that oral TXA will show a decrease in perioperative blood loss, postoperative drain output, total blood loss, postoperative drop in hemoglobin, length of hospitalization, number of blood transfusions, operative time, and postoperative pain scores when compared to no TXA.

Methods:

A retrospective analysis of oral TXA versus no TXA prior to reverse total shoulder arthroplasty was completed on 202 patients (69 TXA, 133 no TXA). Preoperative hemoglobin, operative time, operative blood loss, hemovac output postoperatively, total blood loss, post operative pain score, hospital length of stay, and postoperative hemoglobin drop were recorded. Linear regression analysis was completed on the variables with and without oral TXA.

Results:

There was a 70 cc decrease in hemovac drain output postoperatively in the oral TXA group compared to the control group (p value < 0.001). Additionally, there was a 76 cc decrease in the total blood loss in the oral TXA group compared to the control group (p value < 0.003). However, there was no statistically significant difference in operative time, operative blood loss, postoperative hemoglobin drop, length of stay, or postoperative pain scores.

Conclusion:

Our findings show that oral TXA can decrease postoperative blood loss and total blood loss when compared to a control group. Our data shows similar outcomes with previous studies that focused on the use of IV TXA in reverse total shoulders. As we move towards a healthcare system that focuses on cost savings, oral TXA may have similar enough outcomes to warrant its use.

**Stafford, Sarah**

**Mentor(s): Dr. Christine Schammel, Dr. Yuliya Yurko**

### **The Granular Cell Tumor dilemma: benign disease with potential for malignancy?**

Granular cell tumors (GCT) are characterized as benign mesenchymal tumors of Schwann cell origin. The rarity of these lesions has resulted in a limited understanding of their significance despite being

described initially in 1926. Typically found in subcutaneous tissue, GCT are rare in the GI tract (46%) with most lesions found in the esophagus and colon. A retrospective review of all granular cell tumors diagnosed and treated at a single regional institution between 1/1/2001 and 6/1/2018 was completed. Typical demographic, clinicopathologic treatment and outcome data were collected. Data were stratified based on location in the GI tract. All data was compared to the literature. Statistical analysis using Fischer's t-tests was completed ( $p < 0.05$ ). A total of 24 GCT tumors were identified in 22 patients. This cohort had a mean age of 50 (range 35-71) with 59% white and 41% black patients. GCT were found in more females than males (68% versus 32%). Of the comorbidities noted, only smoking (90%) and alcohol use (59%) were associated with GCT. Most patients were asymptomatic except for abdominal pain (60%), changes in bowel movements (55%) and gastritis (55%), consistent with identification of GCT through general screening (82%) biopsies (88%). Equal numbers of esophageal and colorectal lesions were identified (46% each). As expected, most lesions were unifocal (91%); multifocal lesions included 2 patients – one with lesions in the cecum and transverse colon and interestingly, a second patient with a GCT of the breast (not included in this analysis). Tumors on average were 1.05cm (range 0.5 - 2.7). Histologically, most were infiltrative (46%) without mucosal surface change (75%), lymphoid cuffing (67%), hyalinization (100%) or nuclear pleomorphism (92%). Mean follow-up for the cohort was 58 months with no reported metastases. In this study we performed an extensive analysis of patients' profile demonstrating distinctive features never described in previous studies. We did not demonstrate a recurrence or metastatic disease in this study, as previously shown to be up to 12 % in most studies. Now, 93 years later, we still have a dilemma: should we recognize and treat it as benign disease with potential for malignancy?

**Steverson, Kathryn**

**Mentor(s): Dr. James Cook, Dr. Jody Steinauer**

**An Introduction to the Medical Management of Obesity in Women's Health and the Management of the Post-Bariatric Surgery during Pregnancy**

There is a lack of knowledge among medical students about the effects of obesity and bariatric surgery on pregnancy and women's health. In addition, there is bias towards obese patients among clinicians and students. The goal of this project is to design a case-based learning experience focused on teaching medical students about the impacts of obesity and bariatric surgery on pregnancy while also addressing bias towards obese patients. To do this, we created a seminar in which students take the Implicit Attitude Test (IAT) before the discussion and were asked to read two review articles: an ACOG Practice Bulletin and an Endocrine Society Clinical Practice Guideline. During the 60-minute in-person seminar, students first individually took a pre-seminar quiz with facts taken from the pre-reading. Following the quiz, they then worked in small groups to discuss one of three clinical vignettes pertaining to obesity/bariatric surgery in pregnancy and answered questions/designed management plans. The small groups presented their answers to the collective group. Following this, a discussion was held on the IAT and how bias may affect patient care. To conclude the seminar, students individually took a different post-seminar quiz to measure basic knowledge about obesity and bariatric surgery. By generating discussion and fostering engagement, the session was perceived as a positive learning experience by the students. The participants became knowledgeable on the effects of obesity in pregnancy, which was apparent by the pre-quiz average of 53 and post-quiz average of 84. Additionally, our survey results suggest that students developed a better understanding of bias, which may increase their awareness of bias next time they interact with obese patients.

**Stiver, Hailey**

**Supervisor(s): Conor Myers**

**Mentor(s): Dr. Julie Justo, Dr. Tina Hardison**

**Saying Goodbye to HCAP: A Quality Improvement Initiative to Implement Local Pneumonia Guidelines in an Emergency Department**

**Background:** The Prisma Health-Midlands Antimicrobial Stewardship and Support Team (PHASST) published local pneumonia treatment guidelines in January 2019 and updated relevant ordersets, or PowerPlans, in the electronic medical record in February 2019. These guidelines removed the term, “healthcare-associated pneumonia,” or HCAP, and instead introduced local evidence-based risk factors for multidrug-resistant organisms. Given that much of the empiric antimicrobial selection for pneumonia occurs in the emergency department (ED), a quality improvement initiative was designed to help implement these novel guidelines and ordersets in the ED.

**Objective:** Increase the number of providers within the ED that can locate the local pneumonia guidelines and appropriately apply the algorithm to a patient in the ED.

**Methods:** The quality improvement initiative will be based on development of a 5-10 minute educational video visually identifying the location of the 2019 Prisma Health-Midlands Pneumonia Guidelines within the health system intranet. The educational video will also highlight optimal diagnostic testing, i.e. diagnostic stewardship, and important changes with the new algorithm, such as removal of the term “HCAP” in favor of local risk factors. The video will be disseminated via email to all ED providers in March 2019. Following dissemination, the study team will conduct a survey to assess individual provider ability to locate the guidelines and identify proper diagnostic testing. In order to identify proper utilization of the guidelines and ordersets, the appropriateness of prescribed antibiotics will be evaluated in 10 pneumonia patients seen in the ED in the post-implementation period. Data will be reported using descriptive statistics.

**Results:** In Progress.

**Conclusions:** This quality improvement study should increase the ability of ED providers to locate new local guidelines and implement current clinical recommendations.

**Sweet, Lauren**

**Supervisor(s): Andy See**

**Mentor(s): Dr. Mark Humphrey, Dr. Morgan Adams**

**Prevalence of non-communicable diseases and social determinants of health in Chinandega, Nicaragua using modified WHO STEPs approach**

## INTRODUCTION

Of the top ten leading causes of mortality in Nicaragua, seven are direct results of poorly controlled non-communicable diseases (NCDs), which includes diabetes and hypertension. In order to better understand the epidemiology of the current healthcare climate and associated social determinants of health, we undertook a cross-sectional survey based on the WHO STEPs model in six low/middle income neighborhoods in Chinandega, Nicaragua. The survey primarily looked at access to healthcare and NCD diagnosis and management.

## METHODS:

The study was a descriptive, cross-sectional, survey. The World Health Organization STEPwise approach for Surveillance (STEPS) was modified and used for this study, which took place over 1 week in Chinandega, Nicaragua from February 2018 to March 2018.

## RESULTS:

Health care workers interviewed 225 households in 6 neighborhoods. 87.1% of patients were screened for hypertension and 67.1% were screened for diabetes. The prevalence of hypertension was 39.1% (42%

of women vs 32.4% of men). Of these patients, 71.6% took medication. The prevalence of diabetes was 18.7% (20.4% of women vs 14.7% of men). Of these patients, 57.1% took diabetic medications. The primary reason for seeking medical care was high blood pressure. 67% of patients pay for their medications at a private pharmacy.

#### CONCLUSIONS:

While there is a high incidence of screening for NCDs in the city of Chinandega, there is a lack of access to care and chronic disease management, especially to regular medication management. Women in Chinandega had higher prevalence rates of both hypertension and diabetes compared to men. The majority pay for medications at private pharmacies indicating potential discordance between governmental supply and demand, even though the population has purported access to government subsidized medications.

**Tarar, Omer**

**Mentor(s): Dr. Ali Rizvi, Dr. Sri Harsha Tella**

#### **Double Threat : A Case of Marine-Lenhart Syndrome**

**Introduction:** Thyrotoxicosis secondary to both Graves' disease and co-existing hyperactive nodule is called Marine-Lenhart Syndrome. We present a case of Marine-Lenhart Syndrome with severe thyrotoxicosis manifesting as chest pain, Myocardial infarction and dilated cardiomyopathy.

**Case:** 53 year old Female with PMH of Hypertension, Recent diagnosis of hyperthyroidism not on any medications presented with sudden onset chest pain while sitting at home.

She Reported almost 80 pound weight loss in past 8 months and was being worked up by PCP. Her TSH 3 months ago was < 0.01 uIU/ml with elevated Free T4 of 3.85 ng/dl and Free T3 was 590 ng/dl. Her TSI antibody was elevated. She underwent Thyroid uptake scan 3 months ago by Primary Care Physician which showed markedly elevated 24 hour uptake of 77.5%, diffusely enlarged gland with hot focus in region of left lower thyroid pole likely representing functioning adenoma. However, she was not started on Anti-Thyroid medications at the time.

She denied Family history of Thyroid disease. She smoked half pack of cigarettes daily but denied any alcohol or illicit drug use. Her Physical exam was significant for Sinus Tachycardia, diffusely enlarged and firm Thyroid gland with trace pedal edema.

Her initial troponin was negative but subsequently peaked at 46.16 ng/ml. Her initial EKG showed ST-depressions in anterolateral leads. Her echocardiogram showed dilated cardiomyopathy with ejection fraction of 40% and severe pulmonary hypertension. She underwent Cardiac Catheterization that did not reveal any significant atherosclerotic disease.

She was started on Methimazole and Metoprolol with improvement in her symptoms and hemodynamics. Outpatient follow up was scheduled for definitive management of her Hyperthyroidism.

**Discussion:** The syndrome prevalence was reported between 2.7% to 4.1% previously. If oral anti-thyroid therapy is chosen as first-line treatment for Graves' disease, missed active nodules may result in the failure to achieve euthyroidism. Patients typically require higher doses of Radioactive Iodine or Surgery.

**Conclusion:** Patients with difficult to control Graves' disease should be evaluated for the existence of nodules and the functional status of them for achievement of optimal therapy. Early diagnosis may help in preventing associated complications and decrease failure to therapy.

**Tarar, Omer**

**Mentor(s): Dr. Ali Rizvi**

#### **The Hybrid Closed Loop Insulin Delivery System in Patients with Type 1 Diabetes: More Time in Range**

**Background:** Automatic glucose sensing and insulin delivery remains an important goal for the treatment of type 1 diabetes (T1DM).

**Aims:** To evaluate the effectiveness of the Hybrid Closed Loop insulin delivery system on glycemic control in patients with T1DM.

**Method:** 24 patients using insulin pump therapy were upgraded to the Minimed 670G Insulin Pump and Guardian-3 Real-Time Continuous Glucose Monitor (Fig. 1) in a 5-month period at the Diabetes Unit of an academic Diabetes Unit. Integration between the sensor and the pump allows for automated basal insulin delivery (SmartGuard™ Auto-Mode, target 120 mg/dl) and low-glucose suspend feature. Two-week data before and after initiating Auto-Mode technology was analyzed (Fig. 2) in each patient.

**Results:** Comparison was based on 2,175 days of data. With SmartGuard™ feature on versus SmartGuard™ feature off, there was a significant difference in time in range (% time glucose levels between 70-180 mg/dL) (76.4 vs. 66.1%,  $P < 0.05$ ). Average sensor glucose was 135.9 mg/dl. Time spent in hypo- and hyperglycemia decreased (Fig. 2). Of note, severe hypoglycemia reduced significantly from 5.3% to 0.6% ( $P < 0.05$ ).

**Discussion:** In the short-term, patients with T1DM using the MiniMed HCL (sensor-driven pump with automated basal insulin delivery) had more percent glucose in the target range and fewer glycemic excursions. Reduction in average glucose and severe hypoglycemia could translate to safely lowering hemoglobin A1c levels in these patients.

**Tarasidis, Anna**

**Mentor(s): Dr. Melinda Harman**

### **Histological Evaluation of Explanted Hernia Mesh Fixation Points**

#### **Introduction**

Polymeric surgical mesh is an implantable biomaterial used to repair musculofascial defects. Surgical meshes generally exhibit anisotropic material properties, but their in-situ mechanical behavior in the abdominal wall is poorly understood. Moreover, the mechanical influence of different types of peripheral fixation used to attach the mesh during hernia repair is not well-characterized. Injury models of biomaterials implanted in load-bearing tissues demonstrate that mechanical tension can signal optimal repair of fascial tissues or cause fibrous encapsulation. We hypothesize that peripheral fixation alters connective tissue deposition during hernia repair.

#### **Methods**

17 hernia mesh explants and their clinical data were obtained through an IRB-approved mesh registry and characterized by their material and chemical properties. Central and peripheral samples were histologically processed and stained for grading the tissue responses.

#### **Results**

Preliminary quantification studies indicated a uniform inflammatory response among multiple mesh types. The ratio of mature to immature collagen was lower in the peripheral rim (1.7+1.0) adjacent to fixation points compared to more centralized locations (2.9+1.9). These altered tissue responses near peripheral fixation points support studies linking cyclic strain and non-uniform loading to variations in connective tissue deposition. Analysis of different mesh types, fibrous tissue responses, and full assessment of clinical and pathological features of these cases is on-going.

#### **Conclusions/Implications**

Techniques for hernia mesh fixation are highly variable and complications (e.g., pain, mesh contraction, and slippage) due to poor fixation are leading causes of hernia recurrence. There is a need to better understand the underlying mechanisms governing tissue responses of different fixation techniques.

**Taylor, Ryan**

**Mentor(s): Dr. Chris Kaufmann**

**Trauma Recidivism: A Population Study of Older Adults in a Rural Level 1 Trauma Center**

Trauma recidivism, particularly in the older adult population, is strongly related to functional loss, increased socioeconomic challenges after injury, high mortality rates, and increased healthcare expenses. Given the growing size of our older population and disproportionate risk for significantly adverse events, there is a need to further understand these trauma recidivists. The aim of this study was to investigate trauma recidivism at Grand Strand Medical Center (GSMC), identifying if there is a particular combination of age, gender, medical history, and injury magnitude that implies if an older adult patient in this region will be a recidivist. Insight from this epidemiological study will ultimately be used to focus specific trauma prevention efforts for this at-risk population. This study was a 4-year retrospective data review (2013 to 2017) of all GSMC patients  $\geq 18$  years of age with a history of trauma and trauma recidivism during that period. A young adult population (defined as  $\geq 18$  to 64 years) was compared to the target population of older adults (defined as  $\geq 65$  years). Exclusion criteria consisted of age  $<18$ , and if the patient reported a home zip code outside of Horry County or surrounding communities. In the studied population, recidivists  $\geq 65$  years of age were primarily females suffering blunt injury secondary to fall, with a recidivism rate of 5.25%. This was significantly different from younger recidivists who were predominately males suffering blunt trauma secondary to motor vehicle collisions, with a lower recidivism rate of 2.96%. Recidivism in older adults was also significantly correlated with higher ISS, longer hospital LOS/ICU LOS, and increased number of patients discharged to a rehab or SNF. These results demonstrate that trauma is recurrent and associated with disproportionately poor health outcomes, particularly in older adults. With the aging population, there is a need to further study trauma recidivism to develop targeted prevention strategies for this at-risk group.

**Taylor, Matthew**

**Mentor(s): Dr. Keith Barron**

**Diagnosis at Gut Point: Case Report and Review of Ultrasonographic Identification of Pneumoperitoneum**

**Introduction:** Acute abdominal pain is a common symptom seen in emergency departments around the world, with many cases requiring immediate medical intervention. The key to providing a rapid and accurate diagnosis involves a detailed patient history and thorough physical exam. Bedside ultrasound is a rapid diagnostic tool that can be used to accurately detect pneumoperitoneum, preventing patients from being unnecessarily exposed to radiation from alternative imaging modalities, while also potentially leading to faster treatment times decreased mortality.

**Case Presentation:** An 81 y/o African American female presented to the emergency department with concerns for vaginal bleeding. Diagnostic workup early in the hospitalization revealed diverticulosis. The day after diagnostic colonoscopy was performed, intraperitoneal free air was discovered via ultrasound and confirmed with KUB radiography. Surgical intervention was declined by the patient and family. The patient gradually deteriorated and expired two days later.

**Discussion:** Abdominal ultrasound was used to visualize the intraperitoneal free air along with other imaging modalities. In a patient where there is high clinical suspicion for pneumoperitoneum, abdominal ultrasound has the potential to be used as a rapid bedside diagnostic tool, thus streamlining potential treatment.

**Conclusion:** Ultrasound is a viable tool for diagnosing pneumoperitoneum and should continue to be explored by clinicians to narrow the differential diagnosis of acute abdominal pain.

**Thomas, Reed**

**Supervisor(s): Braden Gregory**

**Mentor(s): Dr. Morgan Adams, Dr. Mark Humphrey**

# Hypertension Control Project

## Hypertension Control Project Abstract

### Introduction:

Approximately 34% of US adults have hypertension (86 million adults in the US), and of those 45.6% have uncontrolled hypertension (39 million adults in the US). These uncontrolled hypertensive patients are at risk for preventable cardiovascular disease. The Palmetto Health Family Medicine Residency has teamed with CCI (Care Coordination Institute) Labs and the AMA (American Medical Association) to implement the Measure Accurately, Act Rapidly, and Partner With Patients (MAP) protocol for achieving optimal rates of blood pressure control. This evidence-based protocol was recently completed in Greenville, SC in 2016 and showed BP control improvement (<140/<90 mmHg) from 61.2% to 89.9% after 6 months. We aimed to implement a similar protocol at our clinic. The MAP protocol has significantly improved blood pressure control in the clinic setting.

### Methods:

Patients included in this study were those with a history of hypertension seen four months before the intervention (July-October 2018) and seen during the four month intervention protocol (November 2018-February 2019). If a patient's initial blood pressure was  $\geq 140/\geq 90$ , then an unattended automatic blood pressure was obtained at one minute intervals over a period of three minutes and averaged (Measure Accurately). When the average office blood pressure was  $\geq 140/\geq 90$ , physicians were instructed to intensify blood pressure medications through a medication protocol based on the ACC/AHA Hypertension Guidelines with close clinic follow up to prevent physician inertia (Act Rapidly). Our study mainly focused on the outcomes from the first two interventions, but the last intervention was Partnering With Patients, which included blood pressure self-monitoring, using affordable combination medications, and patient education.

### Results:

ASAP

### Conclusions:

ASAP

### **Thompson, Ben**

**Supervisor(s): Lauren King**

**Mentor(s): Dr. Andres Leone**

**Improving Resident Physician Comfort and Performance in Goals of Care Conversations**

### Objectives

- Improve resident comfort with Goals of Care conversations
- Improve quality of delivery of end-of-life care

### Original Research

#### Background

Resident physicians typically report discomfort with performing goals of care (GOC) conversations. Some skills like suturing are practiced in safe environments before being performed on patients. In contrast, a physician's first end of life conversation usually occurs on the wards.

#### Research Objectives

The goals of this project were to 1) Provide GOC training to medical residents in a safe environment. 2) Evaluate the impact of a two-hour training session on resident comfort and performance in GOC conversations.

## Methods

First year Family Medicine (FM) residents were surveyed about their comfort with GOC conversations and completed OSCE on discussing end-of-life preferences with a standardized patient. A follow-up survey was completed at two months. Internal Medicine (IM) residents participated in the OSCE, but did not receive a training session.

## Results

Ten FM residents and ten IM residents participated in the OSCE. Across all domains, OSCE scores did not reach a level of significance (FM 10.00 +/- 4.12, IM 7.00 +/- 4.5,  $p=0.34$ ). In the domain of General Interviewing Skills, those who completed a two hour training session outperformed those who did not (FM 3.95 +/- 1.04, IM 2.60 +/- 1.66  $p=0.043$ ). Residents regardless of residency felt more prepared to engage in GOC conversations and comfortable holding GOC conversations at the time of follow-up [Preparedness CI 3.000(1.600-4.564), Discussion CI 1.842 (0.667, 3.714), Shapiro-Wilk  $p$ -value = 0.006]. The number of participants is limited as a single-site study among residents from two programs.

## Conclusion

Residents in the intervention group showed improved performance with regards to general interviewing skills in an OSCE. They also performed better on the OSCE overall. All residents felt more comfortable holding GOC conversations at two months. Further studies of provider training are necessary to improve delivery of this critical skill.

## **Thompson, Joseph**

**Mentor(s): Dr. Phillip Prest, Mrs. Carol Dean**

### **Analyzing Sequential Compression Device Compliance in a Large Tertiary Care Trauma Center**

Hospitalized patients, especially those who have suffered from traumatic injury, are at a significantly increased risk of developing a venous thromboembolism (VTE) due to immobility and vascular injury. VTE has a propensity for developing within the deep venous system of the leg and may dislodge to form pulmonary embolisms in susceptible patients. This occurrence significantly increases the risk of morbidity and mortality within this population. Preventing VTE is multifactorial and include: pharmacological agents, patient ambulation, and the continuous use of sequential compression devices (SCDs). SCDs work through both mechanical and fibrinolytic mechanisms to prevent VTE from occurring; however, compliance with their use in intensive care units and on hospital wards is often low.

The first step of this particular project concluded that compliance with SCDs within a large tertiary care trauma center is unsurprisingly low due several factors: a lack of ordering of SCDs by physicians for newly admitted patients, and a lack of availability of SCDs within each room and of nursing staff protocols for checking patient SCD compliance on hourly rounds. The goal for this step in the project was to address and incorporate a protocol for the nursing staff to "check-off" SCD usage by patients during hourly rounds and to determine whether it proves to be beneficial for patient compliance with SCDs.

## **Todd, Anna**

**Mentor(s): Ms. Lisa Camp**

### **Liberating the Leader Within**

During the spring of my second year of pharmacy school, I had the opportunity to take a step out of my

comfort zone of practicing pharmacy from behind a counter to advocating for the profession on a national level. I served as the South Carolina College of Pharmacy student delegate at the American Pharmacist's Association (APhA) annual meeting, where I voted alongside other student delegates on proposed resolutions and new chapter officers for the 2017-2018 year. Since I have only worked in retail pharmacies, policy and regulation were unfamiliar areas of pharmacy I had never been exposed to. That semester, I was enrolled in POLI 215, Introduction to Leadership Studies, where we had recently learned a five-step model of leadership that focused on key practices vital to becoming an exemplary leader. One of these steps was "challenging the process" and seeking ideas outside the boundaries of familiar experience to move forward. I kept this in mind as I attended the House of Delegates sessions, which opened my eyes to a foundational aspect of the profession that occurs more behind the scenes. A year later, I continued learning about pharmacy leadership nationally while on a trip to Washington D.C. I was able to tour the APhA headquarters and meet with the CEO of the organization and his staff. Speaking with and learning from some of the greatest leaders in pharmacy in the nation was a unique experience and showed me pharmacy laws and regulations I learned about in school put into action. From these trips, among other experiences during my time as a pharmacy student, I gained the confidence and knowledge to become a more effective pharmacist for my patients. The experiences also led me to refine my career path and figure out what I wanted to pursue with my pharmacy degree. I realized my passion for pharmacy lies in the community, leading and advocating for my patients one-on-one. The hands-on experiences and exposure to the unfamiliarity of leadership on a national level was invaluable to this process.

**Tranchita, Kara**

**Supervisor(s): Kristen Kilby, Samantha Benvie**

**Mentor(s): Dr. Douglas L. Pittman, Dr. Carolyn E. Banister**

**Preparation and analysis of growth factors to establish and maintain three-dimensional cancer organoid cultures**

Patient cancer organoids are three dimensional cell culture models being developed to test patient specific, chemotherapeutic strategies. In the future, this will allow clinicians to select the most effective therapy for each patient. The long-term goal of this project is to create the necessary growth factors needed to support the growth of the organoids. One of the growth factors necessary is Noggin. Noggin is a signaling molecule that is involved in the development of bone, muscle, and nerve tissues. A plasmid containing a cytomegalovirus (CMV) promoter driving the expression of the 64 kDa protein homodimer of Noggin was stably transfected into HEK-293 (human embryonic kidney) cells. The cells were grown in DMEM media until the cells were confluent, at which time, the growth medium was switched to Advanced DMEM/F12 conditioning medium. To monitor the metabolic rate of the cells as a function of viability and growth, we tested the glucose levels in 10 ul of media using a glucometer and glucose test strips (commonly used by diabetic patients). The glucometer readout was in mg/dL. The glucose levels of the conditioning medium was monitored and replaced when the glucose levels fell below 100 mg/dL. This ensured that the Noggin producing cells were metabolically active and did not deplete all of the nutrients in the media before harvest. Once the Noggin conditioned media was removed from the flasks, cells and cell debris were removed via centrifugation. The media was filtered through a 0.22  $\mu$ m membrane then stored at -20C. Weekly harvests yielded approximately 8 liters of media that will be used to grow ovarian cancer organoids. Quality control measures to ensure the presence and quantity of Noggin in the harvested media include detection by SDS-PAGE and by western blot using a Noggin specific antibody OTI1H8. In the future, a functional test of the media will determine its ability to maintain organoid 3D cultures. Once ovarian cancer organoids are established, these will be used to study the mechanisms of homologous recombination DNA repair (e.g., sensitivity to PARP inhibitors) and to determine patient specific therapeutic strategies.

**VandeKoppel, Paul**

**Supervisor(s): S. Nicholas Graves**

**Mentor(s): Dr. Laura Nolting**

## **A Comfortable & Affordable Alternative Method For Ocular Ultrasound**

Ocular ultrasound is traditionally performed using a closed-eye technique. A large amount of water soluble ultrasound gel is applied to the patient's closed eyelid prior to scanning. This allows the linear probe to rest in the gel and not apply pressure to the globe itself. Standard ultrasound gel is safe to use around the eye but can be unpleasant for the patient. We sought to find a novel approach that provides the same image quality but is better tolerated by patients.

**Waghchoure, Simon**

**Mentor(s): Dr. Peter Loper**

## **Successful Treatment Of Refractory Shock post IV Thrombolytic therapy**

Pulmonary embolism (PE) is an important cause of morbidity and mortality in the US. More than 100,000 cases present annually with 25% of patients presenting with sudden death<sup>1</sup>. More recent data in 2018 shows that mortality rate is different for low to intermediate risk pulmonary Embolism 3–8% versus 25–52% for High risk pulmonary embolism. <sup>3</sup>.

A 42 year male presented to ED with acute onset of shortness of breath and Chest pain. Patient was noted to have near syncope and shortness of breath. CTPA study obtained showed bilateral PE with large tumor burden with large RV and contrast reflux in IVC. Patient received IV alteplase 50 mg for massive Pulmonary embolism as per safe half dose protocol however obstructive shock persisted with increased vasopressor requirement. He underwent thrombectomy with penumbra device clot retrieval. He was able to walk and was started on Long term DOAC treatment. He was transferred back to the community home. The debate regarding next best step after failure of treatment with IV thrombolytic treatment remains. In our experience using Catheter directed treatment for refractory shock post Intravenous thrombolytic therapy did lead to a survival benefit.

**Wagner, Alexander**

**Mentor(s): Dr. Jeff Holloway**

## **Rivermead Post-Concussion Symptom Questionnaire as a Screening Tool for Clinically Significant Depression in Pediatric Patients with Concussions**

Wagner, A.M.(1); Kay, J.J.M.(1,2); Coffman, C.(2); Davis, R.D.(2); Holloway, J.(1)

1. Prisma Health Children's Hospital-Midlands, Columbia, SC, USA

2. University of South Carolina Department of Exercise Science, Columbia, SC, USA

Depression has been shown to be a common symptom in concussions, both in the acute period, and as a component of post-concussive syndrome. Additional studies have shown that depression following a concussion is a risk factor for prolonged symptoms and delayed clinical recovery. Because of the burden of depressive symptoms in concussions, it is important to be able to adequately screen and monitor patients with these symptoms. Riegler, Gutty and Arnett looked to evaluate the affective symptom cluster percentiles generated by the ImpACT Post-Concussion Symptom Scale as a screening tool for clinically significant depression as compared to the Beck Depression Inventory-Fast Screen. Results demonstrated that the utilized affective symptom cluster scale was able to effectively screen for depression and identify patient's at increased risk for complicated recovery without using a more in-depth depression inventory. However, this analysis required the use of transformed data as part of the ImpACT test. In our current study, we look to analyze non-transformed symptom reporting data as a way to more simply screen for clinically significant depressive symptoms. De-identified data from 97 pediatric patients was collected from a pediatric sports medicine post-concussion clinic. Results from the Rivermead Post-Concussion Symptom Questionnaire (RPCSQ) will be compared to results from the Beck Depression Inventory in pediatric pa-

tients. This study will look to assess the validity of the RPCSQ as a screening tool, both in the acute phase of concussive symptoms (<21 days) as well as those patients approaching the time frame for prolonged symptoms and post-concussion syndrome (>21 days). Due to previously reported gender differences in concussions, as well as difference in depression rates amongst females and males in the general population, data will be grouped by biological sex and analyzed separately. The results of this study will provide insight into the validity of the RPCSQ as a reliable screening tool for clinically significant depressive symptoms in pediatric patients with concussions.

**Wagner, Tyler**

**Mentor(s): Dr. Cynthia Phillips**

**The Effect of Pharmacist Centered Medication Reconciliations on Transitions of Care in Patients with Type 2 Diabetes**

**Introduction:** Inefficient provider communication can lead to inadequate transitions of care, resulting in medical errors and patients receiving substandard education to effectively manage their disease states. As a result, an estimated 80% of serious medical errors and 60% of all medication errors occur during patient hand-off. This provider miscommunication results in patients experiencing unplanned healthcare utilization (UHU), such as avoidable hospital admissions, escalations of care, re-admissions, and an increased length of hospital stay.

**Research Question or Hypothesis:** Do type two diabetic patients (T2DM) who receive a pharmacist centered medication reconciliation have lower rates of UHU?

**Study Design:** An IRB approved, single-health system, retrospective, observational cohort study.

**Methods:** All adult patients with T2DM admitted to Prisma Health Richland Hospital in Columbia, SC between January 1, 2016 and December 31, 2016 were identified. After patients were stratified into two groups according to PCMR status, 300 patients were selected at random from each group to be evaluated. In the treatment group, admission medication reconciliations were obtained and verified by a pharmacist. The Charlson Comorbidity Index, medication reconciliation data (i.e. omissions, edits, etc.), and UHU were collected. The objective of this study is to determine the impact PCMRs have on UHU and secondarily medication discrepancy identification in a high-risk population. T2DM patients are the primary focus of this study due to their increased risk of UHU and medication regimen complexity.

**Results:** A total of 485 T2DM patients have currently been evaluated, with 278 receiving a PCMR (intervention group). Generally, patients receiving PCMR services had a greater Charlson comorbidity index score (4.94 vs 4.59) and increased rates of cardiovascular disease (57.2% vs. 44.0%) at baseline. PCMRs caught an average of 5.66 discrepancies per patient seen and updated patient information (allergies, out-patient pharmacy, etc.) in 62% of patients.

**Conclusion:** PCMR services have an important role in identifying key medication discrepancies within the hospital. With regard to UHU, there is no difference seen at this point between the intervention and control group.

**Wayman, Megan**

**Supervisor(s): Katelyn Bull**

**Mentor(s): Dr. Robert Daniels, Dr. Andrew Gainey, Dr. Christina Cox, Dr. Martin Durkin, Dr. Anna Kathryn Burch**

**Evaluation of time to resolution of necrotizing enterocolitis in a neonatal intensive care unit**

Introduction: Necrotizing enterocolitis (NEC) is a gastrointestinal emergency observed in neonatal intensive care units (NICU). Treatment commonly includes withholding all enteral feedings, administering intravenous antibiotics and supportive care. Controversies exist in the care of infants with NEC, and guidelines have been based off expert opinion and institutional preference.

The standard duration of antimicrobial therapy to treat NEC ranges from 7-14 days. Treatment durations for NEC have remained constant for many years. However, no studies, to our knowledge, have determined the relationship between symptom resolution, NEC resolution, and timing of antimicrobial discontinuation. Our study sought to determine the true time period to NEC resolution, based on surrogate markers used in the diagnosis of NEC.

Secondary objectives were to determine if the time to resolution of NEC is longer or the incidence of NEC recurrence is greater in patients who received shorter durations of antibiotics; determine if a difference in NEC recurrence exists between patients who followed institutional recommended antibiotic durations and those who did not; determine if the time to return to baseline feeds is different based on treatment duration; and determine if antibiotics are discontinued in patients prior to the resolution of NEC.

Methods: Patients with NEC in our NICU from June 1, 2012 and June 1, 2018 were included. Patients were excluded for: positive blood culture or transfer from an outside institution at the time of NEC, presence of a peritoneal drain, or death <24 hours after NEC diagnosis. Time to resolution of NEC was measured by return to baseline of the following markers: I:T ratio or bands, portal venous gas on imaging, vasopressor requirement, inflammatory markers, metabolic acidosis, bloody stool, pneumatosis on abdominal imaging, oxygen requirements and mode of ventilation. Duration and selection of antibiotic(s) were collected. Data is reported using descriptive statistics, chi-square or Fisher's exact tests for categorical variables, Kaplan-Meier curves, and Cox regression models.

Results:

Results to be included on poster.

Conclusion:

Conclusion to be included on poster.

**Wells, Elina**

**Supervisor(s): Kenzie Dent**

**Mentor(s): Dr. Kari-Claudia Allen, Dr. Morgan Adams**

**Evaluating the Efficacy of a Standardized and Integrated LGBTQ Healthcare Curriculum within the Palmetto Health USC Family Medicine Residency Program**

Introduction: LGBTQ individuals comprise an estimated 3.8% of the United States population with over 100,000 reported adults in South Carolina. The LGBTQ community is subject to numerous healthcare disparities. Lack of knowledge by family medicine providers stems from limited LGBTQ curriculums. Incorporating a curriculum devoted to educating residents and faculty on LGBTQ health and cultural competency can educate the new generation of primary care providers to better serve this population and eliminate barriers. Our objective was to implement and study the effectiveness of a standardized LGBTQ curriculum that includes healthcare and cultural humility training in the Palmetto Health USC Family Medicine Residency program. We hypothesize that after the LGBTQ curriculum, our residents will feel more comfortable and competent in caring for the LGBTQ population.

Methods: The LGBTQ curriculum was created to include a lecture series of LGBTQ health disparities and

cultural awareness, lesbian and bisexual health, and transgender care. Participants completed an anonymous pre- and post-curriculum survey, using a Likert scale scored from 1 (strongly disagree) to 5 (strongly agree). A Wilcoxon rank-sum test was done comparing the two groups (pre- and post- curriculum) and we also analyzed the results using the Goodman-Kruskal's gamma statistic.

**Results:** The LGBTQ curriculum helped residents and faculty to improve their knowledge of LGBTQ health disparities and how to overcome them ( $p=0.022$ ) as well as how to access community resources for this population ( $p=0.018$ ).

**Conclusion:** The implementation of an LGBTQ curriculum helped residents and faculty to develop an increased awareness of LGBTQ cultural competence. The curriculum significantly improved knowledge of health disparities in this population and ability to access community resources to assist this group.

**Williams, Kevin**

**Mentor(s): Dr. Michael Horan**

### **Vitamin D trends in the pediatric orthopaedic population: A Survey**

**BACKGROUND:** Within the last decade, multiple studies have demonstrated the potential health benefits of vitamin D supplementation including improved bone health, reduced fracture risk, protection from autoimmune disease, and decreased cancer risk. Because of the prevalence of vitamin D deficiency in pediatric populations and despite recent evidence of increased vitamin D supplementation in the US, our goal is to assess the knowledge of current vitamin D recommendations among pediatric orthopedists and fellows within the Pediatric Society of North America (POSNA). It is our purpose to use the data to increase awareness and understanding of vitamin D amongst all pediatric providers.

**METHODS:** Our survey was distributed to 1316 POSNA members via a series of 2 email requests to participate in the survey on the Survey Monkey website. They agreed to participate by responding positively on the first page of the survey. The data was depersonalized and analyzed via chi square and Fisher's exact testing.

#### **RESULTS:**

395 responses were recorded. 69% of participants rated their vitamin D knowledge as fair to good. 68% of participants have been in practice over ten years and represented most US geographic regions fairly equally. Most estimate that over 25% of their practice is vitamin D deficient with about a 50% compliance rate of supplementation. Over 30% of participants feel vitamin D management is mostly the role of the pediatrician, however 64% of participants discuss or check vitamin D levels in their practice for patients with repeat fractures, medical comorbidities, or nonunions most commonly.

#### **CONCLUSIONS:**

Survey participants demonstrated a wide variety of responses indicating their understanding of vitamin D testing and supplementation. Although providers estimate a high deficiency rate, many do not routinely check vitamin D. When they do check, there is no standard indication for testing or supplementation and many believe this to be the role of the pediatrician or endocrinologist. More studies are needed to provide a standardized protocol for vitamin D testing and supplementation in the pediatric orthopaedic literature.

Clinical Relevance: POSNA Survey

**Xu, QingYu**

**Mentor(s): Dr. Christopher Zust**

**Wingspan Stenting in a Patient With Severe Basilar Artery Stenosis - Case Report**

Vertebrobasilar territory stroke account for approximately 20% of TIA and ischemic stroke cases. Among those with vertebrobasilar stenosis, 70% of these patients had 50% or greater stenosis of the basilar artery. Current treatment for posterior circulation stenosis according to the SAMMPRIS trial favors medical treatment over intracranial stent placement due to high 1 month stroke/death rates in patients after receiving angioplasty and intracranial stent placement of 14.7% vs 5.8% with medical therapy alone. However, the SAMMPRIS study was criticized for lack of stratification by ischemic event and less rigorous operator-experience requirements. We present a 67 year-old African American female with 90-99% proximal basilar artery stenosis with recurrent posterior circulation territory strokes despite maximal medical therapy who successfully underwent basilar artery angioplasty and Wingspan stenting.

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