EARLY EDUCATIONAL EXPERIENCES AND TRAJECTORIES OF COGNITIVE FUNCTIONING AMONG MID-LIFE AND OLDER U.S. ADULTS

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ATTAINMENT AND ADRD

- 1 in 10 U.S. adults age 65 and older with Alzheimer’s Disease or Related Dementia (ADRD)
- Educational attainment most important protective factor
- Related to cognitive functioning but not rate of cognitive decline
ATTAINMENT IS INSUFFICIENT

- Only captures quantity of education
- Other aspects of education left unexamined
  - School context
  - Educational content
  - Academic ability
Per Pupil Spending in Average Daily Attendance, United States, 1925 - 1976
(2019 Dollars)

Source: Table 22 Total and current expenditures and expenditure per pupil in public elementary and secondary schools, by purpose: 1869-80 to 1989-90; 120 Years of American Education: A Statistical Portrait, National Center for Education Statistics
Timeline of Important Educational Policies and Supreme Court Decisions in the United States, 1925 - 1980

1925
- Pierce v. Society of Sisters, 1925; Children cannot be compelled to attend public instead of private school
- School lunch act of 1946

1930

1935

1940

1945

1950

1955

1960

1965
- Elementary and Secondary School Act, 1965 to educate poor children

1970

1975

1980
- Title IX, 1972
- Bilingual Education Act, 1968

Timeline of Important Educational Policies and Supreme Court Decisions in the United States, 1925 - 1980
CONCEPTUAL FRAMEWORK

Early Educational Experiences

School Context
Content
Ability

Educational Attainment

Birth Cohort

Cognitive Functioning Trajectories

Covariates: Race/ethnicity, gender, parents’ education, # of books in childhood home, self-rated health in childhood, proxy LHMS interview
Data and Sample

- Health and Retirement Study (HRS)
  - Life History Mail Survey (LHMS; 2015, 2017; n=10,325)
  - Age-eligible HRS respondents who completed LHMS
  - Provided cognitive functioning at least once (1998-2014)
- Attended at least primary school
- N=9,565 respondents
- 62,037 person-period observations
C O G N I T I V E  F U N C T I O N I N G

- Modified TICS scale
  - Immediate word recall test
  - Delayed recall test
  - Serial 7’s
  - Backwards counting
  - Naming (day, date, president, vice-president, two objects)
- Range: 0 – 35

Distribution of Cognitive Functioning for Sample Respondents, 2014
EDUCATIONAL ATTAINMENT

- AHEAD/CODA
- HRS/War Babies
- Boomers

- <H.S.
- H.S. or GED
- Some College
- College or More

Percentage
SCHOOL CONTEXT

Majority-minority elementary school

Rural school

Percentage

AHEAD/CODA  HRS/War Babies  Boomers

Percentage

AHEAD/CODA  HRS/War Babies  Boomers
EDUCATIONAL CONTENT

Language/Creative Arts

<table>
<thead>
<tr>
<th>Percentage</th>
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High School Curriculum

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- Did not attend HS
- Vocational/Gen Ed
- College Prep
ACADEMIC ABILITY

Learning Problem

Math and Reading Ability*

*Scale for ability: 1=much better than peers; 5=much worse than peers
### Linear Mixed Models

**Without Attainment** | **Adjusted for Attainment**
---|---
### At age 65

<table>
<thead>
<tr>
<th></th>
<th>Without Attainment</th>
<th>Adjusted for Attainment</th>
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</thead>
<tbody>
<tr>
<td>Majority-minority elem. sch</td>
<td>-0.43*</td>
<td>-0.45*</td>
</tr>
<tr>
<td>Rural school</td>
<td>-0.45*</td>
<td>-0.34*</td>
</tr>
<tr>
<td>Language/creative arts</td>
<td>0.71*</td>
<td>0.36*</td>
</tr>
<tr>
<td>H.S. curriculum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never attended H.S.</td>
<td>-2.04*</td>
<td>-0.92*</td>
</tr>
<tr>
<td>Vocational/general ed.</td>
<td>-0.56*</td>
<td>-0.25*</td>
</tr>
<tr>
<td>Learning problem</td>
<td>-0.88*</td>
<td>-0.80*</td>
</tr>
<tr>
<td>Reading ability</td>
<td>-0.28*</td>
<td>-0.18*</td>
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<tr>
<td>Math ability</td>
<td>-0.47*</td>
<td>-0.42*</td>
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<tr>
<td>Age</td>
<td>-0.15*</td>
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**Notes:** Adjusted for race/ethnicity, gender, parents' education, # of books in childhood home, childhood health, proxy IW, and cohort. All models interact early educational experiences, attainment, and controls with age, but educational experiences and attainment unrelated to slope. *p < 0.05
**LINEAR MIXED MODELS**

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Predicted Cognitive Functioning by Educational Content, School Context, and Academic Ability after Adjustment for Educational Attainment and Childhood SES, HRS-LHMS, n=9,565

Notes: Mean represents trajectory for non-Hispanic White men in HRS/War Babies cohort with high school diploma; Educational Content represents difference from mean trajectory when respondents were involved in language/creative arts and in college preparatory curriculum; School Context represents difference from mean trajectory when respondents attended a majority-minority school in a rural area.
### Stratified by Cohort

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<th>HRS/ War Babies</th>
<th>Boomers</th>
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<tbody>
<tr>
<td><strong>At mean age of cohort</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Majority-minority elem. sch</td>
<td>0.23</td>
<td>-0.36</td>
<td>-0.64*</td>
</tr>
<tr>
<td>Rural school</td>
<td>-0.44</td>
<td>-0.38*</td>
<td>-0.26*</td>
</tr>
<tr>
<td>Language/creative arts</td>
<td>0.24</td>
<td>0.39*</td>
<td>0.31*</td>
</tr>
<tr>
<td><strong>H.S. curriculum (ref=college prep)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never attended H.S.</td>
<td>-0.83*</td>
<td>-1.20*</td>
<td>-0.58</td>
</tr>
<tr>
<td>Vocational/general ed.</td>
<td>-0.12</td>
<td>-0.25*</td>
<td>-0.31*</td>
</tr>
<tr>
<td>Learning problem</td>
<td>-0.83*</td>
<td>-0.80*</td>
<td>-0.64*</td>
</tr>
<tr>
<td>Reading ability</td>
<td>-0.26</td>
<td>-0.18*</td>
<td>-0.16*</td>
</tr>
<tr>
<td>Math ability</td>
<td>-0.28*</td>
<td>-0.50*</td>
<td>-0.39*</td>
</tr>
<tr>
<td>Age</td>
<td>-0.25*</td>
<td>-0.15*</td>
<td>-0.02*</td>
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Notes: Adjusted for race/ethnicity, gender, parents' education, # of books in childhood home, childhood health, proxy IW. All models include age as measure of time, but do not interact indicators with time. *p<0.05
**IMPLICATIONS**

- Context, content, and ability related to cognitive functioning, not decline
- Cohort differences may reflect socio-historical changes
- Early educational experiences have lasting impact
- Broaden our conceptualization and measurement of education in ADRD research
Acknowledgment: This research was supported by grants P30AG059294 and P30AG043073 from the National Institute on Aging to the University of South Carolina and the University of Southern California.