Abstract

While considerable attention has been paid to the relationship between later-life depression and cognitive function, the relationship between a history of psychiatric problems and cognitive function in later life is not very well documented. Previous studies of relationships between childhood health, childhood disadvantage, and cognitive function in later life explore different facets of this relationship using a variety of datasets. Few consider both childhood health and disadvantage, include measures for psychiatric history, or use nationally representative longitudinal data. This study explores the relationships between childhood health and disadvantage, psychiatric history, and cognitive function in later life using six waves of the Health and Retirement Study (HRS). Growth curve models are used to analyze these relationships, controlling for demographics, health behavior, and health status. Findings indicate that a history of psychiatric problems is associated with lower cognitive function at age 65 and steeper declines in cognitive function with age. Childhood disadvantage is also associated with lower cognitive function at age 65, but not with rate of cognitive decline. The influence of childhood health on cognition is mediated by later-life health status and behaviors. A combined history of childhood disadvantage and psychiatric problems more strongly affects cognitive function at age 65, but cognitive decline rates remain consistent with those associated with psychiatric history alone. These effects are partially mediated by later-life demographic, socioeconomic, or health characteristics.

Keywords: cognitive function, psychiatric history, childhood SES
Early Life Characteristics, Psychiatric History, and Cognitive Function in Later Life

The relationship between psychiatric problems and cognitive function in later life is not well documented (Cooper & Holmes, 1998; Maddux, Delrahim, & Rapaport, 2003), although interest has begun to grow within gerontology (Gildengers, et al., 2004). Improved awareness of this relationship, and of the manner in which disadvantaged older adults are affected by it, would enable policy-makers and service providers to better design and implement services for affected populations. This study explores the relationship between psychiatric problems and cognitive function or decline in later life, and attempts to identify populations more likely to be affected.

Previous research explores different facets of the relationship between disadvantage and cognition in later life using a variety of datasets. Few studies include race, sex, and early-life indicators in their models, and existing studies inclusive of race, childhood status, and cognitive function do not extend into later life, employ a nationally representative sample, analyze psychiatric history, or explore these relationships across multiple years of data. Of eight longitudinal studies of the Health and Retirement Study (HRS) cognition data, three employ growth curve modeling, but none explicitly examine the predictive relationship between psychiatric history and cognitive functioning (Alley, Suthers & Crimmins, 2007; Ertel, Glymour & Berkman, 2008; Kennison & Zelinski, 2005).

This study uses nationally representative data and a modeling technique that has the potential to enhance awareness and understanding of between-group differences in cognition that are related to cumulative disadvantage, and to confirm previous findings in the fields of aging and psychiatry (Gildengers, et al., 2004; Zorrilla, et al., 2000). This study illuminates this relationship by applying an analysis grounded in the life course perspective, and by conducting a longitudinal analysis of six waves of the HRS data. Self-reported childhood disadvantage is used
to identify potential areas of cumulative disadvantage\(^1\). The HRS is well suited to study this relationship. It includes a representative sample of older adults whose cognitive function was measured using a modified version of the Telephone Interview for Cognitive Status (TICS). Of 16,730 individuals with valid baseline TICS scores, 2,129 indicated a history of psychiatric or emotional problems.

This analysis provides insight into the degree to which psychiatric history affects cognition in specific populations of older adults, and has the potential to enhance public understanding of the trajectories of cognitive decline in later life experienced by groups living with disadvantage. The study will answer the following research questions:

1. Do individuals with a history of psychiatric problems have lower initial cognitive functioning, and/or a unique trajectory of cognitive function with age?
2. Does the effect of psychiatric or emotional problems on cognitive function in later life differ based on early life socioeconomic characteristics?

**Theoretical Framework**

The life course perspective considers the influence of social structures on the lives of individuals across time, and the ways in which aging-related experiences vary between individuals and over time, and across cohort, sex, race, and class groups, generations within families, nations or cultures (Settersten, 1999). Aging-related experiences are joint products of human agency and social structures (Douthit & Dannefer, 2006). Social structures are conceptualized as interlocking power relations that include racial/ethnic relations, age, sex, and class (McMullin, 2000). Major areas of life course theory include considerations of variability between individuals and groups in life course experiences, such as the effects of cumulative

\(^1\) This paper is part of a larger project that also includes an exploration of the impact of ascribed characteristics on the relationship between psychiatric history and cognition in later life (Brown, 2009).
disadvantage (Dannefer, 2003; Settersten, 1999). Link and Phelan (2000) theorize that social factors play a fundamentally causal role in creating social disparities in health through social selection and hierarchical stress. Theories of cumulative disadvantage recognize these structural differences and consider the effects of the life course experienced by socioeconomically disadvantaged groups. Structural disadvantage across the life course can result in poorer physical and mental health, greater functional and cognitive limitations, and poorer quality of life in old age (Dannefer, 2003; Douthit & Dannefer, 2006). This paper considers the relationship between early life factors reflecting structural differences, such as childhood socioeconomic disadvantage, and the long-term influence of these structural differences on later-life trajectories.

Factors that Affect Cognition in Later Life

As the number of persons over 65 increases, so will the number of functionally and mentally disabled elderly, and communities will need to ensure that adequate community-based and institutional services are available for this population. Multiple sources provide data on the national prevalence of mental disabilities or disorders, but do not distinguish between different categories of disabilities like life-long psychiatric problems and age-related cognitive disorders or cognitive decline² (United States Census Bureau, 2006; Centers for Disease Control, 2006; National Library of Medicine, 2006). These estimates are too broad-based for the purpose of this study, which aims to analyze the relationship between these two types of conditions. The current study is primarily interested in the subset of mental conditions for which data is available in the HRS: psychiatric, emotional, or nervous problems. The population affected by dementia and

² For the purpose of this study, cognitive disorders are defined as cognitive impairments not caused by normal aging, but rooted in particular disease processes, and cognitive decline is defined as decreasing cognitive function with age, regardless of underlying disease.
other cognitive disorders\textsuperscript{3} is projected to see consistent growth in the near future (Alzheimer's Disease Education and Referral Center, 2006). However, the HRS survey did not include specific questions about dementia diagnosis\textsuperscript{4}. Therefore, this study concerns itself with questions of cognitive function and decline, rather than with specific cognitive disorders.

**Psychiatric problems**

Little information is available about older adults with a history of psychiatric problems who develop dementia (Perivoliotis, Granholm & Patterson, 2004). Studies exploring the existence of psychosis accompanying mild cognitive impairment or moderate to severe dementia focus primarily on dementia or aging-related depression (Chan, Kasper, Black & Rabins, 2003; Maddux, et al., 2003). Findings indicate that comorbid mental disabilities require further investigation, as increasing numbers of mentally ill adults in the near future will require increased long-term care services (Maddux, et al., 2003).

There are several reasons that the relationship between psychiatric history and cognitive function in later life is important. First, adults with a history of mental illness may be at higher risk for developing cognitive decline or dementia, although studies exploring the connection between these conditions have mixed results (Gildengers, et al., 2004; Zorrilla, et al., 2000). Second, demographic and socioeconomic factors may influence the prevalence and severity of psychiatric diagnoses (Fryers, Melzer & Jenkins, 2003). Finally, previous research in the fields of aging and psychiatry suggests that psychiatric history is related to cognition (Gildengers, et al., 2004; Wetherell, Gatz, Johansson, & Pederson, 1999).

**Cumulative disadvantage**

\textsuperscript{3} Alzheimer’s Disease prevalence estimates range from 5%, for adults aged 65 to 74, and 50%, for adults over age 85 (Alzheimer's Disease Education and Referral Center, 2006).

\textsuperscript{4} While there is a module on dementia in the 2001-2005 data waves of the HRS study (the Aging, Demographics and Memory Study or ADAMS), this module was only conducted with a subset of the 2000 and 2002 samples (n=1770), and only for a limited number of years.
Advocates of the life course perspective suggest that cognitive function and chronic conditions affecting cognitive function in later life are affected by cumulative (dis)advantage (Dannefer, 2003; Douthit & Dannefer, 2006; Luo & Waite, 2005), which can begin in early childhood (Borenstein, Copenhaver & Mortimer, 2006; Luo & Waite, 2005). Thus, to understand later-life cognitive trajectories, we must take into account ascribed characteristics, childhood socioeconomic status (SES), and various mid- to late-life characteristics.

Ascribed characteristics. Race and sex are ascribed characteristics that may contribute to cumulative (dis)advantage. The association between race/ethnicity and cognition in later life is well established (Sloan & Wang, 2005), although this association may diminish when controlling for education and other social and environmental factors (Mehta, et al., 2004). Findings regarding the association between sex and cognitive decline or dementia are mixed (Edland, 2002; Lindsay, et al., 2002).

Early life socioeconomic characteristics. Research has documented the relationship between SES and cognitive function in childhood, adulthood, and old age (Everson-Rose, de Leon, Bienias, Wilson & Evans, 2003; Kaplan, et al., 2001). Few studies examine the relationship between early life SES and cognitive decline in old age (Borenstein, et al., 2006; Everson-Rose et al, 2003), but childhood SES has been linked to adult health status and health behaviors, major depression, physical functioning in later life, and mortality (Guralnik, Butterworth, Wadsworth, & Kuh, 2006; Turrell, Lynch, Leite, Raghunathan, & Kaplan, 2007). Sources of information about childhood (dis)advantage include parental educational attainment, occupational prestige, and family SES, or a composite index of these characteristics (Everson-Rose, et al., 2003; Luo & Waite, 2005).

Mid- to late-life characteristics. A variety of factors in adulthood and later life are linked
to cognitive function in older adults, including education (Lindsay, et al., 2002). Other factors include age, income, marital status, and some health behaviors (Herzog & Wallace, 1997). Cognitive function can be related to multiple coexisting diseases or conditions in older adults, including cardiovascular disease, stroke, hypertension, or diabetes (Blaum, Ofstedal & Liang, 2002; Haan, et al., 2003; Taylor, 2008). Because of this relationship between cognitive and physical function, cognitive function is often considered a “marker of lifelong adversity” (Moody-Ayers, et al., 2005, p. 933). Given the findings of previous research, it is expected that individuals with a history of psychiatric problems would have lower cognitive function at age 65 and steeper rates of cognitive decline, and that these effects would be stronger for individuals who also have a history of childhood disadvantage.

Data

This project explores the relationship between psychiatric history and cognition, while controlling selected demographic and health status and behavior variables, using data from the Asset and Health Dynamics among the Oldest-Old study (AHEAD) and the HRS. The AHEAD sample was collected in 1993 and 1995 and was merged with the HRS in 1998, when the study was transitioned to a steady-state design, introducing the Children of the Depression and War Babies cohorts in 1998 and the Early Baby Boomer cohort in 2004 (University of Michigan, 2009). This study includes data from the 1995, 1998, 2000, 2002, 2004, and 2006 data years.

Subjects who did not complete the cognition interview, or whose cognition data was provided by a proxy, were excluded from the study for that wave. Subjects were administered the cognitive items after they reached the age of 65. This resulted in a sample of 30,896 respondents, of whom 16,730 had attempted at least one valid cognition interview. Of these, 88% had two interviews, 77% had three, 67% had four, 56% have five, and 11% had six interviews.
Observations missing on the dependent variable, or of “Other” race, were deleted from the sample, resulting in a final sample of 16,513 subjects and 53,900 observations.

Technically, the sample includes adults born between 1923 and 1947, but not all subjects have the same number of years of inclusion in the sample. Therefore, the attrition analysis is stratified by the year in which subjects entered the study, and was conducted for study entrants in waves 1995 through 2004\(^5\). T-tests indicate significantly lower baseline cognition scores for subjects who attrit. Ultimately, 41.2% of the sample attrits from the study. Because controlling for attrition introduced little change in effect sizes, attrition is not included in the models.

**Dependent Variable: Cognition Scores**

Cognitive measures reported in the HRS data were collected using a modified version of the TICS instrument. The TICS was designed based on Folstein’s Mini Mental Status Exam (MMSE), a commonly-used instrument for assessing dementia in clinical settings, which could be reliably administered by telephone (Herzog & Wallace, 1997). For the HRS, the TICS was modified to measure six tasks with a maximum score of 35 points, evaluating memory and executive function, and weighting fluid cognitive measures more heavily than in the original instrument (Freedman, et al., 2001). The TICS was modeled after the state of the art understanding of the dimensions of cognition in the late 1980s, and its validity has been previously documented (Zsembik & Peek, 2001).

Subjects who refused or failed an individual cognition task were assigned a zero on that task, as self-interview subjects missing on items or groups of items in the MMSE are likely to have refused because they are cognitively unable to answer (Herzog & Wallace, 1997; Fillenbaum, George & Blazer, 1988). These imputations do not undermine the accuracy of

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\(^5\) It is too soon to tell if all of the respondents from the 2004 wave are missing from the 2006 data because of attrition, or if some of them will be present in later waves. For the purpose of this analysis, I am considering them all to have attritted from the study, even those who may re-enter the study in future waves.
results in the AHEAD/HRS cognition instrument (Sloan & Wang, 2005).

Independent Variables

Predictor Variable: Psychiatric History. The predictive relationship measured in this project is the relationship between cognitive function and psychiatric history. The HRS inquires into psychiatric, emotional, or nervous problems, rather than specific diagnoses or categories of mental disorders. Psychiatric history data was identified by two questions: “Have you ever seen a doctor for psychiatric, emotional or nervous problems?” and “Do you now get psychiatric or psychological treatment for these problems?” Subjects scoring as “don’t know” or “refused” (from 1 to 31, depending on the wave) were assigned the modal value of zero. These questions were used to create three variables: past history (yes to past history but may or may not currently be getting treatment), current treatment (only subjects who report currently getting treatment), and incident cases (yes to past history after having said no in at least one previous wave). At baseline, 2,129 subjects report a past history. All three variables are included as time-varying, in an attempt to control for cases that are prodromal to dementia onset (Wetherell, et al., 1999).

Ascribed Characteristics. The ascribed characteristics used in this analysis are sex and race/ethnicity, and are baseline, non-varying variables. Subjects identifying as a race other than White or Black are excluded because there are too few cases to ensure sufficient statistical power for analysis (Moody-Ayers, et al., 2005). Race and ethnicity are coded into three categories and combined with sex to create sex and race/ethnicity (SRE) variables: White males (reference variable) and females, Black males and females, and Hispanic males and females.

Early Life Characteristics. There are several childhood measures available in 1998 and later waves that are included as baseline, non-varying values. Measures include maternal and

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6 Independent variables are maintained as time-varying covariates unless otherwise specified. Details on the coding of these variables are available upon request (Brown, 2009).

7 Only 340 subjects report current treatment at baseline.
paternal education (less than or greater than 8 years), family SES (higher values indicate better status), and father’s usual occupation. These variables are combined into a childhood disadvantage index (CDI), scaled to range from zero (no disadvantage) to one (most disadvantaged) based on the number of measures to which subjects responded. Sensitivity analyses indicate that subjects missing observations on all four variables are more disadvantaged, and they are assigned a value of 1. Child health is included as a control variable. Tests confirm no interaction between CDI and psychiatric history.

Later-Life Characteristics. Independent variables include respondent education (non-varying), marital status, household income (continuous variable), self-rated health, vision, hearing, chronic health conditions, currently smoking, and ever having drunk alcohol.

Table 1 displays the descriptive statistics for the sample. The mean age of the sample is 74.86 years. Only 13% of subjects report higher levels of childhood disadvantage, and only 6% report fair or poor health during childhood. Mean cognition for the sample is 21.09 out of a possible 35 points. There are distinct differences between people with and without histories of greater childhood disadvantage. The mean cognition scores for subjects with this history are lower than for those without it. Thirteen percent of the sample reported a history of psychiatric, emotional, or nervous problems, compared to 18% of subjects with a history of greater childhood disadvantage. Blacks and Hispanics make up larger proportions of subjects reporting greater childhood disadvantage, as do subjects reporting poorer health as children and as older adults. Difference of the means t-tests indicate that mean cognition scores differ significantly based on psychiatric history at each time point and for all age groups.
Table 1. Sample Descriptives, 1995-2006

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Sample</th>
<th>CDI=0</th>
<th>CDI=1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognition Scores (mean)</td>
<td>21.09</td>
<td>21.55</td>
<td>18.10</td>
</tr>
<tr>
<td>Psychiatric History (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of Psychiatric Problems</td>
<td>13.05</td>
<td>12.26</td>
<td>18.15</td>
</tr>
<tr>
<td>Current Psychiatric Treatment</td>
<td>1.93</td>
<td>1.85</td>
<td>2.42</td>
</tr>
<tr>
<td>Incident Cases of Psychiatric Problems</td>
<td>3.73</td>
<td>1.78</td>
<td>3.59</td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>59.53</td>
<td>59.44</td>
<td>59.39</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black, Non-Hispanic</td>
<td>12.35</td>
<td>10.28</td>
<td>25.77</td>
</tr>
<tr>
<td>Hispanic</td>
<td>6.67</td>
<td>5.19</td>
<td>16.24</td>
</tr>
<tr>
<td>Childhood Disadvantage Index (mean)</td>
<td>0.40</td>
<td>0.31</td>
<td>1.00</td>
</tr>
<tr>
<td>CDI Distribution (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>28.43</td>
<td>32.83</td>
<td>0.00</td>
</tr>
<tr>
<td>1</td>
<td>13.39</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Poor Childhood Health</td>
<td>5.84</td>
<td>5.59</td>
<td>7.47</td>
</tr>
<tr>
<td>Missing on Child Health</td>
<td>6.01</td>
<td>3.98</td>
<td>19.16</td>
</tr>
<tr>
<td>Education (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 12 years</td>
<td>30.88</td>
<td>25.54</td>
<td>65.45</td>
</tr>
<tr>
<td>More than 12 years</td>
<td>34.64</td>
<td>38.13</td>
<td>12.04</td>
</tr>
<tr>
<td>Household Income (mean)</td>
<td>$40,691</td>
<td>43,140</td>
<td>24,851</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>74.86</td>
<td>70.72</td>
<td>71.76</td>
</tr>
<tr>
<td>Marital Status (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>31.57</td>
<td>30.54</td>
<td>38.27</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>7.78</td>
<td>7.60</td>
<td>8.98</td>
</tr>
<tr>
<td>Never Married</td>
<td>2.63</td>
<td>2.57</td>
<td>2.99</td>
</tr>
<tr>
<td>Health Status and Behaviors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective Health (mean)</td>
<td>3.05</td>
<td>3.09</td>
<td>2.74</td>
</tr>
<tr>
<td>Ever Had a Stroke (%)</td>
<td>8.35</td>
<td>8.09</td>
<td>10.06</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>57.86</td>
<td>56.88</td>
<td>64.17</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>18.25</td>
<td>17.69</td>
<td>21.86</td>
</tr>
<tr>
<td>Heart Condition (%)</td>
<td>29.75</td>
<td>29.44</td>
<td>31.75</td>
</tr>
<tr>
<td>Currently Smoking (%)</td>
<td>9.68</td>
<td>9.59</td>
<td>10.29</td>
</tr>
<tr>
<td>Ever Drink (%)</td>
<td>43.87</td>
<td>46.17</td>
<td>29.01</td>
</tr>
<tr>
<td>Vision (mean)</td>
<td>4.08</td>
<td>4.12</td>
<td>3.78</td>
</tr>
<tr>
<td>Hearing (mean)</td>
<td>3.21</td>
<td>3.25</td>
<td>3.03</td>
</tr>
<tr>
<td>Depression (mean)</td>
<td>1.55</td>
<td>1.46</td>
<td>2.13</td>
</tr>
</tbody>
</table>

Observations: 53,900 46,682 7218

*a Category references males  
*b Category references Whites  
c Composite index  
*d References good, very good, and excellent child health  
*e References 12 years of education  
*f References married or partnered  
*Higher values indicate better health  
* Higher values indicate better function  
*Higher scores indicate more depressive symptoms

Methods

This study applies growth curve modeling (GCM) to compare cognition scores at age 65 and to analyze trajectories of cognitive change for different groups as they advance in age. GCM allows you to model change in the dependent variable and to explain within-person and between-
person variability in this change using covariates and control variables (Singer & Willett, 2003; Hox, 2002). GCMs are specifically designed for the analysis of trajectories in repeated-measure longitudinal or panel data (Bollen, Christ, & Hipp, 2004; Kelly-Moore & Ferraro, 2004; McDonough & Berglund, 2003).

In this study, time is measured using chronological age (Sliwinski & Mogle, 2008). Centering age\(^8\) on the sample’s grand mean allows the intercept to represent a respondent of average age at the baseline, to determine changes in cognitive function based on the difference in age between the individual and the group (Alley, et al., 2007) and to accommodate the inclusion of different cohorts at different time points in the study and the assumption of within-person and between-person age effects for different cohorts.

Analysis begins with a discussion of the hierarchical growth curve models. Prediction lines are then plotted using these GCMs to create cognition trajectories and illustrate the effects of psychiatric history, greater childhood disadvantage, and a combination of these circumstances on cognition at age 65 and on cognitive decline as subjects age through the study.

**Results**

Table 2 shows the hierarchical models used in this study. The overall mean cognition score of the sample, when all other variables in the model are held at zero (Model 1), is 20.79 out of a possible 35 points, well above the recommended severe impairment cutpoint of 5% or, in this sample, 10 points (Herzog & Wallace, 1997). The random effects reveal significant between-and within-person variance in cognition at age 65, indicating that subjects have different levels of cognitive function, and that cognitive function varies over time (Singer & Willett, 2003).

\(^8\) Centering age on the grand mean of the sample means that the linear age effect identified in these analyses is the age effect at the centered age (74.86); this slope may be different at other ages, and this difference is visible in the plotted trajectories in Figures 2 and 3.
These models show that long-term psychiatric history is significantly correlated with cognitive function at age 65 and, net the effects of all variables controlled in the fully specified model, with declining cognitive function with age. Additional sets of variables attenuate this effect but do not fully explain it. Long-term psychiatric history is also related to steeper cognitive decline with age. The cognition scores of individuals with this history drop an average of .29 points each year, compared to .26 points for subjects without this history.

Table 2. Hierarchical Models for Total Cognitive Function, HRS data, 1995-2006

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Model 1 Estimate</th>
<th>Model 2 Estimate</th>
<th>Model 3# Estimate</th>
<th>Model 4^ Estimate</th>
<th>Model 5+ Estimate</th>
<th>Model 6~ Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Initial Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of Psychiatric/ Problems</td>
<td>-1.1582 ***</td>
<td>-1.1488 ***</td>
<td>-1.0083 ***</td>
<td>-1.0083 ***</td>
<td>-0.6963 ***</td>
<td>-0.6963 ***</td>
</tr>
<tr>
<td>Current Psychiatric Treatment</td>
<td>-0.3139 *</td>
<td>-0.3730 **</td>
<td>-0.4822 **</td>
<td>0.3802 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Cases of Psychiatric Problems</td>
<td>0.2934 **</td>
<td>0.2787 **</td>
<td>0.2537 **</td>
<td>0.2137 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood Disadvantage Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For Linear Change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.3081 ***</td>
<td>-0.3060 ***</td>
<td>-0.2959 ***</td>
<td>-0.2782 ***</td>
<td>-0.2552 ***</td>
<td>-0.2552 ***</td>
</tr>
<tr>
<td>Age²</td>
<td>-0.0104 ***</td>
<td>-0.0103 ***</td>
<td>-0.0098 ***</td>
<td>-0.0098 ***</td>
<td>-0.0090 ***</td>
<td>-0.0090 ***</td>
</tr>
<tr>
<td>Long-Term History of</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric/Emotional Problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Level</td>
<td>18.8178 ***</td>
<td>17.6262 ***</td>
<td>17.2553 ***</td>
<td>12.5740 ***</td>
<td>10.3462 ***</td>
<td>9.5675 ***</td>
</tr>
<tr>
<td>Covariance</td>
<td>0.2128 ***</td>
<td>0.2095 ***</td>
<td>0.2080 ***</td>
<td>0.2183 ***</td>
<td>0.2051 ***</td>
<td></td>
</tr>
<tr>
<td>Linear Change</td>
<td>0.0448 ***</td>
<td>0.0439 ***</td>
<td>0.0402 ***</td>
<td>0.0381 ***</td>
<td>0.0371 ***</td>
<td></td>
</tr>
<tr>
<td>Level-1 Error</td>
<td>15.4220 ***</td>
<td>10.4153 ***</td>
<td>10.4487 ***</td>
<td>10.5193 ***</td>
<td>10.6174 ***</td>
<td>10.5723 ***</td>
</tr>
</tbody>
</table>

#Psychiatric history only
^Early life and ascribed characteristics
+Includes controls for later-life socioeconomic status
~Includes controls for later-life socioeconomic status, marital status, health status, and health behaviors
* p<.05, **p<.01, ***p<.001

Childhood disadvantage is also related to cognition at age 65, but is not related to cognitive decline as subjects age. The SRE groups and most of the later-life health status and behavior variables are also related to cognition at age 65. Age continues to be significantly related to cognitive decline and this effect accelerates as subjects age (Age²); again, these effects are attenuated by each additional set of variables, which means that each set partially explains the effect of age, and the acceleration effect of age, on cognitive decline. Random effects indicate variation in cognitive function at age 65 (initial level), which is reduced or partially explained by each additional set of variables. Cognitive function varies within individuals
(residual); a variation partially explained by age (Model 2). The rate of cognitive change differs between individuals (Singer & Willett, 2003). In general, respondents with higher cognitive function at age 65 have less steep rates of cognitive decline (linear change and covariance).

Reductions in the size of the deviance measure (-2LL) and the AIC (Table 3) suggest that each additional set of variables improves the ability to predict cognitive function and decline (Singer & Willett, 2003). The proportion of total variability in cognition resulting from between-person variability (inter-class correlation or ICC) decreases with each set of additional variables.

**Table 3 Model Fit Information for Hierarchical Models of Total Cognitive Function, HRS 1995-2006**

<table>
<thead>
<tr>
<th>Model</th>
<th>-2LL</th>
<th>-2LL Difference</th>
<th>ICC</th>
<th>AIC</th>
<th>AIC Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Unconditional means</td>
<td>314278.2</td>
<td>0.550</td>
<td>314286.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Unconditional growth</td>
<td>307502.6</td>
<td>6775.6</td>
<td>0.629</td>
<td>307518.6</td>
<td>6767.6</td>
</tr>
<tr>
<td>3 Psych history only</td>
<td>307290.7</td>
<td>211.9</td>
<td>0.623</td>
<td>307314.7</td>
<td>203.9</td>
</tr>
<tr>
<td>4 Add early life characteristics</td>
<td>303521.2</td>
<td>3769.5</td>
<td>0.494</td>
<td>303561.2</td>
<td>3753.5</td>
</tr>
<tr>
<td>5 Add sociodemographics</td>
<td>301421.6</td>
<td>2099.6</td>
<td>0.494</td>
<td>301473.6</td>
<td>2087.6</td>
</tr>
<tr>
<td>6 Add health status and behaviors</td>
<td>300512.9</td>
<td>908.7</td>
<td>0.475</td>
<td>300584.9</td>
<td>898.7</td>
</tr>
</tbody>
</table>

Prediction lines reveal between-group differences in the effect of long-term psychiatric history on cognition scores and on cognitive trajectories as subjects age (Figure 2). This finding answers research question 1: a history of psychiatric problems does result in lower cognition scores at age 65, and in steeper decline with age.
Subjects reporting childhood disadvantage (not shown) have lower cognition scores at age 65 but similar rates of decline as subjects without this history. A combined history of childhood disadvantage and psychiatric problems results in lower cognition scores at age 65 (Figure 3), but the rate of decline for subjects with this combined history is consistent with that of psychiatric history only. This finding answers research question 2: a combined history of childhood disadvantage and psychiatric problems has a stronger impact on cognition in later life than psychiatric history alone.

![Figure 3. Prediction Lines for Mean Cognition Scores by Psychiatric History and Childhood Disadvantage: 1995-2006 HRS/AHD](image)

**Discussion**

These findings indicate that individuals with a history of psychiatric problems experience significantly lower cognitive function at age 65 and steeper rates of cognitive decline with age, net the effects of sex, race/ethnicity, early childhood disadvantage and health, later-life sociodemographics, and later-life health status and health behaviors. Subjects with a history of childhood disadvantage also have lower cognitive function at age 65, but show no difference in rate of cognitive decline with age. Long-term psychiatric problems exacerbate the effect of childhood disadvantage, resulting in lower cognitive function at age 65 and a steeper rate of
decline for groups with this combined history. The influence of childhood health on later-life cognition is mediated by later-life health variables. While these models included a fairly comprehensive set of variables, some amount of variation in cognition remains unexplained.

These findings confirm earlier studies indicating a relationship between long-term psychiatric problems and later-life cognitive function (Gildengers, et al., 2004; Zorrilla, et al., 2000), and distinguish between age-related cognitive decline and the effects of a history of pre-existing psychiatric problems. Using a more comprehensive set of variables than found in previous GCM studies of cognition (Alley, et al, 2007), this analysis provides a better understanding of early life factors affecting cognition in later life.

This study contains several limitations, including confounding relationships between variables in the data (Neeleman, et al, 2001) and confounding effects in the TICS instrument (Freedman, Aykan & Martin, 2002), although previous studies have ruled out the possibility of modal effects being introduced via telephone interviews with older populations (Herzog & Wallace, 1999). These models do not fully explore the effects of life-course disadvantage on cognitive function in later life, or provide information on the effects of experiences in mid-life that may alter the relationship between early life factors and later-life cognitive function. What is missing is the holistic picture of the trajectories that these individual take across the life course from childhood through adulthood and into old age.

The manner in which the HRS data were gathered is problematic for tracking the predictive relationship in this study. The original data was gathered for specific purposes, and does not include information about psychiatric diagnoses. By excluding specific diagnoses, the HRS limits our ability to determine which types of psychiatric disorders are playing a stronger role in affecting cognition or to distinguish between acute episodes of mental illness and chronic,
life-long conditions. By their nature, acute episodes may have a very different effect, if any, on cognition than would chronic psychiatric disorders. Individuals with psychiatric disorders also face social stigma, which may result in the under-reporting of psychiatric problems, which may affect the strength of the relationship found in these models.

Despite these limitations, the HRS dataset is well-suited to this study. The sample is nationally representative and large enough to lend statistical power to the models. The existence of six data waves allows for a study that spans a total of 11 years, and mapping later-life cognition trajectories that are not possible when using other sources. Some of these limitations may not compromise the results. For example, cognitive deficits are considered an essential feature of dementia, regardless of the specific underlying disease process, which could mean that specific dementia diagnoses are irrelevant to this study (Douthit & Dannefer, 2006). Mid-life factors may not eliminate the effects of early disadvantage (Kaplan, et al., 2001), which would reduce the impact of that limitation on the accuracy of these models.

Implications of Findings

This study demonstrates that older adults do not develop disparities in cognitive function at age 65; rather, their differences are reflective of cumulative processes of disadvantage experienced across the life course. These findings provide some insight into the level of dependency we can expect for older persons with histories of psychiatric disability and suggest that early-life interventions to alleviate psychiatric symptoms, economic disadvantage, and structural inequalities could result in improved cognitive function in later life. Geriatric social workers should advocate for the expansion of psychiatric services in home- and community-based long-term care, and create interventions enabling mentally ill elders to remain safely in the community. Long-term care regulations need to better accommodate older adults with a history
of psychiatric problems and/or childhood disadvantage, as they will need more support, and support appropriate to their psychological and cognitive needs, in order to avoid institutionalization in skilled nursing facilities. Current systems do not provide adequate resources for mentally ill older adults wishing to remain independent or to reside in assisted living facilities (ALFs) or enriched housing programs (EHPs) (Becker, Schonfeld & Stiles, 2002). Proper training may allow ALFs and EHPs to retain residents that would normally be dropped because of behavioral problems, and thus prevent premature institutionalization.

Future studies should attempt to capture information explaining more of the residual within- and between-person variations in cognitive function seen in the current models, including specific diagnostic information and information on the social experiences of older adults living with psychiatric disorders. The vagueness of the psychiatric history questions in the HRS survey, and the resulting limitations of this study, point to the need for surveys that capture specific diagnoses when looking at long-term outcomes – surveys that might also capture the potential impact that mental health care could have on long-term care systems, particularly as the Baby Boomers age. It is time to gather specific diagnostic information about psychiatric and cognitive disorders and to provide a better understanding of the real need for psychiatric staff in long-term care systems. Without this information, providers will have difficulty understanding need, identifying service gaps, and preparing appropriate accommodations for this growing sector of the elderly population.
References


40 (5).


Early Life Characteristics, Psychiatric History, and Cognitive Function in Later Life

*Sciences and Social Sciences, 60B (5), P242-P250.*


