

Education and Late-life Cognitive Health in Diverse Populations

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Overview

- What is Healthy Cognitive Aging
- Education Effects on Cognitive Trajectories in Diverse Populations
- Education, Brain, and Cognition
- Education Pathways to Cognitive Health

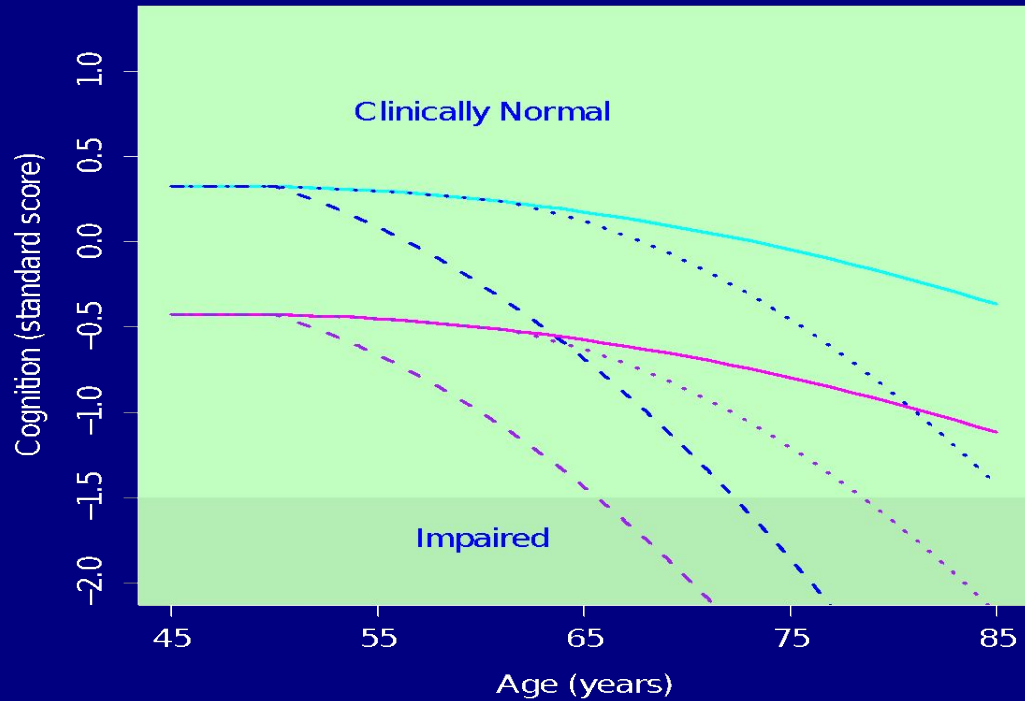
Fundamental Concepts of Cognitive Aging

- Some people decline to dementia and disability
- Some people maintain lifelong levels of cognitive function despite challenges of advancing age
- Heterogeneity rules
 - Variability/heterogeneity is the cardinal feature of cognitive trajectories
 - Broad age-related increases in variability

Fundamental Concepts of Cognitive Aging

- Cognitive aging is a longitudinal process
- Cognitive health is maintenance of cognitive function through late life
 - Is measured by change in cognitive function over time

Cognitive Aging Trajectories



Education Effects on Late Life Cognition

Education as Risk Factor for Dementia

- Low education is a risk factor for both prevalent and incident dementia
 - Multiple populations
 - Diverse cultures

Education and Level of Cognitive Function

- Education is strongly related to lifelong level of cognitive function (cognitive test performance)
- Education may accounts for 20-50% of variance in cognitive test performance
- Quality of education has major impact on test performance independent of years of education

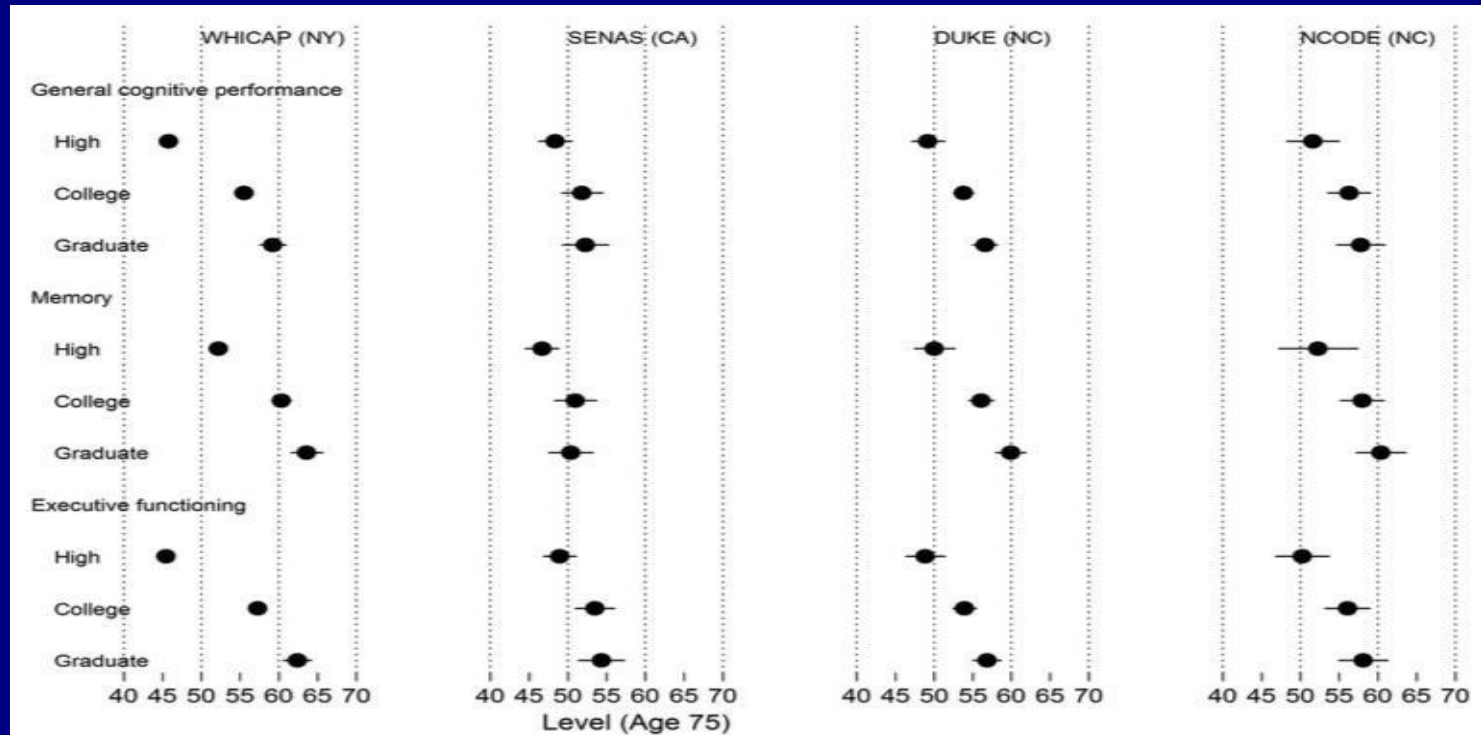
Education and Late Life Cognitive Change

- Most studies do not show an effect of education on late life cognitive decline
 - Multiple studies, diverse populations, different countries of origin

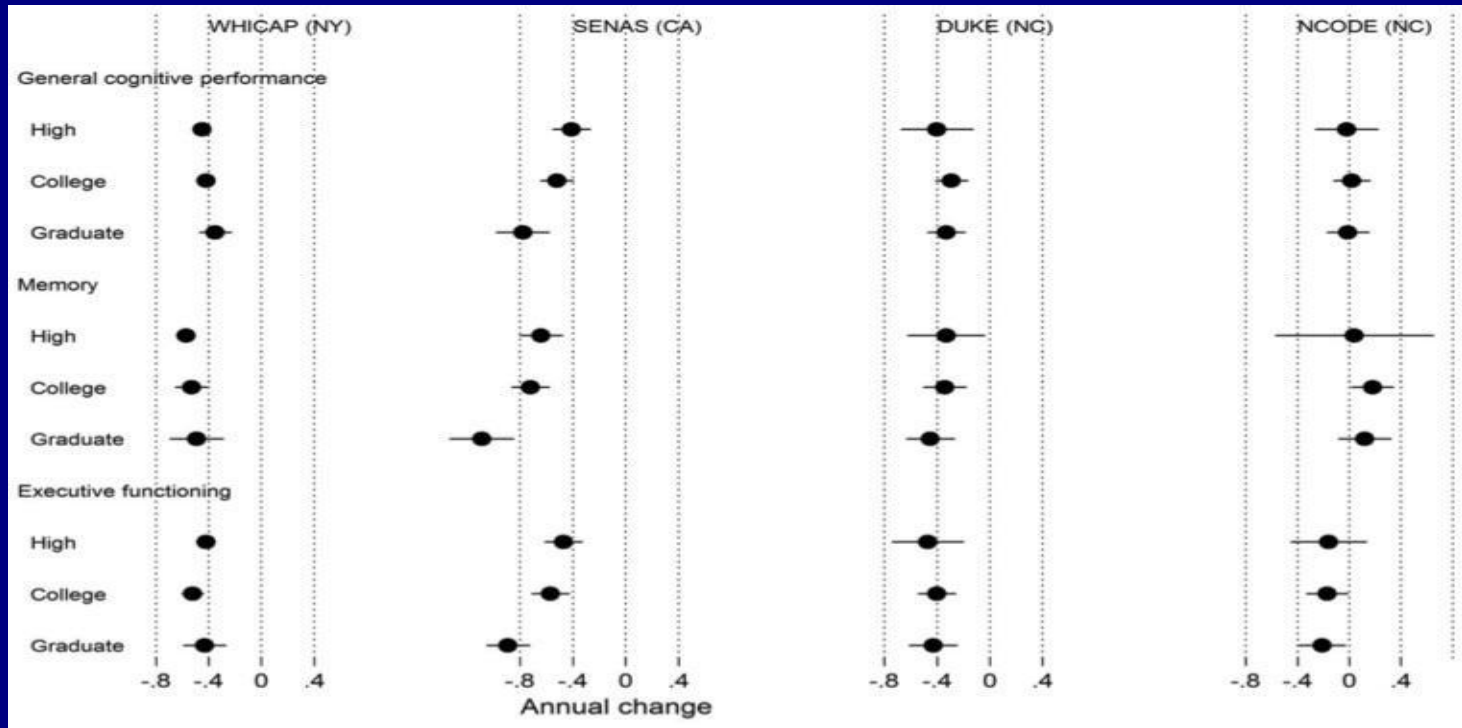
Harmonized Study of Racial/Ethnic and Education Differences in Cognitive Decline

- Four studies, geographically diverse, different cognitive test batteries (WHICAP, UC Davis, Duke ADRC, Duke Depression)
- Item Response Theory methods
- Baseline cognition associated with education
- Cognitive change differences were minimal

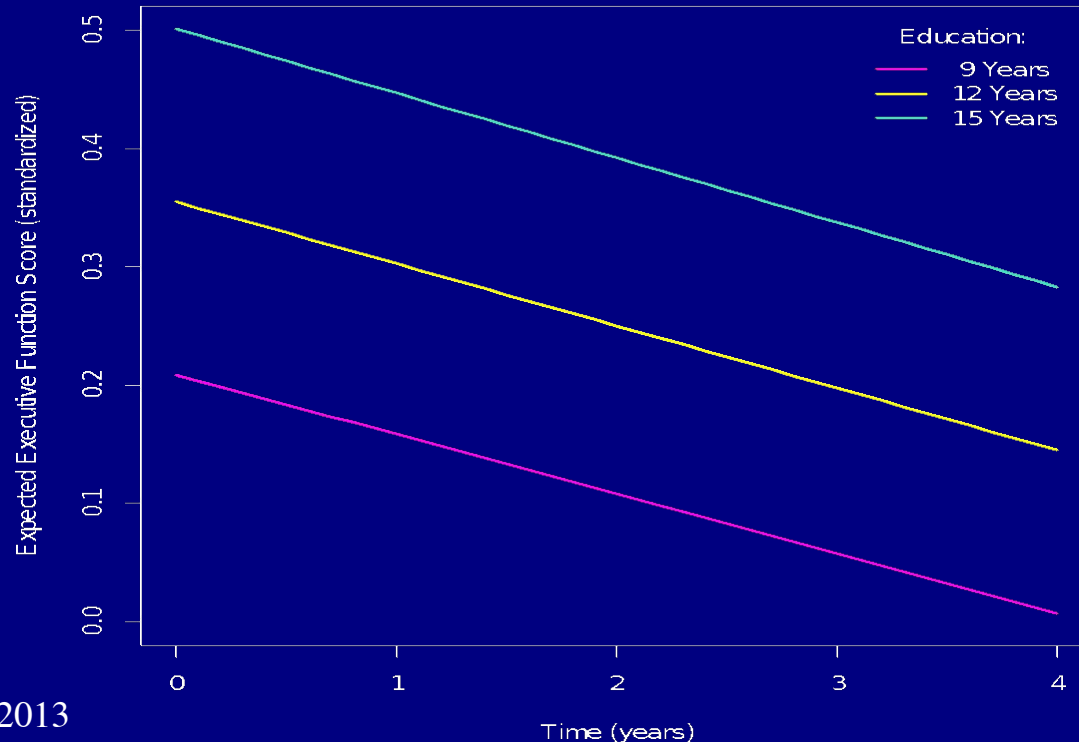
Baseline Cognition by Education Level



Cognitive Change by Education Level

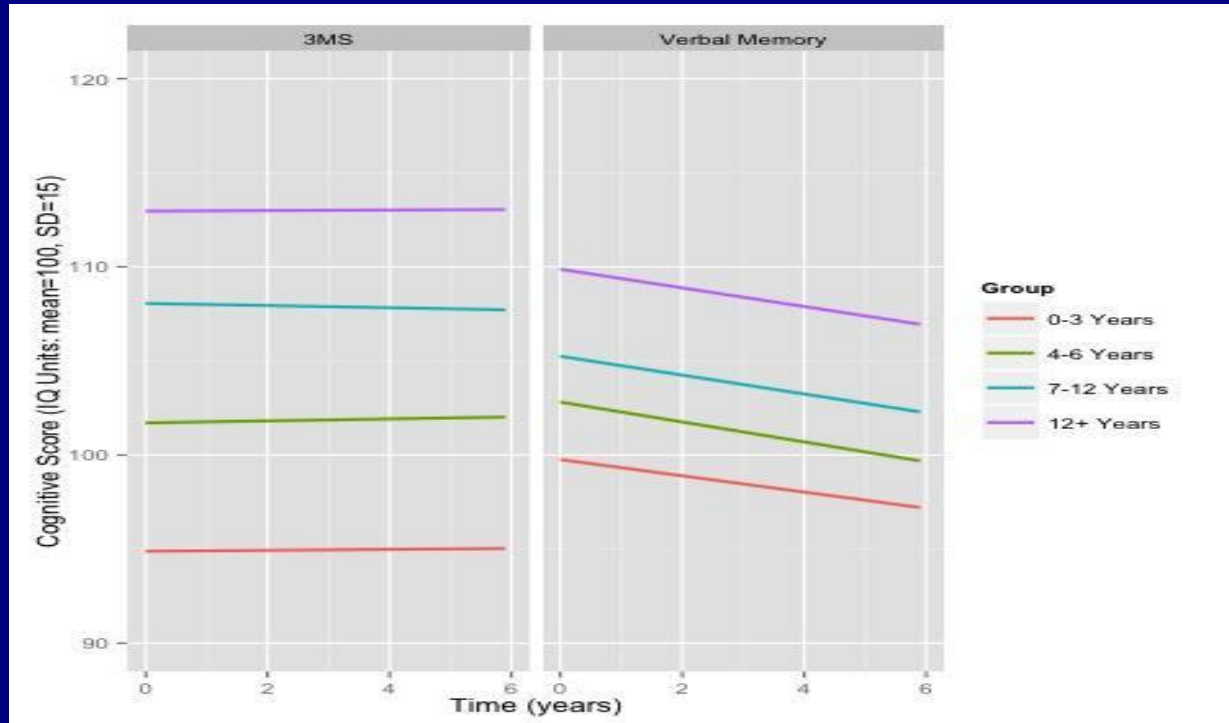


Executive Function Trajectories by Education Level – UC Davis Diversity Cohort



Early et al., 2013

Cognitive Trajectories by Education Level – Sacramento Area Latino Study of Aging



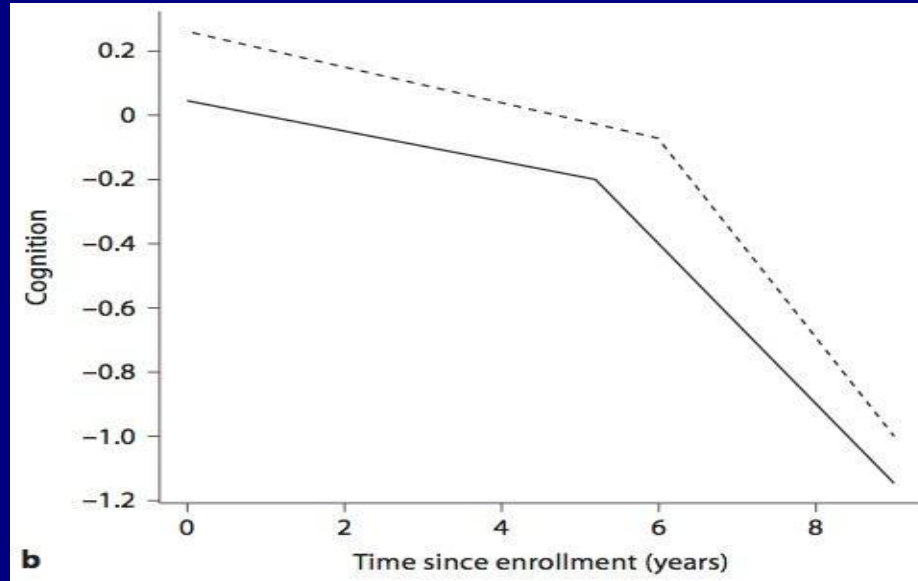
Education and Rate of Progression of Dementia

- Education **negatively** associated with rate of decline in AD patients
- Interpreted as increased cognitive reserve associated with higher education
 - Reserve delays onset of dementia, but decline is more rapid after onset due to greater accumulation of disease before onset

Education, Onset, and Progression of Cognitive Decline

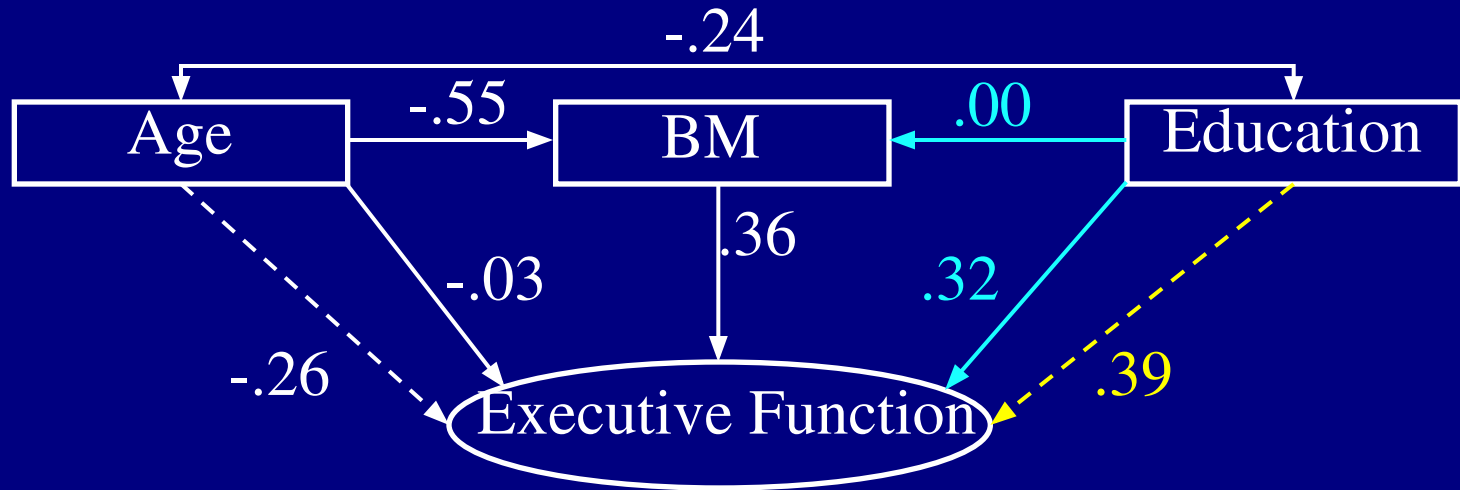
- Education **negatively** associated with faster progression after onset of incident cognitive impairment
- Education was **positively** associated with age of onset of cognitive decline
- Education not related to cognitive decline prior to onset of decline

Education, Onset, and Rate of Cognitive Decline

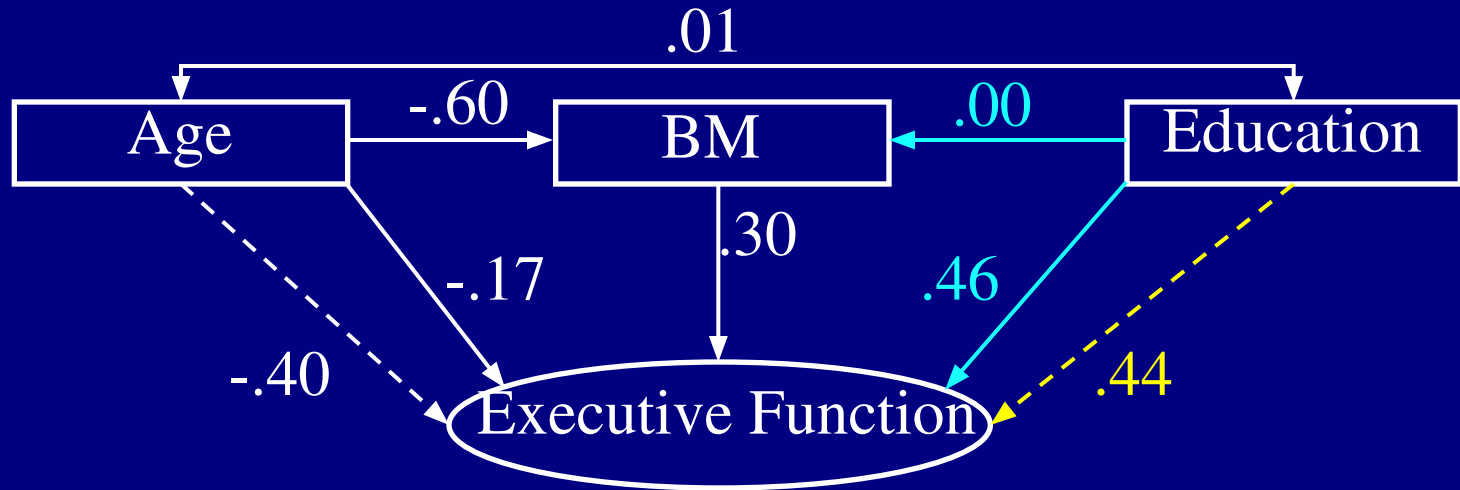


Education, Brain, and Cognition

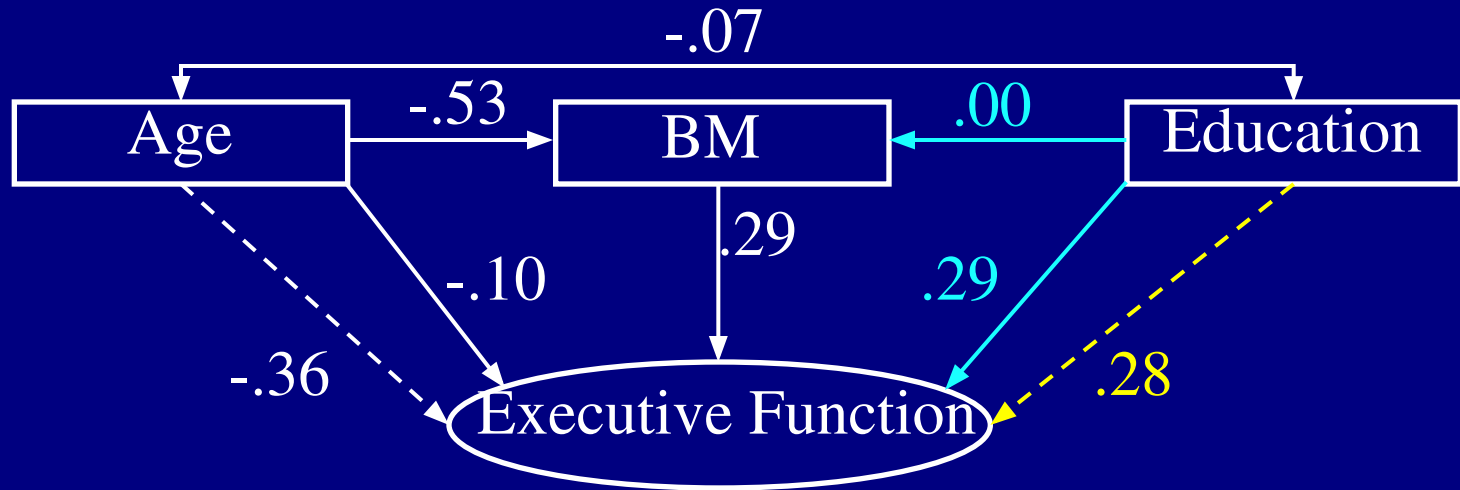
Executive Function, MRI, Age & Education African Americans



Executive Function, MRI, Age & Education Hispanics



Executive Function, MRI, Age & Education Caucasians



Education Pathways to Cognitive Health

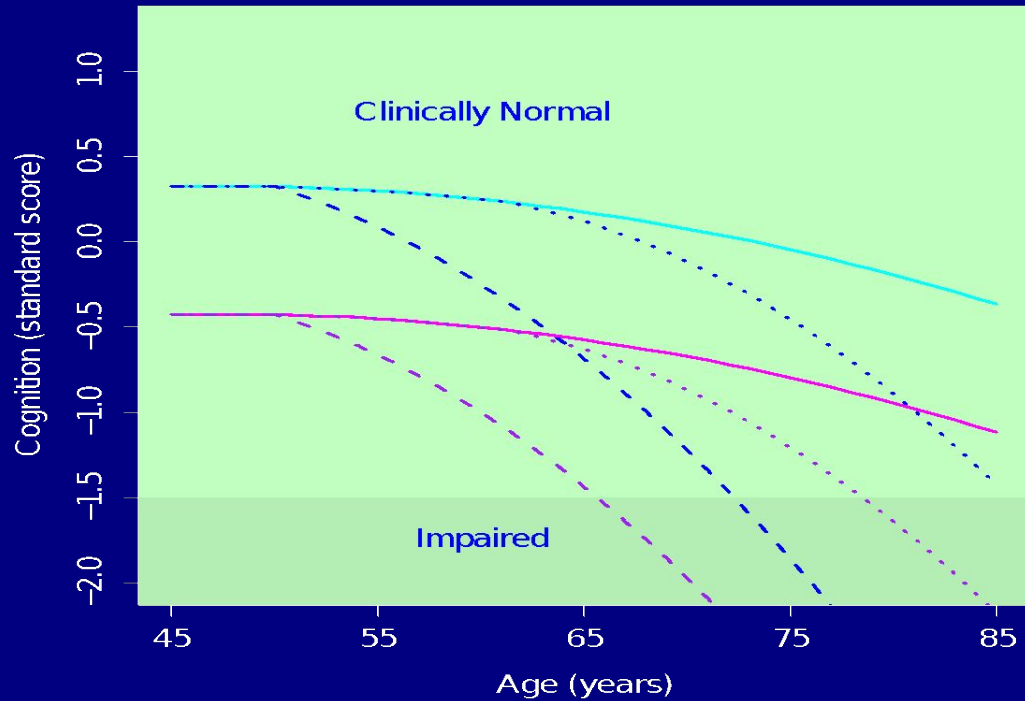
Education and Late Life Cognitive Health

- Education robustly associated with higher cognitive function
- Education effects on cognitive decline are more subtle and complex
 - Might delay onset of cognitive decline associated with Alzheimer's disease and related dementias
 - But at expense of more rapid decline after onset

Education and Late Life Cognitive Health

- Education has a major impact on the level of cognitive function that defines the baseline for cognitive health
- Education has more subtle influences on the timing and trajectories of decline from that baseline level

Cognitive Aging Trajectories



References

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- Yu L, Boyle P, Wilson RS, Segawa E, Leurgans S, De Jager PL, et al. A random change point model for cognitive decline in Alzheimer's disease and mild cognitive impairment. *Neuroepidemiology*. 2012;39(2):73-83. PMCID: PMC3484884.