Research Update on Racial and Ethnic Disparities in Dementia

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Manly Lab, Spring 2018

Brickman Lab, Spring 2018

Supported by

Evidence of Racial/Ethnic Disparities
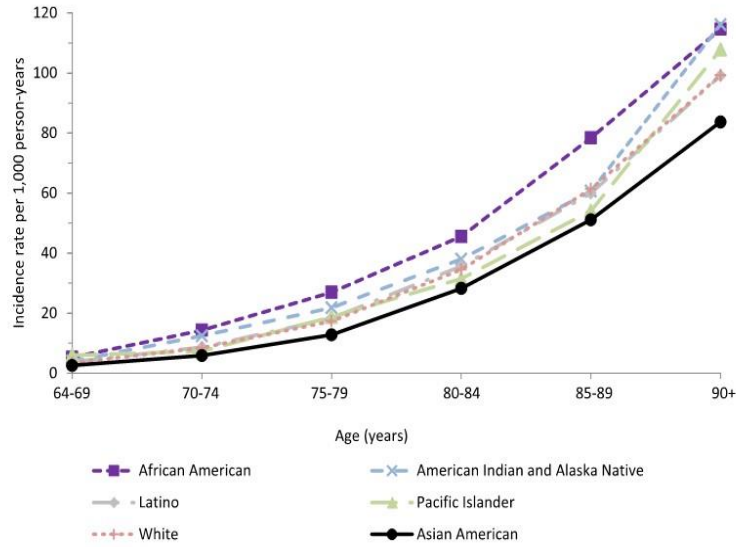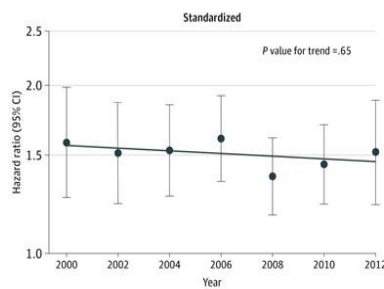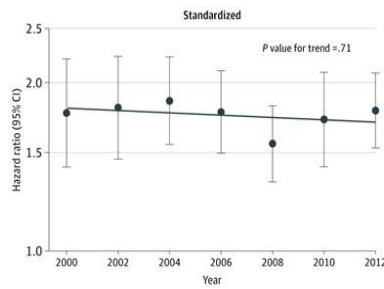## Kaiser Permanente Northern California
Mayeda et al., 2016

Fig. 2. Dementia incidence rates per 1000 person-years by age and race-ethnicity, 2000–2013.

Trends in Relative Incidence and Prevalence of Dementia Across Non-Hispanic Black and White Individuals in the United States, 2000-2016

Power et al., 2020

Cerebrovascular disease
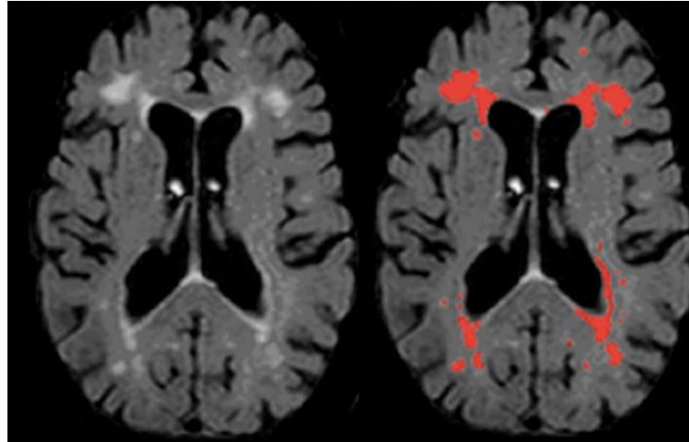
Brickman et al., Arch Neurol, 2008

WMH & language

A. Language

Non-Hispanic White

African American
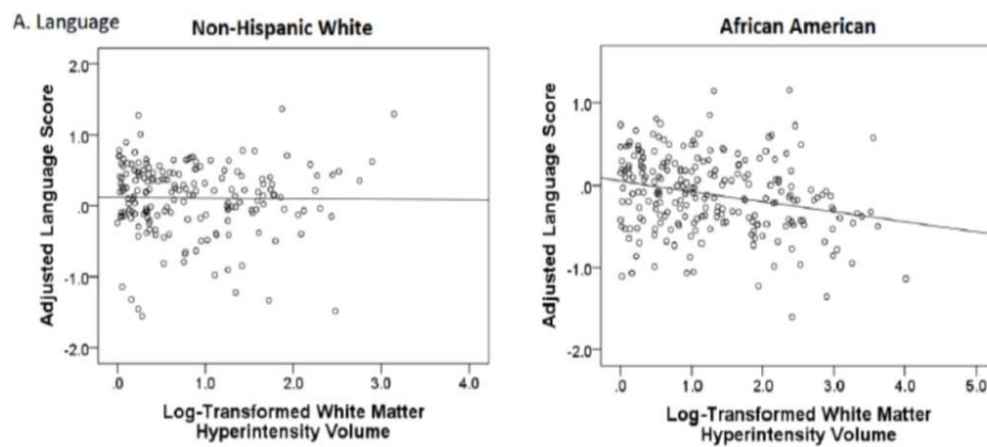
Zahodne *et al, CAR* 2015

Hippocampal volume
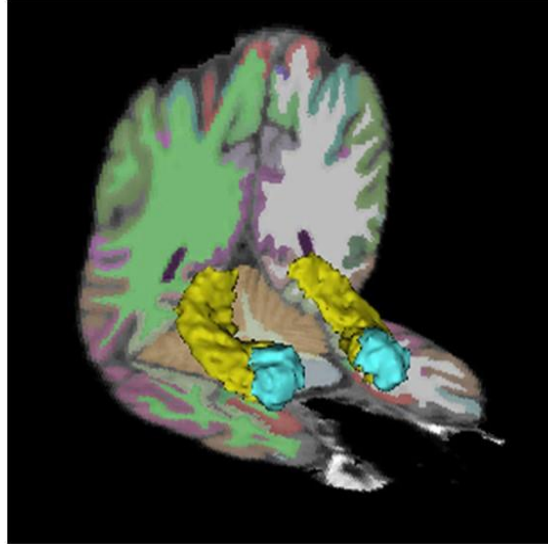
Hippocampal vol. & incident dementia

Intergenerational differences in white matter hyperintensity volume

Indira Turney

COHORT
- PARENTS GENERATION
- OFFSPRING GENERATION

Morris et al. 2019 conclude that there are race-dependent biological mechanisms that contribute to expression of AD

A Standardized uptake value ratios
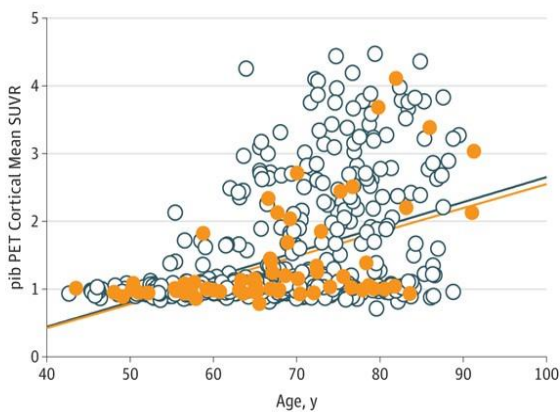
B Cerebrospinal fluid t-tau

- NHW
- AA

Morris et al. 2019 conclude that there are race-dependent biological mechanisms that contribute to expression of AD

RESEARCH ARTICLE

Socioeconomic Status Mediates Racial Differences Seen Using the AT(N) Framework

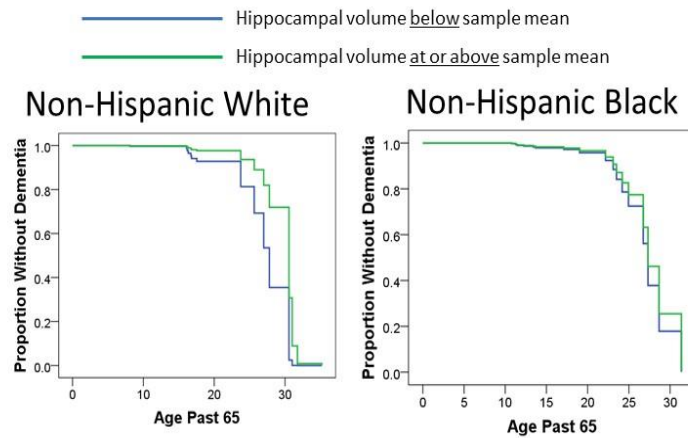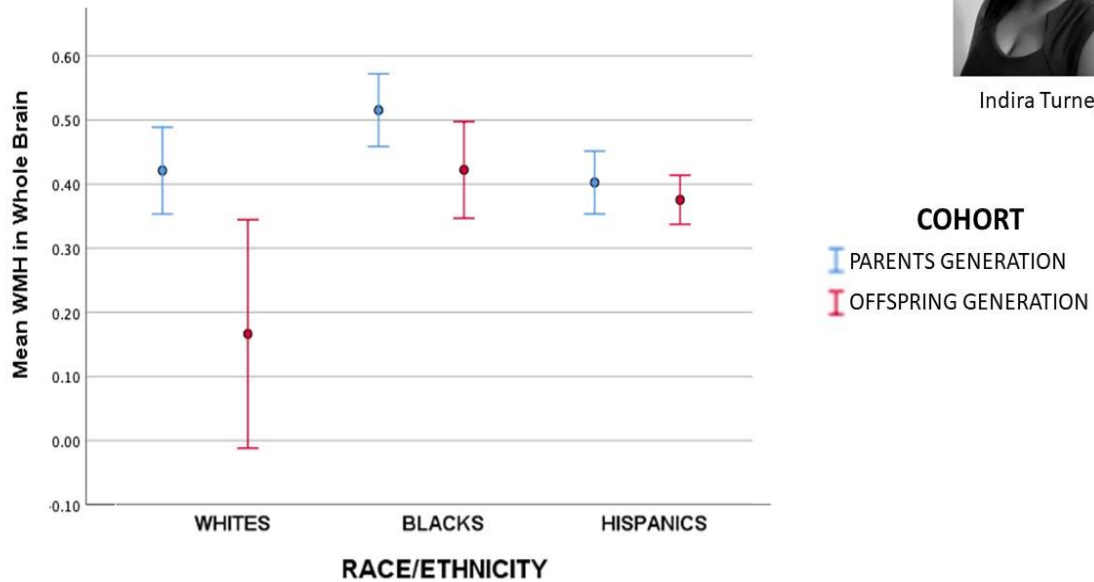Karin L. Meeker, PhD [1†] Julie K. Wisch, PhD [1†] Darrell Hudson, PhD,[2] Dean Coble, PhD,[3] Chengjie Xiong, PhD,[3,5] Ganesh M. Babulal, PhD, OTD,[1] Brian A. Gordon, PhD,[4,5] Suzanne E. Schindler, MD, PhD,[1,5] Carlos Cruchaga, PhD,[6] Shaney Flores, BS,[4] Aylin Dincer, BA,[4] Tammie L. Benzinger, MD, PhD,[4,5] John C. Morris, MD,[1,4,5] and Beau M. Ances, MD, PhD[1,5]
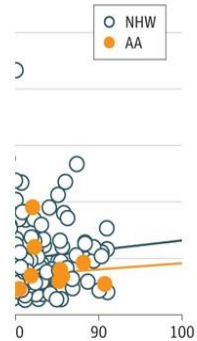
Meeker et al., 2020

In NACC, Whites with MCI had higher likelihood of progression to dementia than Blacks with MCI... why?
Gleason et al., Alzheimer's & Dementia, 2019
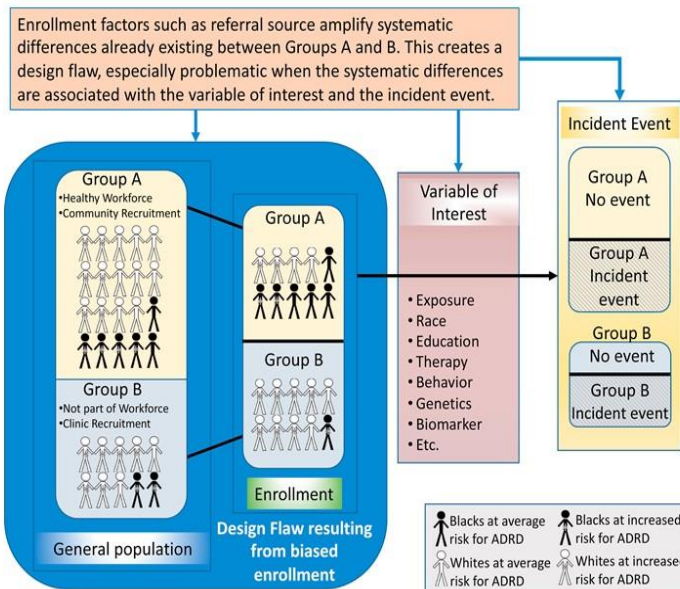
Receiver operating curves for classification of clinical diagnosis of AD with plasma biomarkers

Brickman et al., under review
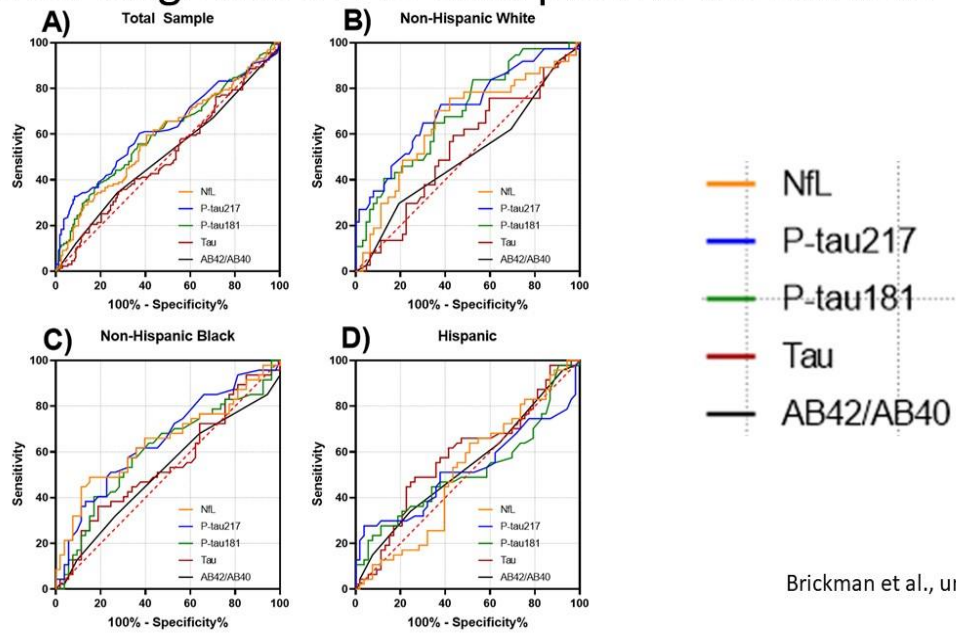
Alzheimer's Disease and All-cause Dementia Mortality by Race and Place of Birth
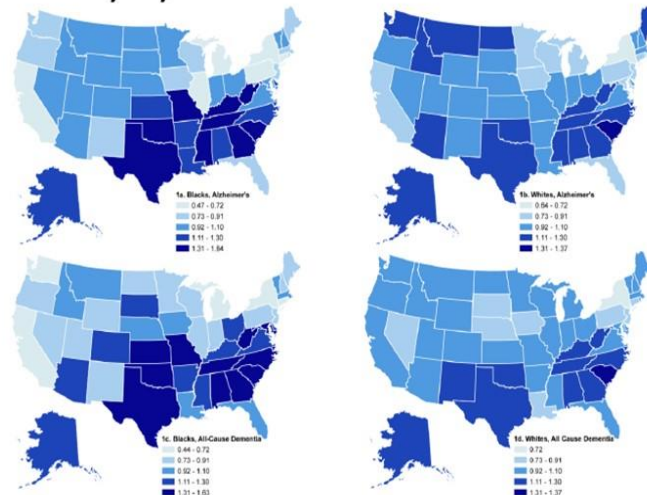
Odds ratios for Alzheimer's or all-cause dementia-related mortality in 2000, by race and state of birth, compared to the national average, based on empirical Bayes (shrinkage) random effect estimates from logistic models, US born blacks and whites ages 65–89.

Glymour et al., *Alzheimer Dis Assoc Disord* 2011

Racial disparities by US region of primary school education in HRS
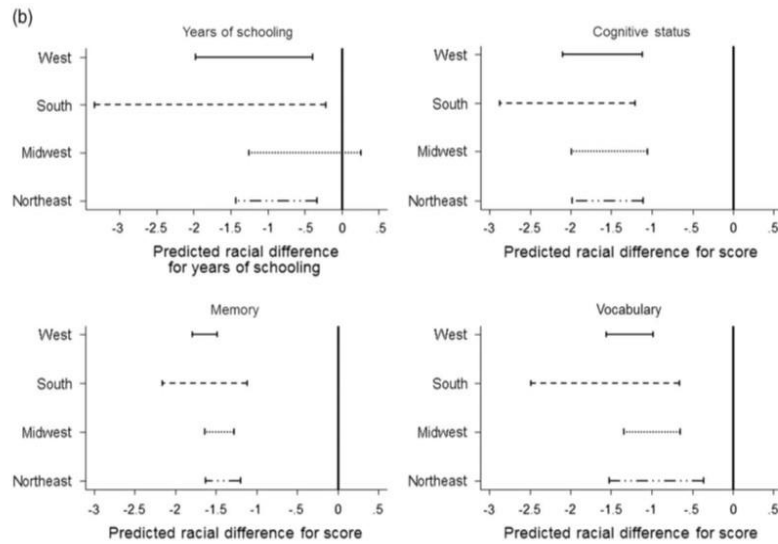
Liu, Glymour, Zahodne, Weiss, & Manly, *JINS* (2015)

Place of birth and dementia risk among Kaiser Northern CA participants

Figure. Cumulative Incidence Dementia Adjusted for Death Rates by Birth Place
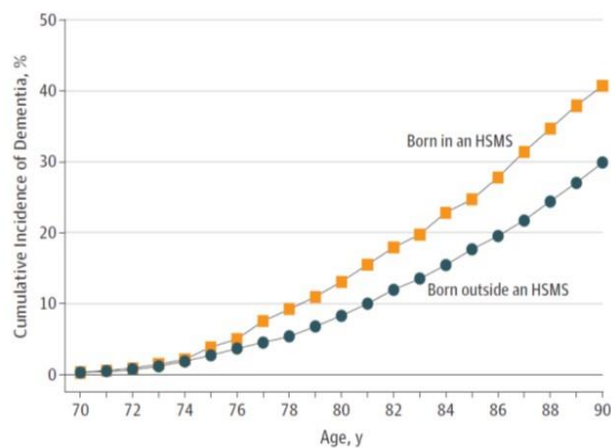
High stroke mortality states: top quintiles of stroke mortality rates (i.e., states with >83 stroke deaths per 100 000 people older than 35 years) Alabama, Alaska, Arkansas, Louisiana, Mississippi, Oklahoma,Tennessee, SouthCarolina, and West Virginia.

All participants had been in Northern California for 23+ years (since 1973)

Gilsanz et al., JAMA Neurol 2017

Global cognition, early-life residence, and schooling at age 12
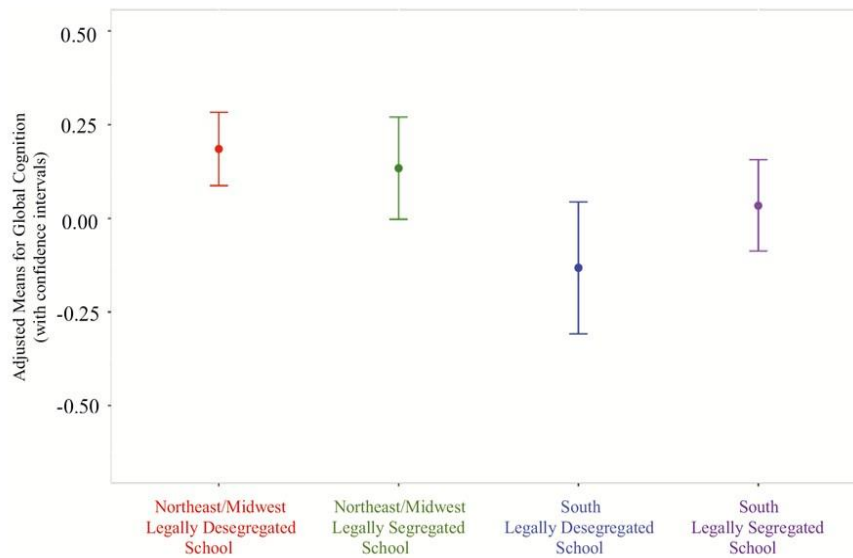
Lamar et al., 2020

Counties with the highest % of Blacks and Latinos living with dementia also have fewer neighborhood resources

Percentage of families living in poverty

15% / 9% — Black Counties	17% / 12% — Latino Counties

Median household income

$45,580 / $64,348 — Black Counties	$46,459 / $62,656 — Latino Counties

Individuals under the age of 65 without health insurance

14% / 7% — Black Counties	18% / 11% — Latino Counties

Percentage of individuals with access to exercise opportunities

55% / 83% — Black Counties	52% / 77% — Latino Counties

Percentage of adults that have a bachelor's degree

16% / 32% — Black Counties	19% / 27% — Latino Counties

■ Highest Prevalence   ■ Lowest Prevalence

Mudrazija, Vega, Resendez, & Monroe (2020)

UK Policy Change Increased Executive Functioning in Late Life
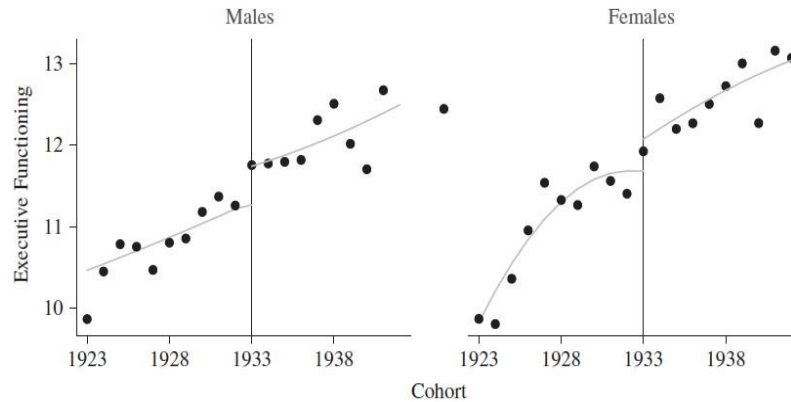
Fig. 9. *Effect of* 1947 *Reform on Executive Functioning* (*Conditional on Leaving Before* 16)

From Banks and Mazzona, 2012

From MM Glymour

Natural Experiments: IV Estimates for Education
HRS through 2002, n=10,964

Estimated effect of 1 year ed'n on cognitive test scores

Model covariates	Memory		Cognition	
	β_{IV}	95% CI$^{\wedge}$	β_{IV}	95% CI$^{\wedge}$
1. Unadjusted	0.33	(0.27, 0.39)	0.19	(0.12, 0.26)
2. Birthyear, and sex	0.30	(0.14, 0.46)	0.34	(0.05, 0.63)
3. Model 2 + birth state	0.18	(0.02, 0.33)	0.03	(-0.22, 0.27)
4. Model 3 + state condns	0.34	(0.11, 0.57)	-0.06	(-0.37, 0.26)
5. OLS estimates	0.09	(0.08, 0.10)	0.15	(0.14, 0.16)

Glymour, JECH, 2008

Less memory decline in older adults born later
Vonk et al., 2019

Born 1921-1935
Born 1905-1920
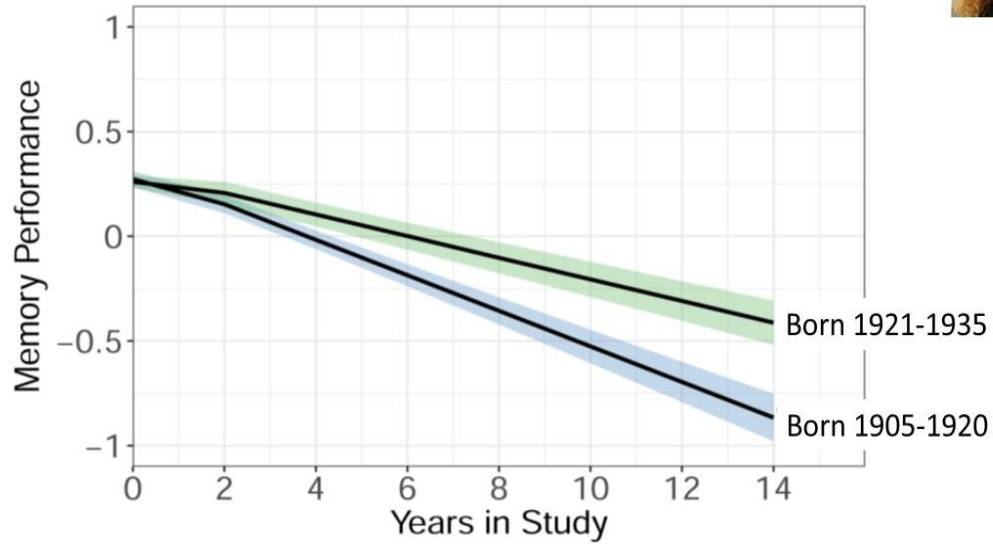
REGARDS Participants are more geographically diverse than other US cohorts of older adults

White
African American

N = 30,239
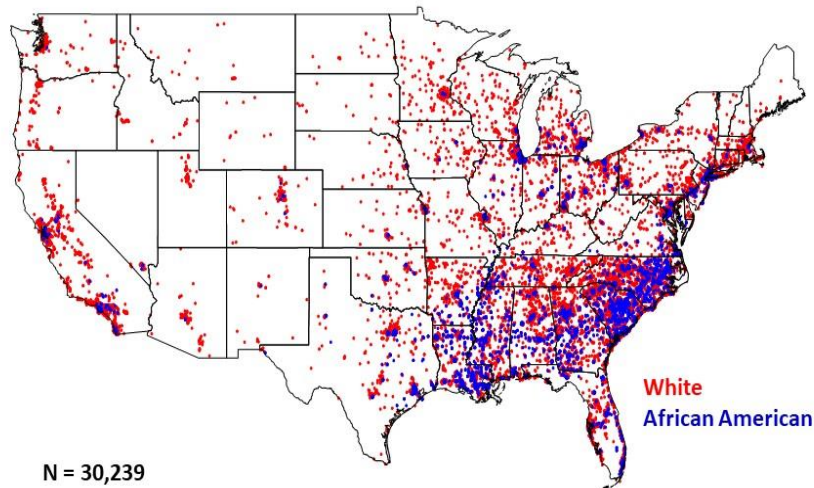
Length of School Year

Student Teacher Ratio
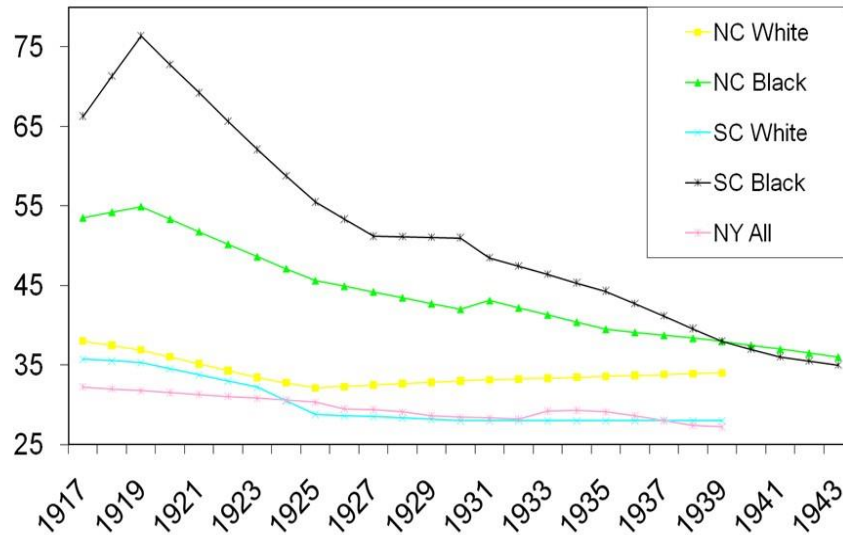
Historical investments in quality of schooling and cognition in later life
School quality provides less protection to Black people from impairment

Audrey Murchland

Maria Glymour

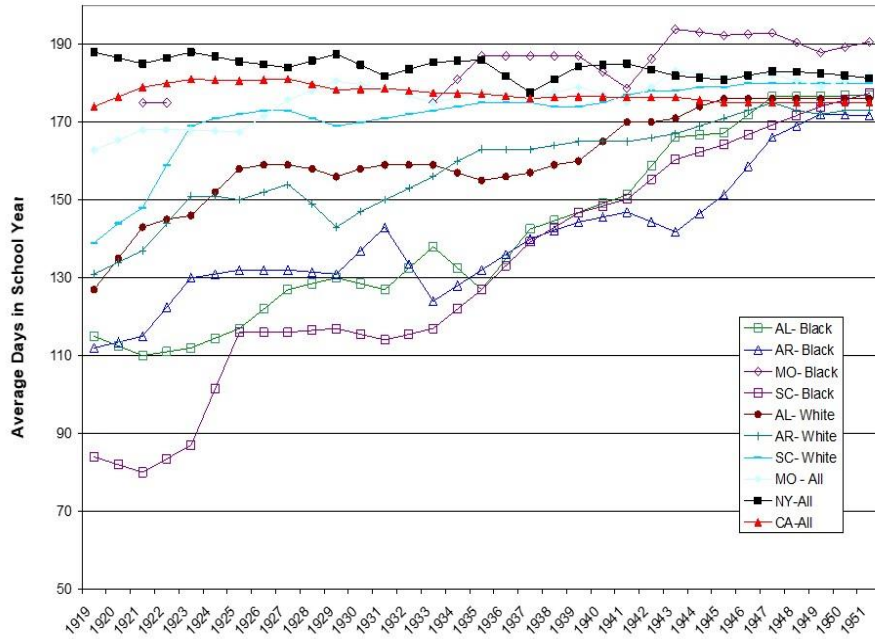| Table 8. Odds Ratios for prediction of prevalent cognitive impairment (N=19,795)				
Variable	Model 1	Model 2	Model 3	Model 4
PPYEd	0.61 (0.58, 0.63)			
PPYED in BM		0.86 (0.78, 0.95)	0.79 (0.67, 0.92)	0.80 (0.69, 0.94)
PPYED in BW		0.80 (0.73, 0.88)	0.73 (0.63, 0.84)	0.75 (0.64, 0.86)
PPYED in WM		0.73 (0.65, 0.83)	0.61 (0.49, 0.75)	0.63 (0.51, 0.78)
PPYED in WW		0.70 (0.60, 0.81)	0.59 (0.47, 0.74)	0.61 (0.49, 0.77)
Model 3 = Model 2 + State Fixed Effects				
Model 4 = Model 3 + Parents Education				

Manly, Murchland, Glymour, et al., under review

Project Talent, 1960

- Nationally representative longitudinal study
- In 1960 377,015 9th-12th graders from 1,255 schools were assessed
- Schools were randomly sampled from cells based on region and type of school across the US
- Large number of siblings, including twins, within sampled schools
- Substantial minority representation within the sample
- All students in grades 9-12 were selected to participate in two full days of data collection
- Study collected extensive personality, knowledge, and cognitive ability data, and completion of an extensive demographic questionnaire
- Follow-up surveys were administered at 1, 5, and 11 years after each grade cohort graduated high school

Project Talent school quality factor

Nika Seblova
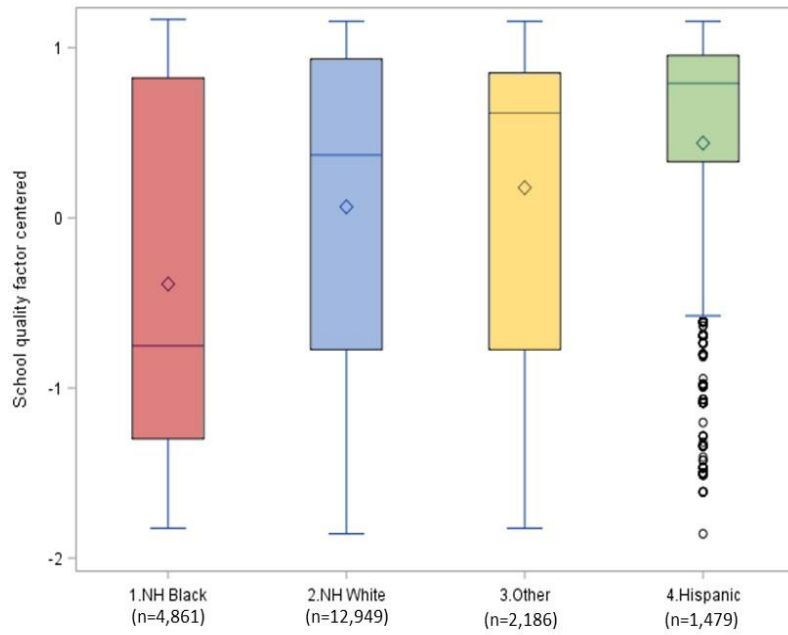
School quality association with SCC (AD8)

Nika Seblova
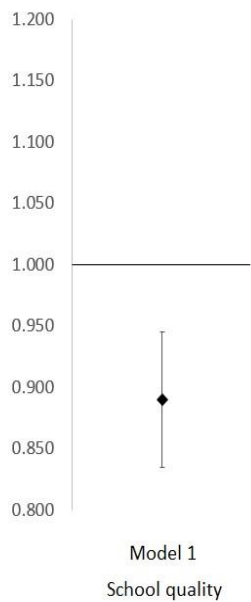
School quality & SCC by race/ethnicity

Nika Seblova

MODEL 1
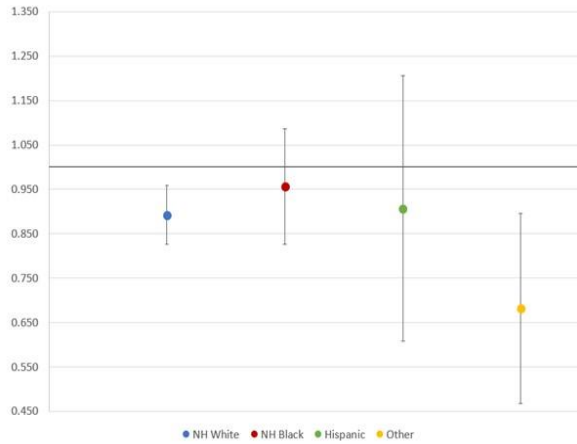
School Quality & Cognition

Nika Seblova

Association* of change in school quality (SD) to level of cognitive abilities (SD)	
Variable	**Beta (95% CI)**
CERAD learning	**0.06 (0.01; 0.10)**
CERAD delayed savings	0.02 (-0.03; 0.07)
Animal fluency	0.04 (-0.002; 0.09)
Letter F fluency	**0.05 (0.005; 0.09)**

*Linear regression adjusting for 1960 cognitive
aptitude, sex/gender, age, and a composite measure
of parental socioeconomic status, and census region

Association by race/ethnicity

Years of school contributes to cognitive reserve in Whites, but not Black or Hispanic older adults

White | Black | Hispanic

β=-0.001 [-0.017, 0.016]   β=0.005 [-0.005, 0.016]

β=-0.020 [-0.039, -0.002]

Current Level

Language

Education
- 8 years
- 12 years
- 16 years

β=-0.007 [-0.021, 0.006]   β=0.013 [-0.002, 0.028]

β=-0.009 [-0.030, 0.013]

Average Rate of Decline

-1 SD   0 SD   +1 SD

Cortical Thickness
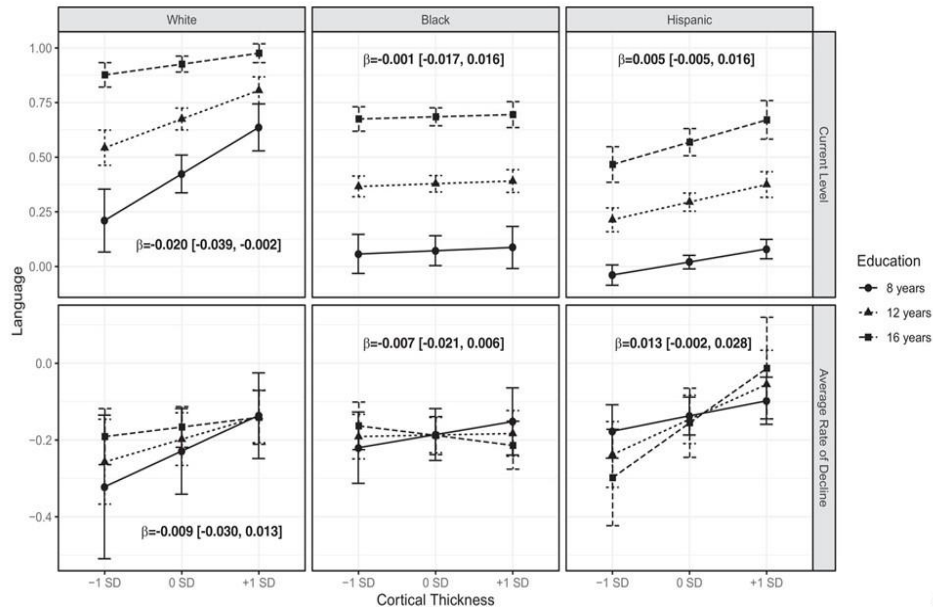
Avila et al., 2020

NIA Disparities Research Framework Hill et al., 2015

FUNDAMENTAL FACTORS: Ethnicity, Gender, Age, Race, Disability Status, Identity*

**Levels of Analyses

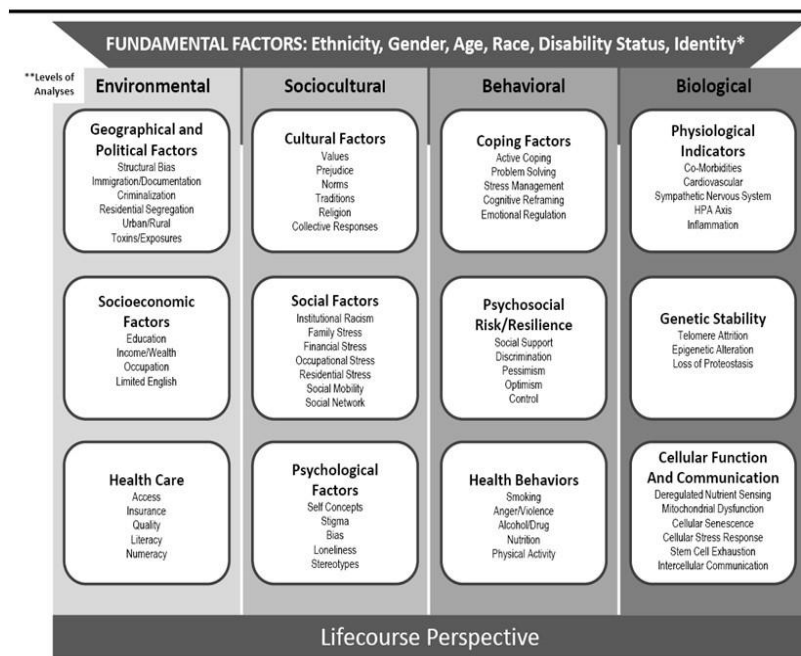| Environmental	Sociocultural	Behavioral	Biological
Geographical and Political Factors Structural Bias, Immigration/Documentation, Criminalization, Residential Segregation, Urban/Rural, Toxins/Exposures	**Cultural Factors** Values, Prejudice, Norms, Traditions, Religion, Collective Responses	**Coping Factors** Active Coping, Problem Solving, Stress Management, Cognitive Reframing, Emotional Regulation	**Physiological Indicators** Co-Morbidities, Cardiovascular, Sympathetic Nervous System, HPA Axis, Inflammation
Socioeconomic Factors Education, Income/Wealth, Occupation, Limited English	**Social Factors** Institutional Racism, Family Stress, Financial Stress, Occupational Stress, Residential Stress, Social Mobility, Social Network	**Psychosocial Risk/Resilience** Social Support, Discrimination, Pessimism, Optimism, Control	**Genetic Stability** Telomere Attrition, Epigenetic Alteration, Loss of Proteostasis
Health Care Access, Insurance, Quality, Literacy, Numeracy	**Psychological Factors** Self Concepts, Stigma, Bias, Loneliness, Stereotypes	**Health Behaviors** Smoking, Anger/Violence, Alcohol/Drug, Nutrition, Physical Activity	**Cellular Function And Communication** Deregulated Nutrient Sensing, Mitochondrial Dysfunction, Cellular Senescence, Cellular Stress Response, Stem Cell Exhaustion, Intercellular Communication

Lifecourse Perspective

16

Eliminating brain health disparities

- Changing healthy behaviors and lifestyle choices will not eliminate disparities in dementia (fundamental social causes)
- There is evidence that lifecourse social factors, most patterned by structural racism, influence dementia risk and resilience
  - Include population feasible biomarkers to determine relative contribution
- Economic and social policies are brain health policies
  - Policies to repair the intergenerational impact of racism & discrimination on wealth
  - Invest in schools and teachers to increase educational quality
  - Provide funds to decrease neighborhood inequalities
- The most informative research on mechanisms of dementia disparities is not from convenience samples, but from population representative random samples