

Ethnoracial Differences in Education–Cognition Associations



Shima Raeesi^{1,2}, Amelie Metz^{1,2}, Cassandra Morrison^{3*}, Mahsa Dadar^{1,2*}

1. Douglas Research Center, Montreal, Quebec, Canada

2. Department of Psychiatry, McGill University, Montreal, Quebec, Canada

3. Department of Psychology, Carleton University, Ottawa, Ontario, Canada (* Co-senior author)



Background

- Educational attainment is a proxy of **cognitive reserve** and is linked to better cognition and resilience to brain pathology¹.
- The cognitive benefits of education may **differ across racial and ethnic groups** due to historical, social, and structural inequities that influence educational opportunities and life-course experiences².
- Neurodegeneration, cerebrovascular disease, and Alzheimer's disease-related biomarkers may be **differentially distributed** across populations³.

Aim: To investigate whether ethnoracial differences in the education-cognition relationship persist after accounting for brain pathology markers.

Methods



Assessed for eligibility

Included and analyzed:

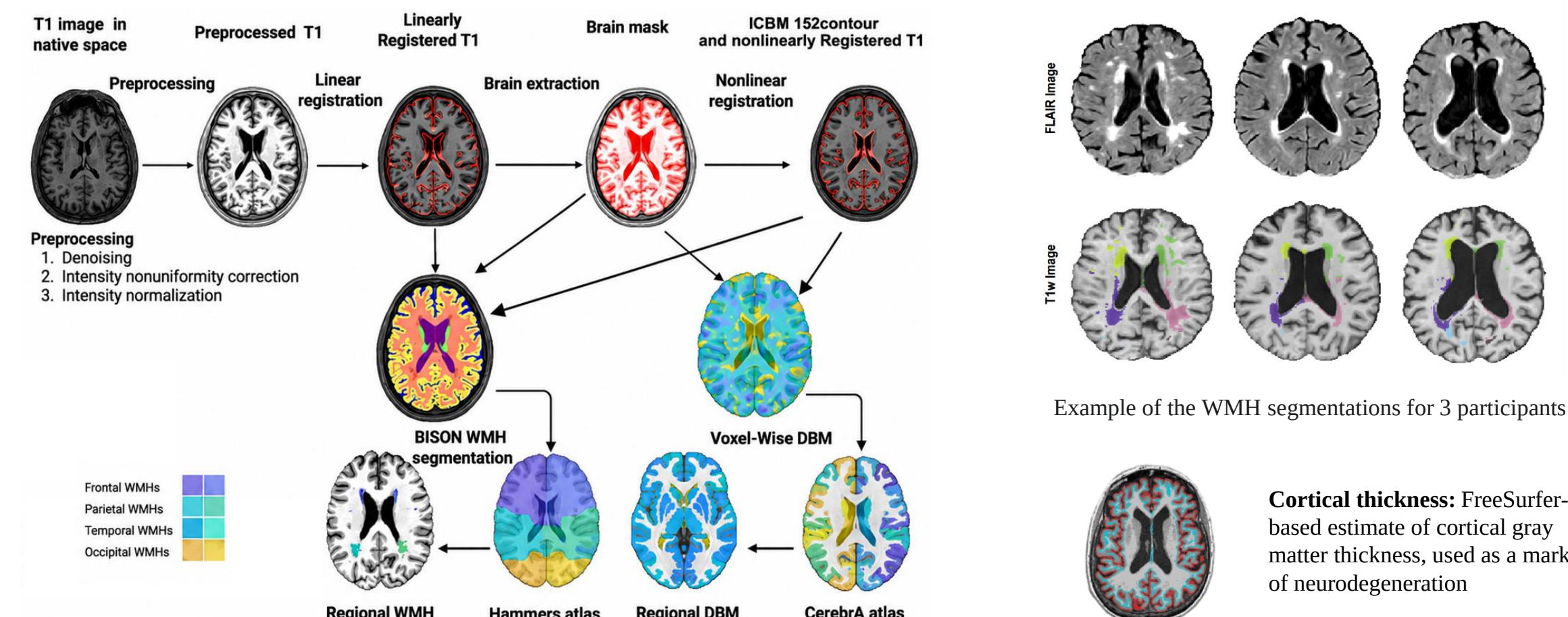
1,641 participants aged 55 and over

Excluded:

- Age <55 years
- No MRI data
- No MMSE data
- Failed MRI QC

Measures:

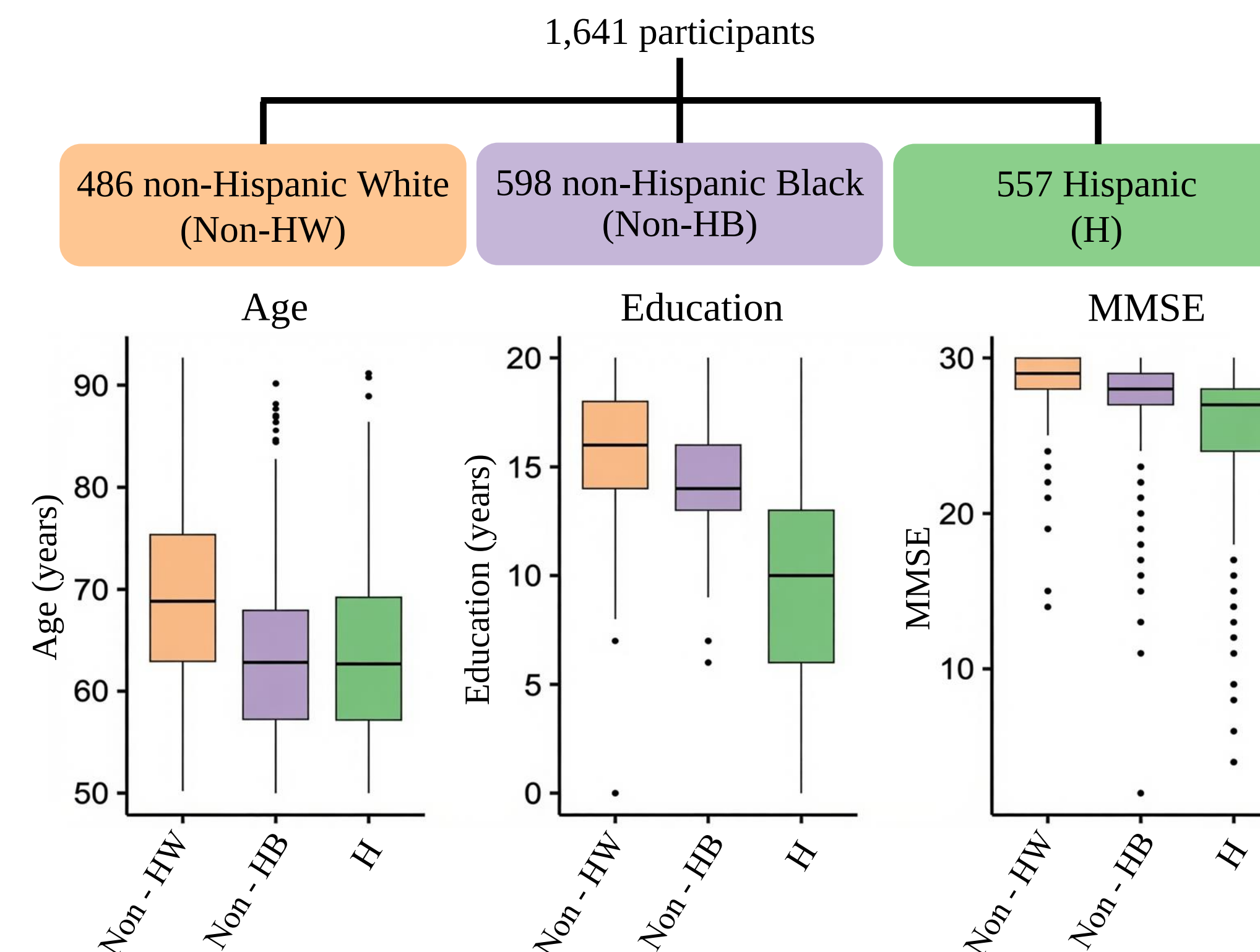
- Education: Years of formal schooling
- Global cognition: Mini-Mental State Examination (MMSE) score
- Brain pathology: Deformation-based morphometry (DBM), white matter hyperintensities (WMHs), cortical thickness, amyloid and tau positivity status



Statistical Analysis:

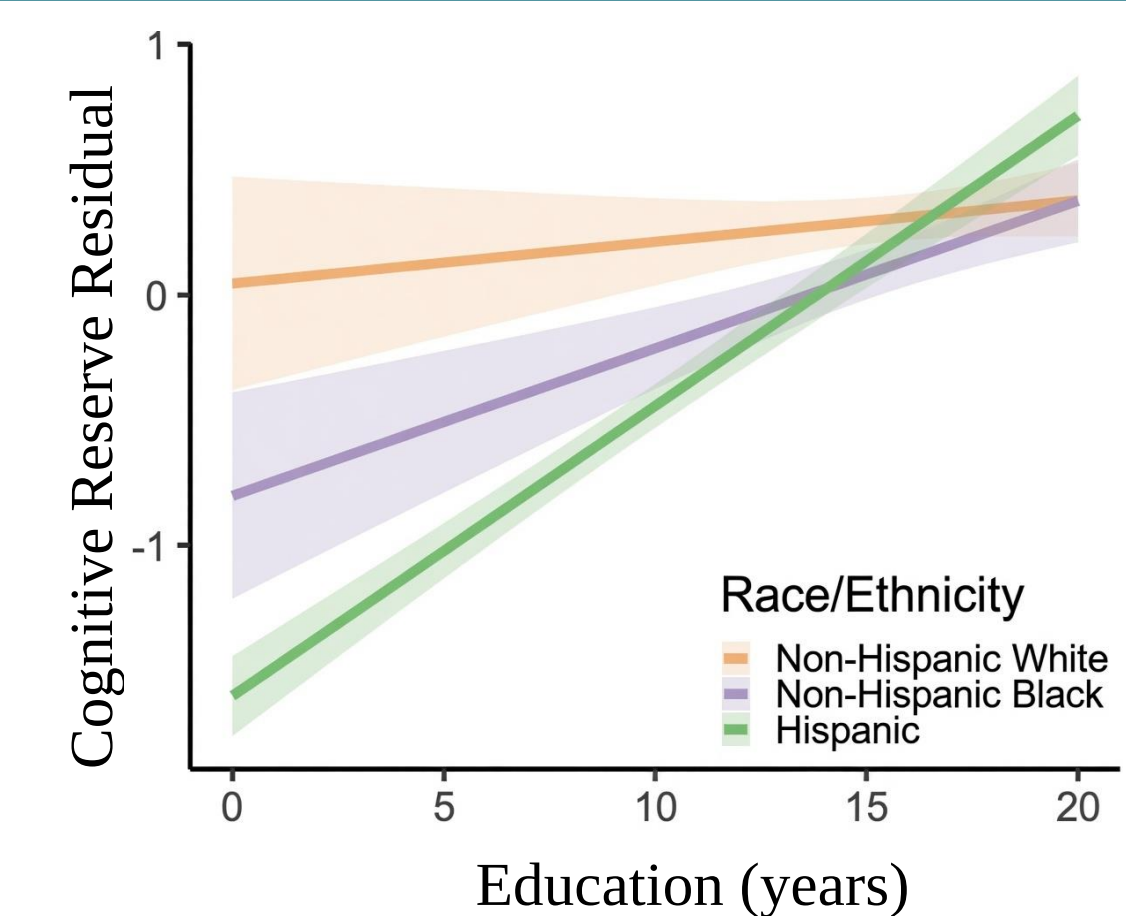
- Linear regression models
- Residual-based cognitive reserve model: Better-than-expected cognitive performance relative to pathology-predicted cognition

Results



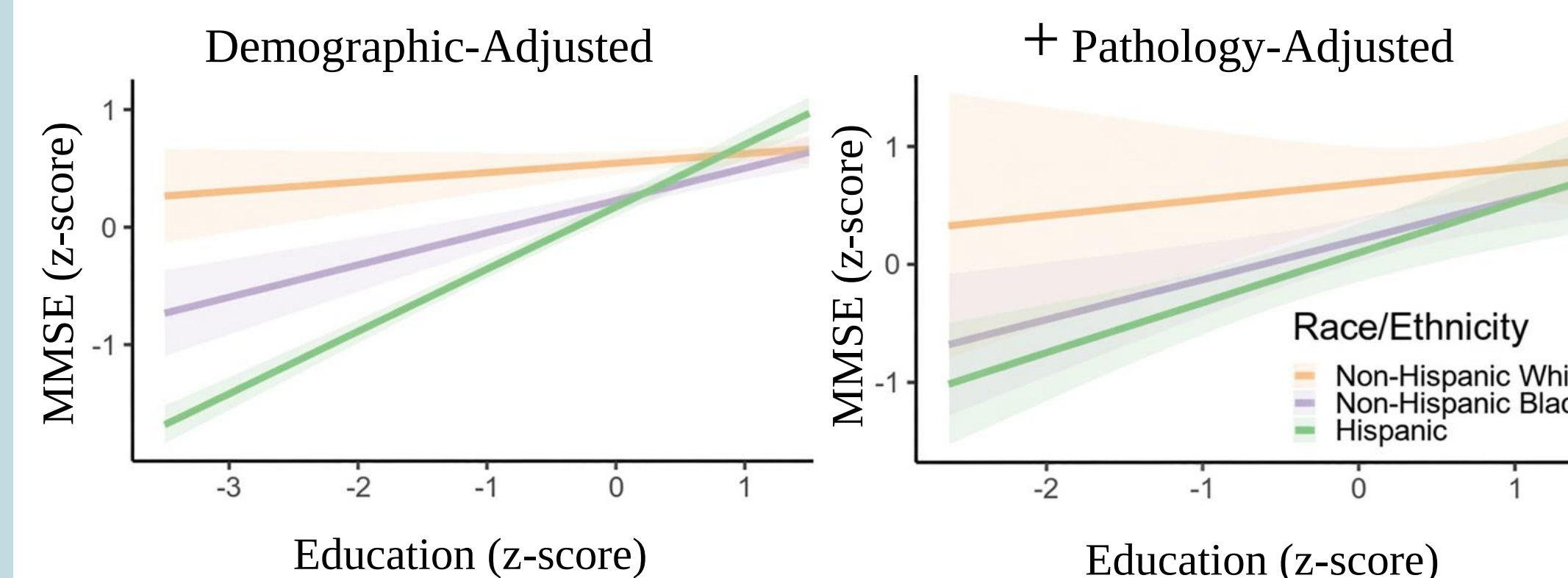
Residual-Based Cognitive Reserve Model

Residual cognition was estimated after accounting for demographics, cognitive status, and pathology measures.



➡ Education remained positively associated with residual cognition.

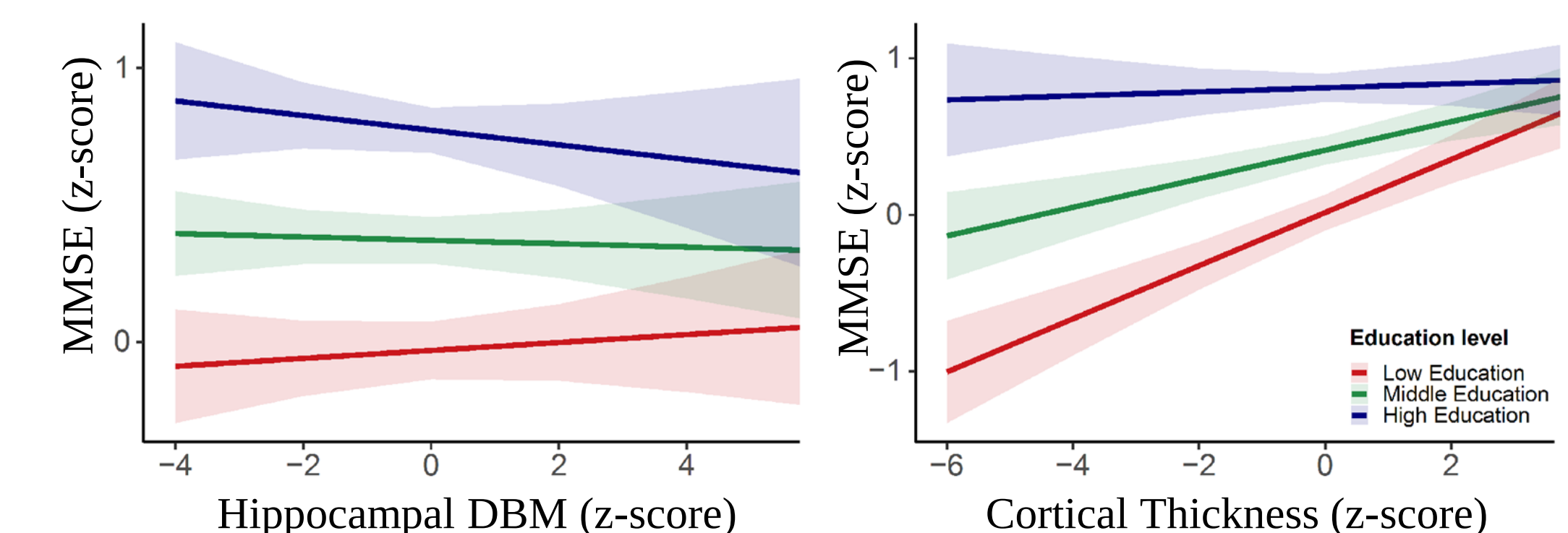
Education - Cognition Models



Cognition ~ **Education** × **Race/Ethnicity** + Age + Sex + Cognitive status (+ Brain Pathology)

➡ Minimal attenuation after adjustment for brain pathology

Education × Pathology Moderation Models



Cognition ~ **Education** × **Brain Pathology** + Age + Sex + Cognitive status + Race/Ethnicity

Summary

- Educational attainment was associated with better cognition across ethnoracial groups.
- These differences persist beyond brain pathology measures, highlighting structural influences.
- The magnitude of benefit differs across ethnoracial groups.

References:

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- Beveridge J, et al. *Expert Rev Neurother.* 2025
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VANDAlab

✉ shima.raeesi@mail.mcgill.ca



Take-Away: Education contributes to cognitive reserve beyond measured brain pathology, with benefits that differ across ethnoracial groups.