

Neuropsychological Test Performance and MRI Outcomes Among Black/African American Females from the National Alzheimer’s Coordinating Center Data Set

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Background

- AD disproportionately impacts female sex and Black/African Americans. Black females are thus at greater risk for developing AD.
- However, Black females are consistently underrepresented in aging research.
- Objective:** Describe neuropsychological test performance and volumetric MRI outcomes in large cohort of Black/African American females from the NACC data sets.

Methods

- Sample:** 6,120 Black/African American females from NACC
- Assessment:**
- Participants completed at least one UDS visit (2.0/3.0) with neuropsychological testing.
 - Subset (n=560) completed MRI and MRI-derived volumetrics examined included hippocampal volume and regional cortical thickness.
 - Global CDR score was used to determine dementia severity.
- Statistical Analyses:**
- ANCOVA models examined differences in neuropsychological test scores, volume of hippocampus, and regional cortical thickness by CDR (0, 0.5, 1.0+)
 - Adjusting for age, education, and *APOE* $\epsilon 4$ status.

Table 1: Sample Demographics

Characteristic	n	CDR 0	CDR 0.5	CDR 1+	p-value ²
		N = 3,263 ¹	N = 1,952 ¹	N = 905 ¹	
Age, n (mean, SD)	6,120 (71.28, 8.85)	70 (8)	71 (9)	77 (9)	<0.001
Years of Education, N (mean, SD)	6,120 (14.79, 7.04)	15.2 (4.8)	14.5 (7.1)	14.0 (11.9)	<0.001
Number of APOE $\epsilon 4$ allele, n (%)	3,901				<0.001
0 copies		1,347 (63%)	645 (53%)	182 (33%)	
1 copy		712 (33%)	482 (39%)	271 (49%)	
2 copies		71 (3.3%)	96 (7.8%)	95 (17%)	
Diabetes, n (%)	2,818	416 (25%)	271 (28%)	48 (28%)	0.12
Hypercholesterolemia, n (%)	2,810	889 (53%)	559 (58%)	97 (57%)	0.030
Hypertension, n (%)	2,832	1,132 (67%)	688 (71%)	111 (65%)	0.047
Sleep Apnea, n (%)	2,767	308 (19%)	178 (19%)	11 (6.7%)	<0.001

Results

Table 2: Summary of ANCOVA Models and Post Hoc Pairwise Comparisons:

Neuropsychological Test	ANCOVA Model, p value	N	P-values*
Digit Span Forwards	F(2, 1491)=24.14, p<0.001	2,767	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Digit Span Backwards	F(2, 1486)=68.95, p<0.001	2,757	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Animals	F(2, 3737)=471.03, p<0.001	5,803	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Vegetables	F(2, 3712)=574.39, p<0.001	5,751	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
BNT	F(2, 2211)=468.58, p<0.001	2,974	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
MINT	F(2, 1478)=148.94, p<0.001	2,730	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Trails Making A	F(2, 3649)=659.95, p<0.001	5,624	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Trail Making B	F(2, 3342)=382.19, p<0.001	5,126	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
F+L Fluency	F(2, 1483)=63.22, p<0.001	2,741	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Craft Immediate	F(2, 1484)=150.51, p<0.001	2,727	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
Craft Delayed	F(2, 1478)=180.26, p<0.001	2,714	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
MOCA	F(2, 1480)=432.01, p<0.001	2,750	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0
MMSE	F(2, 2324)=1549.57, p<0.001	3,186	CDR 0.0>0.5; 0.5>1.0; 0.0>1.0

Table 2:

- Performance on all neuropsychological tests worsened as CDR scores increased**, with the greatest group effect for TMT Part B and Part A, followed by memory measures, MOCA, MMSE, and then language measures.
- Figure 1:**
- ANCOVA models showed **significant associations between all MRI-derived volumetrics except for the posterior cingulate**.
 - Strongest associations observed for entorhinal cortex and hippocampus.
 - Participants with a CDR of 0.5 showed significant hippocampal volume loss.
 - Significant cortical thinning wasn’t observed until mild dementia.

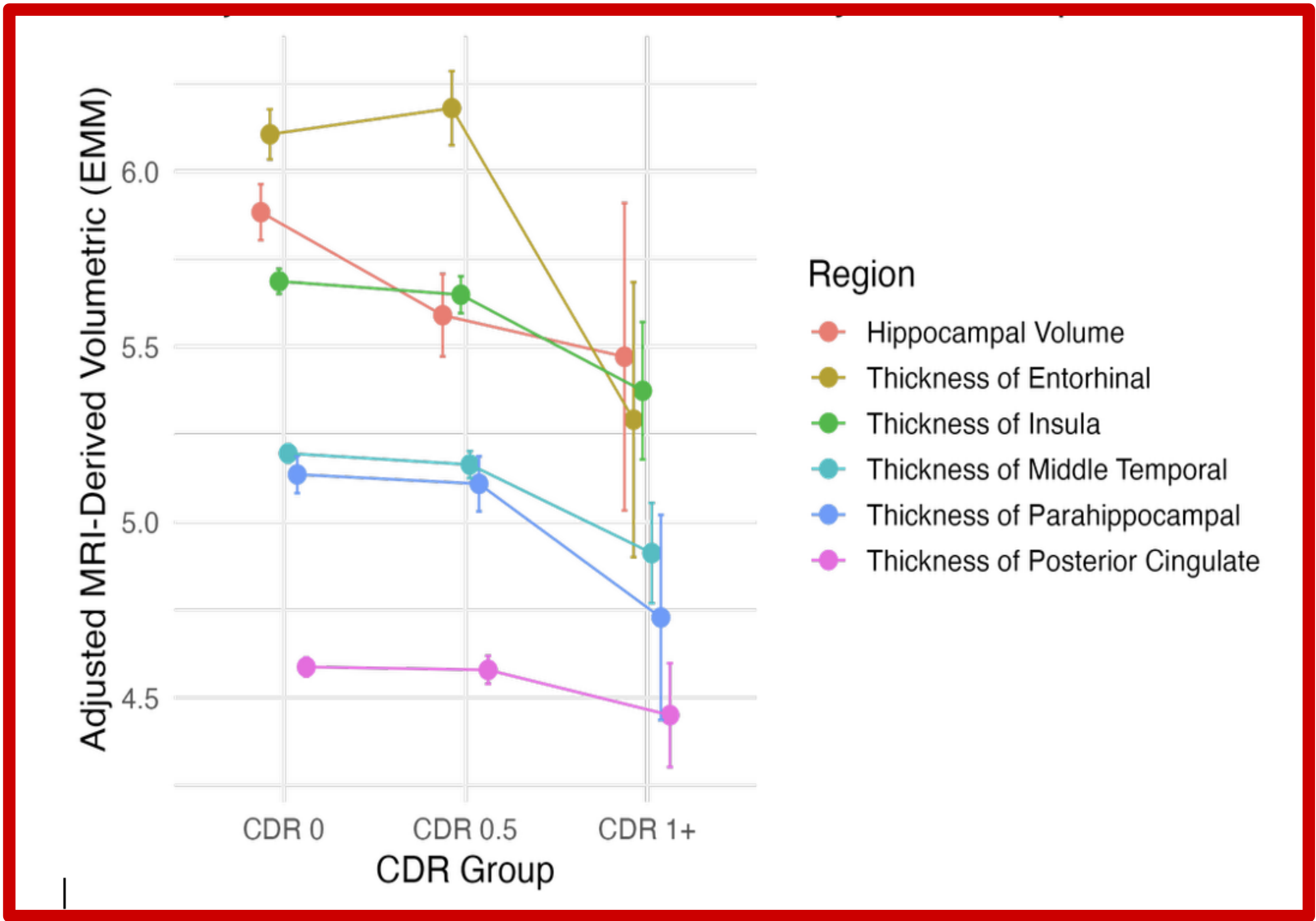


Figure 1: Adjusted means of MRI-derived volumetrics by CDR Group.

Conclusions

- Among Black/African American females from the NACC data set, 53.9% and 14.8% had CDR scores consistent with MCI and dementia, respectively.
- Non-memory cognitive domains had the strongest associations with dementia severity, despite medial temporal lobe involvement.**
- Future:** We plan to replicate analyses investigating autopsy data from brain donors. Furthermore, UDS4.0 collects additional social determinants of health and menstrual/reproductive health data that will be relevant to incorporate into these analyses.
- It’s imperative that efforts to address the historical underrepresentation of populations most impacted, are implemented in future studies.

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