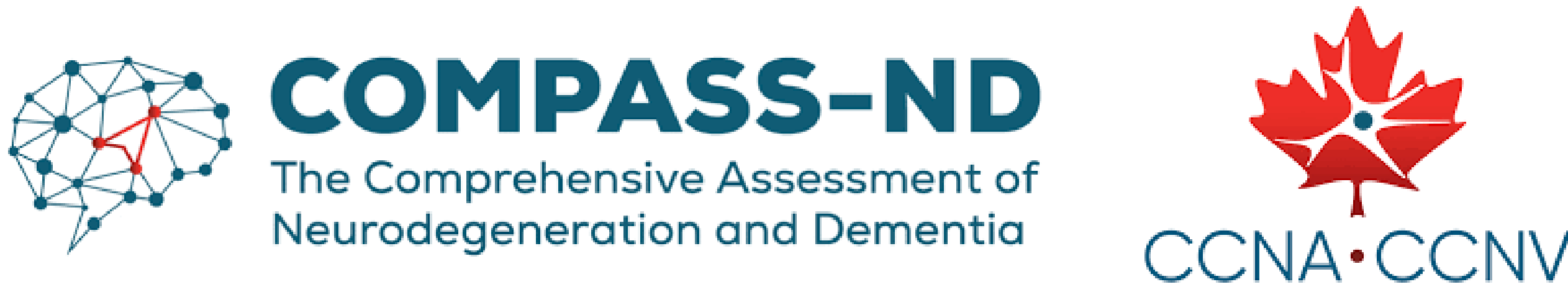


Differential Associations Between Primacy Effects and Hippocampal Volume in Older Adults With or at Risk for Alzheimer's Disease

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BACKGROUND

Serial position effects, particularly primacy effects, are sensitive to early changes in memory function.

- Reduced primacy performance, especially in delayed recall, has been observed in individuals with Alzheimer's disease (AD),¹ mild cognitive impairment (MCI)² and, more recently, subjective cognitive decline (SCD).³
- Lower primacy recall has also been associated with reduced hippocampal volume in cognitively unimpaired (CU) older adults.⁴
- However, its relationship with hippocampal volume across the AD continuum remains unclear.

Objective: This study examined associations between delayed primacy recall and hippocampal volume in older adults with or at risk for AD.

METHODS

Data were taken from the Comprehensive Assessment of Neurodegeneration and Dementia (COMPASS-ND)⁵ study. Data collection took place between 2016-2022.

Primacy Recall

- Words 1-4 of the delayed recall trial of the Rey Auditory Verbal Learning Test⁶

Hippocampal Volumes

- T1-weighted images were obtained using 3T scanners following the Canadian Dementia Imaging Protocol⁷
- Image preprocessing was done with the iterativeN3 pipeline⁸ and hippocampal subfield segmentation was done with the Multiple Automatically Generated Templates (MAGeT) Brain algorithm⁹
- Analyses focused on the left hippocampus and AD-sensitive subfields (CA1, CA2/CA3, subiculum)

PRIMACY	Drum
	Curtain
	Bell
	Coffee
MIDDLE	School
	Parent
	Moon
	Garden
RECENCY	Hat
	Farmer
	Nose
	Turkey
	Color
	House
	River

Descriptive Statistics of Study Samples

	CU (n=124)	SCD (n=139)	MCI (n=382)	AD (n=166)
Age, M (SD)*	69.7 (6.15)	69.8 (5.80)	73.5 (6.84)	74.8 (7.74)
Sex, n (%)				
Male	49 (39.5)	46 (33.1)	227 (59.4)	87 (52.4)
Female	75 (60.5)	93 (66.9)	155 (40.6)	79 (47.6)
Education, M (SD)*	16.2 (3.23)	16.6 (3.34)	15.4 (3.75)	15.4 (3.43)
MoCA, M (SD) /30*	27.4 (1.74)	27.4 (1.81)	23.4 (3.17)	18.2 (3.60)

Note. MoCA = Montreal Cognitive Assessment

*Significant difference between groups

Serial Positions:

Primacy: words 1-4
Middle: words 5-11
Recency: words 12-15

Regression models: Primacy recall ~ hippocampal volume + age + sex + education + intracranial volume

- Separate models were conducted within diagnostic groups for each hippocampal subfield

RESULTS

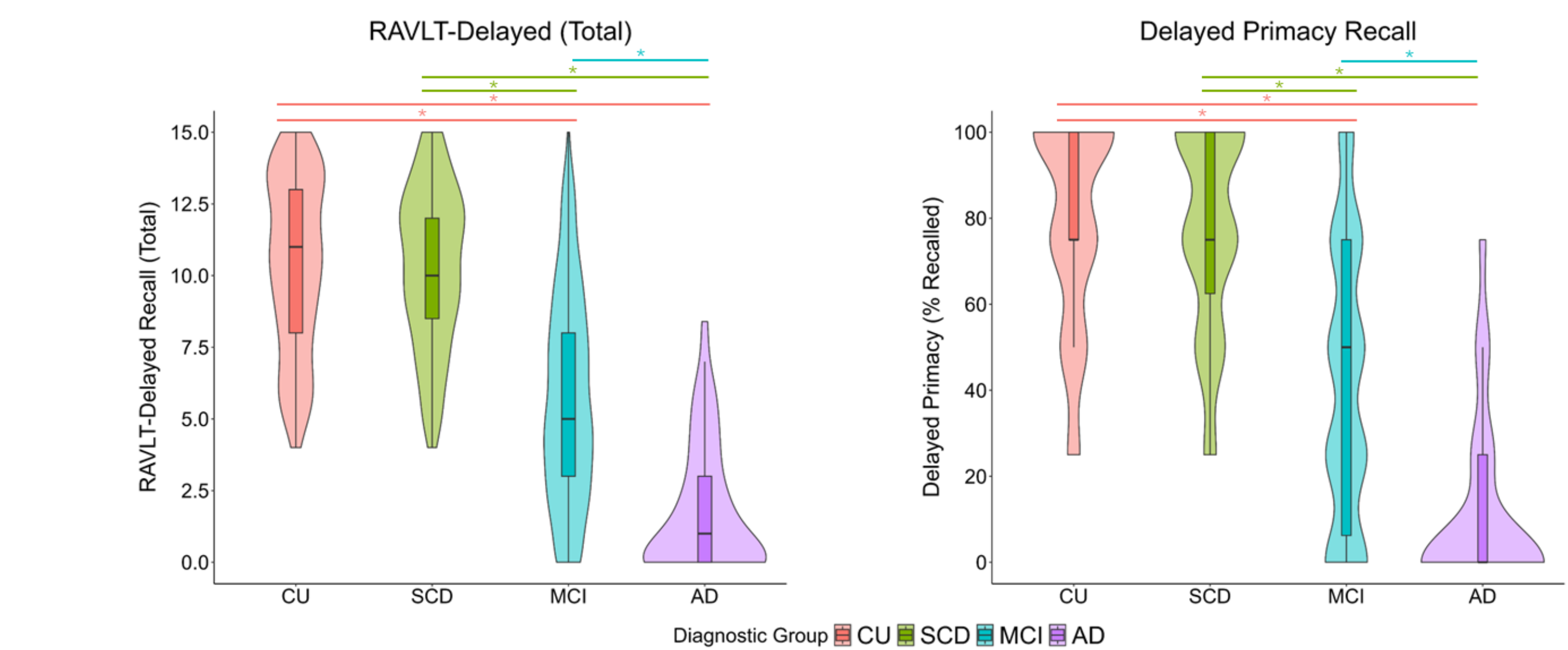


Figure 1. Between-groups differences in RAVLT-Delayed performance (left) and delayed primacy performance (right). Relative to the CU and SCD groups, stepwise reductions in performance were found in the MCI and AD groups. No significant differences emerged between the CU and SCD groups. * $p < .001$

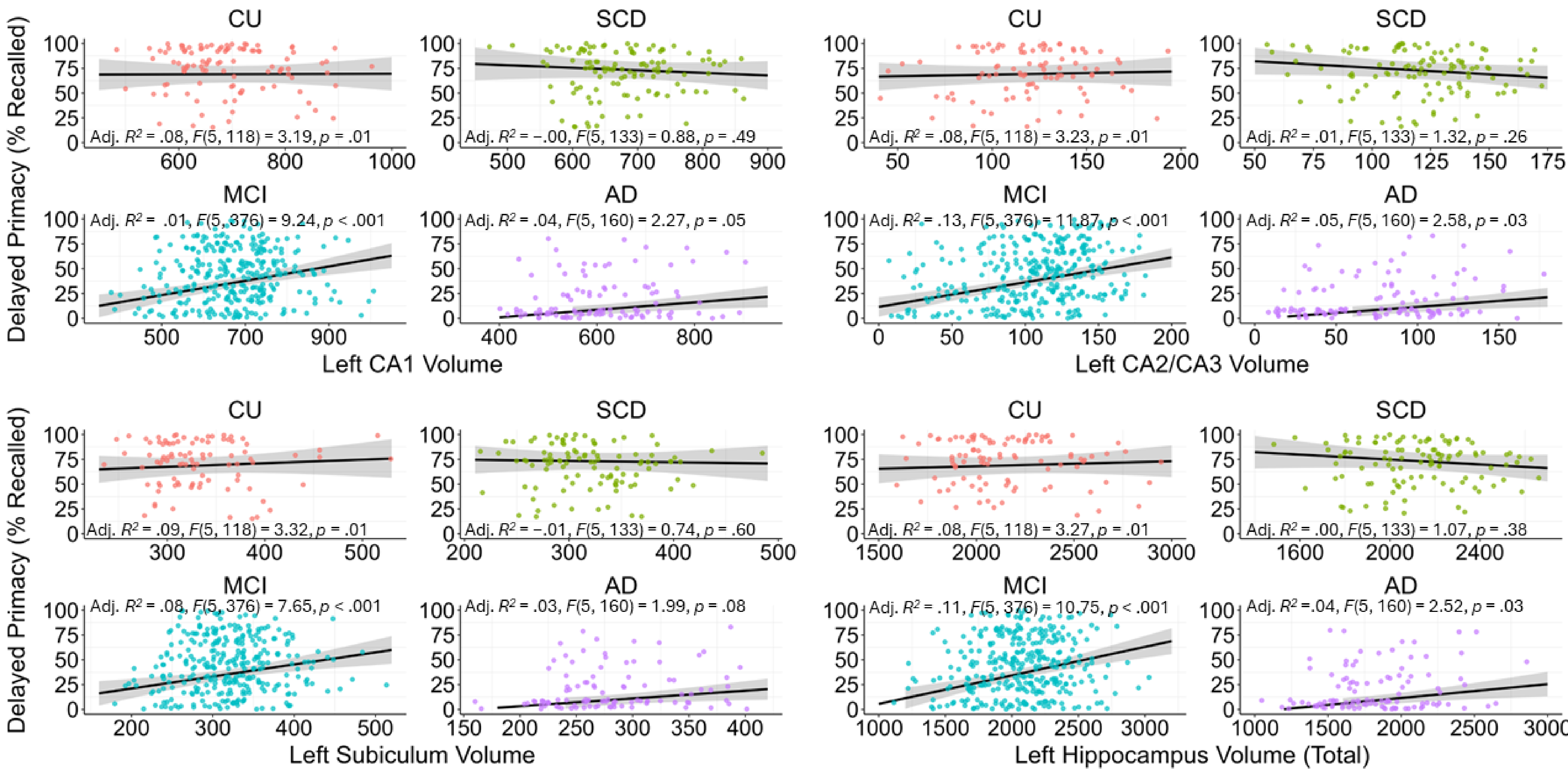


Figure 2. Association between left hippocampal subfield volumes and delayed primacy recall across diagnostic groups. Panels display predicted values obtained from the regression models. Bands represent 95% CIs. Associations with primacy performance were strongest for CA2/CA3 in both the MCI ($b = .25, p < .001$) and the AD group ($b = .12, p < .01$). Significant positive associations were also observed for CA1 (MCI: $b = .07, p < .001$; AD: $b = .04, p < .001$), the subiculum (MCI: $b = .12, p < .001$; AD: $b = .08, p = .02$), and the whole left hippocampus (MCI: $b = .03, p < .001$; AD: $b = .01, p = .01$). No significant associations were found for the CU and SCD groups.

CONCLUSION

In MCI and AD groups, lower delayed primacy recall was associated with lower hippocampal volumes, particularly in the left CA2/CA3. These findings highlight the role of primacy recall as a marker of hippocampal atrophy, while the absence of associations in the SCD group suggests that subtle hippocampal changes may not be sufficient to impact memory performance.

REFERENCES

