

24h-movement behaviors and Alzheimer's disease brain signatures and cognition in cognitively unimpaired older adults

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Microstructural brain reserve, specifically gray matter mean diffusivity, moderates the associations between 24-hour movement behaviors and cognition in older adults

INTRODUCTION

METHODS

RESULTS

CONCLUSIONS

24-hour movement behaviors, including physical activity, sedentary behavior, and sleep, have been linked to cognitive and brain health in older adults, although findings remain inconsistent. These associations may depend on **individual differences in brain reserve**.



Aims:



(1) To examine the direct associations between 24-hour movement behaviors and cognitive function in cognitively unimpaired older adults

(2) To investigate whether AD brain signatures (gray matter mean diffusivity (GMMD) and thickness/volume signatures) moderate these associations.

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89 Cognitively unimpaired older adults from AGUEDA Project (NCT05186090)

37 males (41.6%)

11.74 years (±4.90)

71.61 years (±3.85)

Movement behaviors: wrist-worn ActiGraph GT3X+ (9 days).

Cognitive domains Attention/inhibitory control, working memory, processing speed, episodic memory and visuospatial processing.

AD brain signatures Thickness/volume signature GMMD signature

Lower GMMD
PA: 280.37 min/day
Sleep: 457.70 min/day
SB: 701.48 min/day

Higher GMMD
PA: 301.37 min/day
Sleep: 443.92 min/day
SB: 694.70 min/day



Compositional Data Analysis and multiple linear regression models were used to examine associations adjusted for age, sex and education

No significant associations were observed between movement behaviors and cognitive domains (all $p > 0.05$). However, **significant interactions** were observed between **GMMD and MVPA, LPA and Sleep**.

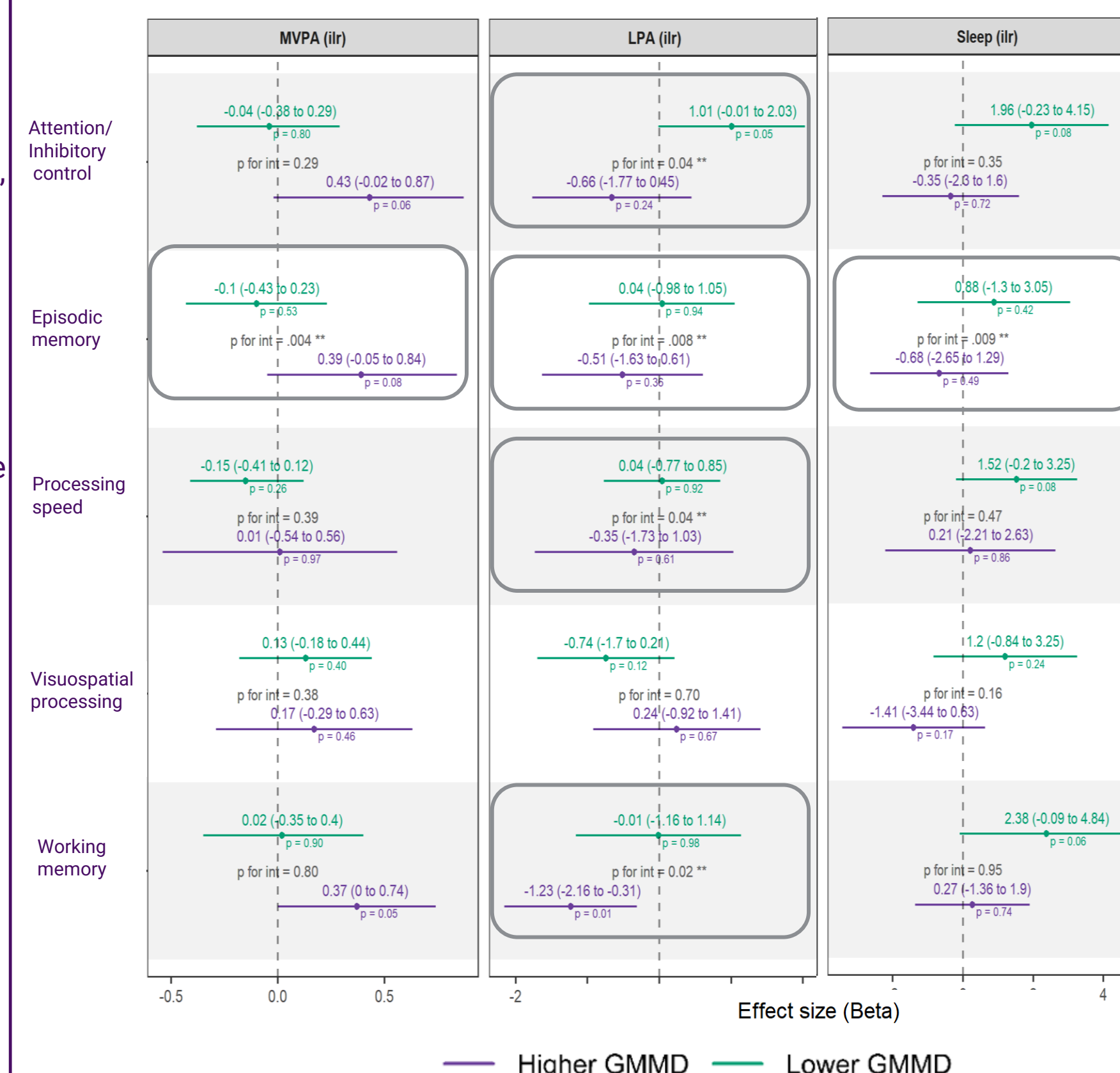
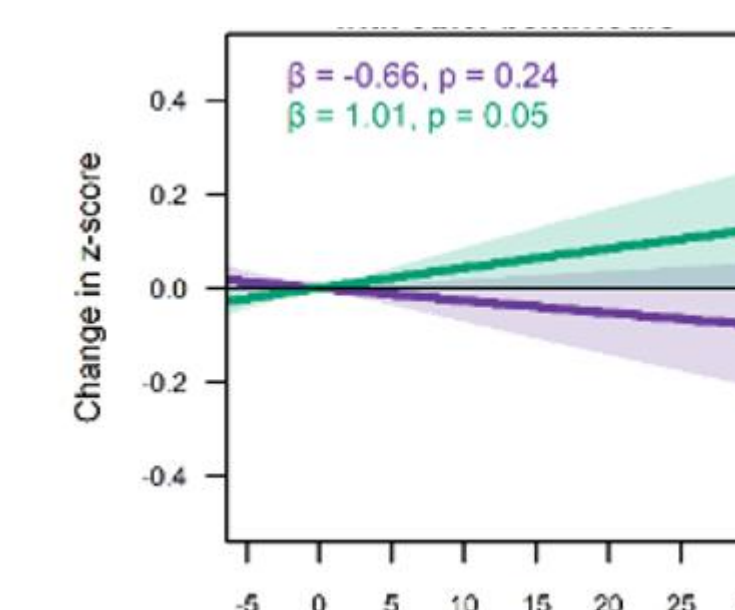
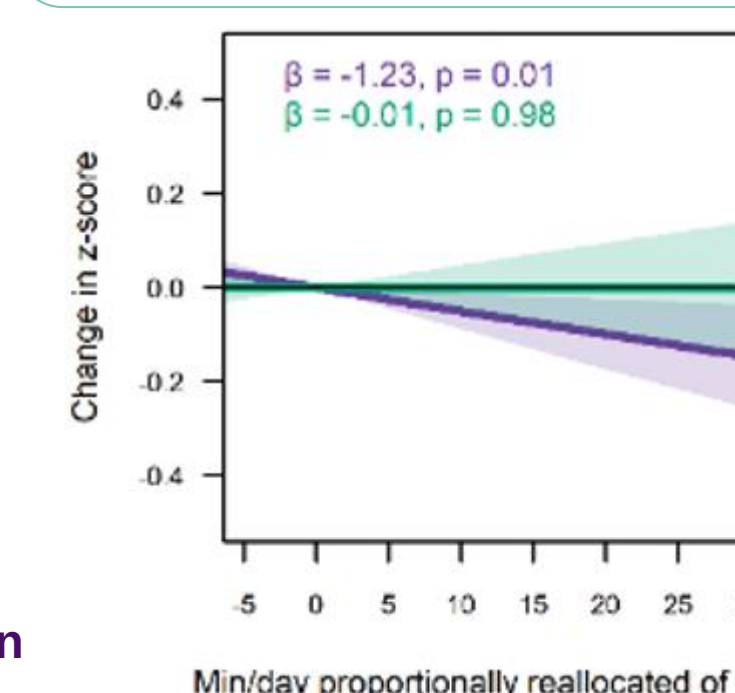


Fig 1. Regression models of movement behaviors and cognition/AD brain signatures by higher vs. lower GMMD

Lower GMMD
Reallocating time proportionally toward LPA
Better attention/inhibitory control



Higher GMMD
Reallocating time proportionally toward LPA
Poorer working memory



GMMD signature moderated several associations between movement behaviors and cognitive outcomes. These findings suggest that the cognitive relevance of daily movement behaviors may depend on **microstructural brain reserve** and support the potential utility of GMMD signatures for personalized movement recommendations in cognitive aging.

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