

Association of Gait Measures with Amyloid, Tau, and Neurodegeneration (A/T/N) Imaging Biomarkers

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Background

Gait impairment is increasingly recognized as an early and clinically meaningful marker of neurodegeneration in aging and Alzheimer's disease and related dementias (ADRD). Previous studies have linked gait dysfunction to AD-related pathology; however, the relative contributions of molecular biomarkers (amyloid and tau) and neurodegenerative brain changes to gait dysfunction remain unclear. Understanding these relationships may improve the utility of gait measures as accessible indicators of underlying ADRD processes.

Learning Objectives:

- Determine the relationships between gait performance and imaging biomarkers of amyloid deposition, tau pathology, and neurodegeneration in older adults.

Methods

Participants:

Adults enrolled in the Wake Forest Alzheimer's Disease Research Center (WFADRC) with available tau PET imaging at baseline (N = 123) were included.

Neuroimaging Biomarkers:

Baseline neuroimaging measures included amyloid PET (¹¹C]PiB global cortical SUVR), tau PET (¹⁸F]florataucipir meta-temporal SUVR), and Freesurfer-derived temporal lobe cortical thickness (TempROI).

Gait Assessment:

Gait performance was assessed using Gait Speed Time (GS) and Narrow Walk Time (NW) from the Expanded Short Physical Performance Battery (ESPPB).

Reference:

- Gras, L. Z., Kanaan, S. F., McDowd, J. M., Colgrove, Y. M., Burns, J., & Pohl, P. S. (2015). Balance and gait of adults with very mild Alzheimer disease. *Journal of geriatric physical therapy*, 38(1), 1-7.

Statistical Analyses

Outliers in gait measures were removed using an IQR-based threshold. Separate linear regression models evaluated associations of TempROI, Tau PET, and Amyloid PET measures with GS and NW performance. All models were adjusted for age, sex, and education.

Demographics

Table 1. Demographic of Sample Analyzed

Characteristic	Overall
Age (years)	68.79 ± 7.13
Female	69 (56.1%)
Education (years)	15.93 ± 2.69
Diagnostic Group	
Cognitively Normal, n (%)	45 (36.6%)
MCI, n (%)	55 (44.7%)
Dementia, n (%)	23 (18.7%)
Amyloid Positive	57 (46.3%)
Tau Positive	47 (38.2%)
Gait Speed (seconds)	4.22 ± 1.01
Narrow Walk (seconds)	4.98 ± 1.55

* Values are presented as mean ± SD or n (%).

Conclusions

- Reduced temporal lobe cortical thickness (TempROI) was significantly associated with worse GS and NW performance.
- Tau PET showed a trend-level association with NW, whereas amyloid PET was not associated with either gait measure.
- Neurodegeneration demonstrated stronger associations with gait performance than molecular AD biomarkers.
- Gait measures may serve as accessible indicators of underlying neurodegenerative changes in aging and AD.

Results

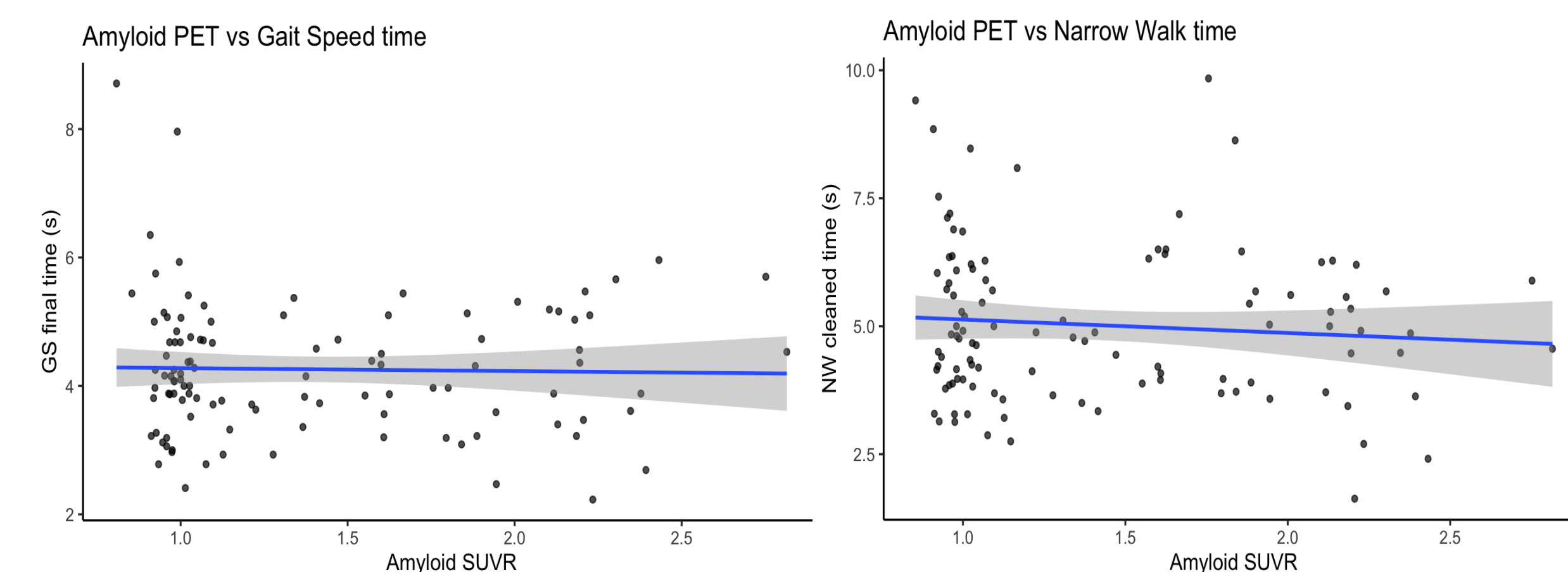
Table 2. Associations Between Imaging Biomarkers and Gait Outcomes

Outcome	TempROI	Tau PET	Amyloid PET
Gait Speed (GS)	$\beta = -1.47$, $p = 0.0099$	$\beta = 0.16$, $p = 0.53$	$\beta = -0.05$, $p = 0.80$
Narrow Walk (NW)	$\beta = -1.80$, $p = 0.0469$	<i>$\beta = 0.76$, $p = 0.056$</i>	$\beta = -0.27$, $p = 0.33$

* β values represent standardized regression coefficients from models adjusted for age, sex, and education. Significant associations ($p < 0.05$) are shown in bold; trend-level associations ($0.05 \leq p < 0.10$) are italicized.

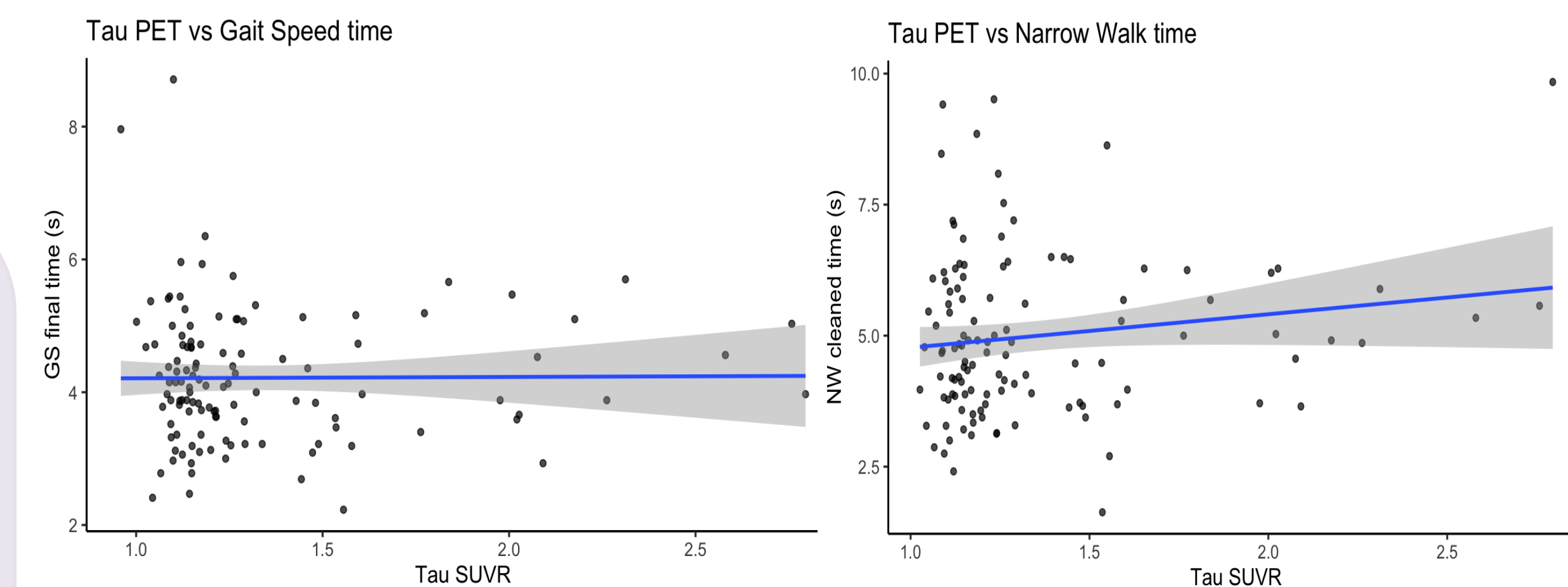
Results Continued

Amyloid PET



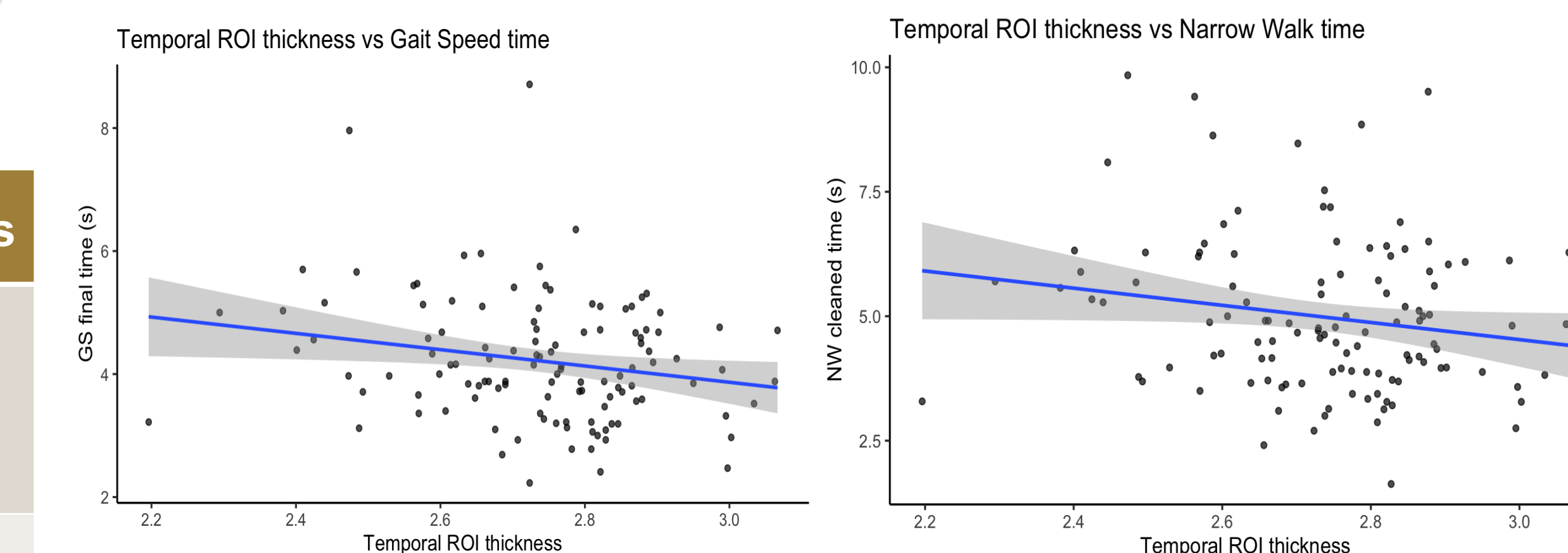
Amyloid PET was not significantly associated with GS or NW performance.

Tau PET



Tau PET showed a trend-level association with NW ($\beta = 0.76$, $p = 0.056$) but not GS.

Temporal Lobe Cortical Thickness



Temporal lobe atrophy was significantly associated with worse GS and NW performance.

Evaluate whether gait measures can serve as accessible clinical indicators of neurodegeneration and Alzheimer's disease progression.

Future directions

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