



Diagnostic Accuracy of Remote Self-Administered Digital Cognitive Tests by Clinical Diagnosis and Alzheimer's Disease PET Biomarkers

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BACKGROUND

- Cognitive status informs eligibility for Alzheimer's disease (AD) anti-amyloid treatment, but comprehensive neuropsychological evaluation is not always feasible
- Remote, self-administered, digital cognitive assessments, such as Mayo Test Drive, could characterize cognition for available treatments and clinical trials, provided they accurately differentiate cognitively unimpaired (CU) from mild cognitive impairment (MCI) and mild dementia (DEM) and show sensitivity to AD pathology

OBJECTIVES

- Investigate diagnostic accuracy of MTD for distinguishing CU from MCI/DEM
- Compare MTD to in-person cognitive measures and demonstrate AD sensitivity by examining diagnostic accuracy for amyloid (A+) and tau positivity (T+) independent of cognitive status

RESULTS

TABLE 1: MTD composite area under the receiving operator curve and effect sizes for group comparisons

Outcome	Categories	n1	n2	N	Effect Size	Observed MTD AUC (95% CI)
Clinical Diagnosis	CU vs MCI/DEM	2131	118	2249	-1.90	.89 (.86, .92)
Subgroup	CU vs MCI	2131	96	2227	-1.78	.88 (.85, .92)
Subgroup	CU vs DEM	2131	22	2153	-2.42	.94 (.89, .99)
Subgroup	CU A- vs MCI/DEM A+	836	51	887	-2.56	.95 (.92, .97)
Subgroup	CU A- vs MCI A+	836	34	870	-2.30	.93 (.89, .97)
Biological AD, all	A-T- vs A+T+	790	115	905	-1.18	.76 (.71, .81)

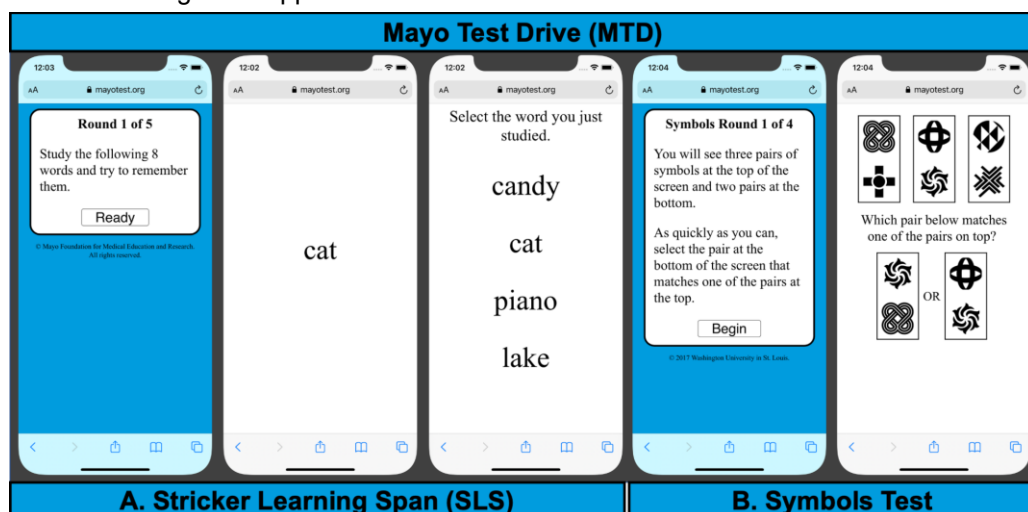
- MTD composite showed excellent discriminability for CU vs MCI/DEM (**AUC=.89**), outperforming a model with demographics alone ($p < .001$; age, sex, education AUC=.69)
- Adding amyloid status to diagnostic groups (CU/A- vs MCI/DEM/A+) improved discriminability (**AUC=.95**)
- MTD composite showed moderate discriminability of A-/T- vs A+/T+ (AUC=.76; 93.5% CU sample)
- A model with MTD and demographics improved biomarker group prediction ($p=.009$, AUC=.86; 95% CI=.82-.89)
- MTD composite **outperformed the MMSE** ($p=.02$) and **performed comparably to Mayo-PACC** ($p=.71$) in discriminating A-/T- vs A+/T+

MAYO TEST DRIVE (MTD)

MAYO TEST DRIVE: Test Development through Rapid Iteration, Validation and Expansion

Web-based platform optimized for remote self-administered cognitive assessment including:

- Stricker Learning Span (SLS):** computer adaptive word list memory test based on cognitive science principles
- Symbols:** measure of processing speed/executive function adapted from the Ambulatory Research in Cognition App

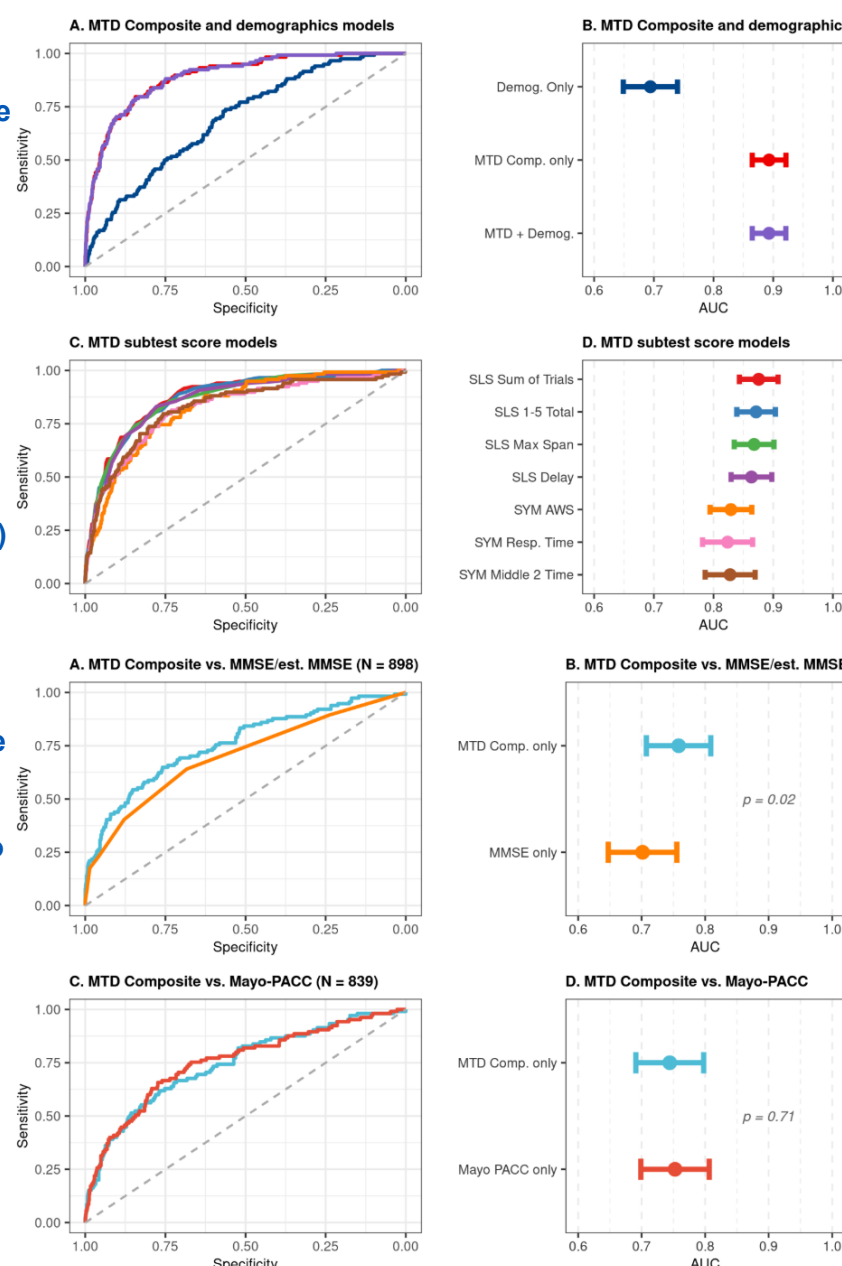


METHODS

- 2,249 participants (2,121 CU/96 MCI/22 DEM) from the Mayo Clinic Study of Aging and Alzheimer's Disease Research Center (age=70±12 years; 48% male; education=16±2 years; 95% White) **completed MTD remotely and unsupervised**
- A subset (n=1,224; 93.5% CU) completed amyloid and tau PET within three years of MTD
 - A+ cut-off ≥25 Centiloid and T+ cutoff ≥1.29 SUVR
- Logistic regression estimated associations between MTD composite performance and group status with AUCs and 95% CIs. *A priori* AUC was .85 for CU vs MCI/DEM. For A-/T- vs A+/T+, we expected MTD to perform similarly to MMSE and Mayo-PACC. AUCs between non-nested models were compared via concordance.

FIGURE 1: Model performance for predicting clinical diagnosis: cognitively unimpaired (n=2131) versus cognitively impaired (n=118 with MCI or DEM)

FIGURE 2: Model performance of MTD composite compared to in-person cognitive tests in predicting abnormal amyloid and tau PET (A-T- vs A+T+)



CONCLUSIONS

- MTD composite exceeded the *a priori* threshold for differentiating CU from MCI/DEM
- Results support MTD's criterion validity through sensitivity to AD pathology
- MTD is a scalable tool for assessing cognitive status as one component of monoclonal antibody treatment eligibility and for clinical trial use

REFERENCES

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See QR Code for additional citations.



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