

Detecting Mild Cognitive Impairment on a Smartphone: The Validation of MyCog Mobile

P3-06

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MyCog Mobile uses a parsimonious 6-predictor, adaptive smartphone screener to detect MCI with clinically meaningful accuracy (corrected AUC = 0.812), supporting EHR-integrated remote screening in primary care.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS	REFERENCES																				
Background - Up to 90% of mild cognitive impairment (MCI) cases are missed in primary care, where most older adults receive care. - Most difficult to detect the earliest stages of impairment, including MCI - Longer assessments improve detection precision but raise patient burden and lower completion. - MyCog Mobile is an NIH-funded smartphone screener self-administered before a primary care visit, with results sent to the EHR. Objectives - Develop and validate a parsimonious, clinically interpretable model to detect MCI from MyCog Mobile. - Reduce patient burden via adaptive task administration without sacrificing accuracy. 	Sample & Measures - Sample: N = 277, age ≥ 65. MCI n = 100 (EHR-confirmed; advanced dementia excluded); normal cognitive aging n = 177 (Mini-Cog ≥ 3). - Self-administered on study iPhones in a standardized environment. - Measures: MySorting (executive function); MyFaces (associative memory: First Letter, Matching); MyPictures (episodic memory: practice, Trial 1, Trial 2). Education included as a predictor. Prediction Model - Harrell/RMS: prespecified 10-predictor logistic model → structured backward elimination → final 6 predictors. 2000-bootstrap internal validation; sensitivity analyses vs. LASSO, Ridge, Elastic Net. - Decision curve analysis to estimate net clinical benefit at the recommended threshold. Adaptive Stepped Protocol - Tasks ordered by Wald χ^2 informativeness. - At each step, 100,000 empirical MyPictures profiles form a predictive interval; if ≥ 95% fall on one side of the threshold, remaining tasks are skipped. - Evaluated by leave-one-out cross-validation; agreement vs. full battery and ΔAUC reported.	0.812 Corrected AUC 0.92 Calibration slope 75% MCI-specific accuracy Predictor Contribution (Wald χ^2) <table><tr><td>MySorting</td><td>29.6</td></tr><tr><td>MyFaces-Match</td><td>18.0</td></tr><tr><td>MyFaces-Letter</td><td>17.6</td></tr><tr><td>Education</td><td>13.2</td></tr><tr><td>MyPic-total</td><td>11.8</td></tr><tr><td>MyPic-practice</td><td>9.9</td></tr></table> Participants classified at each decision point <table><tr><td>Initial (Edu + MyFaces + MySorting)</td><td>92 (33.2%)</td></tr><tr><td>+ MyPictures Practice</td><td>71 (25.6%)</td></tr><tr><td>+ MyPictures Trial 1</td><td>68 (24.5%)</td></tr><tr><td>Full battery</td><td>46 (16.6%)</td></tr></table>	MySorting	29.6	MyFaces-Match	18.0	MyFaces-Letter	17.6	Education	13.2	MyPic-total	11.8	MyPic-practice	9.9	Initial (Edu + MyFaces + MySorting)	92 (33.2%)	+ MyPictures Practice	71 (25.6%)	+ MyPictures Trial 1	68 (24.5%)	Full battery	46 (16.6%)	Conclusions - A parsimonious 6-predictor smartphone model detects MCI with stable, clinically meaningful accuracy (corrected C = 0.812, 75% accuracy, calibration slope 0.92). - Adaptive testing allows most participants (~83%) complete a shortened battery while preserving full-battery accuracy (ΔAUC = 0.008, 100% classification agreement). - Roughly 1 in 3 patients can skip the burdensome MyPictures task entirely; only 1 in 6 require the full battery. - Decision-curve analysis suggests meaningful net clinical benefit: ≈ 28 additional MCI cases identified and ≈ 47 unnecessary referrals avoided per 100 patients. - Together, the parsimonious model and adaptive administration support a clinically feasible, EHR-integrated MCI screener for primary care. Limitations - Single-sample internal validation; LOO-CV mitigates but does not establish real-world generalizability. - Two recruitment pipelines; sample less diverse than the target primary-care population — prospective external validation is warranted. - MCI ascertainment via EHR may miss subclinical or undiagnosed cases in the normal cognitive aging comparator.	- Young SR, et al. Clinical Validation of MyCog Mobile: Development of a Parsimonious and Clinically Interpretable Prediction Model for MCI. <i>JAMIA Open</i>. 2026. - Young SR, et al. A comparison of high performance on remote vs. in-person self-administered neuropsychological measures: the Mobile Toolbox and MyCog Mobile. <i>J Clin Exp Neuropsychol</i>. 2025. - Young SR, et al. MyCog Mobile smartphone-based cognitive screening system: a cross-sectional construct validation in a general population sample at multiple research facilities in the USA. <i>BMJ Open</i>. 2025. - Young SR, et al. An Initial Exploratory Examination of the Sensitivity and Specificity of MyCog Mobile Using the Mini-Cog as a Proxy for Suspected Cognitive Impairment. <i>J Prim Care Community Health</i>. 2024. - Young SR, et al. Protocol for a construct and clinical validation study of MyCog Mobile: a remote smartphone-based cognitive screener for older adults. <i>BMJ Open</i>. 2024. - Young SR, et al. Remote Self-Administration of Cognitive Screeners for Older Adults Prior to a Primary Care Visit: Pilot Cross-Sectional Study of the Reliability and Usability of the MyCog Mobile Screening App. <i>JMIR Formative Research</i>. 2024. - Young SR, et al. Remote Cognitive Screening of Healthy Older Adults for Primary Care With the MyCog Mobile App: Iterative Design and Usability Evaluation. <i>JMIR Formative Research</i>. 2023. CONTACT Funding: NIA 1R01AG074245-01 Contact: stephanieruth.young@northwestern.edu  
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