

Evaluation of MoCA MIS As a Predictor of RBANS DMI in AD Trials

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CLINICAL FRAMEWORK

The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) Delayed Memory Index (DMI) is a common way to look for the typical amnesic profile of Alzheimer's disease in clinical trials. A challenge faced clinically is how to predict the RBANS DMI without introducing a learning bias.

BACKGROUND

The RBANS Delayed Memory Index (DMI) is widely used as a screening assessment in Alzheimer's disease (AD) clinical trials. Research sites and sponsors continue to seek pre-screening tools that can reliably predict RBANS outcomes and reduce screen fail rates. The International Shopping List Test (ISLT) has been utilized as one such pre-screening measure in an industry-sponsored AD trial (Roche, Screening Study to Determine Individuals With Potential Trial Eligibility for Alzheimer's Disease Studies [TRAVELLER]; ClinicalTrials.gov NCT07177352); however, ISLT passing scores (i.e., scores low enough to qualify) were less predictive of RBANS DMI passing scores than the site's inhouse pre-screening protocol (INPUT – CNS Protocol number: 013; IRB number: Pro00083444). This limited predictive utility is consistent with documented instrument-level discordance between the ISLT and independent cognitive reference batteries, with agreement reported at only 66.1% in the MissionAD pre-screening cohort (Albala et al., CTAD 2017), which aligns closely with our site's experience.

A general concern with deploying a verbal list-learning measure immediately prior to the RBANS is the risk of proactive interference suppressing delayed memory scores and paradoxically inflating screen-fail rates (Mossbarger et al., 2012; Spencer et al., 2017). We hypothesized that low Montreal Cognitive Assessment (MoCA) Memory Index Score (MIS) values, and specifically low MoCA MIS multiple-choice subscores, might serve as more reliable predictors of RBANS – DMI eligibility than other tools.

METHODS

An in-depth analysis of our prescreening dataset was conducted to evaluate the relationship between MoCA MIS scores, including the multiple-choice subscore, and RBANS DMI outcomes. Correlational analyses were performed to assess the strength and direction of associations between these measures.

MoCA Memory — Core (DMI) Analysis

Five-word delayed recall scored in three sequential tiers. Denominator of each tier = words still missed after the prior tier.

- **Tier 1** — Free recall (1st pass): $x / 5$
- **Tier 2** — Category cue: $x / \text{remainder} (\leq 5)$ (only words missed in Tier 1)
- **Tier 3** — Multiple choice: $x / \text{remainder}$ (only words still missed after Tier 2)

MIS (Memory Index Score) = (Tier 1 $\times$ 3) + (Tier 2 $\times$ 2) + (Tier 3 $\times$ 1), max = 15

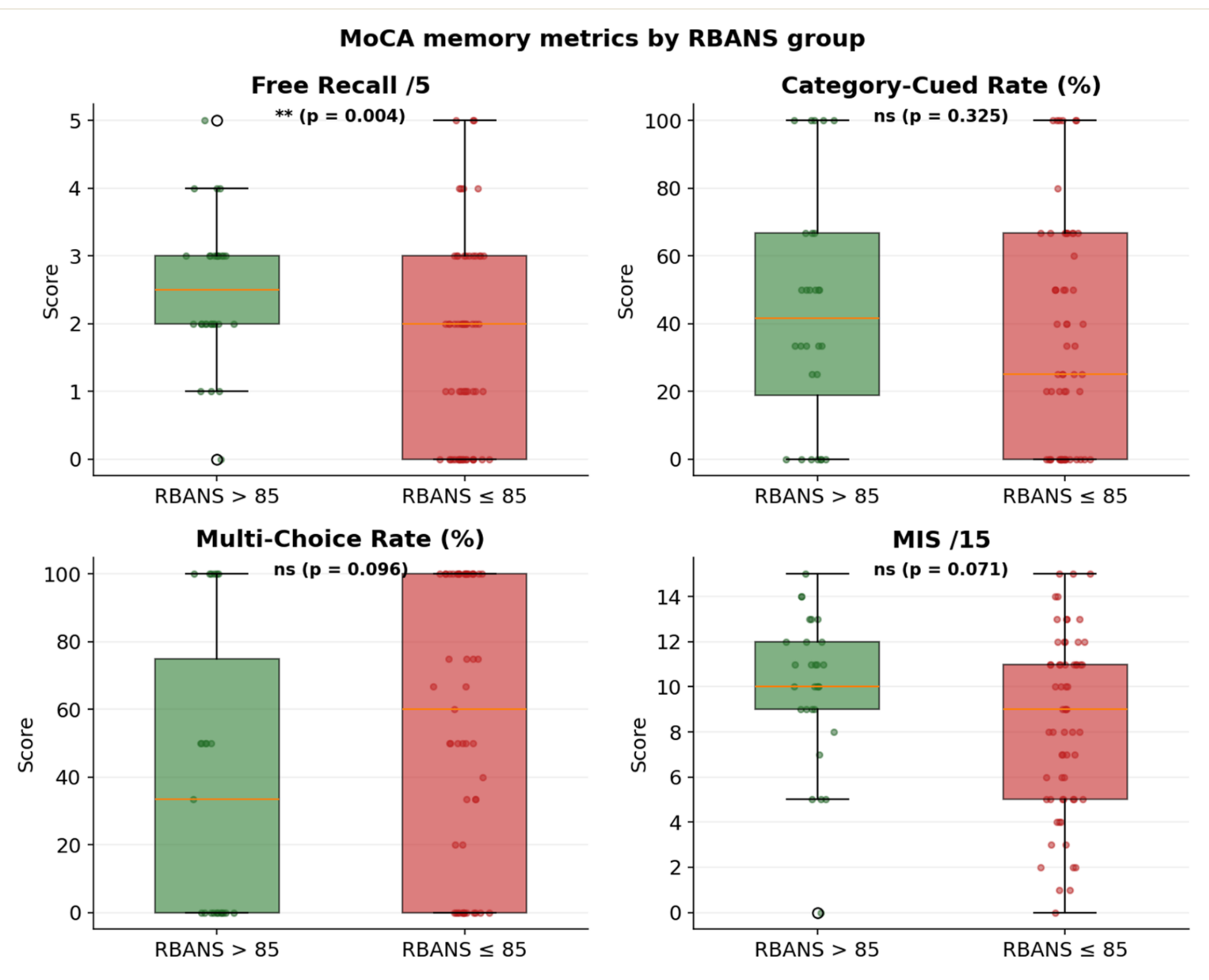


Figure 1. Distributions of MoCA memory subscores by RBANS group. Jittered points overlaid on boxplots.

RESULTS

Only a weak positive correlation was observed between the overall MoCA MIS score and RBANS DMI ($R = +0.24$), along with a weak negative correlation between the MoCA MIS multiple-choice sub score and RBANS DMI ($R = -0.13$). Although portions of these assessments appear conceptually parallel, such as a 5-word delayed recall task, MoCA MIS performance did not meaningfully predict RBANS DMI outcomes.

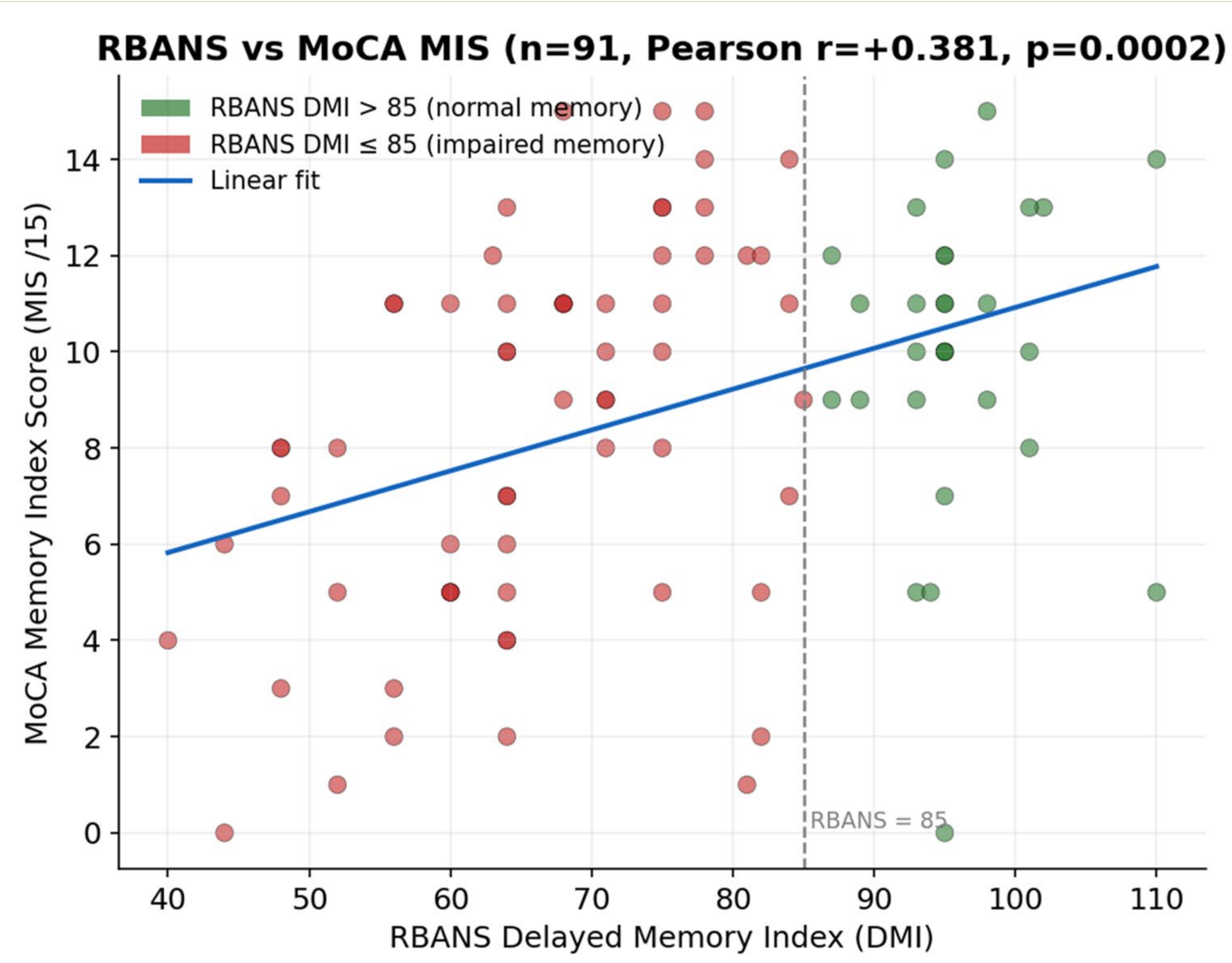


Figure 2. RBANS vs MoCA MIS. Moderate positive correlation (Pearson $r = +0.40$, $p < 0.001$, $n = 89$).

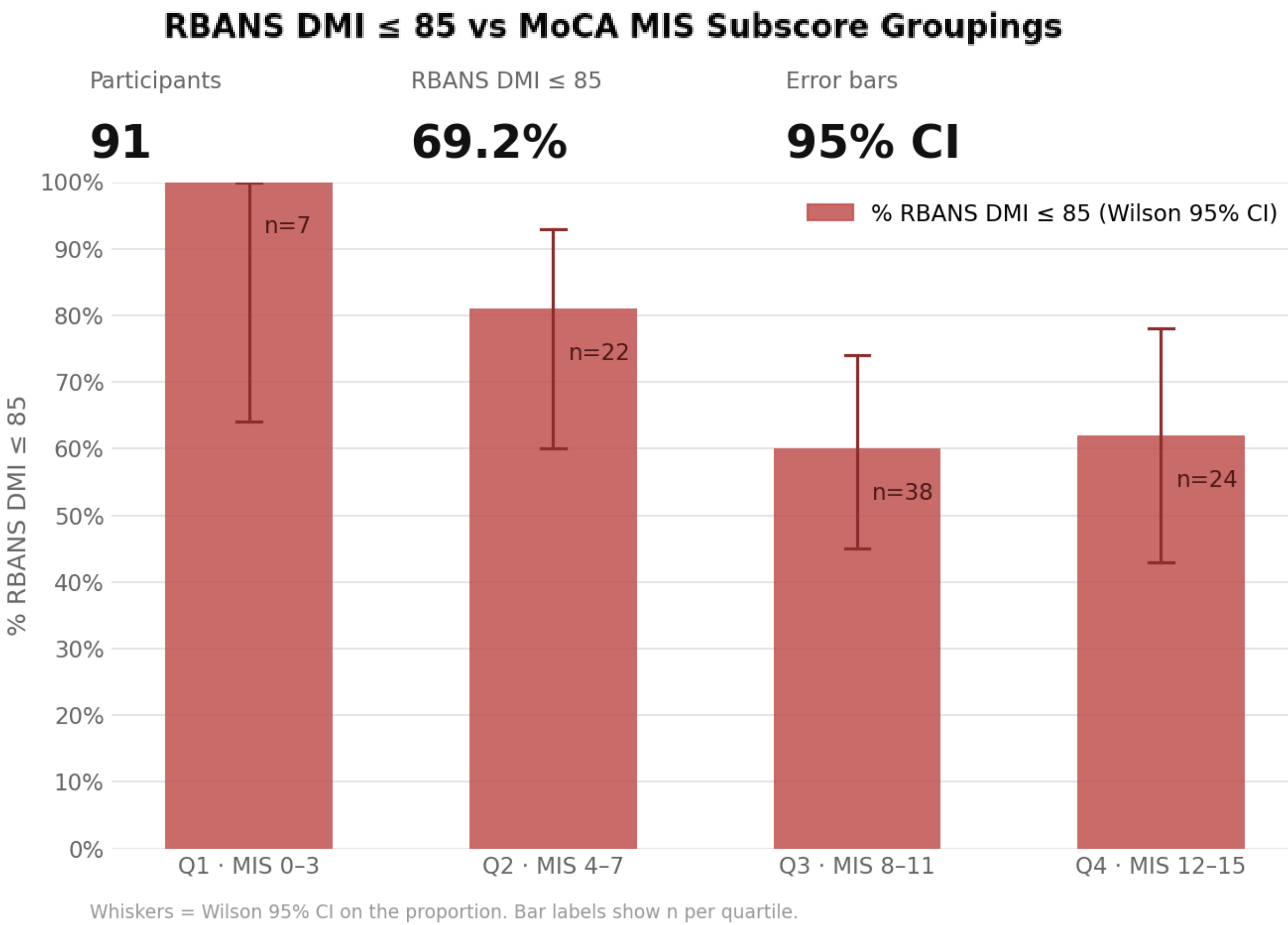
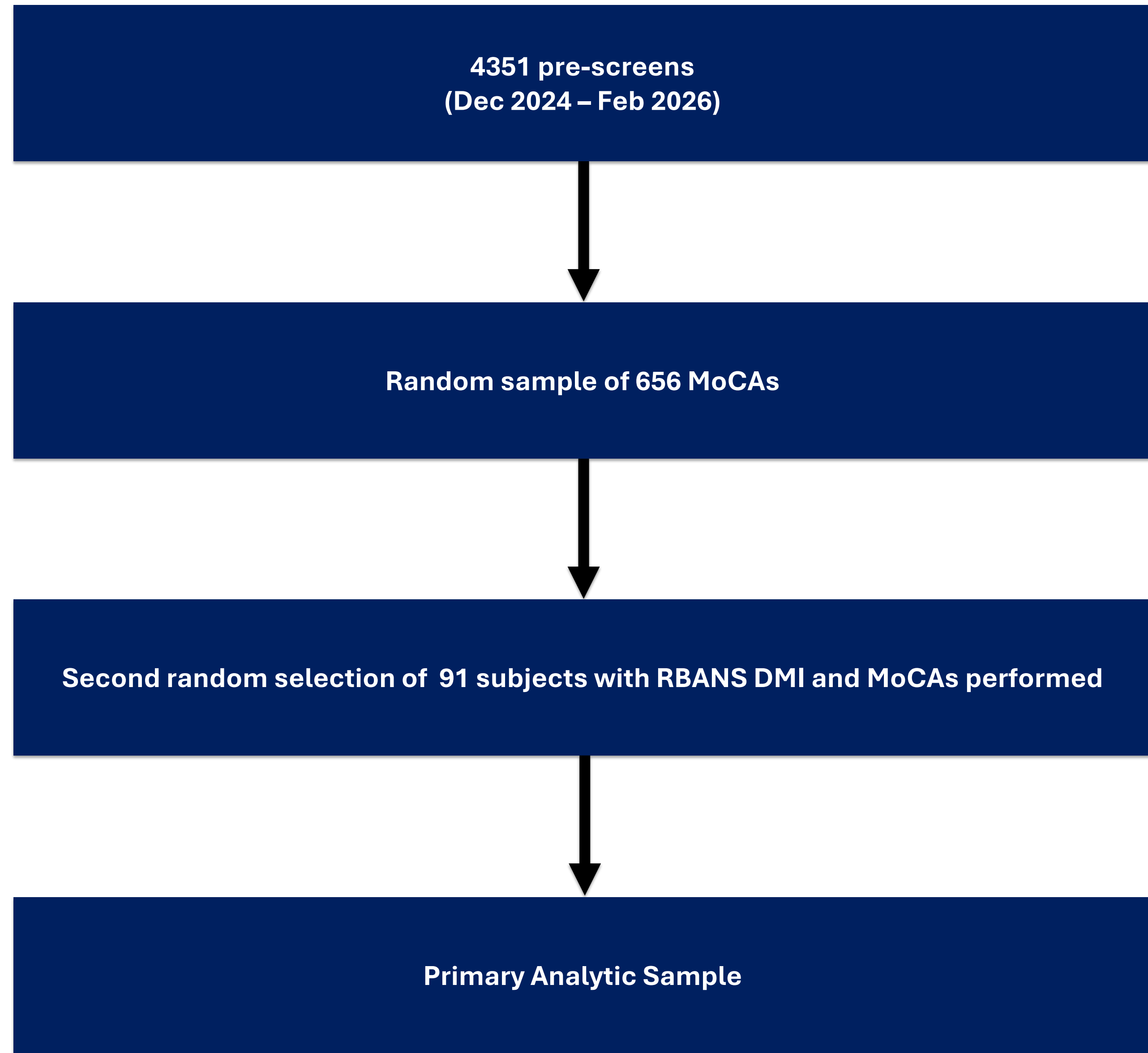


Figure 3. RBANS DMI pass rates by MoCA MIS subscore grouping.

STUDY SAMPLE FLOW

Figure 4: Study Sample Flow – MoCA corpus to DMI-predictive subset



KEY FINDINGS

Analyzing the data by score groups reveals a clear predictive relationship. While our initial overall hypothesis was not supported, subgroup analysis shows that very low MIS scores strongly predict low RBANS scores. In sum, lower MIS scores are reliable indicators of lower RBANS performance; though this relationship weakens at higher scores, it is highly visible within the lower quartiles.

LIMITATIONS

- Single-site retrospective cohort; prospective replication needed.
- RBANS DMI is used as reference standard, not neuropathological confirmation.
- MoCA cue-breakdown recovered via AI-assisted re-extraction (Claude Opus 4.7); ~2% of forms did not yield a complete breakdown — all paired with rendered audit images for review.
- Multi-Choice Rate analysis excludes patients ineligible for the MC stage ($n = 76$); wider CI than single metrics.
- Cohort is memory-clinic-enriched — phenotype proportions will not generalize to general-population screening.

CONCLUSIONS AND FUTURE DIRECTIONS

This analysis reinforces the robustness of the RBANS DMI as an independent and reliable screening tool and highlights the limitations of using just the MoCA MIS or its subcomponents as surrogate predictors of RBANS performance.