

Remote Speech-Based Digital Cognitive Markers Capture Longitudinal Change Beyond Standard Clinical Measures



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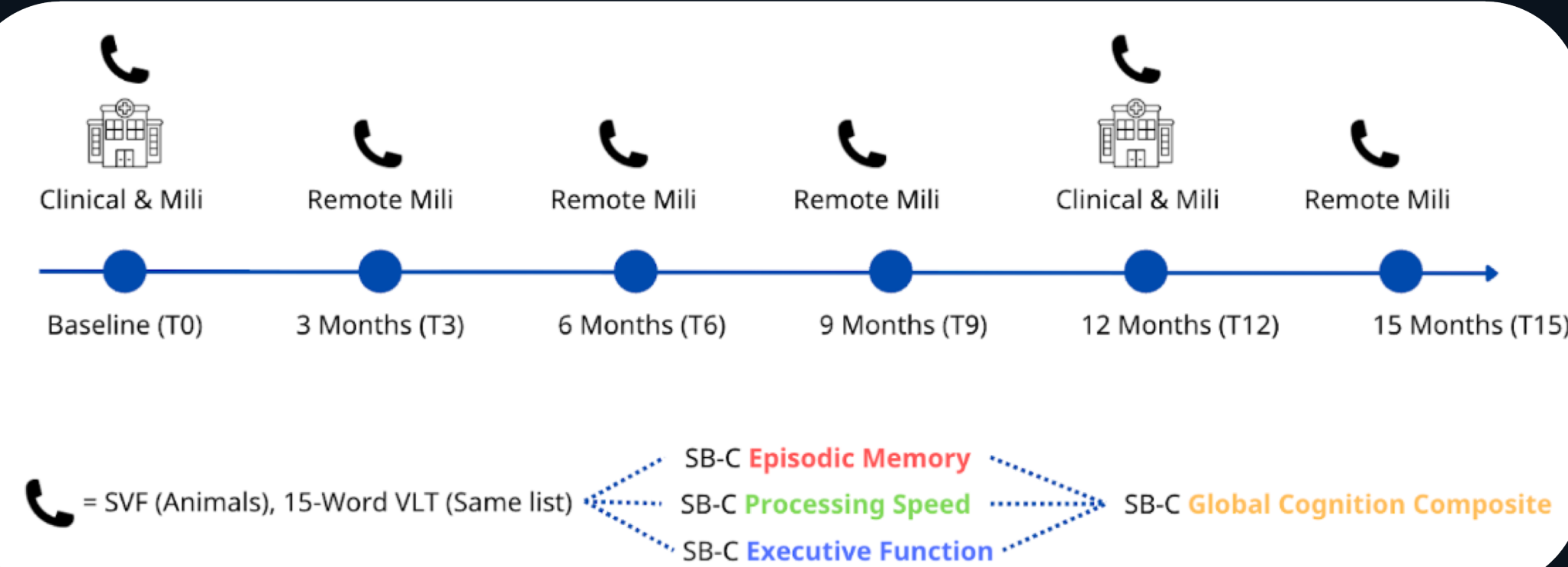
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Introduction

Scalable and low-burden tools are needed to detect and monitor early cognitive changes indicative of pathological ageing. Speech-based assessments can provide high-frequency, remote cognitive monitoring. Here, we examined longitudinal trajectories of a **speech-based composite score of cognition (SB-C)**, and its domain-specific scores, over repeated assessments. We also assessed 12-month change captured by **paper-pencil neuropsychological measures**.

Methods

PROSPECT-AD¹:
DELCODE/DESCRIBE



Participants: $N = 176$ participants, spanning healthy controls (HC), subjective cognitive decline (SCD) and mild cognitive impairment (MCI).

Statistics: Linear mixed-effects models examined longitudinal SB-C trajectories adjusting for covariates and participant-specific random effects. Estimated slopes and marginal means changes from baseline were derived. Annual change in clinical measures was assessed using paired Wilcoxon tests.

Results

Cross-sectionally MCI showed consistently lower SB-C scores compared to HC/SCD. Longitudinally, **SB-C scores significantly improved over time** in all diagnostic groups, indicating **practice effects-related (PEs) gains (Fig.1)**. When adjusting for these potential PEs, group-specific slopes were attenuated, especially for MCI individuals. The SCD group still demonstrated a significant improvement over time across almost all SB-C scores. **Paper-pencil clinical measures exhibited minimal 12-month change (Fig.2).**

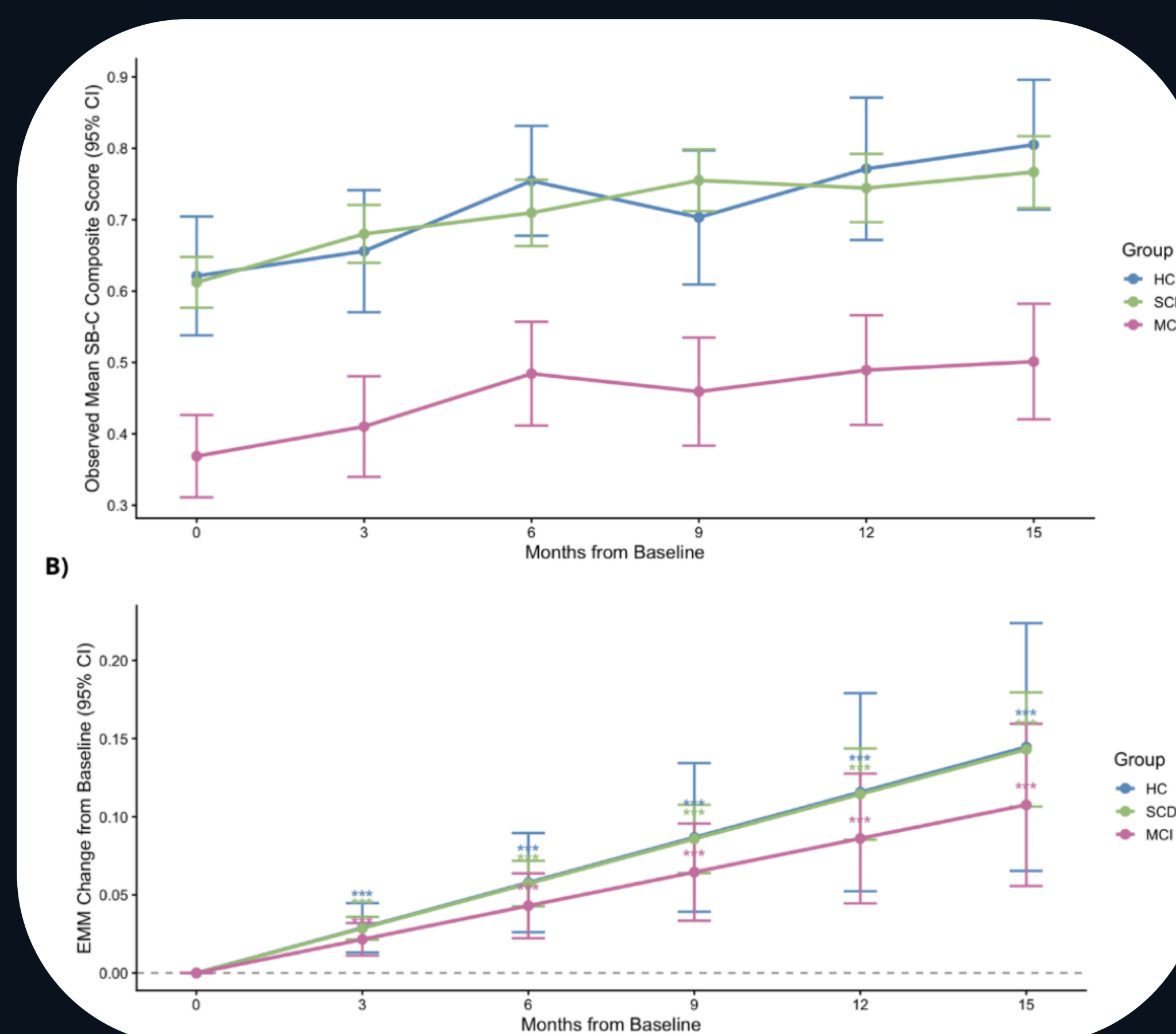


Figure 1. Longitudinal trajectories and adjusted change from baseline in SB-C global composite score.

Conclusion

SB-C scores can reliably **differentiate diagnostic groups at a cross-sectional level and additionally capture PE-related trajectories over repeated short-interval assessments**. SB-C is a promising digital remote cognitive assessment tool, while future longitudinal endpoint work should explicitly address PEs through design and modeling.

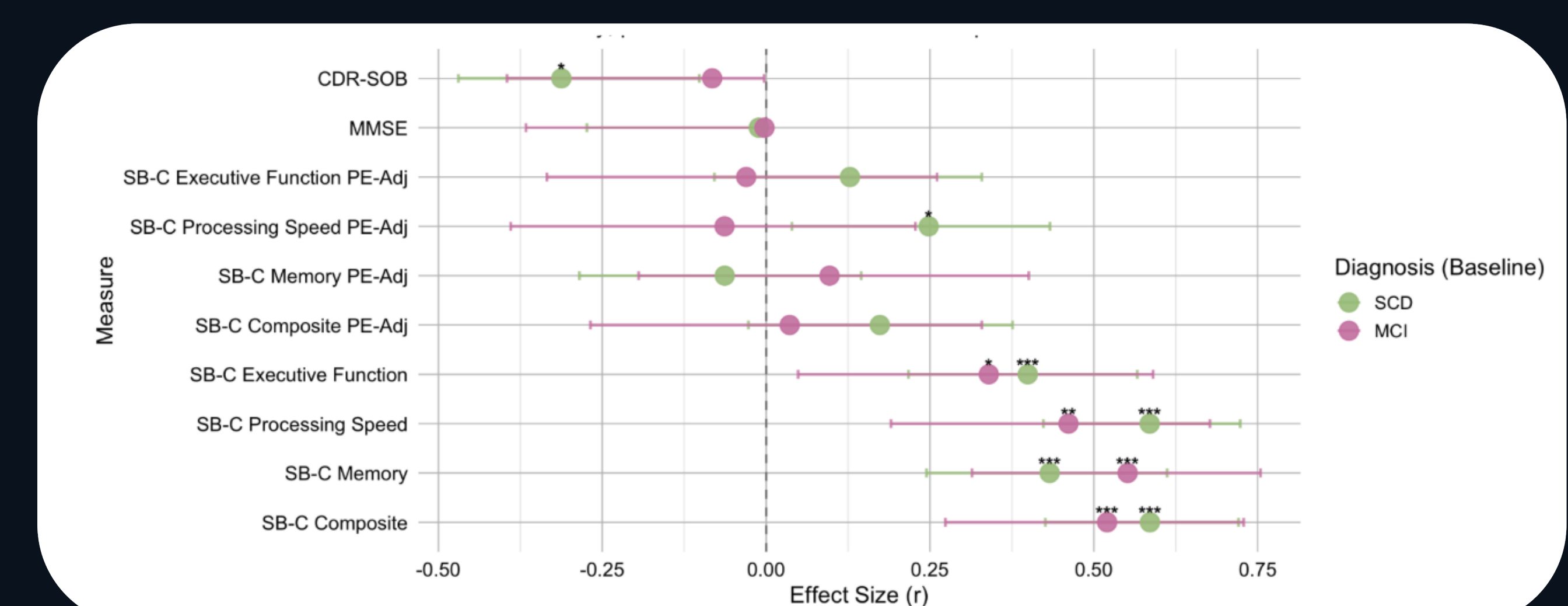


Figure 2. Effect sizes of 12-month change in global clinical and SB-C measures (raw and PE-Adjusted) in the SCD and MCI groups.

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