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BIOMARKERS

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BIOMARKERS (NON-NEUROIMAGING)

Psychometric properties of ViewMind Atlas™: a Digital Cognitive Biomarker for Alzheimer's disease

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Abstract

Background: ViewMind Atlas™ detects patients with or at risk of Alzheimer's disease (AD) with high precision (Fernandez et al., 2022). It incorporates a head-mounted display (HMD), which measures eye-tracking behaviors during five validated visual tasks. The biomarker identifies carriers of autosomal dominant mutations in preclinical and prodromal stages and prospectively predicts, with over 96% accuracy, sporadic MCI to AD conversion within a 3-year window (Parra et al., 2022). ViewMind Atlas™ correlates with blood-based biomarkers linked to inflammatory mechanisms in preclinical AD (Parra et al. (2024). We investigated the psychometric properties of this promising neurocognitive biomarker in a prospective clinical study (clinicaltrials.gov, ID NCT06746844).

Methods: Participants with and without cognitive complaints ($n = 141$) were assessed with ViewMind Atlas™, MoCA, and neuropsychological tests. We explored test-retest reliability using Kendall's coefficient of concordance (W) ($n = 27$, Age: 59.7±9.2, Education 14.7±4, 22 female), construct validity using Pearson correlations (whole sample aged 45–95 years), and Discriminability between self ($n = 48$) vs clinic referrals ($n = 41$) (Age: 66.2±10, Education 13±7.7, 65 female) using t-tests.

Results: All ViewMind Atlas™'s domains (Working Memory, Perception, Processing Speed, Sustained Attention, Selective Attention, Executive Function, and the overall Composite) showed high test-retest agreement (W range: 0.82-0.89, all $p < 0.05$). ViewMind metrics significantly correlated with neuropsychological tests of equivalent constructs (Executive Function vs. MoCA Executive, r=0.329, $p < 0.01$, Sustained Attention vs. MoCA Attention, r=0.354, $p < 0.01$; Processing Speed vs. DSST, r=0.548, $p < 0.01$, Working Memory vs. ROFC, r=0.3836, $p < 0.01$). Self-referrals presented with a more pronounced amnesic and dysexecutive profile than clinic-referrals, as informed by ViewMind Atlas™ and traditional assessments.

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Conclusion: ViewMind Atlas™ is psychometrically valid. Its test-retest reliability confirms its usefulness for serial testing. Its convergent validity relative to traditional neuropsychological tests endorses the proposed constructs and the theory-driven nature of this novel neurocognitive biomarker. ViewMind Atlas™ discriminability (self vs clinic referrals) confirms its clinical utility in assessing older adults worried about their brain health who seek healthcare.

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