

# Repeated and Brief Assessment of Real-World Cognitive Performance and Influencing Factors

**Submitter** Raymond Hernandez

**Affiliation** University of Southern California

## SUBMISSION DETAILS

**I agree to provide poster pdf for attendee download.** Yes

**I have used the poster abstract template to develop my abstract.** Yes

**Methodological Issue Being Addressed** Traditional neuropsychological testing is typically conducted in controlled environments (e.g., a private office) and often involves having trained professionals administer large assessment batteries. Such testing provides a single comprehensive snapshot of people's cognitive capacity under optimal conditions. In contrast, briefer, unsupervised ambulatory cognitive assessments capture people's cognitive performance in their everyday natural environments and have greater ecological validity. A deeper understanding of how contextual factors affect real-life cognitive performance in non-clinical populations is necessary. Such information would provide a reference against which to compare how such factors influence cognitive performance in populations with CNS disorders.

**Introduction** Building on these methodological considerations, the present study examined how everyday contexts shape cognitive functioning outside controlled settings. We investigated how a range of contextual conditions, including distractors, prior activity, substances just taken, and mood, impact real life cognitive performance in a non-clinical U.S. sample.

**Methods** Over a 10-day period, a non-clinical sample of 393 U.S. adults (20-79 years, 70% White) completed daily smartphone-based cognitive tests and surveys within their natural environments. Eight validated self-administered tests (Paolillo et al., 2024) were completed daily, and a total of 20,622 tests were taken by all participants over the study. Additionally, participants completed an ecological momentary assessment survey in conjunction with their cognitive tests, and survey response times, which prior research suggest can serve as an approximation of processing speed (Hernandez et al., 2025), were passively recorded. Domains covered by the ambulatory cognitive tests included processing speed, working memory, recognition memory, response inhibition, and cognitive flexibility. The data were examined using multilevel regression analysis. To enhance interpretability, estimates for binary predictors were reported as Cohen's  $d$  effect sizes, where 0.2, 0.5, and 0.8 can be interpreted as small, moderate, and large effects respectively. Estimates for continuous predictors were estimated as standardized betas  $\beta$ , where effects of 0.1, 0.3, and 0.5 can be interpreted as small, medium, and large effects respectively.

**Results** The average adherence per participant was 88% (SD 21%). Distracting conditions were linked to a moderate decline in processing speed and working memory performance (range from  $d = -.27$  to  $d = -.79$ ). Being alone was significantly associated with a faster survey response time ( $d = .58$ ), better visual working memory ( $d = .22$  and  $d = .42$  on another test), and better recognition

memory ( $d = .36$ ). Cognitive domains were consistently negatively affected by difficulty concentrating (range from  $\beta = -.03$  to  $\beta = -.12$ ) and positively affected by higher energy or excitement (range from  $\beta = .04$  to  $\beta = .07$ ), with small effect sizes. Lower sadness, less stress, and more momentary happiness had small but statistically significant associations with better performance on three cognitive assessments. Notably, Memory List task scores (recognition memory) and survey response times (processing speed) were associated with the widest range of contextual factors, including reporting distraction, being at home versus away from home, mood, anxiety, stress, and energy level.

**Conclusion** Participants in a non-clinical U.S. sample demonstrated better real-world cognitive performance when they experienced fewer distractions, were alone, maintained greater focus, felt more energized or excited, and reported higher levels of happiness. Results here can provide a non-clinical population reference against which to compare how contextual conditions impact different domains of cognitive performance in people with CNS disorders.

### Co-Authors

**Raymond Hernandez**<sup>1</sup>, Briana NC Chronister<sup>2</sup>, Emma Parrish<sup>2</sup>, Phillip Harvey<sup>3</sup>, Stefan Schneider<sup>1</sup>, Laura Campbell<sup>2</sup>, Raeanne C Moore<sup>2</sup>

<sup>1</sup> University of Southern California

<sup>2</sup> University of California San Diego

<sup>3</sup> University of Miami

### Keywords

#### Keywords

ecological momentary assessment

mobile cognitive testing

processing speed

memory

**Guidelines** I have read and understand the Poster Guidelines

**Disclosures** RCM is a co-founder, has equity interest, and is a consultant for NeuroUX. The terms of this arrangement have been reviewed and approved by UC San Diego in accordance with its conflict of interest policies. Emma Parrish and Laura Campbell are consultants for NeuroUX.