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

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## Issue and Purpose

**Methodological Issue:**

- Traditional neuropsychological testing is typically conducted in controlled environments and provide a single snapshot of people's cognitive capacity under optimal conditions.
- 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 needed to provide a reference against which to compare how such factors influence cognitive performance in populations with CNS disorders.

**Purpose**:

- 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 NeuroUX 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.
- The data were examined using multilevel regression analysis with each cognitive test score regressed on each contextual condition predictor (person-mean centered) in separate practice effect adjusted bivariate models.

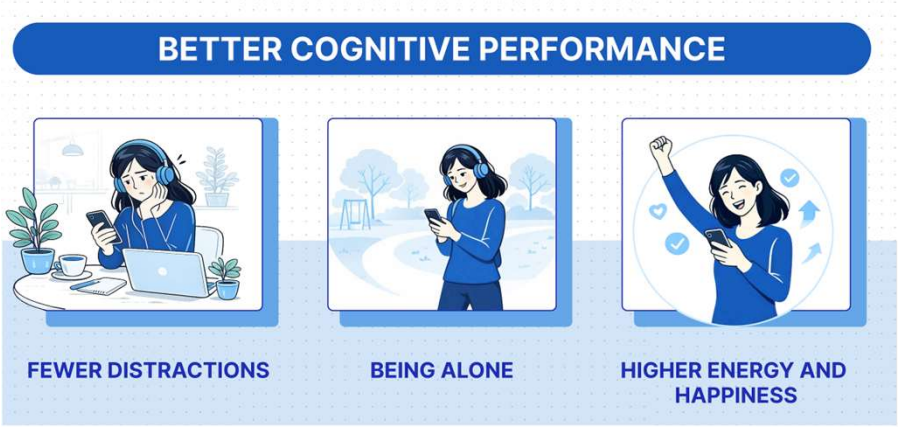
## Conclusion

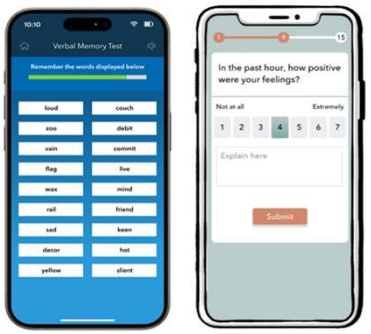
- Participants demonstrated better real-world cognitive performance when they experienced **fewer distractions, were alone, maintained greater focus, felt more energized or excited, and reported higher levels of happiness.**
- Results can provide a non-clinical population reference against which to compare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

## Main Results

| | Distraction[a] | Alone[a] | At home[a] | Depress-ive mood | Anxiety | Stress | Trouble concent-rating | Relaxed | Energized or Excited | Happy | Alcohol |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Matching Pair (Processing speed) | -0.063 (p=0.312) | 0.031 (p=0.442) | 0.389 (p=0.005)* | -0.014 (p=0.254) | -0.019 (p=0.263) | -0.024 (p=0.208) | -0.089 (p<0.001)* | 0.024 (p=0.139) | 0.049 (p=0.027)* | 0.063 (p<0.001)* | -0.01 (p=0.479) |
| Odd One Out (Visual discrimination and processing speed) | -0.435 (p=0.004)* | 0.109 (p=0.15) | -0.014 (p=0.463) | -0.012 (p=0.254) | 0.022 (p=0.263) | -0.006 (p=0.389) | -0.033 (p=0.041)* | -0.021 (p=0.139) | 0.01 (p=0.326) | 0.01 (p=0.358) | -0.485 (p=0.226) |
| Quick Tap 1 (Processing speed) | -0.273 (p=0.046)* | 0.125 (p=0.15) | 0.179 (p=0.159) | -0.019 (p=0.254) | 0.018 (p=0.263) | -0.015 (p=0.271) | -0.044 (p=0.014)* | 0.027 (p=0.139) | 0.067 (p=0.007)* | 0.034 (p=0.103) | -0.486 (p=0.19) |
| Survey Response Time[b] (Processing speed) | -0.622 (p=0.003)* | 0.583 (p<0.001)* | 0.465 (p=0.005)* | -0.047 (p<0.001)* | -0.018 (p=0.21) | -0.034 (p=0.005)* | -0.097 (p<0.001)* | 0.031 (p<0.001)* | 0.038 (p=0.007)* | 0.04 (p<0.001)* | -0.813 (p<0.001)* |
| Memory Matrix (Visual working memory) | -0.656 (p=0.004)* | 0.419 (p=0.002)* | 0.081 (p=0.338) | 0.003 (p=0.452) | 0.004 (p=0.431) | -0.022 (p=0.208) | -0.048 (p=0.013)* | 0.046 (p=0.076) | 0.009 (p=0.356) | 0.049 (p=0.03)* | -0.564 (p=0.203) |
| CopyKat (Visual working memory) | -0.497 (p=0.003)* | 0.216 (p=0.024)* | -0.174 (p=0.159) | -0.034 (p=0.066) | -0.028 (p=0.21) | -0.034 (p=0.122) | -0.116 (p=0.002)* | 0.066 (p=0.03)* | 0.013 (p=0.326) | 0.042 (p=0.03)* | -0.641 (p<0.001)* |
| Memory List (Recognition Memory) | -0.787 (p=0.003)* | 0.359 (p=0.002)* | 0.373 (p=0.007)* | -0.05 (p=0.013)* | -0.046 (p=0.06) | -0.044 (p=0.033)* | -0.112 (p=0.002)* | 0.034 (p=0.076) | 0.059 (p=0.007)* | 0.034 (p=0.068) | -0.358 (p=0.275) |
| Quick Tap 2 (Response inhibition) | -0.234 (p=0.09) | 0.163 (p=0.105) | -0.087 (p=0.326) | -0.01 (p=0.254) | -0.032 (p=0.205) | -0.052 (p<0.001)* | -0.055 (p=0.008)* | 0.055 (p=0.01)* | 0.044 (p=0.031)* | 0.014 (p=0.284) | -0.042 (p=0.479) |
| Hand Swype (Cognitive Flexibility) | 0.082 (p=0.29) | 0.011 (p=0.454) | 0.331 (p=0.066) | -0.032 (p=0.048)* | 0.006 (p=0.431) | -0.031 (p=0.208) | -0.062 (p=0.01)* | 0 (p=0.496) | 0.048 (p=0.03)* | 0 (p=0.495) | 0.413 (p=0.188) |

[a]Binary variable where Cohen's D effect size guidelines of 0.2 for small, 0.5 for moderate, and 0.8 for large can be followed to interpret their estimates; all other predictors are continuous and their estimates were standardized; [b]Multiplied by negative one so that higher values mean better processing speed;
***p<.05**, and false discovery rate (FDR) p-value correction was applied to the tests grouped by which predictor was tested
Note: The estimates for binary predictors of just engaging in passive leisure, just working, just exercising, THC intake, and smoking were not shown but most were not statistically significant.




**Memory List scores and survey response times were associated with the widest range of contextual factors.**

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