

# Utility of the Cogstate Brief Battery for In-clinic and At-home Cognitive Assessments in ADNI-3

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## Objectives

The Cogstate Brief Battery (CBB) is a computerized/digital cognitive test battery assessing psychomotor function, visual attention, visual learning, and working memory. The CBB takes approximately 15 minutes to complete, has been optimized for self-completion, and is offered to cognitively normal (CN) and mild cognitive impairment (MCI) participants in ADNI-3 and those rolling over from ADNI-2. In-clinic visits are completed annually for MCI and every other year for CN participants, with both groups completing unsupervised visits at-home approximately every 3 months.

## Methods

CBB data were analyzed for completeness, and comparisons made between clinical status (cognitively normal (CN) and mild cognitive impairment (MCI)), including summary statistics.

## Results

Table 1: Demographic and Clinical Characteristics

	Cognitively Normal (CN)	Mild Cognitive Impairment (MCI)	Alzheimer's Disease Dementia (AD)
N (%)	440 (68.0%)	197 (30.4%)	10 (1.5%)
Sex			
Male	184 (41.8%)	118 (59.9%)	6 (60.0%)
Female	256 (58.2%)	79 (40.1%)	4 (40.0%)
APOE4			
Carrier	123 (28.0%)	54 (27.4%)	5 (50.0%)
Non-Carrier	270 (61.4%)	84 (42.6%)	4 (40.0%)
Unknown	47 (10.7%)	59 (29.9%)	1 (10.0%)
Mean (SD)			
Age	73.35 (7.30)	74.58 (7.95)	75.20 (10.21)
Education	16.87 (2.32)	16.32 (2.63)	15.30 (3.71)

Completion rate criteria are used to define a test instance with a sufficient number of responses to test stimuli, indicating a complete test instance ( $\geq 75\%$  of stimuli responded to).

Performance check criteria are used to define a test instance with a sufficiently high level of accuracy, indicating good understanding of the test requirements.

Individuals with MCI performed significantly more poorly than cognitively normal individuals on all measures (independent samples t-test). Effect size of the difference (Cohen's d) was between 0.38 and 0.65.

Table 2: Test Completion and Performance Checks

Test	Domain	Completion Pass Rate N (%)	Performance Check Pass Rate N (%)
Detection	Psychomotor function	644 (100%)	644 (100%)
Identification	Visual attention	641 (99.2%)	640 (99.1%)
One Card Learning	Visual learning	632 (99.5%)	631 (99.4%)
One Back	Working memory	631 (99.8%)	629 (99.5%)

Table 3: Known Groups Validity

Test	Normal M (SD)	MCI M (SD)	p	Cohen's d
Detection	2.61 (0.11)	2.66 (0.12)	< .001	-0.38
Identification	2.77 (0.07)	2.81 (0.10)	< .001	-0.47
One Card Learning	0.98 (0.11)	0.91 (0.11)	< .001	0.65
One Back	1.37 (0.17)	1.30 (0.20)	< .001	0.41

## Conclusions

- Very high completion and performance check pass rates across all tests in the battery
  - Facilitated by the possibility of multiple test attempts if the subject has difficulty on their first attempt

- Evidence for known groups validity in the predicted direction on all tests
  - Significant differences between CN and MCI groups were evident for all four tests in the CBB
  - Effect sizes in the medium to large range and highest on the One Card Learning test assessment visual learning using a pattern separation paradigm