



EMBEDDED VALIDITY MEASURES FOR A COMPUTERIZED COGNITIVE TEST BATTERY

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Purpose

Computerized cognitive test batteries are more often used by professional and collegiate athletes as well as the military. It is important to have a method to assess effort within the computerized test battery. This study focused on validating embedded symptom validity tests (SVTs) for a computerized cognitive test battery.

Method

Participants

- 136 undergraduate volunteers and 40 clinical cases, *M* age 22.96 ; Male 76; Females 100.
- Subjects were randomly assigned to be either malingering simulators or controls. Subjects completed the Word Memory Test (WMT) and CNS Vital Signs (CNSVS) computerized cognitive test battery. The data from the 40 clinical cases who also completed the WMT and CNS-VS were included in either the simulator or control group based on their WMT performance.

Procedure

- The following measures from the CNS-VS were examined as embedded SVTs based on their ability to correctly classify an individual as either in the malingering simulator or control group: Finger Tapping (Avg. for both hands < 30), Verbal Memory Imm. & Del. Correct Hits (< 8 correctly recognized), Visual Memory Imm. & Del Correct Hits (< 8 correctly recognized), & Reliable Digit Span (< 7).
- A logistic regression was also conducted using the raw scores of the domains assessed. This procedure was slightly more accurate than the embedded tests scores (88% vs 79%) and the remaining results are based on the logistic results.

Results

- The CNS-VS embedded SVTs correctly classified individuals to their known group 89% of the time (Sensitivity = 0.88; Specificity = 0.89; PPV = 0.90; NPV = 0.88).
- An ANOVA was conducted to examine the CNS-VS Neurocognitive Index (NCI) score between the known groups. A significant main effect was obtained; those in the genuine condition performed significantly better on the NCI than those in the malingering simulator condition ($p < .0001$).

Discussion

The embedded SVTs proposed in this study for the CNS-VS were able to accurately classify feigned versus genuine performance on this computerized test battery. These findings have particular relevance given the increasing use of computerized test batteries for baseline cognitive testing and return to play decisions after concussion.

ANOVA RESULTS OF CNS-VS EMBEDDED VALIDITY MEASURES USING PATIENT DATA

| Variable | Genuine | | Feigned | | Overall | |
|-------------------------------------|----------|-----------|----------|-----------|----------|----------|
| | <i>M</i> | <i>sd</i> | <i>M</i> | <i>sd</i> | <i>p</i> | <i>d</i> |
| 1. Overall Test Battery Mean (OTBM) | 94.4 | 10.5 | 83.4 | 12.8 | <.0001 | 0.94 |
| 2. Overall Test Battery Mean SD | 14.2 | 5.8 | 21.1 | 7.1 | .0004 | -1.07 |

ANOVA RESULTS OF CNS-VS EMBEDDED VALIDITY MEASURES USING ANALOG DATA

| Variable | Genuine, Genuine | | Genuine, Feigned | | Feigned, Feigned | | Feigned, Genuine | | Overall | |
|---------------------------------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|----------|----------|
| | <i>M</i> | <i>sd</i> | <i>M</i> | <i>sd</i> | <i>M</i> | <i>sd</i> | <i>M</i> | <i>sd</i> | <i>p</i> | <i>d</i> |
| 1. Overall Test Battery Mean | 98.6 | 11.7 | 90.9 | 10.4 | 64.2 | 14.8 | 97.4 | 8.2 | <.0001 | 2.6 |
| 2. Overall Test Battery Mean SD | 14.4 | 6.5 | 15.1 | 6.9 | 21.8 | 4.8 | 16.0 | 5.4 | .0382 | -1.3 |

OVERALL TOTAL CNS-VS LOGISTIC VALIDITY PREDICTIVE VALUES

| CONDITIONS | ASSIGNED FEIGNED | ASSIGNED GENUINE | TOTALS |
|-------------------|------------------|------------------|--------|
| PREDICTED FEIGNED | 60 | 7 | 67 |
| PREDICTED GENUINE | 8 | 59 | 67 |
| TOTALS | 68 | 66 | 134 |

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NOTE: Numbers in italics and underlined are used for the overall effect size calculation