You Can't Fake This: Embedded Validity Measures for a Computerized Cognitive Test Battery

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Abstract

Previous research reveals that effort has a greater impact on neuropsychological test scores than the severity of a TBI (Demakis & Rohling, 2010). This study focused on validating embedded symptom validity tests (SVTs) for a computerized cognitive test battery. Participants were randomly assigned to one of two groups, malingerers or non-malingerers and asked to complete neuropsychological tests which included tests of word memorization and recall, reaction time, and spatial ability. Overall, the evaluation served as a comprehensive assessment of individual as well as generalized neurocognitive ability. Specific subtests in the battery were utilized as embedded SVTs. The CNS-VS embedded SVTs correctly classified individuals to their known group 75% of the time. 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 genuine conditions performed significantly better on the NCI than those in the malingering simulator condition ($p < .0001$). The embedded SVTs in this study were able to accurately classify feigned versus genuine performance on this computerized test battery. These findings are significant given the increasing use of computerized test batteries for baseline cognitive testing and return to play decisions.

Hypothesis

Embedded validity indicators in the computerized test battery will perform similarly to embedded validity indicators in non-computerized batteries and will demonstrate good sensitivity and specificity for classifying credible responders and simulated malingers.

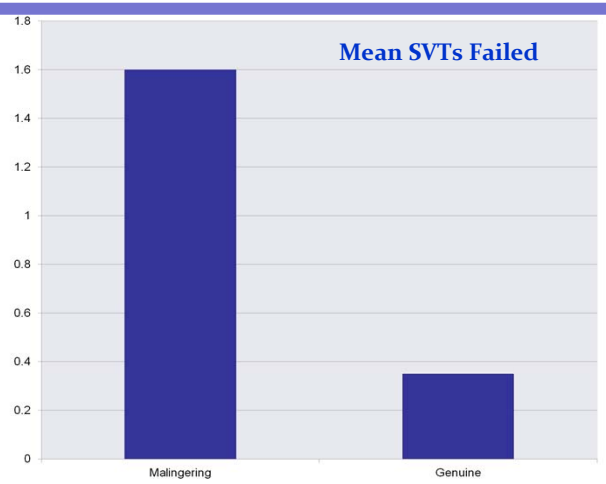
Methods

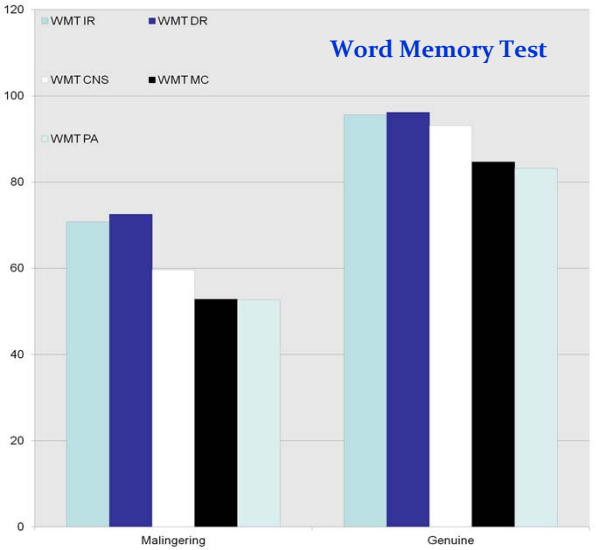
Data from 56 participants were utilized in this study. Mean age was 25.3 (SD 8.2) and mean years of education was 13.4 (SD 2.5). Specifically, 40 undergraduate participates were randomly assigned as either malingering simulators or controls; they completed the Word Memory Test (WMT) and CNS-Vital Signs (CNS-VS) computerized cognitive test battery. The CNS-VS measures performance in following domains: attention/reaction time, executive functioning, memory, and emotional processing. They also completed the California Verbal Learning Test-II (CVLT-II). Additionally, data from 23 clinical cases who also completed the WMT and CNS-VS were included in either the suboptimal effort or control group based on their WMT performance. This resulted in 24 individuals in the known malingering group and 32 in the known genuine performance group.

The following measures from the CNS-VS were examined as embedded SVTs based on their ability to correctly classify an individual as a malingering simulator/suboptimal effort or control group participant: Finger Tapping (avg. for both hands < 30), Verbal Memory Immediate Correct Hits (< 10 correctly recognized), Visual Memory Immediate Correct Hits (< 10 correctly recognized), and Reliable Digit Span (< 7). These cut-scores were utilized based on published literature demonstrating their utility as embedded SVTs in non-computerized cognitive assessment.

Results

Analyses revealed that the embedded SVTs in the CNS-VS battery were effective. These embedded measures accurately identify and classify the performances of feigned and genuine participants CNS-VS embedded SVTs correctly classified individuals to their known group 75% of the time (sensitivity=.70; specificity=.78; ppv=.82; npv=.64). An ANOVA was conducted to examine the CNS-VS Neurocognitive Index (NCI) score between the groups which identified a significant distinction between the genuine and malingering conditions ($p < .0001$).





Conclusions

- The employment of computerized test batteries to assess cognitive functioning has the potential to provide economical and efficient ways to screen large numbers of individuals for cognitive disorders as well as efficiently track individuals with neurodegenerative diseases overtime.
- Capable computerized neurocognitive assessments have the potential to significantly decrease healthcare costs due to its accessibility to the masses as well as its accuracy; closely associated with sports, car accidents and warfare, neurocognitive injuries impact nearly 2 million people in the U.S. annually (CDC 2011).
- Results support that certain embedded SVTs increase validity by enhancing the effectiveness of detecting suboptimal levels of effort in a computerized test battery.

Future Directions

- Current systems do not incorporate tests of effort or symptom validity in their design, standardizing and implementing SVTs will increase their effectiveness and potentially significantly decrease healthcare costs.
- Investigating and incorporating these measures in computerized neurocognitive test batteries will contribute to enhanced accuracy and advanced methodology; bringing modern testing up to acceptable clinical standards.

Literature Cited

Centers for Disease Control and Prevention. (2010). *Concussion and Mild TBI.* Retrieved from http://www.cdc.gov/concussion/.

Demakis, G.J., & Rohling, M.L. (2010). Bowden, Shores, Mathias (2006): failure to replicate or just failure to notice. Does effort still account for more variance in neuropsychological tests scores then TBI severity? *Clinical Neuropsychologist, 24 (1),* 119-136.

Francis, D.J., Kane, R.L., Larrabee, J.R. (1985). Construct validity of various memory testing procedures. *Journal of Clinical and Experimental Neuropsychology, 7(3),* 239-250.

Gualtieri, T., & Johnson, J.G. (2008). Computerized test battery sensetive to mild and severe brain injury. *Medscape Journal of Medicine, 10(4),* 90.

Gualtieri, T., & Johnson, L.G. (2006). Reliability and validity of a computerized neurocognitive test battery, CNS Vital Signs. *Archives Clinical Neuropsychology 21(7),* 623-643.

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