VALIDATION OF A COMPUTERIZED ASSESSMENT OF FUNCTIONAL CAPACITY

ABSTRACT

Assessment of functional capacity is critical to the treatment of cognitive impairments in schizophrenia. Current methods are highly correlated with performance on neuropsychological tests, but suffer from compromised ecological validity due to reliance on role playing exercises. Methods of assessment with improved ecological validity are acutely needed. In response, we have developed a computerized virtual reality assessment that contains the components of a shopping trip, including searching the pantry, making a list, taking the correct bus, shopping, paying for purchases, and getting home. Previous pilot studies indicated that the assessment of functional capacity with virtual reality methodology is feasible, and suggested such a tool may meet criteria for use as a co-primary measure. The primary aims of the current study were to extend our previous results to: 1) assess the validity, sensitivity, and reliability of the Virtual Reality Functional Capacity Assessment Tool (VRFCAT) as a primary measure of functional capacity in schizophrenia; and 2) examine the VRFCAT’s ability to quantify changes in functional capacity by comparing it to the UCSD Performance-based Skills Assessment (UPSA-2-VIM), and 3) determine the association between performance on the VRFCAT and performance on the MATRICS Consensus Cognitive Battery (MCCB), which is the gold standard measure of cognition in pharmaceutical clinical trials regulated by the FDA.

METHODS

Participants included 158 patients with schizophrenia (87 male, 71 female) and 166 healthy controls (88 male, 78 female). All subjects completed the VRFCAT, UPSA-2-VIM, and the MCCB at Visit 1. The VRFCAT and UPSA-2-VIM were completed again at Visit 2. Key outcome measures for the VRFCAT included total time to complete all objectives as well as errors and forced progressions. A VRFCAT Performance Composite was created by standardizing the summation of the T-scores for the VRFCAT total time, total errors, and total progressions. Analyses examined test-retest reliability as well as performance differences and correlations between measures.

RESULTS

High test-retest reliability was demonstrated for VRFCAT Total Completion Time in both Patient and Control groups (ICCs = 0.81 and 0.78, respectively). Test-retest reliability for the UPSA-2-VIM was also high for both groups (ICCs = 0.78 for both Patients and Controls). The test-retest reliability for the VRFCAT Performance Composite was slightly lower than the Total Completion Time and UPSA-2-VIM (ICCs = 0.77 and 0.76 for Patients and Controls, respectively).

The VRFCAT Total completion time was negatively correlated with both UPSA-2-VIM (r = 0.52, p < 0.001 for patients and 0.66, p < 0.001 for controls) and MCCB Composite (r = 0.47, p < 0.001 for patients and 0.64, p < 0.001 for controls). The VRFCAT Performance Composite was positively correlated with the UPSA-2-VIM (r = 0.48, p < 0.001 for patients and 0.65, p < 0.001 for controls) and the MCCB Composite (r = 0.44, p < 0.001 for patients and 0.60, p < 0.001 for controls).

DISCUSSION

Findings extend previous results and indicate the VRFCAT is a highly reliable and sensitive measure of functional capacity in schizophrenia, as well as a co-primary measure for use in the assessment of functional capacity in schizophrenia.

CONCLUSIONS

The VRFCAT demonstrates:

- Good test-retest reliability
- Strong correlations with the MCCB and UPSA-2-VIM
- Minimal practice effects
- Strong discrimination between patients and healthy controls.

Findings suggest the VRFCAT is a highly reliable and sensitive measure with associations to the UPSA-2-VIM and MCCB. Results provide support for the VRFCAT as a co-primary outcome measure of functional capacity assessment for use in schizophrenia trials.

NOTES & ACKNOWLEDGEMENTS

DATA ANALYSIS NOTES

1 A Wilcoxon Signed Ranks Test was used to test for significant differences between HC and SZ.
2 Cohen’s d is the medium effect size divided by the mean of the two groups; Cohen’s d is the mean difference divided by the pooled SD from the two groups.

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