



Comparison of Parent and Teacher Reports of Executive Functioning to Drexel Tower of London Performance in a Pediatric ADHD Sample

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INTRODUCTION

The importance of using multiple information sources such as parent ratings and performance-based measures in order to examine executive functioning (EF) has been highlighted in recent literature (Bodnar, Prahme, Cutting, Denckla, and Mahone, 2007). Moreover, diagnosis of ADHD requires presence of impairment

across multiple settings (APA, 2000) stressing the importance of integrating multiple sources of information along with the in-clinic, performance-based measures. However, often the results from the performance-based EF measures and parent/teacher questionnaires fail to agree. In fact, performance-based measures of EF in children have failed to consistently show good predictive quality in real-world settings (Gioia & Isquith, 2004). The current study aims to examine the relationship between parent and teacher reports from the BRIEF with performance on a commonly administered EF measure, the Tower of London, Drexel Version (TOL-DX) in a pediatric ADHD population.

PREVIOUS RESEARCH

V. Anderson, P. Anderson, Northam, Jacobs, & Mikiewicz (2002) studied a mixed clinical sample of children with “brain disease” and found minimal correlations between parent ratings on the Behavior Rating Inventory of Executive Functioning (BRIEF) and several EF measures. In particular, the Tower of London test used in the study showed no correlation with any BRIEF scores. Similarly, Vriezen & Pigott (2002) also compared parent ratings from the BRIEF to several performance-based tests of EF in a TBI population with no significant correlations found between measures. Bodnar et al. (2007) also found minimal correlation between tests of inhibitory control and parent ratings of inhibitory control on the BRIEF. On the other hand, Price, Joschko, & Kerns (2003) found significant correlation between performance on tests of attention and adaptive functioning questionnaires in a mixed clinical sample. Moreover, Ready, Stierman, & Paulsen (2001) found moderate correlations between neuropsychological, personality, and behavioral ratings in a normal population.

Few studies have focused on the correlations between the parent and teacher reports of everyday EF and performance-based measures in an ADHD population. One study by DuPaul, Anastopoulos, Shelton, Guevremont, & Metevia (1992) examined the correlation of a variety of parent and teacher reports of behavioral functioning with several tests of EF on an ADHD sample and found minimal correlations between the questionnaires and the in-clinic measures. The authors highlighted the “limited utility” of current in-clinic ADHD measures with regard to their ability to reflect real-world functioning and called for more research in this area.

It is apparent after a thorough search of the literature that there is a paucity of studies focusing on ecological validity of EF measures in pediatric populations. Moreover, as shown above, the studies that do focus on this issue reveal relatively meager relationships between in-clinic measures and ratings of everyday functioning. The current study aims to examine the relationship between a popular performance-based tests of EF (Tower of London-Drexel Version) to parent and teacher ratings on the BRIEF. Despite the progress made with regard to test construction and standardization of pediatric EF measures, the author hypothesizes that minimal correlations will be found between the EF measures and related factors measured on Parent and Teacher ratings on the BRIEF.

METHODS

Archival data was drawn from neuropsychological evaluations conducted between the years 2004 and 2008 at Children’s Healthcare of Atlanta outpatient neuropsychology clinic. Fifty-one subjects ($N = 51$) were selected from the large database based on the following criteria: (1) a diagnosis of ADHD- Combined Type based on DSM-IV TR (APA, 2000) diagnostic criteria; (2) absence of co-morbid diagnoses (3) the evaluation includes a measure of intellectual functioning, Tower of London-Drexel Version, and Parent and Teacher BRIEF; (4) BRIEF validity scores were valid; (5) and Full-scale IQ was above 80. The sample included 37 males and 23 females. The mean age at the time of evaluation was 10.20 ($SD = 2.5$). In terms of medication, 15 (29.4 %) of the subjects were administered psychotropic medications and 36 (70.6%) were not medicated at the time of the original evaluation.

Correlations between measures were conducted using Pearson product-moment correlation coefficient (r). Due to the large number of correlations calculated, an alpha level of .01 was selected in order to avoid Type I errors. Negative correlations are expected between performance-based EF measures and Parent/Teacher BRIEF reports as higher BRIEF scores and lower scores on the EF measures suggest more executive dysfunction. However, positive correlations are expected between parent and teacher BRIEF scores.

RESULTS

Descriptive statistical analysis (see addendum) for TOL-DX standard scores and BRIEF ratings revealed mean sample scores within the average ranges on all TOL-DX variables with the exception of Total Rule Violations (mean = 84.08). However, across all BRIEF variables on parent and teacher forms, mean scores were 1 to 1.5 standard deviations above the mean indicating significant levels of executive dysfunction when compared to the normative sample.

Table 1. Significant Correlations (.05 Level) Between Parent and Teacher BRIEF and TOL-DX Scores.

| | r^* |
|---|-------|
| TOL-Time Violation and Parent BRIEF Shift | -.34 |
| TOL-Total Time and Parent BRIEF Shift | -.37 |
| TOL-Rule Violations and Teacher Plan/Organization | -.33 |

Note. TOL: Tower of London-Drexel Version. * Significance at .05 alpha level

Correlation analysis found no significant correlations at the .01 alpha level between any scores from the TOL-DX and the Parent/Teacher BRIEF scores. However, at the .05 level two significant negative correlations were found between Parent BRIEF Shift subscale scores and Time Violation as well as Total Time scores on the TOL-DX. In addition, a modest correlation at the .05 level was found between Teacher BRIEF Plan/Organize subscale and Rule Violations score on the TOL-DX (Table 1).

Table 2. Significant Correlations (.01 level) Between Parent and Teacher BRIEF Scores.

| | r^* |
|-----------------------------|-------|
| Shift | .60 |
| Inhibition | .43 |
| Working Memory | .43 |
| Plan/Organization | .41 |
| Behavioral Rating Index | .41 |
| General Executive Composite | .44 |

Note. Italicized font denotes index scores. * Significance at .01 alpha level.

Several significant (.01 alpha level) positive correlations were found between parent and teacher BRIEF scores (Table 2). The Shift subscale had the most robust correlation at .60. Other moderate but significant correlations were found between the Inhibition, Working Memory, and Plan/Organization subscales, while the Behavioral Rating Index and General Executive Composite scores also were moderately correlated.

DISCUSSION

Overall, findings are consistent with previous studies suggesting discrepancies between performance-based measures of EF and ratings of real-world functioning (Bodnar et al., 2007; Gioia & Isquith, 2004). In fact, no significant correlations between BRIEF ratings and TOL-DX scores were found, which was congruent with the author’s hypothesis. More specifically certain EF constructs (e.g., planning and inhibition), which are purported to be measured via the TOL-DX did not correlate even at the .05 level (Culbertson & Zillmer, 2001). BRIEF ratings were at least one standard deviation above the mean, which is consistent with ADHD findings of executive dysfunction across home and school settings, while the TOL-DX scores did not differ significantly from the mean with the exception of the Rule Violation score. These findings suggest limited sensitivity with regard to the TOL-DX in detecting various symptoms of ADHD. However, Rule Violations appears to be one score sensitive to this ADHD sample. On the other hand, the BRIEF demonstrated expected elevations for the clinical ADHD samples and also showed modest correlations between parent and teacher ratings indicating good inter-rater reliability. The BRIEF appears to be a valid and useful instrument in detecting particular EF deficits in children with ADHD across environments (i.e., home and school). Further areas of study are encouraged to use the BRIEF as a measure of real-world functioning in which performance-based EF measures can be compared in order to better determine ecological validity. By improving ecological validity of EF measures clinicians will be better equipped to predict real-world functioning, as well as generate more pertinent accommodations and recommendations.