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Multi-method assessment of ADHD characteristics in preschool children: Relations between measures☆

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ABSTRACT

Several forms of assessment tools, including behavioral rating scales and objective tests such as the Continuous Performance Test (CPT), can be used to measure inattentive and hyperactive/impulsive behaviors associated with Attention-Deficit/Hyperactivity Disorder (ADHD). However, research with school-age children has shown that the correlations between parent ratings, teacher ratings, and scores on objective measures of ADHD-characteristic behaviors are modest at best. In this study, we examined the relations between parent and teacher ratings of ADHD and CPT scores in a sample of 65 preschoolers ranging from 50 to 72 months of age. No significant associations between teacher and parent ratings of ADHD were found. Parent-ratings of both inattention and hyperactivity/impulsivity accounted for variance in CPT omission errors but not CPT commission errors. Teacher ratings showed evidence of convergent and discriminant validity when entered simultaneously in a hierarchical regression. These tools may be measuring different aspects of inattention and hyperactivity/impulsivity.

1. Introduction

Despite substantial research on the neurological, genetic, and environmental causes of Attention Deficit/Hyperactivity Disorder (ADHD), no one factor has been identified as the primary cause of the disorder. Furthermore, researchers have posited theories of multiple pathways to ADHD, which may preclude the discovery of a single definitive test for identifying ADHD. As such, it is likely that high-quality ADHD diagnostic procedures will always benefit from a combination of informant ratings, background information (e.g., school records), and neuropsychological tests.

ADHD is characterized by three distinct forms of problem behaviors: inattention, hyperactivity, and impulsivity (American Psychological Association, 2000). Inattention refers to difficulties focusing and ignoring distractions. Hyperactivity is represented by difficulties with behaviors such as remaining still and engaging in a single activity for extended periods of time. Impulsivity is characterized by behaviors such as often interrupting and intruding during social interactions and academic situations. To warrant a diagnosis of ADHD, these symptoms must be causing the child impairment in two or more settings, which may include school or preschool. However, research has shown that behaviors associated with ADHD relate to the development of academic skills (Lonigan et al., 1999) and social development (Rydell, Diamantopoulou, Thorell, & Bohlin, 2009) even in samples that include children without clinically elevated levels of these behaviors.

Some common tools that have been used in practice and research to measure inattentive and hyperactive/impulsive behaviors include behavioral rating scales that are completed by individuals who interact often with the child and objective tasks such as the Continuous Performance Test (CPT). However, each assessment tool has limitations and drawbacks; no single tool has been identified as a "gold standard" for determining the presence of ADHD-characteristic behaviors. Although informant rating scales and objective tests both have been used to measure ADHD-characteristic behaviors, research has demonstrated generally low to moderate correlations between scores on each of these measures in school-age children (e.g., Achenbach, McConaughy, & Howell, 1987). Even less is known regarding the relations between these measures in preschool children. Given the recognized link between behavior problems in preschool and later elementary school (e.g., Willcutt & Pennington, 2000), efforts to measure effectively ADHD-characteristic behaviors in preschool and use these measures to predict the course of symptomatology have recently increased (Lahey, Pelham, Loney, Lee, & Willcutt, 2005; Re & Cornoldi, 2009). A greater understanding of the tools used to assess ADHD in

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school-age children is needed for preschool populations. The purpose of this study was to examine the overlap between parent-ratings of ADHD, teacher-ratings of ADHD, and CPT scores in a preschool sample and determine the convergent and discriminant validity across these measures.

1.1. Behavioral ratings

1.1.1. Parent-ratings

Parents often have the most contact with clinicians and, thus, serve as a valuable resource for providing information. However, several characteristics of parent-ratings raise concerns regarding possible biases. Given the heritability of ADHD (e.g., Epstein et al., 2000), many parents of children with the disorder may also be afflicted. Parental symptomatology may impact ratings, which could compromise the validity of parent-ratings (Sayal & Taylor, 2005). Compared to other informants, parents also tend to report more symptomatology in children (Re & Cornoldi, 2009). This raises concerns of potential over-reporting of symptoms by parents.

Given the need to verify the presence of symptoms in multiple settings to diagnosis ADHD, parents may be asked to report on their child's school behavior if contacting the teacher is inconvenient. However, Sayal and Taylor (2005) found that when comparing parent-ratings of school and home behavior and teacher-ratings of school behavior, parent-ratings of school behavior correlated more strongly with parent-ratings of home behavior than with teacher-ratings of school behavior. This suggests that parents do not accurately infer how a child behaves in school and most likely base their ratings on the child's behavior at home. Parent reports of school behavior also would be secondhand through information gained from teachers and, therefore, may vary in part as a function of the degree and quality of contact between parent and teacher. These factors may become problematic when attempting to assess the pervasiveness of a disorder using only parent report. This suggests that an understanding of children's manifestation of the ADHD characteristics across domains requires additional informants.

1.1.2. Teacher-ratings

Problems in school are often the primary reason behind referrals for ADHD treatment (Loe & Feldman, 2007), making teachers important informants of children's behavior. Teachers are sometimes considered ideal informants for behavioral reports because they interact with children over long periods of time in a wide range of settings that vary in structure (e.g., Evans, Allen, Moore, & Strauss, 2005). Furthermore, teachers interact with many children of the same age, giving them a better reference point for making decisions regarding what behaviors should be deemed atypical. Correlations between teacher-ratings at different times and concurrent agreement between individuals with teacher roles (e.g., teachers and teacher's assistants) have been shown to be high (Loughran, 2003).

Although teacher-ratings are widely used in the assessment of ADHD-characteristic behaviors, this method of evaluation is not without criticism. Compared to assessments conducted by examiners from outside of the classroom, assessments of educational outcomes conducted by teachers contain a large proportion of assessor-level variance, raising concerns that teacher-level factors influence assessment scores (Waterman, McDermott, Fantuzzo, & Gadsden, in press). Concerns related to extraneous factors that may impact teacher assessments are magnified when considering behavioral problems, for which there is no "gold standard" for determining accuracy. Several potential biases have been noted in the literature. Just as parents tend to report higher levels of behavior problems than do teachers, teachers have been shown to report higher levels of behavior problems than do trained observers (Phillips & Lonigan, 2010), suggesting that teachers also may engage in over-reporting. There is evidence that teachers may be more likely to identify minority students, compared to non-minority students, as exhibiting hyperactive/inattentive behavior (Nolan, Gadow, & Sprafkin, 2001). These findings indicate that factors other than observed child behavior may affect teachers' ratings. Furthermore, the stability of cross-grade teacher-ratings of clinically significant inattentive behaviors has also been shown to be low (Rabiner et al., 2010), making the utility of teacher-ratings for predicting future behavior questionable.

Teachers' abilities to differentiate ADHD behaviors from symptoms of other disorders also have been challenged. Findings in several studies (e.g., Abikoff, Courtney, Pelham, & Koplewicz, 1993) have demonstrated that teachers often rate children with Oppositional Defiant Disorder (ODD) as having elevated levels of inattention and hyperactivity even when no behaviors directly indicative of these symptoms have been displayed. This bias, referred to as the *halo effect*, appears to be bi-directional such that teachers also rate children with ADHD characteristics with elevated oppositional scores (Hartung et al., 2010). These findings suggest a bias that may inflate teacher-ratings of ADHD in children with other comorbid behavior problems.

1.1.3. Discrepancies between informants

Although multiple informants are used often for diagnostic purposes, there is a growing body of literature suggesting only modest associations between parent and teacher ratings of ADHD (Collett, Ohan, & Myers, 2003). Low inter-rater agreement is found not only for clinical elevations of ADHD-characteristic behaviors, but also for parent and teacher ratings of more general behavior problems and social skills (Winsler & Wallace, 2002). Observed statistical relations may vary somewhat depending on the unit and method of analysis. For example, analysis of data conducted dimensionally, rather than categorically, produces results with higher estimates of parent-teacher agreement (Mitsis, McKay, Schulz, Newcorn, & Halperin, 2000). Furthermore, parent- and teacher-ratings of ADHD-characteristic behaviors are similar in that both typically rate boys as exhibiting more problematic behaviors than girls (Newcorn et al., 2001). Still, correlations between raters are generally low in school-age samples. Research with preschoolers has also shown low correlations between teacher and parent ratings of each symptom domain (Murray et al., 2007). Taken together, these findings suggest that there are inconsistencies across informants.

Discrepancies between informant ratings have created controversy regarding which informant is better at predicting diagnosis. In a study by Power et al. (1998), teacher-ratings of inattention and hyperactivity demonstrated better predictive validity than parent ratings for determining the presence or absence of an ADHD diagnosis as determined by a multi-method assessment battery including a diagnostic interview. However, the associations for both parent and teacher ratings ranged from only low to moderate. This study also found that teacher ratings were generally more useful than parent ratings for distinguishing between subtypes (e.g., primarily inattentive, primarily hyperactive/impulsive, combined inattentive and hyperactive) of children with ADHD. Other studies have found similar results (e.g., Owens & Hoza, 2003), although at least one study has found conflicting results showing that parent-ratings yielded more powerful subtype differentiation (DuPaul et al., 1998). The high sensitivity of parent-ratings supports their use as screening measures. However, the low specificity suggests that further inquiry is needed to minimize false positives (Tripp, Schaughency, & Clarke, 2006).

Although teacher ratings are often seen as a valid source of information for determining the presence of ADHD-characteristic behaviors because of teachers' extensive experiences with children, some evidence has suggested that combining ratings from both teachers and parents is optimal for predicting diagnosis compared