



Diagnostic utility of the Pervasive Developmental Disorder Behavior Inventory[☆]

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ARTICLE INFO

Article history:

Received 8 June 2011

Accepted 6 July 2011

Available online 2 August 2011

Keywords:

Autism

Diagnosis

PDDBI

Assessment

Screening

Validity

ABSTRACT

This study assessed the diagnostic utility of the Pervasive Developmental Disorder Behavior Inventory (PDDBI) in a sample of 84 children aged 3–12 years of age. Forty-two children with ASD were individually matched on age and non-verbal IQ to 42 children with other disabilities and groups were compared on PDDBI subscales and total score. Results indicated that the groups differed on the total score and on only one of the 14 subscales. Optimal sensitivity and specificity were achieved using a cutoff score of 45 on the Autism Composite *T*-score. Diagnostic accuracy was not good (sensitivity = .74, specificity = .62, efficiency = .68), but better in individuals with NVIQ < 70. We do not recommend the PDDBI for diagnostic screening.

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1. Introduction

Accurate screening methods and thorough assessment processes are needed when evaluating individuals suspected of having an Autism Spectrum Disorder (ASD). Filipek et al. (1999) proposed a two-step process that involves screening all children for developmental disorders as part of their routine early childhood evaluations by primary care providers (known as Level 1 screening), followed by a more in-depth diagnostic evaluation of children identified from those screenings as being at-risk (known as Level 2 evaluations).

Ideally, Level 2 diagnostic evaluations should be performed by an interdisciplinary team of experienced clinicians with expertise in the differential diagnosis and treatment of developmental disorders. The assessment should include a comprehensive medical and neurological evaluation, a speech-language-communication evaluation, and a psychological evaluation. The evaluation should include the use of an empirically validated diagnostic instrument with good sensitivity and specificity for ASD. It should also include a standardized parental interview; a direct, structured observation of the child's social and communicative behavior and play; as well as cognitive, adaptive behavior, and academic assessments (Filipek et al., 1999). The *Autism Diagnostic Interview-Revised* (ADI-R; Lord, Rutter, & LeCouteur, 1994) and *Autism Diagnostic Observation Schedule* (ADOS; Lord et al., 2000) are considered the "gold standard" of ASD assessment as they have excellent diagnostic validity (see Gotham, Risi, Pickles, & Lord, 2007; Lord et al., 1997), especially when used together (Risi et al., 2006). However, they can be lengthy to administer and require extensive training, making them expensive options.

[☆] This manuscript was prepared from a thesis presented in partial fulfillment of the requirements for the degree of Master of Arts in the Graduate School of The Ohio State University by Kristy Reel (name at time: Kristy Lynne Hall).

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Caregiver-completed rating scales are often part of diagnostic evaluations. They are favored by clinicians because of their ease and efficiency of administration and scoring and low cost. They also allow the rater to consider a wide range of behaviors over a broad time period and across a number of settings. Examples of commonly used rating scales include the *Gilliam Autism Rating Scale* (GARS-2; Gilliam, 2006), the *Autism Spectrum Screening Questionnaire* (ASSQ; Ehlers, Gillberg, & Wing, 1999), the *Social Responsiveness Scale* (SRS; Constantino & Gruber, 2005), the *Social Communication Questionnaire* (SCQ; Berument, Rutter, Lord, Pickles, & Bailey, 1999), and the *Autism Spectrum Disorders-Diagnostic for Children* (ASD-DC; Matson, Gonzalez, Wilkins, & Rivet, 2008; Matson, Mahan, Hess, Fodstad, & Neal, 2010).

Norris and Lecavalier (2010) reviewed the literature on select rating scales designed for the screening of ASDs in children aged 3 years or more. Results indicated that the SCQ was the only instrument that had been rigorously studied. Indeed, it was the only instrument that had been subjected to (a) comparison with other instruments, (b) evaluations with a wide range of diagnostic groups, and (c) independent validation and replication. Overall, the review indicated that comparisons between scales were few and available evidence for diagnostic validity was scarce for certain instruments and subpopulations (e.g., lower functioning individuals, PDDNOS). The field is in need of clinically useful, efficient, and psychometrically sound caregiver-completed measures.

A relatively new instrument worthy of investigation is the *Pervasive Developmental Disorder Behavior Inventory* (PDDBI, Cohen & Sudhalter, 2005). The PDDBI was initially developed to measure changes in maladaptive behavior and core adaptive social and language skills relevant to ASD in the context of treatment studies. However, it is also used to differentiate ASDs from children without ASDs. It is a parent-completed questionnaire consisting of 188 items divided into 10 domains. Domain results can yield a *T*-score, and domain scores are used to generate several composite *T*-scores, including an overall Autism Composite *T*-score. These *T*-scores are used to compare patients to a standardization sample of children with autism. It typically takes about 45 min for a parent or caregiver to complete the questionnaire, and it can be completed outside of the clinical setting (Cohen & Sudhalter, 2005).

To date, we are aware of three studies published in peer-reviewed journals investigating the PDDBI. The first two publications reported on the instrument's development. Cohen, Schmidt-Lackner, Romanczyk, and Sudhalter (2003) reported adequate to good internal consistency for all subscales. Principal components analyses were used to assess construct validity, and results were interpreted to largely confirm a priori-defined category-item groupings and the overall structure of the instrument. The authors also included a Receiver Operating Characteristic (ROC) analysis on the Autism Composite score between children with autism ($n = 135$), PDD-NOS ($n = 28$) and mixed receptive-expressive language disorder (MRELD; $n = 20$). When comparing the autism and MRELD groups, a cutoff score greater than 40 resulted in sensitivity and specificity of .91 and .80, respectively.

In an accompanying publication, Cohen (2003) reported on the criterion-related validity of the PDDBI using a subset of the Cohen et al. (2003) study sample ($n = 84$, ages 3–6 years). The PDDBI Autism Composite was found to correlate significantly with the ADI-R current domain scores (Social, $r = .58$; Communication, $r = .40$; and Repetitive Behaviors: $r = .35$) as well as the Childhood Autism Rating Scale ($r = .53$). Adaptive subscales on the PDDBI were also significantly correlated with comparable Vineland Adaptive Behavior Scales domains.

More recently, Cohen et al. (2010) examined the PDDBI's ability to assist in the differential diagnosis of autism, PDDNOS, and non-ASD as defined by ADOS-G and ADI-R criteria. The sample consisted of 73 children (46 with ASD and 27 at risk for developmental problems) between the ages of 2–5 years with Griffiths Mental Development Scales Performance Quotient (PQ) of 75 or greater. The Autism and non-spectrum groups significantly differed on several of the subscales and composite scores, including the Autism Composite ($F = 57.1$, $p < .001$, effect size = .51). Following ROC analyses, the authors recommended an Autism Composite score of 32 for optimal discrimination between diagnostic groups (autism or PDDNOS vs non-spectrum). With this cutoff, sensitivity was 1 and specificity was .79. Because of PQ differences between the non-spectrum group and the ASD groups, analyses were repeated on a subset of subjects ($n = 20$ per group) individually matched on PQ. Groups continued to differ significantly on a number of subscales, but the optimal Autism Composite cutoff score moved from 32 to 42. The authors concluded that the PDDBI could be useful in the differential diagnosis of ASD.

The developers of the PDDBI have reported good psychometric properties. We were especially interested in the instrument's ability to differentiate ASD from non-ASD. While it was not originally designed for the purpose of differential diagnosis of ASD, some data on its diagnostic validity have been published and the instrument is being marketed and used in clinical settings in this fashion. In the current study, the diagnostic utility of the PDDBI was assessed by comparing a heterogeneous group of children with ASD to an individually matched group of children with other developmental problems.

2. Methods

2.1. Participants

The participants were 84 children between the ages of 3 years, 1 month and 11 years, 9 months (mean = 6 years, 6 months; SD = 2 years, 3 months) who had been referred from 2006 to 2008 to a specialty clinic in a large Midwestern children's hospital for diagnostic evaluation to rule out ASD. They were consecutive referrals with NVIQ < 115. Forty-two ASD participants were individually matched within 12 months of age and 10 NVIQ points to a non-ASD group (primarily consisting of diagnoses of Developmental Delay, Language Impairment or Intellectual Disability; total $n = 42$). The final matched sample had NVIQs ranging from 46 to 111 (mean = 80.1, SD = 16.2) and was 78.6% male ($n = 66$ males). The ethnic

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