



Behavior and Sensory Interests Questionnaire: Validation in a sample of children with autism spectrum disorder and other developmental disability



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ABSTRACT

Repetitive behaviors, restricted interests and other unusual sensory behaviors often significantly impact the lives of many individuals with developmental disabilities, including Autism Spectrum Disorder (ASD). Identifying specific patterns of atypical behaviors across different disorders allows for improved specificity of diagnoses, monitoring response to treatment and elucidating the genetic and neurobiological underpinnings of these disorders. The Behavior and Sensory Interests Questionnaire (BSIQ) is a newly designed, continuous dimensional instrument that comprehensively assesses the type, frequency, intensity, age of onset, and duration of these behaviors. The BSIQ takes 15–40 min to administer to a caregiver in an interview format. Using a large sample of children with either ASD, intellectual disabilities or who were typically developing, the construct validity of the BSIQ was confirmed using a series of multi-group confirmatory factor analysis models. Configural and metric invariance were satisfied, but not scalar invariance, as expected. The BSIQ showed acceptable internal consistency, excellent inter-rater reliability and excellent test-retest reliability.

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Restricted and repetitive behaviors, unusual and repetitive vocalizations, sensory interests and aversions, and other unusual behaviors (RRBs) are characteristic of many developmental disabilities (Bodfish, Symons, Parker, & Lewis, 2000). Since the inception of autism spectrum disorders (ASD) as a diagnosis, RRBs have been a defining, necessary feature of the disorder (Asperger, 1944, 1991; Kanner, 1943; South, Ozonoff, & McMahon, 2005; American Psychiatric Association, 2013). In addition, the cataloging of these behaviors helps clinicians in accurate differential and early diagnosis and is an essential part of a complete clinical ASD assessment (Bryson et al., 2007; Loh et al., 2007; Ozonoff et al., 2008). In the most recent iteration of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition, a number of categories of RRBs are

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important to assess for ASD (American Psychiatric Association, 2013) based on previous research that supported the inclusion of these behaviors as necessary, though not sufficient, for diagnosis (e.g., Bodfish et al., 2000; Freeman et al., 1981; Lord & Pickles, 1996; Militeri, Bravaccio, Falco, Fico, & Palermo, 2002; Osterling, Dawson, & Munson, 2002; Richler, Bishop, Kleinke, & Lord, 2007; South et al., 2005).

Documenting RRBs is critical to ASD research as well. Using these behaviors as endophenotypes to increase the homogeneity of samples is important in neurobiological and genetic research studies (Hanson et al., 2010; Hus, Pickles, Cook, Risi, & Lord, 2007; Sears et al., 1999; Couteur et al., 1989; Hollander et al., 2005a). Measurement of change or improvement in RRB also is desired in assessing the efficacy of medical (McPheeters et al., 2011), psychopharmacological (Hollander et al., 2005b), educational, behavioral, and other therapeutic interventions (Dawson et al., 2010). Studies of patient and family outcomes also have documented the negative impact of RRBs themselves, such as increased stress levels in caregivers and increased difficulty in learning new skills or engaging in activities of daily living (Dunlap, Dyer and Koegel, 1983; Gabriels, Cuccaro, Hill, Ivers, & Goldson, 2004).

Despite the clear research and clinical significance of RRBs, comprehensive tools designed specifically for measuring these behaviors have been slow to emerge (e.g., Constantino et al., 2003; Lord et al., 2001). Without a comprehensive tool to document RRBs, clinicians and researchers have predominantly relied on measures designed for other purposes (Lord et al., 2001). For example, the Autism Diagnostic Observation Schedule (ADOS) (Lord, Rutter, DiLavorne, & Risi, 2003), Autism Screening Questionnaire (Berument, Rutter, Lord, Pickles, & Bailey, 1999), the Modified Autism Checklist for Toddlers (M-CHAT), Dumont, Matthew, & Fein, 2005) and the Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & Couteur, 1994), used to diagnose or screen for ASD, as well as the behavior checklist for identifying autism symptoms in severely handicapped individuals (Krug, Arick, & Almond, 1980), have sections looking at RRBs but only list a few specific behaviors necessary for accurate differential diagnosis. Other measures commonly used in RRB research have a limited number of RRBs sampled as part of their measurement of other constructs (e.g. the Autism Observation Scale for Infants (Bryson, Zwaigenbaum, McDermott, Ronbough, & Brian, 2008); Autism Behavior Checklist (Aman & Singh, 1986); Social Communication Questionnaire (Rutter, Bailey, & Lord, 2003); Modified Checklist for Autism in Toddlers (Robins et al., 2001); Social Responsiveness Scale (Constantino & Gruber, 2005); Childhood Routines Inventory (Evans et al., 1997); and the Behavior Problems Inventory (Rojann, Matson, Lott, Esbensen, & Smalls, 2001).

Until now, only the Repetitive Behavior Scale (RBS and RBS-R) (Bodfish, Symons, Parker, & Lewis, 1999; Bodfish et al., 2000) has been created solely for the purpose of measuring repetitive behaviors in individuals with ASD (Lam & Aman, 2007). It is comprised of 43 questions across six categories: stereotyped behavior, self-injurious behavior, compulsive behavior, ritualistic behavior, sameness behavior, and restricted behavior. The RBS-R has many strengths, including being an easily understood parent questionnaire which takes a relatively short time to complete. However, it also has several limitations that reduce its usability in many research and clinical scenarios. In developing the RBS-R, the authors dropped any item endorsed by less than 10% of the sample. This theoretical approach is appropriate for improving the odds of conducting a valid factor analysis but may reduce the measure's ability to capture the wide range of RRBs in the population, which is necessary for studies conducting detailed phenotyping. This also reduces its sensitivity to change when looking at response to intervention. Many RBS-R codes cover a wide range of behaviors (i.e. "object usage" includes spins or twirls objects, twiddles or slaps or throws objects, lets objects fall out of hands), which decreases its specificity. The RBS-R also has broad definitions and examples in Ritualistic Behavior and in Sameness Behavior that could potentially pull for the same behaviors, thus inflating the score of the measure by counting behaviors twice, threatening its dimensionality and construct operationalization. Finally, the RBS-R used a convenience sample of parent members of the South Carolina Autism Society (SCAS) who self-reported their child's ASD diagnosis without independent confirmation by the research team using standardized methods.

1. Importance of the present study

There is a clear need within both clinical and research settings for an easy-to-administer, structured, continuous tool that captures a variety of RRBs. To address this need, we developed the Behavior and Sensory Interests Questionnaire (BSIQ), a semi-structured, interview-based instrument covering a wide range of individual RRBs that are typically associated with developmental disorders, including ASD. It is designed to assist clinicians and researchers in the assessment and analysis of these behaviors that often are atypical in their type, amount, or intensity and which can change over time in children with developmental issues. Some additions in the BSIQ which are not present in previous measures include "current" and "ever" codes to give researchers flexibility in assessing which timeframe behaviors are seen. The BSIQ also has attempted to include a fairly exhaustive list of behaviors in order to describe the full range of a child's behavior and increase the ability to analyze longitudinal changes. In addition, it has attempted to increase specificity of codes by describing only one behavior at a time, decreasing the possibility that a single behavior could be counted under two or more different codes. The current study examines the performance of the BSIQ in a large cohort of individuals with ASD, individuals with other developmental difficulties and typically developing individuals. Our aim was to test the psychometric properties of the BSIQ, including its internal consistency, predictive accuracy and invariance across study populations. Severity estimates and sensitivity to change over time will be addressed in future papers.

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