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Research Based Practice

Identifying Students With Autism Spectrum Disorders - A Review of Selected Screening Tools

By Lee A. Wilkinson

There has been a dramatic worldwide increase in reported cases of autism over the past decade (Wing & Potter, 2009). Autism is much more prevalent than previously thought, especially when viewed as a spectrum of disorders (autism spectrum disorders; ASD). School-based professionals are now more likely to be asked to participate in the screening and identification of children with ASD than at any other time in the recent past. Although ASDs affect approximately 1% to 2% of the school-age population, identification rates have not kept pace in our schools (Fombonne, 2005; Safran, 2008; Wilkinson, 2010). It is not unusual for children with milder forms of autism (e.g., Asperger syndrome, pervasive developmental disorder-NOS, high-functioning autistic disorder) to go unidentified until well after entering school (Brock, Jimerson, & Hansen, 2006). Using a population-based sample from an ongoing surveillance effort across 13 sites in the United States, a recent study examining the timing of identification of children with autism determined the gap between potential and actual age of identification (for those identified) to be in the range of 2.7 to 3.7 years. Combined with the fact that more than one quarter of cases were never identified as having ASD through age 8, these results illustrate the need for a more effective system of screening and identification for ASD (Shattuck et al., 2009). The aim of this article is to provide school psychologists with a review of three ASD-specific screening instruments with promising psychometric properties for identifying children who are most likely to have ASD and thus, necessitate a comprehensive assessment.

Core Features of ASD

The defining feature of ASD is impairment in interpersonal relating and communication. This includes difficulty communicating with others, processing and integrating information from the environment, establishing and maintaining reciprocal social relationships, taking another person's perspective, inferring the interests of others, and transitioning to new learning environments (Carter, Davis, Klin, & Volkmar, 2005; Wilkinson, 2010). While all children with ASD experience core social-communication deficits, we now recognize that autism-related traits are quantitatively distributed in the general population and that autism is best conceptualized as a spectrum disorder, rather than a categorical diagnosis (Constantino & Gruber, 2005; Skuse et al., 2009). Even mild degrees of what might be called autistic social impairment can significantly interfere with classroom performance and adaptation. Likewise, a combination of mild autistic symptomatology and other psychological liabilities (e.g., attention problems, mood problems, aggression) can have an adverse effect on children's learning and behavior (Constantino & Gruber, 2005; Skuse et al., 2009). It is also important to recognize that socialization deficits are a major cause of impairment in ASD regardless of the individual's level of cognitive or language ability (Carter et al., 2005).

Because children with mild or even moderate deficits in social and communicative competence are often overlooked, misdiagnosed with another psychiatric condition, or experience co-occurring disorders, many students continue to be underserved in schools (Wilkinson, 2010). Unfortunately, the core features of ASD may not diminish with development. Distress may actually increase as they approach adolescence and the social milieu becomes more complex and challenging. These difficulties may then persist into adulthood, when they continue to negatively impact adaptive functioning. Consequently, it is critical that support professionals, particularly school psychologists, give greater priority to case finding and screening to ensure that children with milder forms of ASD are identified and have access to the appropriate intervention services (Brock et al., 2006; Wilkinson, 2010).

Screening for ASD

Developing screening tools to identify the milder forms of ASD tends to be especially difficult because the autism spectrum comprises a wide range of impairment without clear-cut boundaries (Wing, 2005). Until recently, there were few validated screening measures available to assist school psychologists in the identification of students with the core symptoms of ASD (Campbell, 2005; Lord & Corsello, 2005). Because autism has traditionally been viewed as a categorical diagnosis, most rating scales were developed to categorically determine the presence or absence of ASD, rather than dimensionally assess the severity of ASD symptoms. Yet, research indicates that children with the same diagnostic classification are likely to be heterogeneous and that many childhood disorders, including ASD, fall along a continuum in the general population

(Constantino & Gruber, 2005). However, there are now several reliable and valid screening tools and rating scales to quantify the severity of symptoms across the autism spectrum and/or serve to assess response to intervention.

Diagnostic validity/accuracy. Diagnostic validity is an especially important psychometric characteristic to consider when evaluating the quality and usefulness of a test or screening instrument. It refers to a test's accuracy in predicting group membership (e.g., ASD versus non-ASD). Diagnostic validity can be expressed through metrics such as sensitivity and specificity, and positive predictive value and negative predictive value. Sensitivity and specificity are measures of a test's ability to correctly identify someone as having a given disorder or not having the disorder. Sensitivity refers to the percentage of cases with a disorder that screens positive. A highly sensitive test means that there are few false negative results (individuals with a disorder who screen negative), and thus fewer cases of the disorder are missed. Specificity is the percentage of cases without a disorder that screens negative. A highly specific test means that there are few false positive results (e.g., individuals without a disorder who screen positive). An efficient screening tool should minimize false negatives, as these are individuals with a likely disorder who remain unidentified (National Research Council, 2001; Norris & Lecavalier, 2010; Wilkinson, 2010). Sensitivity and specificity levels of .80 or higher are generally recommended (Coonrod & Stone, 2005; Norris & Lecavalier, 2010).

Positive predictive value (PPV) and negative predictive value (NPV) are also important validity statistics that describe how well a screening tool or test performs. The probability of having a given disorder, given the results of a test, is called the predictive value. PPV is interpreted as the percentage of all positive cases that truly have the disorder. PPV is a critical measure of the performance of a diagnostic or screening measure, as it reflects the probability that a positive test or screen identifies the disorder for which the individual is being evaluated or screened. NPV is the percentage of all cases screened negative who are truly without the disorder. The higher the PPV and NPV values, the more efficient the instrument at correctly identifying cases. It is important to recognize that PPV is influenced by the sensitivity and specificity of the test as well as the prevalence of the disorder in the sample under study. For example, an ASD-specific screening measure may be expected to have a higher PPV when utilized with a known group of high-risk children who exhibit signs or symptoms of developmental delay, social skills deficits, or language impairment. In fact, for any diagnostic test, when the prevalence of the disorder is low, the positive PPV will also be low, even using a test with high sensitivity and specificity.

Screening Tools

The following tools have demonstrated utility in screening for ASD in educational settings and can be used to determine which children are likely to require further assessment and/or who might benefit from additional support. They also afford the ability to measure autistic characteristics on a quantitative scale across a wide range of severity. All measures have strong psychometric qualities, are appropriate for school-age children, and are time efficient (5 to 20 minutes to complete). Although training needs are minimal and require little or no professional instruction to complete, interpretation of the results requires familiarity with ASD and experience in administering, scoring, and interpreting psychological tests.

Autism Spectrum Rating Scales (Short Form). The Autism Spectrum Rating Scales (Short Form) (ASRS; Goldstein & Naglieri, 2009) is a relatively new norm-referenced instrument designed to effectively identify symptoms, behaviors, and associated features of ASD in children and adolescents from 2 to 18 years of age. The ASRS was standardized on 2,560 cases from across the United States. The psychometric properties of the ASRS provide strong evidence that the measure can accurately distinguish ASD from general population groups as rated by teachers and parents (Goldstein & Naglieri, 2009). The ASRS has both full-length and short forms for young children (2–5) and youth (6–18). The Short Form was developed for screening purposes and contains 15 items from the full-length form that have been shown to differentiate children diagnosed with ASD from children in the general population. Each item is scored on a Likert scale from 0 (“never”) to 4 (“very frequently”). The Short Form can be completed in approximately 5 minutes, and includes items such as “Share fun activities with others?,” “Notice social cues?,” “Insist on certain routines?,” “Becomes obsessed with details?,” and “Show good peer interactions?” High scores indicate that many behaviors associated with ASD have been observed and the need for more comprehensive assessment exists. The ASRS Short Form has excellent test–retest reliability and good interrater consistency. The scale has been found to have good discriminate validity and utility as an efficient screener for at-risk groups of school-age children (Chandler et al., 2007). On average, the sensitivity and specificity values for parent and teacher informants were .94 and .92, respectively (Goldstein & Naglieri, 2009).

Social Communication Questionnaire. The Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003), previously known as the Autism Screening Questionnaire (ASQ), was initially designed as a companion screening measure for the Autism Diagnostic Interview–Revised (ADI-R; Rutter, Le Couteur & Lord). The SCQ is a parent/caregiver dimensional measure of ASD symptomatology appropriate for children of any chronological age older than 4 years. It can be completed by the informant in less than 10 minutes. The primary standardization data were obtained from a sample of 200 individuals who had participated in previous studies of ASD. The SCQ is available in two forms,

Lifetime and Current, each with 40 questions presented in a yes or no format. Scores on the questionnaire provide an index of symptom severity and indicate the likelihood that a child has an ASD. Questions include items in the reciprocal social interaction domain; the communication domain; and the restricted, repetitive, and stereotyped patterns of behavior domain. The scale has been found to have good discriminant validity and utility as an efficient screener for at-risk groups of school-age children. A threshold raw score of >15 is recommended to minimize the risk of false negatives and indicate the need for a comprehensive evaluation. Comparing autism to other diagnoses (excluding mental retardation), this threshold score resulted in a sensitivity value of .96 and a specificity value of .80 in a large population of children with autism and other developmental disorders. The SCQ is the most researched of the three ASD-specific screening tools (Noris & Lecavalier, 2010).

Social Responsiveness Scale. The Social Responsiveness Scale (SRS; Constantino & Gruber, 2005) is a brief quantitative measure of autistic behaviors in 4 to 18 year old children and youth. This 65-item rating scale was designed to be completed by a teacher and/or parent who is familiar with the child's current behavior and developmental history. The SRS can be completed in approximately 15 minutes and focuses on the child's reciprocal social interactions, a core impairment in all pervasive developmental disorders. Standardization is based on a sample of 1,636 children from the general population. SRS items measure the ASD symptoms in the domains of social awareness, social information processing, reciprocal social communication, social anxiety/avoidance, and stereotypic behavior/restricted interests. Each item is scored from 1 ("not true") to 4 ("almost always true"). Scores are obtained for five treatment subscales: Social Awareness (e.g., "Is aware of what others are thinking or feeling"), Social Cognition (e.g., "Doesn't recognize when others are trying to take advantage of him or her"), Social Communication (e.g., "Avoids eye contact or has unusual eye contact"), Social Motivation (e.g., "Would rather be alone than with others"), and Autistic Mannerisms (e.g., "Has an unusually narrow range of interests"). Interpretation is based on a single score reflecting the sum of responses to all 65 SRS questions. Raw scores are converted to T-scores for gender and informant. A total T-score of 76 or higher is considered severe and strongly associated with a clinical diagnosis of autistic disorder. A T-score of 60 through 75 is interpreted as falling in the mild to moderate range, whereas a T-score of 59 or less suggests an absence of ASD symptoms. A raw score total of > 75 is associated with a sensitivity value of .85 and specificity value of .75 for ASD (autistic disorder, Asperger's disorder, or PDDNOS). In school settings, raw scores at or above 85 from two separate informants provide very strong evidence of ASD. The SRS is an efficient tool for capturing the more subtle aspects of social impairment associated with ASD (e.g., PDD-NOS) and reflects the level of severity across the autism spectrum. The scale demonstrates strong reliability across informants, acceptable internal consistency, and correlates highly with the Autism Diagnostic Interview-Revised (ADI-R).

A MultiTier Screening Model

When screening and evaluating students who demonstrate risk factors and/or warning signs of atypical development, or when caregiver/parent concerns strongly suggest the presence of ASD symptoms, school psychologists should consider the following three-tier (or three-step) model.

Tier 1. The initial step is *case finding*. This involves recognizing the risk factors and/ or warning signs of ASD. All school professionals should be aware of those students who display atypical social and/or communication behaviors that might be associated with ASD. Although no two children are alike, at-risk students may demonstrate difficulties in the areas of social interaction, attention, impulse control, and behavioral regulation. They may have difficulty interacting with peers and display a narrow range of interests or intense preoccupation with specific objects. Delays in language milestones or pragmatic skills (social language), as well as the presence of repetitive behaviors, inflexibility, and difficulty transitioning have been associated with ASD. Pedantic or overly mature speech, stereotypic mannerisms, poor eye contact, and sensory sensitivity may also be observed in at-risk children. The failure to make friends, understand social rules and conventions, or display social reciprocity in interpersonal relationships are considered warning signs at all age and grade levels. Case finding also requires that attention be given not only to teacher concerns about children's development, but to parental worries as well. Parent and/or teacher reports of social impairment, combined with communication and behavioral concerns, constitute a "red flag" and identify children who should be referred for formal screening.

Tier 2. Once screened, scores obtained on the ASRS, SCQ, and SRS can be used as an indication of the approximate severity of ASD symptomatology for students who present with elevated developmental risk factors and/or warning signs of ASD identified through case finding. They can also be used for progress monitoring and to measure change over time. Students with a positive screen who continue to show minimal progress at this level are then considered for a more comprehensive assessment and intensive interventions as part of Tier 3. However, as with all screening tools, there will be some false negatives (e.g., children with ASD who are not identified as such). Thus, children who screen negative, but who appear to have a high level of risk and/or when parent and/or teacher concerns indicate developmental variations and behaviors consistent with an autism-related disorder, should continue to be monitored, regardless of screening results.

Tier 3. Students who meet the threshold criteria in Tier 2 may then be referred for an in-depth assessment and intensive intervention. Because

the ASRS, SCQ, and SRS report good reliability and high levels of diagnostic validity, results from these screening measures can be integrated into a comprehensive developmental assessment to assist in determining eligibility for special education services and guide intervention planning. A multidisciplinary team of school professionals (e.g., school psychologist, general and special educators, speech–language pathologist, and occupational therapist) should collaborate to determine an appropriate classification and intervention plan. Qualitative measures should include parent/caregiver interviews, developmental history, direct observation, and interaction with the referred student, combined with a quantitative assessment of social behavior, cognitive functioning, academic achievement, language and communication, adaptive behavior, and when indicated, motor skills, sensory processing, and atypical behavior (Filipek et al., 2000; National Research Council 2001; Wilkinson, 2010). Although a more detailed explanation of the comprehensive developmental assessment model is beyond the scope of this article, practitioners are referred to Wilkinson (2010) for a description of best practice guidelines for screening and assessment, evidence-based test instruments, research-supported interventions/treatments, and case examples to illustrate effective school-based practice.

Limitations

Although the ASRS, SCQ, and SRS can be used confidently as efficient screening tools for identifying the presence of the more broadly defined symptoms of higher-functioning ASD, they are not without limitations. Some students who screen positive will not be identified with an ASD (false positive). On the other hand, some children who were not initially identified will go on to meet the diagnostic and/or classification criteria (false negative). Therefore, it is especially important to carefully monitor those students who screen negative so as to ensure access to intervention services if needed (Bryson, Rogers, & Fombonne, 2003). Gathering information from family and school resources during screening will also facilitate identification of possible cases.

Gender differences should also be taken into consideration when screening. Research suggests that there may be sex differences in expression of the broader autism phenotype (Wilkinson, 2008). Although few studies have examined effects of gender-specific differences on various screening measures, the ASRS and SRS have generally reported higher mean scores for boys than girls. For example, the SRS identifies two separate total raw score cut-offs, with a lower threshold for girls than boys (Constantino & Gruber, 2005).

Finally, none of the screening measures reviewed here can differentiate between autism spectrum subtypes. A screening tool's efficiency will also be influenced by the practice setting in which it is used. ASD-specific tools are not currently recommended for the universal screening of typical school-age children. Focusing on case finding and children with identified risk-factors and/or developmental delays will increase predictive values and result in more efficient screening (Wilkinson, 2010).

Concluding Comments

Epidemiological studies indicate a progressively rising prevalence trend for ASD over the past decade (Wing & Potter, 2009). Yet, compared with general population estimates, children with mild to moderate autistic characteristics remain an underidentified and underserved population in our schools (Safran, 2008; Skuse et al., 2009; Wilkinson, 2010). There is likely a substantial number of children with equivalent profiles to those with a clinical diagnosis of ASD who are not receiving services (Russell, Ford, Steer, & Golding, 2010; Safran, 2008; Skuse et al., 2009). Research indicates that outcomes for children on the autism spectrum can be significantly enhanced with the delivery of intensive intervention services (National Research Council, 2001). However, intervention services can only be implemented if students are identified. Screening is the initial step in this process. School psychologists should be prepared to recognize the presence of risk factors and/or early warning signs of ASD and be familiar with screening tools to ensure children with ASD are being identified and provided with the appropriate programs and services (Wilkinson, 2010).

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