The performance of children with mental health disorders on the ADOS-G: A question of diagnostic utility

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Abstract

Over the past few decades, the reported number of children identified as having one of the Autism Spectrum Disorders (ASD) has increased exponentially. One proposed reason for the dramatic increase in the prevalence of ASD is diagnostic substitution, whereby children with other disorders incorrectly receive a diagnosis of ASD. Little research has examined whether standardized diagnostic measures of ASD can appropriately distinguish high functioning children with ASD from children with mental health disorders. The present study evaluated the diagnostic utility of the Autism Diagnostic Observation Schedule, Generic (ADOS-G) Modules 3 and 4 in distinguishing ASD from mental health disorders in children and adolescents (aged 5–21 years) with at least average intellectual functioning. ADOS-G Modules 3 and 4 classifications were evaluated in 93 clinically referred children and adolescents with mental health disorders other than ASD. Fifteen percent of participants were misclassified as being in the Autism or Autism Spectrum category. This translates into a specificity score of 84.9%. Children and adolescents with a mood disorder had a higher likelihood of being misclassified than children and adolescents with other mental health disorders, while children and adolescents with a disruptive behavior disorder had a lower likelihood of being misclassified. Findings have implications for understanding the diagnostic usefulness of the ADOS-G and enhancing the diagnostic process for ASD.
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Autism Spectrum Disorders (ASD) are a group of developmental disorders defined by impairments in the areas of communication and socialization, as well as patterns of restricted or repetitive behaviors (American Psychiatric Association [APA], 2000). Over the past few decades, the reported number of children identified as having ASD has increased exponentially, from approximately 5 per 10,000 in the 1980s to 50–70 per 10,000 presently (Center for Disease Control and Prevention, 2007). One proposed reason for the dramatic increase in the prevalence of ASD is diagnostic substitution (e.g., Croen, Grether, Hoogstrate, & Selvin, 2002; Eagle, 2004; Jick & Kaye, 2004; Shattuck, 2006), whereby children with other disorders involving impairments in social, language, and behavioral presentations incorrectly receive a diagnosis of ASD. Obtaining accurate diagnoses of ASD versus mental health disorders may be particularly difficult among higher functioning children who do not exhibit marked developmental differences. Little research has examined whether standardized diagnostic measures of ASD can appropriately distinguish high functioning children with ASD from children with mental health disorders.

A review of the Diagnostic and Statistical Manual, Fourth Edition, Text Revision (DSM-IV-TR; APA, 2000) reveals overlap in the diagnostic criteria for ASD and mental health disorders, making the process of differential diagnosis difficult. The core areas of impairment in ASD – communication, socialization, and restricted or repetitive behaviors – are also defining or associated features of several different mental health disorders. For example, impairments in social relationships and relatedness are required as part of the diagnostic criteria for ASD, but also for Major Depressive Disorder, Reactive Attachment Disorder, Schizophrenia, and Social Phobia. Impairments in communication are also part of the diagnostic criteria for Schizophrenia, as well as ASD. Repetitive behaviors, thoughts or interests not only define ASD but also some of the Anxiety Disorders, such as Obsessive-Compulsive Disorder and Posttraumatic Stress Disorder, and the Tic Disorders. Difficulties often seen in children with ASD, such as poor concentration, are included in the diagnostic criteria for multiple mental health disorders (i.e., Attention-Deficit/Hyperactivity Disorder (ADHD), Mood Disorders, and Anxiety Disorders). Standardized diagnostic measures of ASD are intended to assist clinicians in the process of determining whether presenting symptoms best represent an ASD or a mental health disorder. As part of the diagnostic process, these measures need to have appropriate specificity to distinguish children with ASD from children with mental health disorders.

The Autism Diagnostic Observation Schedule, Generic (ADOS-G; Lord et al., 2000) is a widely utilized and respected autism-specific, diagnostic instrument, and often cited as the "gold standard" for ASD diagnosis (Filipek et al., 2000; Ozonoff, Goodlin-Jones, & Solomon, 2005). The ADOS-G provides a standardized, semi-structured assessment of the core features of autism: social interaction, communication, play and creativity, and repetitive or restricted behaviors or interests. Four separate modules are available; the module used is chosen based on an individual's expressive language abilities. Activities in each of the modules vary from those appropriate for non-verbal children to those appropriate for verbally fluent children, adolescents, and adults. Following administration, specific behaviors are scored, and those scores entered into an algorithm, placing an individual into one of three classifications: Autism, Autism Spectrum, or Non-Spectrum. In order for an individual to receive a classification of Autism or Autism Spectrum, scores must fall above a certain cutoff in the areas of communication, social interaction, and a combination of the two.

Following the development of the original ADOS-G algorithms, Lord et al. (2000) requested replication of their findings with larger samples. Numerous studies have been published using the ADOS-G to assist in classifying participants as having an ASD. However, only a small body of

research suggests that the ADOS-G can adequately differentiate ASD from other disorders in children with other developmental differences. For example, studies have reported that ADOS-G scores and classifications evinced high criterion-related validity when compared to the clinical diagnosis of ASD in individuals with intellectual disability, even individuals with lower levels of functioning (Chawarska, Klin, Paul, & Volkmar, 2007; de Bildt et al., 2004). Evidence is mixed regarding the validity of ADOS-G in distinguishing children with ASD from children with specific language impairments, suggesting that the ADOS-G may be useful in distinguishing between ASD and children with receptive language impairments but not children with pragmatic impairments (Bishop & Norbury, 2002; Conti-Ramsden, Simkin, & Botting, 2006; Noterdaeme, Mildenberger, Sitter, & Amorosa, 2002). In contrast, almost no studies have examined the diagnostic utility of the ADOS-G in terms of distinguishing ASD from mental health disorders in children with little or no traditional developmental concerns. While increased awareness of ASD has resulted in a decrease in the average age of first diagnosis, a significant number of individuals with ASD continue to be first diagnosed during older childhood, often after entering public schools (De Giacomo & Fombonne, 1998; Goin-Kochel, Mackintosh, & Meyers, 2006; Howlin & Asgharian, 1999; Howlin & Moore, 1997; Wiggins, Baio, & Rice, 2006). These individuals are often high functioning and obtain scores at least within the average range on standardized measures of intelligence and language ability. The diagnostic process in this subgroup of children is complicated by their often mild and varied presentation of the ASD core impairments, which makes differential diagnosis with mental health disorders difficult (e.g., Goin-Kochel et al., 2006; Holzer et al., 2006; Wiggins et al., 2006).

Little is known about whether the ADOS-G can successfully distinguish higher functioning children with ASD from children with mental health disorders. With one exception described below, the only published research addressing this question comes from the ADOS-G standardization sample (Lord et al., 2000). The sensitivity and specificity of the ADOS-G Module 3 was examined using a sample of 41 individuals diagnosed with ASD, autistic disorder or pervasive developmental disorder not otherwise specified, and a comparison group of 18 Non-Spectrum individuals (15 had a diagnosis of Receptive-Expressive Language Disorder, Intellectual Disability, ADHD, Oppositional Defiant Disorder and three were typically developing). The sensitivity and specificity of the ADOS-G Module 4 was examined using a sample of 30 individuals diagnosed with ASD and a comparison group of 15 Non-Spectrum individuals (eight had a diagnosis of Intellectual Disability, Schizophrenia, Anxiety Disorder, Obsessive-Compulsive Disorder, Depression, and ADHD and seven of whom were typically developing). The sensitivity and specificity of the ADOS-G Modules 3 and 4 in differentiating the individuals with ASD from the Non-Spectrum individuals was calculated. A high sensitivity and specificity was found for both Module 3 (sensitivity of 90% and specificity of 94%) and Module 4 (sensitivity 90% and specificity 93%). However, a further break down of sensitivity and specificity for the Non-Spectrum children with a mental health disorder versus those who were typically developing or had intellectual disability was not conducted. Mazefsky and Oswald (2006) examined ADOS-G classifications in 59 children with ASD and 19 children with a non-ASD diagnosis. Specific information on diagnoses was not provided. Results indicated that 3 (16.8%) of the 19 children with a non-ASD diagnosis incorrectly received an ADOS-G classification of ASD. This translates into a specificity of 86.4%.

While recognizing the importance of ongoing investigation into the clinical utility of the ADOS-G with individuals with intellectual and other developmental disabilities, the aim of the present study was to evaluate the diagnostic utility of the ADOS-G Modules 3 and 4 in distinguishing ASD from mental health disorders in children and adolescents with at least

average intellectual and language functioning. To accomplish this aim, we evaluated ADOS-G Modules 3 and 4 classifications for 93 clinically referred children and adolescents with mental health disorders other than ASD seen at a university-based autism program. Subsequently, we evaluated whether agreement was better for certain diagnoses, age groups, or gender.

1. Method

1.1. Participants

This study examined ADOS-G scores for 93 children (15 girls and 78 boys) aged 5–21 years ($M = 9.5$, $S.D. = 3.1$) who participated in an evaluation through the autism program at a tertiary children's hospital that is part of a medical university, between August 2003 and August 2006. Ethnicity data were obtained from 37% of the sample. For this subset, 91% of participants were Caucasian, 3% were Asian American/Pacific Islander, and 6% were of other ethnicity. This ethnicity breakdown corresponds to the demographics of children seen at the children's hospital more generally. Caregivers did not report ethnicity for 63% of participants on an informant-reported questionnaire. On a standardized measure of intelligence, either the Stanford-Binet Intelligence Scales (Roid, 2003) or the Wechsler series of intelligence scales (Wechsler, 1999, 2002, 2003), participants had an average Full Scale score of 99.6 ($S.D. = 11.8$), and all participants had a minimum Full Scale score of 80. None of the participants had ever received any of the DSM-IV-TR pervasive developmental disorder diagnoses; in addition, they did not meet diagnostic criteria at the time of the evaluation for any of the ASD. In addition, children with other developmental disorders, including intellectual disability, speech language disorders, and learning disorders, were excluded. The latter group of children was excluded to minimize any impact of these other developmental disorders on ADOS-G scores thus limiting the number of possible confounding variables. Twenty-two participants received an anxiety disorder diagnosis (Generalized Anxiety Disorder, Posttraumatic Stress Disorder, or Anxiety disorder, not otherwise specified), 17 participants received a Mood Disorder diagnosis (Major Depressive Disorder, Dysthymia, or Mood Disorder, not otherwise specified), 41 participants received a disruptive behavior diagnosis (Attention Deficit Hyperactivity Disorder or Disruptive Behavior Disorder, not otherwise specified), 10 participants received a Reactive Attachment Disorder diagnosis, 2 participants received an Adjustment Disorder diagnoses, and 1 participant received a Psychotic Disorder diagnosis (Psychotic Disorder, not otherwise specified).

1.2. Measures

1.2.1. Autism Diagnostic Observation Scale-Generic

The ADOS-G is a semi-structured, standardized, play-based assessment measure designed to elicit autistic behaviors that are then coded and entered into a diagnostic algorithm. The ADOS-G is divided into four separate modules: each module is aimed at a specific level of expressive language ability. The use of different modules reduces possible biasing effects of differences in language skills (Lord et al., 2000). Eighty-two participants were administered Module 3 and 11 participants were administered Module 4.

Scoring of the ADOS-G occurs immediately after its administration. Each item is scored on a 0–3 scale (0 = no evidence of abnormal behavior to 3 = markedly abnormal behavior) (Lord et al., 2000). The ADOS-G algorithms contain those items with the highest inter-rater reliabilities that discriminated among autism, ASD, and Non-Spectrum individuals in the standardization

sample. Each module has a different algorithm. Items used in the algorithms are divided into four areas: Communication, Social Interaction, Play/Creativity, and Restricted/Repetitive Behaviors or Interests. Cutoff scores in the domains of Communication, Social Interaction, and Combined (Communication + Social Interaction), allow an individual to be given a(n) Autism, ASD, or Non-Spectrum classification. An individual must receive a classification of Autism or ASD in all three domains in order to receive an overall classification of Autism or Autism-Spectrum.

The authors report good to excellent reliability of the items, domains, and classification categories (Lord et al., 2000). Validity studies were conducted by carrying out several analyses. Correlation matrices were generated for all items on each module for all domains. Intercorrelations that were above .70 for two or more items within a module and overlapped in conceptualization were removed from the algorithm (Lord et al., 2000). A fixed-effects analysis of variance (ANOVA) was then carried out to compare samples of Autism and Non-Spectrum individuals. Items that did not show significant differences were excluded from the algorithm. Further analyses were conducted to compare the three classification groups (i.e., Autism, Autism Spectrum, and Non-Spectrum) for each of the items that had been retained in the algorithm.

1.3. Procedures

Primary care physicians across the state and region referred patients to the Autism Program for the purpose of having an interdisciplinary team evaluate behaviors that are suspected of being consistent with ASD. The majority of participants were accompanied to the clinic by their parents. Occasionally foster parents or caseworkers accompanied the participant. The diagnostic team used a state-of-the-art diagnostic protocol, which included the most reliable and accurate instruments available. Participants in the present study were administered a standardized intelligence test, a standardized language test, and the ADOS-G by a random combination of team members. Caregivers were given a comprehensive, semi-structured diagnostic interview of DSM-IV-TR criteria for ASD, the Vineland Adaptive Behavior Scales, Survey Form (Sparrow, Cicchetti, & Balla, 2005) and were asked to complete a standardized behavior checklist. The ADOS-G was administered and scored immediately after administration by two, licensed clinicians that had reached clinical reliability on the instrument. Clinical diagnoses, including Axis I diagnoses, were based on consensus between the psychologist and developmental pediatrician, using all of the standardized and non-standardized information available. Data were entered into a de-identified clinical database, which was approved by the Oregon Health and Science University's Institutional Review Board for research use. Primary diagnosis, scores from standardized intelligence measures, and scores from the ADOS-G were analyzed for the present study.

2. Results

Table 1 presents the number and percentage of participants receiving a classification of Non-Spectrum, Autism Spectrum, and Autism across the domains of Communication, Social Interaction, Communication + Social Interaction, as well as overall. Twenty-three participants (24.7%) received an Autism or Autism Spectrum classification for the Communication Domain and 27 participants (29.0%) scored in the Autism or Autism Spectrum range for the Social Interaction Domain. Only 16 participants (17.2%) were in the Autism or Autism Spectrum category for the Communication + Social Interaction domain. Fourteen of the 93 participants

Table 1

Number and percentage (in parenthesis) of children and adolescents falsely classified as Autism Spectrum (ASD) or Autism and correctly classified as Non-Spectrum (non-ASD) on ADOS-G domains

	ASD	Autism	Non-ASD
Communication	12 (12.90%)	11 (11.83%)	70 (75.27%)
Social Interaction	20 (21.51%)	7 (7.53%)	66 (70.97%)
Communication + Social Interaction	8 (8.60%)	8 (8.60%)	77 (82.80%)
All domains	9 (9.68%)	5 (5.38%)	79 (84.95%)

Note: A child/adolescent must receive a classification of Autism or ASD in all three domains in order to receive a classification of Autism or ASD.

received an overall ADOS-G classification of either Autism or Autism Spectrum (i.e., all three domains had scores above cutoff for Autism or Autism Spectrum), suggesting that 84.9% of participants were classified as Non-Spectrum, consistent with their clinical diagnosis. This translates into specificity for the ADOS-G, or probably of a Non-Spectrum rating among individuals without ASD, of 0.85.

Table 2 presents the subject characteristics of participants correctly classified as Non-Spectrum and of those misclassified as Autism or Autism Spectrum on the ADOS-G. Of the participants receiving an ADOS-G misclassification of Autism or Autism Spectrum, 13 were male and only one was female. That represents a 13:1 male to female ratio, compared with the 4.7:1 male to female ratio for the participants that were accurately classified as Non-Spectrum on the ADOS-G. Independent samples t-tests indicated that there was not a significant difference in age between the participants classified as Autism or Autism Spectrum and those classified as Non-Spectrum ($t(91) = 1.01$, $p = .25$). Independent t-tests also indicated that there was not a significant difference in full scale score between the participants classified as Autism or Autism Spectrum and those classified as Non-Spectrum ($t(91) = -0.91$, $p = .35$). The 14 participants misclassified on the Autism Spectrum had a variety of psychiatric diagnoses: three with Anxiety Disorders, five with Mood Disorders, three with Behavior Disorders, two with Reactive Attachment Disorder and one with Psychotic Disorder. Participants with a Mood Disorder had the highest relative risk of being falsely classified as having an ASD (29.4%), followed by

Table 2

Subject characteristics of children and adolescents falsely classified as Autism Spectrum (ASD) and correctly classified as Non-Spectrum (non-ASD) on the ADOS-G

	ASD $N = 14$	Non-ASD $N = 79$
Sex (boys:girls)	13:1	65:14
Age (years)	10.15 (3.94)	9.32 (2.83)
Full Scale IQ	102.69 (14.51)	99.48 (12.88)
Mental health diagnosis		
Anxiety Disorder ($N = 22$)	3 (13.6%)	19 (86.4%)
Mood Disorder ($N = 17$)*	5 (29.4%)	12 (70.6%)
Behavior Disorder ($N = 41$)*	3 (7.1%)	38 (92.7%)
Psychotic Disorder ($N = 1$)**	1 (100.0%)	0 (0%)
Attachment ($N = 10$)	2 (20.0%)	8 (80%)
Adjustment ($N = 2$)	0 (0%)	2 (100%)

Note: *Trend toward difference between classification groups at $p \leq .07$; **significant difference between classification groups at $p < .05$.

participants with an attachment disorder (20.0%). In contrast, only 7.1% of participants diagnosed with a Behavior Disorder and 13.6% of participants diagnosed with an Anxiety Disorder were misclassified as having an ASD. The one participant with a psychotic disorder was misclassified, yet neither of the two participants with Adjustment Disorder received a classification of Autism or Autism Spectrum.

Chi-square analyses were used to examine the ratio of participants with mental health diagnoses in the group falsely classified as ASD ($N = 14$) as compared to the group correctly classified as Non-Spectrum ($N = 79$). There was a significantly higher percentage of participants with psychotic disorder in the group falsely classified as ASD than in the group correctly classified as Non-Spectrum ($\chi^2 = 5.70$, $\phi = -2.48$, $p = .17$). There was a trend toward a higher ratio of participants with Mood Disorders in the group falsely classified as ASD than in the group correctly classified as Non-Spectrum ($\chi^2 = 3.35$, $\phi = -0.19$, $p = .07$). There was also a trend toward a lower ratio of participants with Behavior Disorders in the group falsely classified as ASD than the group correctly classified as Non-Spectrum ($\chi^2 = 3.43$, $\phi = -0.19$, $p = .06$). There was not a significant difference in the percentage of participants with Anxiety Disorder ($\chi^2 = 0.45$, $\phi = 0.22$, $p = 0.83$), Reactive Attachment Disorder ($\chi^2 = 0.21$, $\phi = -0.05$, $p = .64$), or Adjustment Disorder ($\chi^2 = 0.36$, $\phi = 0.06$, $p = .55$) in the group falsely classified as ASD and the group correctly classified as Non-Spectrum.

3. Discussion

In the past few decades there has been a dramatic increase in the prevalence of ASD (e.g., Center for Disease Control and Prevention, 2007). One commonly proposed reason for this dramatic rise is that children with mental health disorders are incorrectly receiving a diagnosis of ASD (Croen et al., 2002; Eagle, 2004; Jick & Kaye, 2004; Shattuck, 2006). Despite concern for diagnostic substitution, only a few research studies have examined whether standardized diagnostic measures of ASD can accurately differentiate children with ASD from those with mental health disorders, and in particular mental health disorders in older children with little or no traditional developmental concerns. The present study examined the diagnostic utility of the ADOS-G in differentiating high functioning children and adolescents with DSM-IV-TR mental health diagnoses from ASD.

In the present study, ADOS-G scores for 93 children and adolescents of at least average intelligence with DSM-IV-TR diagnoses other than ASD were examined. Seventy-nine children and adolescents (84.9%) were correctly classified by the ADOS-G as being in the Non-Spectrum classification, while 14 (15.1%) were misclassified as being either in the Autism or Autism Spectrum classification. Children and adolescents with Mood Disorders had a relatively higher risk of being misclassified as Autism or Autism Spectrum than children and adolescent with other mental health disorders. The present study also suggests that children and adolescents with Psychotic Disorder have a heightened risk of false positives on the ADOS-G. However, this finding is based on one participant, which is reflective of the small prevalence of Psychotic Disorders in children and adolescents, but prohibits conclusions on the risk of ADOS-G misclassification for this mental health disorder. In contrast to children with mood or Psychotic Disorders, children and adolescents with Disruptive Behavior Disorders had a relatively lower risk of being misclassified. A higher ratio of males to females was noted for the misclassified children and adolescents, suggesting that false positives may be more likely for males than females. The misclassified children and adolescents did not significantly differ in general cognitive functioning or age from those who were correctly classified as Non-Spectrum.

Overall, these results suggest that the ADOS-G is a useful tool in the differential diagnostic process for high functioning children and adolescents suspected of having an ASD. In our group of children with mental health diagnoses, only a small number of false positives were noted, and the specificity of the ADOS-G for correctly categorizing a high functioning child or adolescent was 0.85. Stated differently, a high functioning child with a mental health diagnosis rather than ASD had only a 15% chance of being falsely labeled as ASD. This specificity score is very similar to scores reported in past research. In the ADOS-G standardization sample, Lord et al. (2000) reported a specificity score of 93% for Module 4 and 94% for Module 3 when comparing classifications of Autism and Autism Spectrum to Non-Spectrum. However, as previously mentioned, the Non-Spectrum sample for Modules 3 and 4 was small ($N = 18$ and $N = 15$) and included typically developing individuals with no mental health diagnoses. Mazefsky and Oswald (2006) reported an ADOS-G specificity score of 86.4% when using children with a non-ASD diagnosis, however, their study was also plagued by a small sample size ($N = 19$). By having a relatively large sample size, the present study provides confirmation of results from previous studies with smaller sample sizes and adds to the literature by focusing exclusively on children and adolescents with mental health disorders. Conti-Ramsden et al. (2006) reported a specificity of 79% for their sample of 76 adolescents with specific language impairment, suggesting that having language impairment may result in a slightly higher chance of having a false positive score on the ADOS-G. This possibility warrants further empirical investigation.

As Lord et al. (2000) report in the ADOS-G manual, our results confirm the need for multiple sources of information during the diagnostic process. ADOS-G classification scores should not be interpreted in isolation, as a small but significant percentage of high functioning children with non-ASD mental health disorders were falsely classified as having ASD. Input from parent or other caregivers, as well as teachers, provides valuable information in addition to the ADOS-G scores and classifications. The use of collateral information appears particularly important when evaluating higher functioning males that present in clinic with possible Mood Disorders.

It is interesting to speculate why participants with mood and disorders were more likely than other individuals to obtain a classification of either Autism or Autism Spectrum on the ADOS-G. Our informal observations during administration of the ADOS-G suggest that individuals with Mood Disorders are more likely to refuse to respond to the interview questions or participate in activities such as the imaginative play or the demonstration task. Moreover, they often demonstrate a flat affect, poor eye contact, limited gesture use, and avoid talking about their own experiences or the experiences of others and are difficult to engage in a conversation. All of these behaviors are coded on the ADOS-G. While some of these behaviors overlap with ASD symptoms, our clinical experiences suggest that children and adolescents with high functioning ASD often present differently. For example, many children and adolescents with ASD, at least in a one-on-one clinic setting, are verbal, often hyper verbal, with a positive, often exuberant affect, prone to one-sided conversations about their intense area of interest. They attempt all activities and answer all questions: it is precisely their attempts at appropriate social behavior and their responses to socially relevant questions that provide the information needed to confirm an ASD diagnosis. Future studies are needed to employ a systematic method to investigate these preliminary observations and identify ways to differentiate the social and communication difficulties of children with ASD from those with Mood Disorders.

While results from the present study address the utility of the ADOS-G in differentiating high functioning individuals with mental health disorders from similar individuals with ASD, it does not address the question of comorbid mental health disordering in individuals with ASD. A recent review article by Matson and Nebel-Schwalm (2006) highlights the need to further examine

phobias, depression, generalized anxiety and even psychoses in individuals with ASD. At present, few standardized instruments exist that systematically address concerns about comorbidity in ASD, forcing reliance on subjective information, such as parent interview, to assist in the diagnostic process. The accurate differentiation of mental health disorders *from* ASD, as well as identification of comorbid mental health disorders *and* ASD remains important and both areas warrant further investigation.

Children and adolescents in the present study had a limited range of ethnicity. Additional research is needed to determine whether findings can generalize to more diverse populations. Moreover, children and adolescents in the present study were referred to an autism clinic by their primary care providers, presumably because of autistic-like behaviors. The behavioral presentations of children and adolescents in the present study may thus have been more complex or difficult than that of other children and adolescents with mood, anxiety, adjustment, attachment, disruptive behavior, and psychotic disorders more generally. If this is the case, then the specificity of the ADOS-G may be higher for correctly categorizing non-ASD children with mental health disorders when examined at a more global level. The present study is also limited in that it excluded children and adolescents with language disorders. Children and adolescents with language disorders have an increased risk for other mental health disorders such as mood, anxiety, and ADHD (Beitchman, Cohen, Konstantareas, & Tannock, 1996, for review). Individuals with comorbid language impairment and mental health disorders may be particularly prone to false positives on the ADOS-G. Further research is needed to address these issues. Finally, results from the present study cannot allow comment on the sensitivity of the ADOS-G, as only scores from individuals without an ASD were analyzed.

In conclusion, results from the present study confirm the utility of the ADOS-G Modules 3 and 4 in the process of differentiating high functioning ASD from other DSM-IV-TR diagnoses; however, ADOS-G results should be interpreted with caution. This is particularly true when interview and other data suggest a primary diagnosis of one of the Mood Disorders and for males. The present study is a first attempt to identify the specificity of standardized measures for incorrectly diagnosing ASD in higher functioning children with mental health disorders and to discover characteristics of children at risk for being falsely labeled as having an ASD. This information has important implications for understanding the role of diagnostic substitution in the rise in ASD prevalence over the past decade. More importantly, this information has implications for enhancing the diagnostic process to reduce false positives for ASD, which can have detrimental effects on parents and children through inappropriate diagnoses and treatment recommendations and delays in appropriate intervention.

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