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A pilot study examining the use of the autism diagnostic observation schedule in community-based mental health clinics

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ABSTRACT

Community-based mental health (CMH) services play an important, but relatively understudied role in the identification and treatment of youth with autism spectrum disorder (ASD) who may be receiving care for other psychiatric conditions. Little is known about the role of standardized ASD assessment measures administered by providers working in generalist community-based mental health (CMH) settings. This pilot study extracted data from three CMH clinics to examine the use of the Autism Diagnostic Observation Schedule (ADOS) by 17CMH providers who received ASD assessment training with 62 youth (Mean = 10.69 years) referred for an ASD diagnostic evaluation. Results indicated that 57% of youths assessed ultimately received an ASD diagnosis. All cases given a final ASD diagnosis were classified as "Autism" or "ASD" on the ADOS. Seventy percent of youth who did not receive a final ASD diagnosis were classified as "Non-Spectrum" on the ADOS. In these false positive cases, report narratives indicated that social communication difficulties identified on the ADOS were explained by symptoms of other mental health conditions (e.g., ADHD, anxiety). Future research is needed to examine the utility of the ADOS when used by CMH providers to facilitate CMH capacity to identify ASD.

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1. Introduction

Research examining diagnostic practices of Autism Spectrum Disorder (ASD) in community service settings is limited (Akshoomoff, Corsello, & Schmidt, 2006; Corsello, Askshoomoff, & Stahmer, 2013; Daniels et al., 2011; Rosenberg et al., 2009; Wiggins et al., 2006; Williams, Atkins, & Soles, 2009). The research available indicates that delays are common in receiving an initial ASD diagnosis, particularly for children who ultimately receive a diagnosis of Pervasive Developmental Disorder, Not Otherwise Specified (PDD, NOS) or Asperger's Disorder (Centers for Disease Control and Prevention, 2012; Wiggins et al., 2006; Yeargin-Allsopp et al., 2003). In addition, studies suggest that disparities exist in the timing of an initial ASD diagnosis based on socioeconomic status, child race/ethnicity, and child clinical factors (Fountain, King, & Bearman, 2011; Goin-Kochel, Mackintosh, & Myers, 2006; Mandell, Listerud, Levy, & Pinto-Martin, 2002; Mandell et al., 2009). Specifically, lower family socioeconomic status, child racial/ethnic minority background, and a higher functioning ASD diagnosis are significant correlates of delays in receipt of initial ASD diagnosis. Further, there is variability in adherence of community-based

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clinicians to best practice guidelines such as using a standardized ASD diagnostic instrument (Wiggins et al., 2006; Williams et al., 2009).

The Autism Diagnostic Observation Schedule (ADOS) (Lord, Rutter, DiLavore, & Risi, 2001) is considered one of the "gold standard" diagnostic assessment tools for research and clinical use. There is minimal research on the use of the ADOS when administered by community-based mental health (CMH) clinicians with children. From what is known, the ADOS retained strong diagnostic classification properties when administered to preschool and school-aged children in an ASD specialty clinic (Mazefsky & Oswald, 2006) and when community-based psychologists who specialized in developmental disabilities administered the ADOS to toddlers (24–36 months) seen in a developmental evaluation clinic (Corsello, Akshoomoff, & Stahmer, 2013). However, it has been shown that the ADOS was less accurate in identifying children without ASD due to misclassifications on the ADOS when used with preschool and school-aged children in a general developmental/behavioral disorders clinic (Molloy, Murray, Akers, Mitchell, & Courtney-Manning, 2011).

Children with ASD are served through multiple service systems, primarily special education/school, developmental disabilities, and pediatrics. The CMH system, which provides publicly-funded services to address psychiatric problems through psychosocial and pharmacological interventions, also plays an important role in differential diagnosis assessment and treatment for individuals with ASD. Children with ASD served in this system are typically school-aged, have average to above average cognitive functioning (i.e., IQ > 70), have a broader subtype of ASD (e.g., PDD, NOS), and exhibit high rates of co-occurring psychopathology and challenging behaviors (Brookman-Frazee, Drahota, & Stadnick, 2012; Brookman-Frazee, Taylor, & Garland, 2010; Brookman-Frazee et al., 2009; Joshi et al., 2014; Mandell et al., 2005). Also, a high proportion of these youth are from racial/ethnic minority backgrounds (e.g., Levy et al., 2010; Mandell et al., 2007; Williams, Atkins, & Soles, 2009). Due to the high rates of co-occurring psychopathology, reported at 70% or greater, and challenging behaviors that are common in children with ASD (e.g., Joshi et al., 2010; Levy et al., 2010; Simonoff et al., 2008), the CMH system provides ongoing mental health care for these children.

CMH providers are typically generalist in practice (i.e., not specializing in a particular disorder) and may have limited ASD training (Brookman-Frazee, Drahota, Stadnick, & Palinkas, 2012; Brookman-Frazee et al., 2010). In research examining the training needs of CMH providers, clinicians in these settings requested comprehensive training in ASD assessment and diagnosis in addition to training in intervention strategies (Brookman-Frazee et al., 2012c). These CMH providers indicated that they were treating many children for other psychiatric conditions whom they suspected had ASD, but these providers did not feel equipped to accurately assess for ASD. Many ASD symptoms (e.g., repetitive behaviors, avoidance of social situations) are shared with other common psychiatric disorders. These factors may increase the difficulty of an accurate or differential ASD diagnosis (White, Bray, & Ollendick, 2012), particularly for providers with less specialized ASD training.

To address the need for research on building CMH capacity to identify ASD when serving diagnostically and racial/ethnically diverse youth, the current pilot study extracted data from routine care to examine the use of the ADOS when administered by CMH clinicians to children referred for an ASD assessment. Specifically, the proportion of ADOS classifications relative to final provider-assigned diagnosis by CMH clinicians who were trained to incorporate the ADOS in their diagnostic evaluations with children suspected of ASD was examined.

2. Method

This pilot study used extracted, de-identified clinical evaluation reports generated as part of routine clinical care between the Fall of 2008 and the Spring of 2012 in three outpatient CMH clinics from one organization in a large, diverse county. This organization is the largest contractor for publicly funded youth mental health services in the county.

2.1. CMH context

The participating clinics provided diagnostic evaluations, medication evaluations and management, and individual, family, and group therapy to youth ages 2–18 years with a variety of mental health conditions. Youth were eligible to receive services if they met medical necessity for a qualifying psychiatric condition and either qualified for educationally-related mental health services as part of their Individualized Education Plan or received public funding for mental health services (through the state's Medicaid program).

2.2. Procedures

2.2.1. ASD assessment training

Based on increased referrals for differential diagnosis of ASD and other psychiatric disorders, the lead psychologist and medical director of the outpatient CMH clinics coordinated access to specialized training in ASD diagnosis for all interested clinical psychologists and predoctoral psychology trainees. These clinicians received training in ADOS administration by one certified ADOS trainer (co-author: NA). The ADOS training consisted of an 8 hour workshop that included two components (1) four hours of didactic instruction regarding administration of the ADOS and interpretation of results to determine a diagnosis and (2) four hours of live observation of ADOS administration by the trainer and in vivo practice administration by attendees with performance feedback from the trainer. Following the workshop, attendees were provided the opportunity to receive review of administration video recordings and corresponding reports from the ADOS trainer. Unlicensed psychology

trainees (psychology practicum students and pre-doctoral interns) received additional individual supervision from a licensed clinical psychologist who had also completed the ADOS training.

2.2.2. ASD assessment procedure

A referral protocol was implemented by the medical director and lead psychologist across the three clinics to standardize the process of ASD-specific assessment referrals for ongoing clients. Children were referred for an evaluation by their treating therapist. Therapists were instructed to obtain parent report screening measures (see Section 2.4) and include these measures in the referral packet along with previous testing reports. The staff clinical psychologist at each clinic coordinated referrals and case assignment of the ASD evaluations with the clinicians who completed the ASD assessment training describe above. These evaluations were designed to assess for the presence of ASD. Evaluators who had undergone the ADOS training completed the following components for each evaluation: (1) gathered a brief developmental history through clinical interview with the parent or caregiver, (2) reviewed parent-report ASD symptom questionnaires obtained by the referring therapists, (3) reviewed past psychological testing evaluations, if available, and (4) administered the ADOS. If a more comprehensive evaluation was warranted based on the referral question or availability of cognitive testing, the same ADOS trained evaluator administered additional cognitive and academic achievement assessments. Per best practice guidelines for ASD diagnosis, the clinician who conducted the ASD assessment using the ADOS integrated findings from the ADOS with results from the clinical interview and other available measures and used clinical judgment to determine whether the child met criteria for Autistic Disorder, Asperger's Disorder, or PDD-NOS, per the DSM-IV-TR (APA, 2000).

2.3. Participants

2.3.1. Children

Sixty-two children who were ongoing clients in the three clinics were referred for and received an ASD assessment. Mean child age at the time of testing was 10.69 years (SD = 3.48; Range = 5–18) and 76% were boys. The sample was racially/ethnically diverse with 42% Latino/Hispanic, 33% White/Caucasian, 11% African American, 8% Asian/Pacific Islander, and 5% Multiracial, per the clinical evaluation report or clinic records. Demographic data are provided in Table 1.

2.3.2. Evaluators

A total of three clinical psychologists and 14 predoctoral psychology trainees completed the described ASD assessment training and conducted the evaluations. There were 11 providers from the first clinic, two from the second clinic, and four from the third clinic. Each clinic had one clinical psychologist who participated in the ASD assessment training and served as the trainees' assigned primary supervisor. Trainee clinicians conducted the majority (76%) of the evaluations.

2.4. Measures

All data used in the current were extracted by research staff from de-identified reports written by the CMH clinicians who conducted the ASD assessments.

2.4.1. Final ASD diagnosis

The presence and type of a DSM-IV ASD diagnosis assigned by the CMH evaluator was extracted by research staff from the de-identified evaluation reports.

Table 1
Child demographics.

	Total sample ($n = 62$)	Final ASD diagnosis ($n = 35$)	Final Non-ASD diagnosis ($n = 27$)
Age: Mean (SD); Range	10.69 (3.48); 5–18	10.91 (3.38); 6–18	10.41 (3.64); 5–17
Gender (%)			
Boys	76%	77%	74%
Girls	24%	23%	26%
Race/Ethnicity (%)	($n = 60$)	($n = 33$)	($n = 27$)
Latino/Hispanic	42%	46%	37%
White/Caucasian	33%	33%	33%
African American	11%	12%	11%
Asian/Pacific Islander	8%	6%	11%
Multiracial	5%	3%	7%

2.4.2. Autism Diagnostic Observation Schedule

(ADOS; Lord, Rutter, DiLavore, & Risi, 2001). The ADOS is a semi-structured, clinician-administered observational assessment used to assist in the diagnosis of ASD. The quality of the child's communication and social interaction alone and in combination are rated and results in a classification of "Autism," "Autism Spectrum Disorder," or "Non-Spectrum" based on standardized cut-off values. Children were administered one of the modules based on their language and developmental level. The ADOS classification was included in the reports but the quantitative ADOS values obtained for each domain were not included in the reports and therefore not available for analysis in the current study.

2.4.3. Parent-report ASD screening measures

As part of the referral process, referring therapists were instructed to obtain caregiver-report questionnaire, typically the *Social Responsiveness Scale* and the *Social Communication Questionnaire*. The *Social Responsiveness Scale* (SRS) (Constantino & Gruber, 2005) is a 65-item parent-report measure that examines the severity of ASD symptoms. A Total Score is calculated that categorizes severity into three groups: Severe Range, Mild to Moderate Range, Normal Range. The *Social Communication Questionnaire* (SCQ) (Rutter, Bailey, & Lord, 2003) is a 40-item parent-report measure that examines the presence of ASD symptoms. The SCQ yields an overall total score based on age cutoffs indicating the possibility of an ASD and need for further evaluation (Corsello et al., 2007). Both measures were reported in 36 evaluation reports, and 20 evaluation reports were missing information from both measures. When results from the SRS and SCQ were included in the reports, therapists described integrating these parent-report findings into their final diagnostic considerations. Available score classifications were extracted from reports and are reported in Table 2.

Table 2
Child clinical characteristics.

	Total sample (n = 62)	Final ASD diagnosis (*n* = 35)	Final Non-ASD diagnosis (*n* = 27)
ADOS module used (%)			
Module 4	18%	20%	15%
Module 3	77%	80%	69%
Module 2	5%	–	12%
Module 1	2%	–	4%
ADOS classification (%)			
Autism	44%	63%	19%
ASD	26%	37%	11%
Non-Spectrum	31%	–	70%
SRS (%)	(*n* = 36)	(*n* = 24)	(*n* = 12)
Severe Range	75%	75%	75%
Mild-Moderate Range	17%	13%	25%
Normal Range	8%	13%	–
SCQ (%)	(*n* = 41)	(*n* = 26)	(*n* = 15)
ASD	78%	89%	60%
Non-ASD	22%	12%	40%
Final ASD diagnosis (%)			
Autistic disorder	21%	37%	–
Asperger's disorder	16%	29%	–
PDD-NOS	19%	34%	–
Non-spectrum	42%	–	96%
Rule/out ASD	2%	–	4%
Number of Non-ASD	(*n* = 59)	(*n* = 32)	(*n* = 27)
Axis I diagnoses: Mean (SD); Range	1.88 (1.13); 1–5	1.72 (1.09); 1–5	2.07 (1.17); 1–5
Type Non-ASD Axis I diagnoses (not mutually exclusive) (%)	(*n* = 59)	(*n* = 32)	(*n* = 27)
ADHD	58%	59%	56%
Anxiety disorders	37%	25%	52%
Mood disorders	25%	28%	22%
Disruptive behavior disorder	19%	13%	26%
Other	22%	19%	26%

Note: The number and type of non-ASD Axis I DSM-IV disorders data were extracted from the evaluation reports. The Anxiety Disorders category included diagnoses of Anxiety Disorder, Not Otherwise Specified, Generalized Anxiety Disorder, Obsessive Compulsive Disorder, Social Phobia, and Specific Phobia. The Mood Disorders category included diagnoses of Bipolar Disorder, Mood Disorder, Not Otherwise Specified, and Depressive Disorder, Not Otherwise Specified. The Other Disorders category included diagnoses such as Adjustment Disorder, learning disorders, and language disorders.

2.4.4. Additional diagnoses

To further characterize the clinical characteristics of the sample, additional mental health diagnoses were extracted from the evaluation report. Specifically, the number and type of non-ASD DSM-IV Axis I disorders included in the report were extracted and categorized. Note that the initial assignment of these diagnoses may have come from the referring clinician and were retained by the assessing clinician. The Anxiety Disorders category included diagnoses of Anxiety Disorder, Not Otherwise Specified, Generalized Anxiety Disorder, Obsessive Compulsive Disorder, Social Phobia, and Specific Phobia. The Mood Disorders category included diagnoses of Bipolar Disorder, Mood Disorder, Not Otherwise Specified, and Depressive Disorder, Not Otherwise Specified. The Other Disorders category included diagnoses such as Adjustment Disorder, Tourette's Disorder, learning disorders, and language disorders.

2.4.5. Data analytic plan

Descriptive analyses were performed to characterize the sample of children receiving an ASD assessment from participating clinics and outcome of the ASD assessment. These descriptive analyses included examination of youth sociodemographics, examiner characteristics, proportion of children who met the cutoff for "Autism" or "ASD" on the ADOS, proportion of children who received a final ASD diagnosis, results from parent-report ASD assessment measures, and youth psychiatric comorbidity. As a secondary, exploratory aim, clinician-assigned ASD diagnosis by clinician trainee status was also examined. Lastly, to provide a more in-depth examination of how the ADOS was used to inform final ASD diagnoses, descriptive analyses were used to determine the proportion of children who received an ADOS classification that matched with the final diagnostic decision regarding ASD.

3. Results

3.1. Characteristics of full sample

Descriptive statistics are reported in Table 2. Of the total sample of children referred for an ASD assessment, 70% were classified as "Autism" or "ASD" on the ADOS and approximately half of the total sample (57%) ultimately received a final ASD diagnosis. The total sample of children had an average of 1.88 co-occurring DSM-IV diagnoses (SD = 1.13; Range = 1–5), with 93% being assigned at least one non-ASD Axis I diagnosis.

3.2. Characteristics of children who received a final ASD diagnosis

Of the 35 children who received a final DSM-IV ASD diagnosis, 37% received a diagnosis of Autistic Disorder, 29% received a diagnosis of Asperger's Disorder, and 34% received a diagnosis of PDD-NOS. All of these children were classified as "Autism" or "ASD" on the ADOS. On the SRS, 75% ($n = 18$) of these children with available data scored within the "Severe" range of concern and 89% ($n = 23$) of these children with available data scored above the autism cutoff on the SCQ.

3.3. ADOS classification and ASD diagnosis by clinician trainee status

Descriptive statistics were used to examine possible differences in ADOS classification and ASD diagnosis by evaluator trainee status (licensed clinical psychologist versus predoctoral psychology trainee). Overall, 20% of the 15 children assessed by licensed psychologists received an ASD diagnosis, while 68% of the 47 children assessed by a psychology trainee received an ASD diagnosis.

3.4. Correspondence between ADOS classification and final ASD diagnoses

In this sample, 100% of children who were classified as "Autism" or "ASD" on the ADOS received a final ASD diagnosis. Among the 27 children who did not receive a final ASD diagnosis, 70% were classified as "Non-spectrum" on the ADOS. Among the eight children who scored in the "Autism" or "ASD" range on the ADOS but who did not receive a final ASD diagnosis, five were categorized as "Autism" and three were categorized as "ASD" on the ADOS. For those with available data on the parent report measures, three scored above the autism cutoff on the SCQ and four scored within the "Severe" range on the SRS. A closer examination of the reports for these eight cases indicated similarities in child clinical characteristics. Specifically, for seven of the eight cases, evaluators attributed elevated ADOS scores to symptoms of an anxiety disorder (either Generalized Anxiety Disorder or Social Phobia) or symptoms of an ADHD diagnosis. For four of these seven children, evaluators explained that clinically significant ADOS scores were best explained by a combination of either an anxiety disorder or ADHD and impairments related to cognitive difficulties (i.e., lower cognitive functioning or learning disorder), a mood disorder, or unilateral hearing loss. For one child, the evaluator did not provide a detailed rationale for not providing an ASD diagnosis but suggested additional developmental history and clinical information was needed.

4. Discussion

This pilot study begins to address the paucity of research regarding use of the ADOS when administered by community-based providers to school-aged children referred for an ASD evaluation in CMH clinics. The overarching purpose was to describe the characteristics of children referred for ASD assessment and outcomes of these assessments when community-based clinicians are trained to use the gold standard diagnostic assessment measure with a clinically complex and diverse set of children served in CMH settings. Further, findings provide a preliminary understanding of how routine CMH providers trained to administer and interpret the ADOS use results to determine an ASD diagnosis for school-age children with co-occurring mental health problems. Child sociodemographics and psychiatric comorbidity in this sample were generally consistent with past ASD research in similar CMH settings (e.g., Brookman-Frazee et al., 2010, 2012b; Joshi et al., 2010; Williams et al., 2009). Specifically, similar to past research in CMH settings, children were school-aged (Mean age = 10.69 years), the majority of the sample were boys (76%), and Latino youth (42%) represented the largest racial/ethnic group. Child had, on average two, non-ASD diagnoses. Approximately half (57%) of children referred for an ASD assessment received a final diagnosis of ASD.

The pattern of children receiving final ASD diagnoses that matched with their classification on the ADOS within this community sample are generally similar to those reported in other community-based samples (e.g., Corsello, Akshoomoff & Stahmer, 2013; Molloy et al., 2011). Specifically, consistent with past research using community-based samples, the proportion of children who were classified as "Autism" or "ASD" on the ADOS and received a final ASD diagnosis was descriptively higher than the proportion of children who were classified as "Non-Spectrum" on the ADOS and were not determined to meet criteria for ASD. In this sample, all children who received a final ASD diagnosis obtained classifications in the "Autism" or "ASD" range on the ADOS. Among the children who did not receive a final diagnosis of ASD, 30% were classified as "Autism" or "ASD" on the ADOS. As is standard practice per the ADOS manual and consistent with gold standard diagnostic practices, clinical judgment and integration of additional clinical information was used to evaluate results on the ADOS and available parent report measures. Notably, the eight children who represented "false positives" shared similar clinical characteristics that influenced the diagnostic decisions of evaluators and were generally attributed to behavioral symptoms of an anxiety disorder or ADHD. This suggests the importance of employing a thorough differential diagnostic approach given the overlap of behavioral symptoms of other psychiatric disorders, including anxiety and disruptive behavior disorders, in children and adolescents (Cath, Ran, Smit, van Balkom, & Comijis, 2008; Luteijn et al., 2000; Sikora et al., 2008). This is especially important when conducting ASD assessments within the context of mental health services. Although ASD shares clinical symptoms with other disorders that may be targets of intervention (e.g., social-communication), research suggests that the psychotherapy process requires tailoring for the unique learning needs of children with ASD to impact child outcomes (e.g., use of visual cues, motivational strategies, priming, emphasis on skill generalization) (Brookman-Frazee et al., 2012b; Brookman-Frazee et al., 2012).

To facilitate accurate and reliable ASD diagnoses within CMH settings, there may be value in employing a formal "team" approach to ASD assessment to ensure standardized integration of clinical judgment and available clinical data. For clinic settings where this approach is not feasible, an alternative might be to include a staff member with greater ASD evaluation experience offer consultation to guide novice evaluators. Research on the stability of initial ASD diagnoses in community settings indicates that diagnoses initially made by a team of healthcare professionals are more stable over time compared to diagnoses made by a single evaluator (Daniels et al., 2011). This is further supported by best practice recommendations that encourage evaluation by a team of experienced providers (Johnson, Myers, & American Academy of Pediatrics, Council on Children with Disabilities, 2007; Ozonoff, Goodlin-Jones, & Solomon, 2005).

4.1. Limitations

These data were derived from diagnostic assessments by community providers who, while trained to use the ADOS, did not receive independent evaluation to validate their diagnostic conclusions. The study investigators considered applying the Records-based Methodology for ASD Case Definition that was developed by the Metropolitan Atlanta Developmental Disabilities Surveillance Program to establish case reviewer diagnoses (Centers for Disease Control, 2007), but the majority of the clinical evaluation reports did not include the requisite information to apply this methodology. The lack of independent evaluation limits understanding of the accuracy of the ADOS results and their impact on the ASD diagnostic decision but this reflects routine practice in CMH settings. In addition, because these were targeted evaluations of ASD, a comprehensive assessment was not conducted for most children, limiting the ability to identify additional clinical characteristics that may have influenced the evaluator's ASD diagnostic decision. Further, this study was limited by the data available in the clinical evaluation reports. It was not possible to collect additional assessment information or resolve the incomplete data on ASD assessment measures including the SRS and SCQ.

5. Conclusions

Findings indicate that the utility of the ADOS within this CMH sample was relatively strong and descriptively comparable to the data reported about the ADOS in other community settings. This study adds to the extant literature by providing preliminary data regarding use of the ADOS administered by CMH providers, who do not specialize in ASD, to clinically

complex, diverse, school-aged children suspected of ASD and receiving CMH services. Findings can inform efforts to increase and improve ASD identification processes in CMH settings. At a practice-based level, this study suggests that due, in part, to the clinical complexity of children referred for an ASD evaluation in CMH settings, it may be valuable for CMH providers to adopt a team-based approach to reviewing evaluation data and ultimately determining an ASD diagnosis, with an emphasis on considering the impact of other mental health conditions on social communication skills. Future research is clearly indicated with larger sample sizes and diagnostic validation using independent reviewers. Next steps for research could include examining the added value in diagnostic precision and feasibility of administering the ADOS along with a structured diagnostic interview to youth suspected of ASD in CMH settings. This study is a first step in studying processes for building CMH capacity to identify ASD in children being treated for other mental health conditions.

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