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Complex Psychiatric Comorbidity of Treatment-Seeking Youth With Autism Spectrum Disorder and Anxiety Symptoms

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Abstract

Anxiety disorders and other co-occurring psychiatric disorders significantly impact adaptive functioning for many children with autism spectrum disorder (ASD). This descriptive study examines the complexity of psychiatric comorbidity in treatment-seeking youth with ASD and anxiety symptoms. Forty-two parents of 8- to 14-year-old children with ASD and anxiety symptoms completed a structured psychiatric interview (K-SADS) and provided information about the child's past and current psychological functioning as part of a screening process to enter an anxiety intervention program. Overall, comorbidity was very complex, with children obtaining an average of 4 psychiatric diagnoses (including anxiety disorders) on a structured clinical interview (range = 0–9). Onset and course differed by psychiatric disorder. Complexity of comorbidity did not differ significantly by age, sex, or autism severity. Despite clinical significance of the symptoms reported, few children were currently (or ever) engaged in mental health treatment or group psychosocial intervention. Although the specificity of the current sample limits the generalizability of these results, findings suggest that treatment-seeking children with ASD and anxiety often present with additional psychiatric symptoms, which supports a transdiagnostic approach to research and intervention in this area. Accurate assessment of comorbidity may provide valuable information for families and clinicians regarding individualized treatment approaches.

Keywords

autism; anxiety; psychiatric comorbidity; descriptive

BACKGROUND

Children with anxiety disorders often present with additional psychiatric symptoms (Cummings, Caporino, & Kendall, 2013; Garber & Weersing, 2010). Comorbidity in youth with anxiety disorders is associated with poorer global functioning and family functioning as well as increased symptom severity (O’Neil, Podell, Benjamin, & Kendall, 2010). Researchers have suggested that the complexity of co-occurring symptoms may call for increased flexibility and individualization of treatment approaches (e.g., Kendall, Kortlander, Chansky, & Brady, 1992).

Children with autism spectrum disorder (ASD) are at especially high risk of developing anxiety symptoms (Brereton, Tonge, & Einfeld, 2006; Skikauskas & Gallagher, 2011). Clinically significant disorders of attention, mood, and other conditions have also been reported among children (de Bruin, Ferdinand, Meester, de Nijs, & Verheij, 2007; Leyfer et al., 2006; Sukhodolsky et al., 2008), adolescents (Brereton et al., 2006), and adults with ASD (Attwood, 2005; Tantum, 2000). Recent studies estimate the prevalence of co-occurring disorders (including anxiety) in individuals with ASD to be as high as 60–70% (Joshi et al., 2010; Mattila et al., 2010; Simonoff et al., 2008) or even higher (Mukaddes, Hergüner, & Tanidir, 2010).

The intensity and severity of psychiatric symptoms in individuals with ASD can vary and are influenced by a number of factors, including the severity of the core deficits associated with autism, the severity of associated cognitive impairments, the presence of comorbid medical disorders, life experiences related to coping with a disability, and/or a combination of these influences (Lainhart, 1999). Psychiatric symptoms are often distressing and interfere with the day-to-day functioning of affected individuals. Comorbid psychopathology has been associated with increased risk of serious educational problems, later underemployment, substance abuse, and development of other comorbid psychiatric conditions in persons with and without ASD (Russell & Sofronoff, 2005; Velting, Setzer, & Albano, 2004). Fortunately, evidence for the efficacy of psychosocial and psychopharmacological treatment of anxiety in persons with ASD is promising (Chalfant, Rapee, & Carroll, 2007; de Bruin et al., 2007; Hollander, Robinson, & Compton, 2004; Reaven, Blakeley-Smith, Culhane-Shelburne, & Hepburn, 2012; Sofronoff, Attwood, & Hinton, 2005).

The accurate identification of anxiety and co-occurring mental health symptoms in individuals with ASD is important for accessing appropriate treatment; however, there are many challenges inherent to assessing comorbidity in this population. Definitions of specific forms of anxiety, attention, and mood disorders can overlap with the diagnostic criteria or associated features of ASD (e.g., Wood & Gadow, 2010) and contribute to “diagnostic overshadowing” (Reiss & Szyszko, 1983), a tendency for mental health symptoms to be attributed to a developmental disability, in this case, an autism spectrum diagnosis. For

similar reasons, it can be difficult for families to report their concerns to clinicians with sufficient specificity to indicate the need for more thorough psychiatric assessment and treatment (White, Oswald, Ollendick, & Scahill, 2009). For clinicians, the accurate diagnosis of co-occurring mental health conditions in individuals with ASD may be particularly challenging when the individual has marked cognitive and/or communicative challenges. Psychosocial masking, or the difficulty that individuals with developmental disabilities have in accurately reporting their psychiatric symptoms, may further complicate efforts to obtain comprehensive clinical information (Fuller & Sabatino, 1998). For these reasons, researchers have advocated for renewed efforts to validate psychiatric assessment tools specifically for use with ASD populations (Kerns & Kendall, 2012; Lecavalier et al., 2013; Leyfer et al., 2006; Mazzone, Ruta, & Reale, 2012).

Several research groups are working to improve psychiatric assessment in persons with ASD. Moderate rates of comorbidity have been reported in studies using parent-report checklists of psychiatric symptoms designed for ASD populations (e.g., Autism Spectrum Disorders-Comorbid for Children; Matson & Wilkins, 2008), with anxiety disorders (15%), ADHD (18%), and epilepsy (10%) representing the most common co-occurring disorders (Mannion, Leader, & Healy, 2013). However, these proportions may underestimate rates of comorbidity due to the study's inclusion of children as young as 3 years old, prior to the typical age of onset for many psychiatric disorders. Moreover, questionnaire measures may fail to capture the full clinical profile of this complex population. Parent interview measures, widely considered the "gold standard" of child psychopathology assessment, reveal higher rates of comorbid anxiety (28–55%), ADHD (23–45%), and ODD (23–37%) in children with ASD (de Bruin et al., 2007; Simonoff et al., 2008; Sukhodolsky et al., 2008; van Steensel et al., 2013). One of the most widely used interview measures is the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS; Kaufman et al., 1997). Studies of clinical and community-based samples indicate that about 70% of children with ASD meet diagnostic criteria for one or more psychiatric disorders on the K-SADS (Gjevik, Eldevik, Fjaeran-Granum, & Sponheim., 2011; Mattila et al., 2010). Similar results were reported by Leyfer and colleagues (2006) using a modified version of the K-SADS specifically for children with ASD. The most commonly endorsed diagnosis in this study was specific phobia (44%); the median number of diagnoses per child was three. Together, these findings reflect a movement toward improved assessment tools that take into account the diagnostic challenges inherent in ASD as well as a profound need for intervention strategies to target anxiety and other psychiatric conditions that frequently co-occur in this population.

Improved identification and treatment of psychiatric conditions in children with ASD requires better understanding of the complexity of the mental health challenges faced by these children and their families. Given the heterogeneity of ASD, understanding individual differences in symptom presentation and psychiatric complexity may be especially important in structuring treatments that address children's unique constellation of symptoms. Moreover, determining which diagnosis is primary is helpful for allocating resources appropriately and setting specific treatment goals (Matson & Nebel-Schwalm, 2007). Although extant research has established general estimates of the prevalence of anxiety and other co-occurring psychiatric conditions in youth with ASD, few studies have explored

specific developmental and phenomenological factors related to comorbidity in this population. Therefore, the present study is a descriptive inquiry into the phenomenology, onset, course, and complexity of comorbid mental health conditions in a help-seeking, clinical sample of children with high-functioning ASD and anxiety symptoms. The goal of the investigation is to enhance our current understanding of psychiatric complexity in individuals with ASD in order to improve identification, intervention, and access to mental health care for persons with a pervasive developmental disorder. Specific research questions are as follows:

1. For children with ASD whose parents are concerned about anxiety symptoms, how complex is their clinical presentation? Do children with ASD and anxiety symptoms also meet diagnostic criteria for attention, mood, conduct, or other childhood psychiatric conditions?
2. What is the onset and developmental course of co-occurring psychiatric conditions among this sample of children with ASD and anxiety disorders?
3. Are there any differences in psychiatric complexity by age or sex?
4. What is the association between the severity of autism symptoms and the severity of psychiatric symptoms?
5. What kinds of mental health interventions have been provided for children with ASD and complex psychiatric profiles?

METHOD

Participants

Forty-two children with high-functioning autism, as determined by current administration of the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 1999), the Social Communication Questionnaire (SCQ; Berument, Rutter, Lord, Pickles, & Bailey, 1999), review of past clinical evaluations, and current clinical judgment by one or more clinicians, were enrolled in this study. Recruitment occurred over a 3-year period as part of a treatment efficacy study of modified cognitive-behavioral group therapy for children with ASD and anxiety symptoms (see Reaven et al., 2012; Reaven et al., 2009); thus the sample is best described as “treatment seeking.” Letters describing the treatment study were sent to families already enrolled in existing studies being conducted by the Autism and Developmental Disabilities Research Group at the University of Colorado Denver, School of Medicine. Additional recruitment occurred through referrals from clinicians at the Children’s Hospital Colorado and the JFK Partners Autism and Developmental Disabilities Clinic and through advertisements by local and family advocacy groups, such as the Autism Society of Colorado and the Autism Society of Boulder.

Inclusion criteria specified that the youth be between the ages of 8 and 14; have a diagnosis of autism spectrum disorder; and present with significant fears, worries, and/or anxieties that were concerning to parents and interfered with the youth’s participation in home, school, or community activities. Given that the treatment approach being studied relied upon verbally mediated coping strategies, only verbally fluent youth were included in the study. Families

were asked to attend up to two qualification visits to conduct diagnostic and cognitive assessments. Fifty-eight families participated in the qualifying visits; however, only 42 children met eligibility for the study.¹ Information concerning the child's developmental and medical history was collected via the Child Demographic Form (Wehner, 1999), which was completed by parents prior to their first appointment with the research team. Participant characteristics are shown in Table 1.

In all 42 cases, mothers were the respondents in the interviews, which were administered by a licensed clinical psychologist, a postdoctoral fellow in psychology, or an advanced graduate student with experience in autism and mental health interviews. In three cases, fathers joined mothers in the interviews (see Table 1 for parent characteristics).

Procedures

Children and parents provided informed consent prior to initiating the qualification visits for this study. To obtain informed child assent, the psychologists affiliated with the study met with the parent and child together and described the study. Children were given a written, bullet-pointed list of the tasks associated with enrolling and then were asked to repeat back what the study was about and to describe their role. Children who were not capable of assenting in this manner were not enrolled in the study.

Qualification visits (as briefly described previously) included conducting the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 1999) and the Wechsler Abbreviated Scales of Intelligence (WAST; Wechsler, 2002) with the child over two visits. The child also completed several self-report anxiety measures, reported elsewhere (Reaven et al., 2012; Reaven et al., 2009). Simultaneously (and usually in a separate room, behind a one-way mirror), mothers were asked to complete the Social Communication Questionnaire (SCQ; Berument et al., 1999) to report symptoms associated with ASD as observed at home.

Only mothers of children who met eligibility criteria ($n = 42$) were asked to return for an additional session to complete a standardized clinical interview of mental health conditions (K-SADS-PL; Kaufman et al., 1997) with a trained examiner. Children did not attend these visits, which were usually 2–3 hr in length.

Parents did not receive specific feedback concerning the findings of the interview; however, all families received information about how to access mental health support and treatment in their communities. Referrals to community mental health centers were made in 14 cases (33%). Thirty-eight families (90%) eventually participated in the anxiety treatment research program at JFK Partners of the University of Colorado Denver. This family-focused, cognitive-behavioral group treatment is described in Reaven et al. 2012 and Reaven et al. 2009

¹Of the 16 children who were not eligible, 4 did not meet diagnostic criteria (2 had an intellectual disability but not ASD and 2 were diagnosed with schizophrenia but not ASD), and the remaining 12 children did not meet verbal criteria (due to the nature of the treatment study, it was important that children could discuss anxiety symptoms with their parents).

Measures

Autism Diagnostic Observation Schedule—generic (ADOS; Lord et al., 1999)—

The ADOS is a semistructured standardized play interview that employs developmentally appropriate social and toy-based interactions in a 30- to 45-min session to elicit social and communicative behaviors. It provides an algorithm for identifying children who may have autism and can also be useful in characterizing a child's social-communication strengths and relative deficits. Module III of the ADOS was administered to all participants in a standardized fashion by well-trained administrators as part of the diagnostic qualification process. Administrators were blind to the specific questions of this study. Reliability was maintained at 85% and checked by a second clinician for 40% of participants across the period of data collection. To be included in this study, children had to obtain an algorithm score within the "autism" or "autism spectrum" range.

Social Communication Questionnaire (SCQ; Berument et al., 1999)—

The SCQ is a screening version of the Autism Diagnostic Interview-Revised (ADI-R) and was administered as a parent interview to all families interested in the study. This instrument was chosen to reduce caregiver burden and save research resources, as administration took approximately 20 min. To qualify for the study, children needed to obtain an SCQ score within the autism range (i.e., 15 or higher).

Diagnostic checklist (based upon the DSM-IV-TR; American Psychiatric Association, 2000)—

The DSM-TV-TR checklist was developed verbatim from the *Diagnostic and Statistical Manual*, with each symptom defined and separated. If the clinician reviewing the case found convincing evidence in parent report and/or clinical observation to endorse a symptom, it was endorsed. Decision-making rules, as listed in *DSM-IV-TR*, were applied to determine a diagnosis on autism, PDD-NOS, Asperger's syndrome, or not autism. Reliability on clinician endorsements of *DSM-IV-TR* items was computed on a subsample of 28 children, using the same procedures and clinicians, and kappas ranged from .62 to .88 per symptom.

Wechsler Abbreviated Scales of Intelligence (WASI; Wechsler, 2002)—

This cognitive screening instrument includes four subtests (two for verbal, two for performance) and provides IQ estimates of overall functioning as well as verbal and performance domains. Psychometric data suggest that the WASI is quite comparable to more extensive standardized tests in providing overall estimates of intellectual potential.

Schedule for Affective Disorders and Schizophrenia (K-SADS-PL; Kaufman et al., 1997)—

The K-SADS-PL is a commonly used standardized psychiatric interview that provides information about the child's developmental, educational, and treatment history as well as information about family history for various psychiatric and medical conditions. Beginning with a set of screening questions tapping eight disorder categories (e.g., anxiety, mood, attention, psychosis/thought disorder, externalizing, eating disorders, tics, and toileting disturbances), the interviewer queried the absence/presence of specific symptoms and estimates of interference with functioning. If a parent endorsed screening items, a set of more comprehensive follow-up questions were explored. Thirty-eight psychiatric disorders

of childhood were examined in this study. For each disorder, the K-SADS-PL includes a scoring algorithm, based upon the *DSM-III-R*, which classifies each Axis I disorder as either “present” or “not present.” Specific scripts for questions are provided and the trained examiner can also probe areas for specific examples in order to ascertain appropriate codes. The measure was chosen for its quality and thoroughness as well as the ease of administration, as clinical interview staff were previously trained in the protocol.² A subset of 30% of interviews was assessed for reliability of administration and scoring, either with two psychologists attending an interview or through audiotaping the interview for later coding. Reliability was maintained at 85% or better for the duration of the study.

Other child and family variables—In addition to the K-SADS-PL, the Child Information Sheet (Wehner, 1999) was used to examine potential child and family characteristics that might be associated with comorbidity of psychiatric conditions as well as the family’s experience with interventions.

RESULTS

Complexity of Comorbid Conditions Reported by Parents

Table 2 provides a summary of the screening results and final diagnostic classifications (past and current) determined by the KSADS-PL interview. Only parents of children who screened positively for a condition participated in a full interview regarding that condition.

Given that recruitment for this sample specifically emphasized children whose parents were concerned about anxiety (defined for families on flyers and other program materials as “excessive worrying, exaggerated fears, and nervousness that get in the way of home and school activities”), it is not surprising that almost all parents reported symptoms consistent with an anxiety disorder in their children. What is more interesting is that more than three quarters of the children (78.6%) met criteria for a depressive disorder at some point in their young lives, and a similar number (76.2%) met criteria for an attention deficit disorder. More than one third of high-functioning children in this sample met criteria for a current functional toileting problem (i.e., enuresis or encopresis), which is striking given their age and level of cognitive functioning.

The modal number of psychiatric disorders that reached clinical significance via the K-SADS-PL interview in this sample was 4 disorders. Three children (7%) did not meet criteria for any psychiatric diagnoses, 5 children (12%) met criteria for 1–2 disorders, 24 children (57%) presented with 3–5 co-occurring psychiatric conditions, and 10 children (24%) met criteria for 6 or more comorbid disorders.

Clinicians provided ratings of the child’s overall functioning using the General Adaptive Functioning Scale (GAF), ranking the child’s adaptation from 1 to 100 with highest scores indicating better adaptation. Scores were 315 as follows: Current Functioning (i.e., last 2 weeks): mean GAF = 48.45, *SD* = 10.33, range of 36–85; Most Severe Functioning in the Past: mean GAF = 38.18, *SD* = 6.89, range of 20–55; and Highest Level of Functioning

²Clinicians moved to the ADIS protocol in later stages of the study to account for changes in the *DSM-IV-TR*.

within the past year: mean GAF = 49.36, $SD = 10.98$, range of 36–86. These ratings indicate significant impairment in adaptive functioning, even during periods considered by parents to be relatively better than average for the child.

Screening for Significant Symptoms

Data pertaining to the proportion of children who screened positively for a disorder are presented in Table 2. We did not formally assess the utility of the screening component of the K-SADS (e.g., we did not administer sections of the interview if the child did not screen positively for that particular disorder), so we cannot comment on the false negative rate of the K-SADS screening questions. However, for positive screens, we observed fairly good concordance with final diagnoses for several disorders, including panic, social phobia, tic disorders, depression, functional toileting disorders, and attentional disorders. Conversely, false positive screens were observed for more than one third of children identified as at risk for the following disorders: separation anxiety, generalized anxiety, post-traumatic stress disorder, eating disorders, psychosis, and oppositional defiant disorder. This has implications for assessment practice and research, as screening measures may be useful for tapping relevant symptomology but may not be valid measures of actual clinical diagnoses.

Course and Onset

Information concerning parent report of the age of onset psychiatric symptoms and the parent-reported course of the disorders (i.e., intermittent or consistent) are presented in Table 3, and highlights are summarized here.

Anxiety disorders—Onset and course of anxiety disorders varied as a function of the specific form of anxiety symptoms. Social phobia symptoms tended to emerge earliest, with onset reported in the first years of life, and were described as consistent in 75% of the 15 affected children. Notably, this is consistent with the diagnostic criteria for autistic disorder and may reflect the overlap of the two conditions (Tyson & Cruess, 2012). However, given that only 15 of 42 children (36%) screened positively for social phobia, parents appeared to differentiate between problems in core social relatedness and problems with social anxiety.

Specific phobias were reported to be consistent in 100% of affected children, and 46% of children first demonstrated exaggerated fears during the preschool years. One quarter of children were reported to be phobic before 3 years, and a similar proportion were observed to become noticeably phobic after age 8.

Generalized anxiety symptoms were described as intermittent in course for over 80% of affected children. Onset most commonly occurred in the preschool years (55%), with 14% presenting symptoms before age 3 and approximately 31% first showing symptoms after age 8.

Obsessive-compulsive symptoms were described as following a consistent course in two thirds of cases and onset most commonly occurred during elementary school (ages 4–10: $n = 14$, 82% of affected children).

Depressive disorders—Of the children exhibiting depressive symptoms, most experienced a consistent course, with onset occurring most commonly between the ages of 8 and 10 (36%). Onset before age 3 was reported for 29% of children; similarly 29% of children presented with depressive symptoms for the first time between the ages of 4 and 7, most often described by parents as around the time of transition to elementary school.

Attention deficit disorders—All parents who reported significant attentional symptoms described the course as consistent, with onset before age 3 in 63% of children in the sample and before 7 years in the remaining cases.

Psychosis and thought disorders—For the 9 children in the sample whose parents reported some symptoms associated with a thought disorder, onset occurred after age 8 in 6 children (67% of the sample) and between 4 and 7 years in 3 children (33% of the sample). The majority of children were reported to be intermittent in their demonstration of symptoms; notably all 3 children who actually met diagnostic criteria for a thought disorder were reported to be consistent in their symptom expression from the age of 5 onward.

Externalizing disorders—Although a substantial majority of parents expressed concerns about externalizing behaviors, less than 5% of children ($n = 2$) met diagnostic criteria for a conduct disorder and less than 20% ($n = 8$) met criteria for oppositional defiant disorder. Course of symptoms was consistent in all symptomatic children. Onset of conduct problems was most commonly reported to occur in the late elementary years (between ages 8 and 10), whereas oppositional symptoms were reported to onset before age 8 in all cases.

Enuresis/Encopresis—These two disorders tended to co-occur in the same children, such that most encopretic children were enuretic, but only half of enuretic children were also encopretic. Onset occurred between ages 3 and 5 years for 93% of affected children (around the age of toilet training). Course was consistent for 76% of affected children.

Differences by Age, Sex, and Autism Severity

Differences in the total number of current psychiatric conditions as a function of child factors (i.e., age, sex, autism severity) were examined using the Mann-Whitney *U* Test. Nonparametric methods were chosen due to the nonnormal distributions of the sample, small sample size, and nature of the dependent variable (ordinal, range limited from 0 to 9).

Age—Chronological age was inversely correlated with number of psychiatric diagnoses ($r = -.26$), suggesting that younger children in this sample presented with more psychiatric complexity (i.e., were more likely to have multiple clinical diagnoses beyond anxiety alone). This may indicate a recruitment bias within this treatment-seeking sample, as parents of more significantly affected children may be more likely to seek help earlier. To compare differences by age, two age groups were constructed, yielding 15 children defined as “Younger” or between 8 and 10 years 11 months and 27 children defined as “Older” or between 11 and 14 years. The mean number of psychiatric diagnoses was slightly higher for younger children: Younger ($M = 4.8$, $SD = 2.62$; mean rank = 23.93), Older (mean number

of diagnoses = 4.0, $SD = 2.09$; mean rank = 20.15), but these differences were not statistically significant ($p = .33$).

Sex—Females ($n = 8$) had a mean of 2.9 diagnoses (mean rank = 17.44) compared with their male counterparts ($n = 34$), who obtained a mean of 3.5 diagnoses (mean rank = 22.46); however, these differences were not statistically significant ($p = .30$). Symptom counts were also computed for each psychiatric disorder (current) and patterns of symptom endorsement were similar across sex, with the exceptions of three conditions where the mean symptom count was higher for males: oppositional defiant disorder (5.0 vs. 1.5 for females), tic disorder (2.2 for males vs. 0.0 for females), and enuresis (2.7 vs. 0.4 for females). These findings are purely descriptive and further examination of sex differences in a larger community-based sample is needed.

Severity of Autism Symptoms and Comorbid Psychopathology

The association between the number of psychiatric diagnoses and the Calibrated Severity Score (Gotham et al., 2009) for Module III of the ADOS was examined using Spearman's Rho. The Gotham severity calibration algorithm was applied retrospectively, as data were collected prior to publication of the severity scores. Results were not significant ($r_s = -.38$, $p = .14$), suggesting that the severity of autism symptoms is not strongly associated with psychiatric complexity in this treatment-seeking sample.

Experience With Mental Health Interventions

Table 4 summarizes families' reported use of mental health interventions. Twenty-six youth (62%) had been seen once by a psychiatrist, and 8 (19%) were currently being followed by a psychiatrist. Seven children (16%) had been hospitalized briefly or placed in a day treatment program due to concerns about behavioral problems and/or mental health. Thirty children (71.4%) were currently taking a psychotropic medication, most often prescribed by their pediatricians; 2 children were taking multiple psychotropic medications (each combined an antidepressant with Abilify).

Of the 4 youth who had participated in outpatient psychosocial interventions, 3 (7%) had participated in individual therapy with a psychologist or social worker and 1 (2.4%) had participated in a therapeutic group focused on improving coping skills. Conversely, 41 (97.6%) children had participated in speech therapy, 38 (90%) had participated in occupational therapy, and all children were receiving special education services with an individualized education plan in place. It is not known how many children received psychological services within the educational system.

DISCUSSION

The results of this descriptive study of a sample of youth with ASD seeking treatment for anxiety suggest that comorbidity of psychiatric conditions can be quite complex in verbal school-age children with autism spectrum disorders and that assessment and intervention approaches should take into account the complexity and heterogeneity of psychiatric symptoms in this population. Specifically, youth with ASD seeking treatment for anxiety

symptoms may present with additional psychiatric symptoms that contribute to functional impairment and family distress. Enuresis and encopresis, for example, may contribute to social phobia symptoms and poor school functioning. Clinical practice and research may benefit from increased attention to co-occurring symptoms. Although these findings cannot be generalized to the population of children with ASD due to the specificity of this treatment-seeking sample, this study provides clinically useful descriptive information concerning the patterns of co-occurring symptoms in a sample of children with ASD seeking help with anxiety symptoms. Despite these limitations, results from this sample are largely consistent with other studies of comorbidity in youth with ASD (e.g., Mukaddes et al., 2010; Simonoff et al., 2008).

What is most striking about the results of this study is the consistency in the complexity of co-occurring conditions. In this sample, attentional issues and depressive disorders were reported quite commonly, whereas rates of psychosis and externalizing disorders were rather low. Transdiagnostic interventions—such as teaching emotion regulation skills in an effort to reduce symptoms of depression or anxiety—are worth exploring. Within the domain of anxiety disorders, separation anxiety was reported more commonly than in studies of typically developing children in this age group. Approximately one third of 4th–7th graders experienced difficulties separating from parents, and although this is not surprising given the treatment-seeking nature of this sample, the potential impact on social and school functioning is notable. Specific phobias were also common, and anxiety disorders tended to co-occur, such that social, separation, and generalized anxiety were more closely associated with each other than with obsessive-compulsive disorder and panic symptoms. This is consistent with the findings of the coaggregation (Verduin & Kendall, 2003) or high degree of symptom overlap among these anxiety disorders in typically developing children (Gurley, Cohen, Pine, & Brook, 1996).

Few children in this sample were being followed regularly by a psychiatrist and even fewer had participated in psychosocial interventions to treat these conditions. This may reflect the participant source, as families enrolling in a treatment study may be less likely to be involved in other interventions; on the other hand, this finding may also reflect a lack of needed clinical supports or appropriate diagnosis of co-occurring conditions. Medications, when used, were most often prescribed and monitored by a pediatrician. Anecdotally, many parents reported that they were not certain what the medications were supposed to be targeting or whether they were effective. Many reported that physicians, educators, and therapists sometimes minimized their concerns about their child's mental health, relating the parents' reported challenges as "part of his autism." This underscores clinical concerns regarding diagnostic overshadowing, which may hinder families' access to appropriate treatment for psychiatric symptoms that interfere with daily functioning. On the other hand, disentangling the core deficits of ASD from other psychiatric symptoms remains a methodological challenge and an important area for future research (Kerns & Kendall, 2012).

Although the implications of this study are limited by its descriptive nature and the generalizability of the findings may not extend beyond the current sample, the results support the notion that co-occurring mental health conditions may be underrecognized and

undertreated in children with ASD. For children with ASD and anxiety, assessing additional psychiatric conditions such as depression may be important in understanding complex symptom presentation, setting appropriate treatment goals, individualizing treatment approaches, and assessing treatment outcomes. As Simonoff and colleagues (2008) pointed out, the identification of all symptom constellations that meet diagnostic criteria has value in that these symptoms may be treated via targeted intervention. Early identification and treatment of comorbid conditions may benefit children with ASD by improving emotional coping strategies and paving the way for positive adjustment in their transition to adulthood. Examining access to mental health care with more robust epidemiological methods is needed to inform development of systems of care. Future studies, designed prospectively and recruiting larger, community-based samples, will also be important for establishing more accurate prevalence estimates of complex comorbidity.

Ultimately, designing and delivering psychosocial interventions aimed toward promoting mental health in persons with ASD is a very relevant area for scientific inquiry. Assessing the extent to which anxiety, depression, attention, and other psychiatric disorders co-occur and compound functional impairment beyond the core deficits of ASD, as well as finding effective ways to minimize the severity of impairment, is an important priority for clinicians who treat this population. Families and community-based clinicians may underestimate the impact of co-occurring mental health conditions and may not recognize the potential for treating psychiatric conditions within the context of a pervasive developmental disability. As more and more children with an ASD become identified, attention to preventing and treating mental health conditions will become increasingly relevant in schools, homes, and communities.

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TABLE 1

Participant Characteristics

Participant characteristic	<i>M</i> (range, <i>SD</i>)/ <i>N</i> %
Child characteristics	
Age (years)	10.9 (8.1–14.0, <i>SD</i> = 1.82)
Full scale IQ	98.4 (63–129, <i>SD</i> = 15.01)
Nonverbal IQ	97.8 (75–129, <i>SD</i> = 14.74)
Verbal IQ	100.1 (67–123, <i>SD</i> = 13.87)
Gender	
Male	<i>n</i> = 34 (81.0)
Ethnicity	
Asian	<i>n</i> = 2 (4.8)
African American	<i>n</i> = 2 (4.8)
Caucasian	<i>n</i> = 36 (85.7)
Hispanic	<i>n</i> = 4 (9.5)
Native American	<i>n</i> = 1 (2.4)
Other/Biracial	<i>n</i> = 1 (2.4)
Parent characteristics	
Age (years)	
Mothers	42.3 (28–54, <i>SD</i> = 2.6)
Fathers	44.3 (36–61, <i>SD</i> = 4.4)
Other children in household	<i>n</i> = 32 (76.2)
Mother's highest level of education	
High school graduate	<i>n</i> = 3 (7.1)
Partial college	<i>n</i> = 9 (21.4)
College graduate	<i>n</i> = 15 (35.7)
Postcollege education	<i>n</i> = 13 (30.9)
Father's highest level of education	
High school graduate	<i>n</i> = 5 (11.9)
Partial college	<i>n</i> = 7 (16.7)
College graduate	<i>n</i> = 18 (42.9)
Postcollege education	<i>n</i> = 10 (23.8)

TABLE 2

Parent Report on K-SADS: Children Meeting Diagnostic Criteria by Disorder ($n = 42$)

Psychiatric condition	Children who met diagnostic criteria: PAST	Children who diagnostic criteria: CURRENT
	<i>N</i> (%)	<i>N</i> (%)
<i>Anxiety disorders</i>	38 (90.5)	40 (95.2)
Panic	5 (11.9)	5 (11.9)
Separation	14 (33.3)	8 (19)
Social	13 (31)	12 (28.6)
Simple phobia	33 (78.6)	33 (78.6)
Generalized	16 (38.1)	13 (31)
Obsessive-compulsive	15 (35.7)	13 (31)
Post-traumatic stress	7 (16.7)	4 (9.5)
<i>Mood disorders</i>	31 (73.8)	25 (59.5)
<i>Depressive disorders</i>	25 (59.5)	21 (50)
Dysthymia	6 (14.3)	6 (14.3)
Major depressive	10 (23.8)	6 (14.3)
Depressive disorder NOS	2 (4.8)	2 (4.8)
<i>Manic disorders</i>	6 (14.3)	4 (9.5)
Bipolar I	3 (7.1)	3 (7.1)
Bipolar II	2 (4.8)	1 (2.4)
Bipolar NOS	1 (2.4)	0 (0)
<i>Psychotic disorders</i>	3 (7.1)	3 (7.1)
<i>Attention disorders</i>	32 (76.2)	32 (76.2)
Predominantly inattentive	13 (31)	14 (33.3)
Predominantly hyperactive	2 (4.8)	2 (4.8)
Combined type	15 (35.7)	14 (33.3)
ADD NOS	2 (4.8)	2 (4.8)
<i>Externalizing disorders</i>	9 (21.4)	10 (23.8)
Oppositional-defiant	8 (19)	8 (19)
Conduct	1 (2.4)	2 (4.8)
<i>Toileting disorders</i>	22 (52.4)	13 (31)
Enuresis	17 (40.5)	9 (21.4)
Encopresis	10 (23.8)	5 (11.9)

TABLE 3

Parent Report of Child Psychopathology on K-SADS: Positive Screens, Onset, and Course ($n = 42$)

Psychiatric condition	Positive screens (n of affected children)	Age of onset (% of affected children)					Course (% of affected children)		
		0–3 years	4–7 years	8–10 years	11–14 years	Intermittent	Consistent		
Anxiety disorders									
Panic/Agoraphobia	5	40	60	—	—	67	33		
Separation	21	38	38	19	5	20	80		
Social	15	67	26	7	—	25	75		
Generalized	29	14	55	21	10	80	20		
Specific phobia	41	27	46	25	2	0	100		
OCD	17	12	41	41	6	33	67		
Post-traumatic stress	21	25	42	33	—	67	33		
Mood disorders									
Depressive	28	29	29	36	7	38	62		
Manic	9	33	33	33	—	67	33		
Psychotic disorders	9	—	33	22	44	40	60		
Attention disorders	38	63	37	—	—	0	100		
Externalizing disorders									
Oppositional-defiant	24	42	29	29	—	0	100		
Conduct	8	13	13	62	13	0	100		
Toileting disorders									
Enuresis	17	47	53	—	—	24	76		
Encopresis	10	30	70	—	—	0	100		

TABLE 4Parent Report of Child Experience With Mental Health Interventions ($n = 42$)

Type of intervention	<i>N</i> (%)
Psychiatrist—seen once	26(62)
Psychiatrist—current	8(19)
Hospitalized/Day treatment program	7(16)
Psychotropic medications	30(71)
SSRIs	15(36)
Attention meds	15(36)
Atypical antipsychotics	11(26)
Sleep meds	8(19)
Mood stabilizers	8(19)
Short-acting antianxiety meds (as-needed use only)	2(5)
Anticonvulsants	2(5)
Vitamins/Supplements/Homeopathics	17(40)
Outpatient psychosocial intervention	4(10)
Individual therapy	3(7)
Group therapy	1(2)
Speech therapy	41(98)
Occupational therapy	38(90)
Special education services	42(100)

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