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Characterizing psychiatric comorbidity in children with autism spectrum disorder receiving publicly funded mental health services

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Abstract

Publicly funded mental health programs play a significant role in serving children with autism spectrum disorder. Understanding patterns of psychiatric comorbidity for this population within mental health settings is important to implement appropriately tailored interventions. This study (1) describes patterns of psychiatric comorbidity in children with autism spectrum disorder who present to mental health services with challenging behaviors and (2) identifies child characteristics associated with comorbid conditions. Data are drawn from baseline assessments from 201 children with autism spectrum disorder who participated in a community effectiveness trial across 29 publicly funded mental health programs. Non-autism spectrum disorder diagnoses were assessed using an adapted Mini-International Neuropsychiatric Interview, parent version. Approximately 92% of children met criteria for at least one non-autism spectrum disorder diagnosis (78% attention deficit hyperactivity disorder, 58% oppositional defiant disorder, 56% anxiety, 30% mood). Logistic regression indicated that child gender and clinical characteristics were differentially associated with meeting criteria for attention deficit hyperactivity disorder, oppositional defiant disorder, an anxiety, or a mood disorder. Exploratory analyses supported a link between challenging behaviors and mood disorder symptoms and revealed high prevalence of these symptoms in this autism spectrum disorder population. Findings provide direction for tailoring intervention to address a broad range of clinical issues for youth with autism spectrum disorder served in mental health settings.

Keywords

autism spectrum disorder; challenging behaviors; children's mental health services; comorbidity

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Psychiatric comorbidity in children with autism spectrum disorder (ASD) is common with rates of 70%–75% reported in previous epidemiological survey and community clinic studies (De Bruin et al., 2007; Leyfer et al., 2006; Simonoff et al., 2008; Wozniak et al., 1997) and rates as high as 83% for psychiatrically referred youth with ASD (Joshi et al., 2010). Rates for this population may be even higher due to both diagnostic overshadowing—when comorbid psychiatric symptom problems are overlooked due to ASD characteristics being more pronounced (Jopp and Keys, 2001; Mason and Scior, 2004; Meera et al., 2013; Reilly et al., 2015; Reiss et al., 1982; Rush et al., 2004) and because core ASD symptoms (e.g. cognitive rigidity, avoidance of social situations) can overlap with symptoms of other psychiatric diagnoses (Cath et al., 2008; Luteijn et al., 2000; Sikora et al., 2008). As such, accurately identifying co-occurring disorders in children with ASD can be particularly challenging (Mazzone et al., 2012).

Given high rates of psychiatric comorbidity, publicly funded clinic and school-based mental health (MH) programs play a significant role in providing ongoing MH treatment for youth with ASD. Children with ASD are commonly being seen within such MH programs in which services are designed for a large range of presenting problems for children and not specifically focused on ASD (Brookman-Frazee et al., 2012c). The small but growing body of literature characterizing children with ASD receiving MH services has shown that these school-aged youth typically have average cognitive functioning (i.e. intelligence quotient (IQ) > 70), are racially/ethnically diverse and exhibit high rates of challenging behaviors, which are often the primary presenting problem for treatment (Brookman-Frazee et al., 2009, 2010, 2012b; 2012c; Joshi et al., 2014; Levy et al., 2010; Mandell et al., 2005, 2007; Williams et al., 2009). Although there are a number of studies reporting rates of comorbidity in ASD (e.g. Leyfer et al., 2006; Simonoff et al., 2008), the research on the prevalence of psychiatric diagnoses in youth with ASD receiving MH services, particularly within publicly funded service settings that represent the primary source of MH services, is very limited.

Only two studies to date have included standardized diagnostic measures of comorbid psychiatric diagnoses (as opposed to non-standardized assessment measures) within community MH service systems. The first study, Joshi et al. (2010), compared the prevalence of psychiatric diagnosis of 200 children with ASD compared to a large sample of children without ASD, all of whom were referred to a psychopharmacology program in an academic medical center. Children with ASD met criteria for a significantly greater number of diagnoses than children without ASD. The most common diagnoses in children with ASD were attention deficit hyperactivity disorder (ADHD) (83%) and oppositional defiant disorder (ODD) (73%). Although this is the largest study conducted to date, it is not known how the results of these findings generalize to MH services provided outside of an academic medical center, including MH services providing psychosocial interventions. Second, Brookman-Frazee et al. (2009) reported the prevalence of externalizing diagnoses (ADHD, ODD, and conduct disorder) in children with ASD or intellectual disability (ID) in five public service systems including 117 children within MH services. Results indicate a large proportion (78%) of children with ASD or ID served in publicly funded MH services met criteria for an externalizing disorder, with ADHD being most common (62%). This study is limited by a number of factors: (1) the ascertainment of the ASD/ID sample (e.g. based on parent report of either ASD or ID), (2) time since the data were collected (1996–1997), and

(3) the narrow range of MH conditions examined (i.e. externalizing conditions only). More research is needed from a large, diverse, and representative sample of children with ASD served in publicly funded MH service settings to fully understand the current MH needs of children with ASD served in community care. Additionally, both studies focused on diagnostic prevalence based on meeting criteria for comorbid diagnoses. Greater understanding of symptomatology, that may be sub-threshold of diagnosis yet impairing, is also needed to shed light on the nature of the primary presenting problem and common target of treatment in children's MH services—challenging behaviors. The focus on understanding symptoms aligns with increased focus on developing trans-diagnostic interventions targeting symptoms or underlying mechanisms rather than specific diagnoses (e.g., Kenworthy et al., 2014).

Previous research has shown that children with ASD (as well as with other conditions) often present for MH services due to challenging behaviors (Brookman-Frazee et al., 2012c). Challenging behaviors are broader than specific symptoms of externalizing diagnoses and also include the outward demonstration of core ASD symptoms and internalizing (anxiety and mood) psychiatric symptoms. For example, behavioral rigidity (core ASD symptom) can be displayed as hostility and tantrum behaviors when an individual is requested to adapt within a certain context. Additional anxiety can be the trigger to what appears as a challenging behavior (Wood and Gadow, 2010). For example, a child may engage in tantrum behaviors in response to an anxiety-producing situation like attending a social event. This is particularly relevant because rates of anxiety disorders in children with ASD range from 11%–84%, and this comorbidity is linked to heightened functional impairment (Kerns et al., 2015; White et al., 2009). Additionally, children with ASD and comorbid depression symptoms may exhibit negative affect through aggression (Kim et al., 2000). Such challenging behaviors can be children's most impairing symptoms, hindering academic and social development, and place children at risk for more restrictive (and costly) levels of care in both education and psychiatric settings (Horner et al., 2002; Matson et al., 2009). Such behaviors may be related to other comorbid MH conditions, specifically internalizing conditions such as anxiety or depression.

Problem behaviors are also a major source of stress and burden to families and teachers (Hastings, 2003; Lecavalier et al., 2006). In part, because of the negative impacts of problem behaviors related to ASD symptoms, school-based interventions have been developed that incorporate evidence-based behavioral intervention strategies such as functional assessment and evaluation (e.g. Schwartz et al., 2013). Given the research to date on challenging behaviors, the presence of behavior problems may indicate several or varied co-occurring diagnoses for children with ASD (Brookman-Frazee et al., 2012a, 2012c; Mandell et al., 2005). Overall, greater understanding of common patterns of psychiatric comorbidity in children with ASD and challenging behaviors served in publicly funded MH programs is important to inform the implementation of targeted evidence-based intervention strategies for ASD.

To address this need, our group has recently begun to examine the presence of psychiatric comorbidity in children with ASD who receive community MH services (Stadnick et al., 2016). This study builds on our prior research to (1) characterize the patterns of psychiatric

comorbidities in children with ASD being served in publicly funded outpatient clinic and school-based MH services who present with challenging behaviors (Aim 1); (2) identify child sociodemographic and clinical factors (cognitive, social, and problem behaviors) associated with meeting criteria for the most common comorbid diagnoses (Aim 2); and (3) examine patterns of internalizing symptoms (anxiety and mood) in this sample of children with ASD (Aim 3).

Methods

Procedures

Data were drawn from a community effectiveness trial of AIM HI ("An Individualized Mental Health Intervention for ASD"; Brookman-Frazee and Drahota, 2010), a parent-mediated and child-focused intervention for children with ASD, conducted in publicly funded MH outpatient and school-based MH programs in Southern California. Therapist/child dyads were recruited from within these programs between 2012 and 2015.

Therapists (n = 179) were recruited from 29 participating programs, and children (n=202) were recruited from the therapists' existing caseloads. The 29 programs included 24 programs operated by community-based MH agencies and 5 school district-operated programs. All programs serve a racially and ethnically diverse population of children in Southern California who have their MH services financed through public (Medicaid or special education) funding. The majority of children received outpatient MH services (n = 134; 74%) and the rest received school- based MH services (n = 48; 26%). Preliminary analyses indicated no group differences in demographics between children served in outpatient MH clinics versus school- based programs (all p-values >0.05). Children were eligible for the parent study (community effectiveness trial) if they (1) were 5 to 13 years of age during the recruitment period, (2) spoke English or Spanish as their primary language, (3) presented with at least one challenging behavior, and (4) had an existing ASD diagnosis on record, and exhibited clinically significant ASD symptoms on a standardized ASD diagnostic measure. Specifically, 94% of children were classified as "Autism" or "ASD" on the Autism Diagnostic Observation Schedule-2 (ADOS-2; Lord et al., 2012) administered by trained to reliability standards research staff. The remaining children (6%, n = 12) who were not classified as "Autism" or "ASD" on the ADOS-2 demonstrated multiple clinical indicators of a typical ASD profile including scores in the clinical range on all subscales of the Social Responsiveness Scale-2 (SRS-2) and were previously diagnosed with ASD by a community provider specializing in developmental disabilities (e.g. psychologist from state developmental disabilities services, California Regional Center). These inclusion criteria were established to represent the population of children with ASD served in publicly funded MH systems regarding clinical characteristics, including the diagnostic practices used to determine an ASD diagnosis and sociodemographics (Brookman-Frazee et al., 2009, 2010).

The baseline assessment to determine eligibility for the broader effectiveness trial included administration of standardized measures to both caregivers and children (described in Measures) and lasted approximately 2 hours. Families received a US$40 gift card for completing the baseline assessment. The study was approved by the University of California, San Diego institutional review board.

Participants

A total of 201 children and their 196 primary caregivers were included in this study. One child from the full sample (n=202) was excluded because a Mini-International Neuropsychiatric Interview, parent version (MINI-KID-P) could not be administered to the caregiver due to time constraints. See Table 1 for child and caregiver characteristics.

Measures

MINI-KID-P.—The MINI-KID-P (Sheehan et al., 1998) was used to determine the presence of co-occurring psychiatric disorders (additional to the child's ASD diagnosis). The MINI-KID-P is a structured diagnostic interview to assess symptoms of Axis I disorders as listed in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV) and ICD-10 (World Health Organization (WHO), 1993). It has robust psychometric properties including strong interrater and test-retest reliability, construct validity, sensitivity (0.61–1.00) and specificity (0.81–1.00) (Sheehan et al., 2010). The MINI-KID-P was administered in person or via phone to the child's primary caregiver. The following MINI-KID-P modules were used based on the most common psychiatric comorbid disorders for children with ASD in MH settings according to standardized diagnostic assessment procedures (Brookman-Frazee et al., 2009; Joshi et al., 2010) and therapist report procedures of comorbidity (Brookman-et al., 2010, 2012b). The diagnostic modules that were selected and administered to caregivers in this study were as follows: ADHD, ODD, Panic Disorder, Agoraphobia, Separation Anxiety Disorder, Social Phobia, Specific Phobia, Obsessive Compulsive Disorder (OCD), Generalized Anxiety Disorder (GAD), Tic Disorders, Major Depressive Episode, Dysthymia, and Manic and Hypomanic Episodes. To facilitate interpretation of study findings, diagnoses derived from these MINI-KID-P modules were collapsed into four diagnostic categories: (1) ADHD, (2) ODD, (3) anxiety disorders, and (4) mood disorders. The anxiety disorders category included panic disorder, agoraphobia, separation anxiety disorder, social phobia, specific phobia, OCD, and GAD. The mood disorders category included major depressive episode, dysthymia, and manic and hypomanic episodes. Tic disorders remained as a separate diagnostic category but were not included in all analyses due to the limited sample size.

For this study, the MINI-KID-P was adapted for our sample of children with ASD by adding follow-up probes to facilitate differentiation between ASD symptoms/ behaviors and other psychiatric symptoms. Specifically, prior to asking about anxiety, caregivers were provided a brief explanation of the physiological component that occurs with anxiety to reduce over-endorsement based on behaviors related to ASD. For most modules, the following adaptations applied: (1) caregivers were asked to give examples following endorsement of screening items to illustrate whether the symptom was clearly a distinct symptom from ASD, (2) skip patterns were removed, and (3) additional follow-up probes were added when necessary to distinguish symptoms, for example, for the OCD module additional probes aided in distinguishing restrictive, repetitive behaviors (characteristic of ASD) from compulsions. Finally, the Dysthymia module questions were embedded into the Major Depressive Episode module to reduce time and burden. All interviewers were trained to criterion prior to administering the MINI-KID-P by study author (M.B.E.) who is a licensed clinical psychologist with clinical expertise in ASD and diagnostic assessment, and who

served as the supervising clinician. A total of six trained study personnel who had clinical research experience with children with ASD and MH problems administered the MINI-KID-P to all caregivers in the study via in-person or phone interview. The trained personnel comprised two doctoral-level clinical psychologists, two masters-level clinicians, and two bachelors-level research staff with clinical experience in ASD. Inter-rater reliability was examined in a sub-sample of our data using the kappa statistic. Kappa values ranged from 0.87–1.00 for the four diagnostic categories (ADHD, ODD, Anxiety, and Mood) examined in our study. Please refer to Stadnick et al. (2016) for a detailed description of the training procedures for these six study staff who administered the MINI-KID-P to all caregivers in the study.

ADOS-2.—The ADOS-2 is a semi-structured observational assessment administered by a trained provider to assist in the diagnosis of ASD (Lord et al., 2012). The quality of the child's social affect, communication, and restricted, repetitive behaviors is rated. An algorithm is applied to the scores and results in a classification of "Autism," "Autism Spectrum Disorder," or "Non-Spectrum" based on standardized cutoff values. The overall total score and the child's chronological age are used to identify the ADOS-2 Comparison Score that ranges from 1 (Minimal-To-No- Evidence of ASD-related symptoms) to 10 (High level of ASD-related symptoms). The ADOS-2 has strong reliability and validity across modules (Lord et al., 2012). Children were administered modules 1, 2, or 3 based on their language and developmental level. For this study, the ADOS-2 Comparison Score was used to characterize ASD severity.

SRS-2.—The SRS-2 is a 65-item caregiver-report measure of the severity of social-communication impairments associated with ASD (Constantino and Gruber, 2012). The SRS-2 has demonstrated strong internal consistency, interrater reliability, and diagnostic discrimination in school- age children (Constantino and Gruber, 2012). The SRS-2 Total Score, which is converted to a t-score (M= 50; standard deviation (*SD*) = 10), was used to characterize the severity of social-communication difficulties. Scores of greater than 60 on the Total *T*-Score are considered clinically significant.

Cognitive functioning measures

One of the following measures was administered to estimate the child's cognitive abilities based primarily on chronological age. A total of six trained study personnel administered one of the following cognitive assessments to each child in the study. Both measures have been used previously in research studies that have involved children with ASD (e.g. Kanne et al., 2011; Reaven et al., 2009).

Wechsler Abbreviated Scale of Intelligence-II.—The Wechsler Abbreviated Scale of Intelligence-II (WASI-II) is a brief standardized assessment of cognitive ability that is administered by a trained provider (Wechsler, 2011). The WASI- II has strong internal consistency, with the average reliability coefficients ranging from 0.87–0.91 for children, and good convergent and discriminant validity (Wechsler, 2011). Four subtests are administered to yield a full-scale IQ, Verbal Comprehension Index score, and a Perceptual Reasoning Index score. Each score is represented as a standard score (M = 100; *SD* = 15).

The WASI- II was administered to children aged 6 years and over at the time of the baseline assessment (94% of the sample for whom cognitive data are available).

Differential Ability Scale-II.—The Differential Ability Scale-II (DAS-II) is a comprehensive assessment of cognitive ability that is administered by a trained provider (Elliott, 2007). A full-scale IQ (FSIQ), the General Conceptual Ability (GCA) score, and two core composites (Nonverbal Reasoning Ability and Verbal Ability) are produced. The DAS-II has established psychometric properties with strong internal consistency for both the standardization sample and special clinical populations and evidentiary support for convergent and discriminant validity (Elliott, 2007).

The GCA and two core composites are represented as standard scores ($M = 100$; $SD = 15$). The DAS-II was administered for children under 6 years of age at the time of the baseline assessment (5% of the sample for whom cognitive data are available).

The FSIQ score derived from the WASI-II or DAS-II was used to characterize the child's global cognitive abilities.

Behavior problem measure

Eyberg Child Behavior Inventory.—The Eyberg Child Behavior Inventory (ECBI) is a 36-item caregiver-report measure that assesses the frequency and intensity of child disruptive behaviors (Eyberg and Pincus, 1999). Two scores that are converted into *t*-scores ($M = 50$; $SD = 10$) are yielded: an Intensity score that represents the frequency of disruptive behaviors rated on a 7-point Likert scale from (1) never to (7) always, and a Problem score that represents the total number of behaviors that caregivers endorsed (yes/no) as being a problem for them. The ECBI has strong test-retest reliability (reliability coefficient of 0.86 for the Intensity score) and good construct and concurrent validity (Boggs et al., 1990; Eyberg and Ross, 1978; Robinson et al., 1980). It has also demonstrated strong psychometric properties in clinical samples of children with ASD (e.g. Ginn et al., 2017; Sofronoff et al., 2005; Solomon et al., 2008; Whittingham et al., 2009). In our sample, the ECBI Intensity scale yielded strong internal consistency ($\alpha = 0.93$). For this study, the Intensity *t*- score was used to characterize the severity of child behavior problems. *T*-Scores that are greater than 60 are considered clinically significant. In the current sample, 63% of the children met or exceeded the clinical cutoff score on the ECBI Intensity scale and the three most common challenging behaviors reported on the ECBI were as follows: "gets angry" (77%), "interrupts" (72%), and "easily distracted" (76%).

Data analytic plan

Characterizing diagnostic prevalence (Aim 1).—Individual MINI-KID-P disorders were collapsed into four diagnostic categories to facilitate interpretation of results: ADHD, ODD, any Anxiety Disorder, and any Mood Disorder. Descriptive statistics were used to characterize the prevalence of meeting criteria for at least one co-occurring psychiatric diagnoses within each category and the patterns of diagnostic overlap (i.e. the proportion of children meeting criteria for one, two, three, and all four diagnostic categories excluding Tic Disorders).

Identifying predictors of diagnostic comorbidity (Aim 2).—Meeting criteria for each of the four MINI-KID-P diagnostic categories were used as binary outcome variables. The following predictor variables were examined: (1) child sociodemographic characteristics:age, ethnicity as non-Hispanic (reference group) versus Hispanic, and gender (male was the reference category); (2) child clinical characteristics: FSIQ standard score on the WASI-II or DAS-II, ADOS-2 Comparison score, SRS Total *T*-Score, and ECBI Intensity *T*-Score, and meeting criteria for other psychiatric diagnoses. Initial bivariate analyses were performed using chi-square analyses for binary predictor variables and one-way analyses of variance (ANOVAs) for continuous predictor variables. Predictor variables that were statistically significant at $p < 0.05$ in bivariate analyses were subsequently included in multiple logistic regression analyses (one model for each of the four diagnostic categories). Based on this approach, the following variables were entered as predictors in the multiple logistic regression models: (1) for the model predicting ADHD: gender, SRS Total *T*-Score, ECBI Intensity *T*-Score, meeting criteria for ODD; (2) for the model predicting ODD: SRS Total *T*-Score, ECBI Intensity *T*-Score, meeting criteria for ADHD, meeting criteria for mood disorder; (3) for the model predicting an anxiety disorder: age, SRS Total *T*-Score, meeting criteria for a mood disorder; (4) for the model predicting a mood disorder: SRS Total *T*-Score, ECBI Intensity *T*-Score, meeting criteria for ODD, meeting criteria for an anxiety disorder.

Exploring prevalence and predictors of internalizing symptoms (Aim 3).—To characterize the presence of internalizing symptoms, we examined whether the child met screening criteria on the MINI-KID-P for any of the internalizing modules (anxiety and mood disorders). Descriptive statistics were used to characterize the prevalence of meeting screening criteria within the two internalizing categories. Following, we applied the same approach described in Aim 2 to identify factors associated with meeting screening criteria for an Anxiety or Mood Disorder.

Results

Prevalence of psychiatric diagnoses (Aim 1)

Ninety two percent of children met criteria for at least one non-ASD psychiatric diagnosis examined in this study (see Table 2). The average number of non-ASD Axis I diagnoses was 2.80 *(SD* = 1.91; Range = 0–9 diagnoses). The prevalence of primary Axis I diagnoses was as follows: ADHD (78%), ODD (58%), any Anxiety Disorder (56%), and any Mood Disorder (30%). The patterns of multiple comorbidity are also reported in Table 2. The most common profile of comorbidity was ADHD + ODD + Anxiety (17%) followed by ADHD + ODD + Anxiety + Mood (16%), ADHD + ODD (15%), and ADHD only (10%).

Factors associated with meeting criteria for each diagnostic category (Aim 2)

Results from bivariate analyses and multiple logistic regression analyses indicated that there were common and unique variables that were independently associated with each MINI-KID-P diagnostic outcome (see Tables 3 and 4).

ADHD.—The following characteristics were associated with meeting criteria for ADHD in preliminary bivariate analyses: gender (boys), $\chi^2(1) = 4.75$, $p < 0.05$; Total *T*-Score on the SRS-2, $F(1, 198) = 9.65$, $p < 0.01$; ECBI Intensity *T*-Score, $F(1, 196) = 39.32$, $p < 0.001$; and meeting criteria for ODD, $\chi^2(1)=31.68$, $p < 0.001$. Results from the multiple logistic regression model examining child gender and clinical characteristics associated with meeting criteria for ADHD on the MINI-KID-P were statistically significant $\chi^2(4) = 49.40$, $p < 0.001$. This model explained 34% (Nagelkerke R^2) of the variance in meeting criteria for ADHD and correctly classified 80.3% of cases. Boys, $B = 1.21$, standard error *(SE)* = 0.51; Wald χ^2 (1) = 5.68, $p < 0.05$ (odds ratio (OR) = 3.37, 95% confidence interval (CI) = 1.24–9.14), children with higher ECBI Intensity *T*-Scores, $B = 0.08$, *SE*=0.03; Wald χ^2 (1) = 8.48, $p < 0.01$ (OR = 1.08, 95% CI = 1.03–1.14), and children who met criteria for ODD on the MINI-KID-P, $B = 1.22$, *SE*=0.49; Wald χ^2 (1) = 6.29, $p < 0.05$ (OR=3.40, 95% CI = 1.318.85) had significantly increased odds of meeting criteria for ADHD. The Total *T*-Score on the SRS-2 was not significantly associated with ADHD in the multiple logistic regression model.

ODD.—The following characteristics were associated with meeting criteria for ODD in preliminary bivariate analyses: Total *T*-Score on the SRS-2, $F(1, 198) = 11.0$, $p < 0.01$; ECBI Intensity *T*-Score, $F(1, 196) = 103.15$, $p < 0.001$; meeting criteria for ADHD, $\chi^2(1) = 31.68$, $p < 0.001$; and meeting criteria for a Mood Disorder, $\chi^2(1) = 10.74$, $p < 0.01$. The overall logistic regression model that examined child clinical characteristics associated with meeting criteria for ODD on the MINI-KID was statistically significant $\chi^2(4) = 94.35$, $p < 0.001$. This model explained 51% (Nagelkerke R^2) of the variance in meeting criteria for ODD and correctly classified 78.3% of cases. Children who had higher scores on the ECBI Intensity scale, $B = 0.16$, $SE = 0.03$; Wald $\chi^2(1) = 34.50$, $p < 0.001$ (OR = 1.18, 95% CI = 1.11–1.24), who met criteria for ADHD on the MINI-KID-P, $B = 1.34$, *SE*=0.51; Wald χ^2 (1) = 6.85, $p < 0.01$ (OR=3.84, 95% CI = 1.40–10.49), and who met criteria for a Mood Disorder on the MINI-KID-P, $B = 0.86$, $SE = 0.43$; Wald χ^2 (1) = 3.97, $p < 0.05$ (OR=2.35, 95% CI = 1.01–5.46) had significantly increased odds of meeting criteria for ODD. The Total *T*-Score on the SRS-2 was not significantly associated with ODD in the multiple logistic regression model.

Anxiety disorders.—The following characteristics were associated with meeting criteria for any anxiety disorder in preliminary bivariate analyses: child age (older children), $F(1, 199) = 4.08$, $p < 0.05$; Total *T*-Score on the SRS, $F(1, 199) = 24.15$, $p < 0.001$; and meeting criteria for a Mood Disorder, $\chi^2(1) = 12.56$, $p < 0.001$. The overall multiple logistic model for meeting criteria for any Anxiety Disorder was statistically significant, $\chi^2(3) = 35.64$, $p < 0.001$. This model explained 22% (Nagelkerke R^2) of the variance in meeting criteria for any Anxiety Disorder and correctly classified 66.5% of cases. Children who had higher scores on the SRS Total *T*-Score, $B = 0.07$, *SE*=0.02; Wald $\chi^2(1) = 16.90$, $p < 0.001$ (OR = 1.07, 95% CI = 1.04 –1.10), and who met criteria for a Mood Disorder on the MINI-KID-P, $B = 0.91$, *SE*=0.36; Wald χ^2 (1) = 6.47, $p < 0.05$ (OR=2.49, 95% CI = 1.23–5.04) had significantly increased odds of meeting criteria for any Anxiety Disorder. Child age was not significantly associated with Anxiety in the multiple logistic regression model.

Mood disorders.—The following characteristics were associated with meeting criteria for any Mood Disorder in preliminary bivariate analyses: Total *T*-Score on the SRS, $F(1, 198) = 8.85$, $p < 0.001$; ECBI Intensity Score, $F(1, 196) = 9.79$, $p < 0.01$; meeting criteria for an Anxiety Disorder, $\chi^2(1) = 12.56$, $p < 0.001$; and meeting criteria for ODD, $\chi^2(1) = 10.74$, $p < 0.01$. The overall multiple logistic model for any Mood Disorder was statistically significant, $\chi^2(4) = 27.06$, $p < 0.001$. This model explained 18% (Nagelkerke R^2) of the variance in meeting criteria for a Mood Disorder and correctly classified 73.2% of cases. Children who met criteria for an Anxiety Disorder, $B = 1.06$, $SE = 0.37$; Wald $\chi^2(1) = 8.17$, $p < 0.01$ (OR=2.88, 95% CI = 1.40–5.96) had significantly increased odds of meeting criteria for any Mood Disorder. The Total *T*-Score on the SRS-2, the ECBI Intensity Score, and meeting criteria for ODD were not significantly associated with Mood Disorder in the multiple logistic regression model.

Prevalence of screening criteria endorsement for internalizing disorders (Aim 3)

Table 5 reports the proportion of children who met screening criteria for each internalizing disorder administered to caregivers via the MINI-KID-P. A total of 77% of children in the sample met screening criteria for at least one anxiety disorder and a total of 44% of children met screening criteria for at least one mood disorder.

Factors associated with meeting screening criteria for anxiety and mood disorders

To determine differences in child sociodemographic and clinical characteristics between those who met screening criteria for an anxiety or mood disorder and those who did not meet screening criteria, a set of bivariate analyses were conducted. The analyses are reported in Table 6. These bivariate analyses informed selection of the child characteristics that were included in subsequent multiple logistic regression models that are reported in Table 7.

Anxiety disorders.—In preliminary bivariate analyses, the following characteristic was associated with meeting screening criteria for any Anxiety Disorder: Total T-Score on the SRS-2, $F(1, 199) = 11.10$, $p < 0.01$. No other child sociodemographic or clinical characteristics were associated with meeting screening criteria for an anxiety disorder, so these were not included in the subsequent logistic regression model. The overall logistic model for meeting screening criteria for any Anxiety Disorder was statistically significant $\chi^2(2) = 26.46$, $p < 0.001$. This model explained 8% (Nagelkerke R^2) of the variance in meeting screening criteria for any Anxiety Disorder and correctly classified 77.1% of cases. Children who had higher scores on the SRS-2 Total scale had significantly higher odds of meeting screening criteria for an Anxiety Disorder, $B = 0.05$, $SE = 0.02$; Wald $\chi^2(1) = 9.95$, $p < 0.01$ (OR = 1.05; 95% CI = 1.02–1.08).

Mood disorders.—In preliminary bivariate analyses, the following characteristics were associated with meeting screening criteria for any Mood Disorder: ADOS -2 Comparison Score, $F(1, 190) = 13.10$, $p < 0.001$; Total *T*-Score on the SRS-2, $F(1, 199) = 5.08$, $p < 0.05$; and ECBI Intensity *T*-Score, $F(1, 197) = 10.72$, $p < 0.01$. Child age, gender, ethnicity, and cognitive score were not associated with meeting screening criteria for an anxiety disorder, so these were not included in the subsequent logistic regression model. The overall logistic model for meeting screening criteria on any Mood Disorder was statistically significant

$\chi^2(2) = 14.26$, $p < 0.01$. This model explained 15% (Nagel- kerke R^2) of the variance in meeting screening criteria for a Mood Disorder and correctly classified 66.0% of cases. Children who had lower scores on the ADOS-2 Comparison Score, $B = -0.24$, $SE = 0.08$; Wald$\chi^2(1) = 9.10$; $p < 0.01$ (OR=0.79; 95% CI = 0.67–0.92) and higher scores on the ECBI Intensity scale, $B = 0.04$, $SE = 0.02$; Wald $\chi^2(1) = 5.77$, $p < 0.05$ (OR = 1.04; 95% CI = 1.01–1.08) had significantly higher odds of meeting screening criteria for a Mood Disorder.

Discussion

This study examined the patterns of psychiatric comorbidity in a diverse sample of children with ASD receiving care in 29 publicly funded outpatient clinic or school-based MH programs in Southern California. Almost all children in this sample met criteria for at least one additional psychiatric disorder based on a structured diagnostic interview linked to the DSM-IV, with an average of more than two comorbid diagnoses per child. The most common diagnosis across the sample was ADHD, with 78% meeting criteria for this diagnostic category. ODD (58%) and Anxiety Disorders (56%) were also prevalent, affecting much of the sample. The most common profile of multiple diagnoses was ADHD + ODD + Anxiety (17%). These findings are consistent with the findings of Brookman- Frazee et al. (2009) that reported comorbidity in a combined sample of children with ASD or ID receiving care in publicly funded systems of care and found ADHD to be the most common diagnosis based on a different parent interview measure, the NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV). It is not surprising that such a high proportion of children with ASD in the current sample meet criteria for comorbid psychiatric disorders given that they are receiving care in a MH system designed to target these disorders. These findings suggest that there is a high need for the development, testing, and implementation of intervention protocols targeting these common areas.

Child gender and clinical characteristics were differentially associated with meeting criteria for each diagnostic group of ADHD, ODD, an Anxiety, or Mood Disorder with results similar to studies of non-ASD youth with MH conditions (Canino et al., 2004; Costello et al., 1996; Kessler et al., 2005, 2012). Specifically, in multiple logistic regression models, boys with ASD were more than three times likely to meet criteria for an ADHD diagnosis based on the MINI-KID-P compared to girls in our sample. This finding is consistent with research in children without ASD demonstrating the prevalence of ADHD to be substantially higher in boys (e.g. Bauermeister et al., 2007). The consistency in findings between ASD and non-ASD samples potentially suggests that the diagnostic assessment operates similarly in the two samples. This gender difference should be interpreted with caution, however, given the small proportion of girls in our sample and the prevalence bias of both ASD and ADHD toward boys. Research suggests that girls display unique behavioral and cognitive profiles that may lead to underdiagnoses of these conditions (Dworzynski et al., 2012; Rucklidge, 2010).

Higher ASD symptom severity as measured on the SRS-2 was associated with greater odds of meeting criteria for all four diagnostic groups in bivariate analyses but only for anxiety disorders (OR = 1.07) in the multiple logistic regression models when controlling for other demographic and clinical variables significant in bivariate analyses. This extends the

research on the clinical profiles of children with co-occurring ASD and psychiatric conditions. In particular, SRS-2 total score prediction of ADHD and ODD did not maintain in the regression analyses compared to bivariate analyses in this study, though other studies have found an association. Specifically, Rao and Landa (2014) reported that young children (aged 4–8 years) with ASD who also have ADHD exhibit more severe social impairment on the SRS than children with ASD only. They found that children with both ASD and ADHD diagnoses had lower cognitive and adaptive functioning than children with ASD alone. Similarly, Yerys et al. (2009) found that severity of ADHD symptoms in children with ASD (aged 6–14 years) was associated with higher autism symptoms on the SRS. Furthermore, there is increasing documentation of the high comorbidity of anxiety disorders and ASD, with this comorbidity associated with greater functional impairment (Kerns et al., 2015; White et al., 2009). Specifically, social deficits, which are the majority of ASD symptoms assessed by the SRS-2, may be particularly related to anxiety and an area for intervention to target to potentially prevent onset of anxiety (Hartley and Sikora, 2009; Wood and Gadow, 2010). Additionally, the presence of another non-ASD psychiatric condition was associated with two to over three times greater odds of meeting criteria for ADHD, ODD, Anxiety, or Mood Disorders in multiple logistic regression models. Thus, it is difficult to distinguish between core ASD symptoms and other psychiatric symptoms as treatment targets, and treatment may require integrated intervention models.

Higher behavior problem severity on the ECBI was associated with increased odds of meeting criteria for ADHD, ODD, and Mood Disorders in bivariate analyses but only for ADHD (OR = 1.08) and ODD (OR = 1.18) in multiple logistic regression models. These findings are not surprising given that problem behaviors are required symptoms to meet diagnostic criteria for ADHD and ODD. These data are also consistent with prior research documenting higher problem behaviors in children with ASD and co-occurring ADHD compared with those with ASD alone (Yerys et al., 2009). Similar findings in longitudinal research regarding the unique or concomitant negative impact of early social and behavioral problems on subsequent comorbid psychopathology have been found in non- ASD child samples (Hofstra et al., 2002; Roza et al., 2003). These findings are also consistent with MH services research indicating that problem behaviors are the most common presenting problem for children receiving publicly funded MH services (Garland et al., 2001). It highlights the importance of addressing challenging behaviors in this sub-population with ASD.

We also conducted exploratory analyses to examine internalizing symptomatology beyond the presence of symptoms meeting diagnostic criteria. A significant proportion of children met MINI-KID-P screening criteria for Anxiety and Mood Disorders. The difference between the higher proportion of children meeting the screening (77%) versus the diagnostic criteria (56%) for Anxiety Disorders and similarly for Mood Disorders (44% screening criteria versus 30% diagnostic criteria) suggests that many children with ASD present with internalizing symptoms (even if they do not meet full diagnostic criteria) and these symptoms may contribute to their complex clinical profiles. Further exploration through the multiple logistic regression models of internalizing symptoms indicated that greater ASD symptom severity per caregiver report (SRS-2) was linked to increased odds of meeting screening criteria for Anxiety Disorders similar to what was found for anxiety diagnoses.

These findings support further the relationship between social deficits and anxiety. Interestingly, lower ASD severity per trained observer (ADOS-2) and greater challenging behaviors were linked to increased odds of meeting screening criteria for Mood Disorders. These findings begin to elucidate relationships between ASD symptom presentation and symptoms of internalizing conditions. Such results indicate a need for MH clinicians to consider internalizing symptoms and challenging behaviors in children with ASD and how each may be interconnected. This highlights the potential of function-based behavioral approaches that address challenging behaviors through consideration of the function and underlying cause of the behavior. Such function-based behavioral approaches are consistent with best educational practices recommended for community ASD providers, particularly in addressing challenging behaviors (National Autism Center, 2015;Wong et al., 2015). Consideration of other non-ASD diagnoses within the function-based assessment is warranted by exploring such anxiety or depression symptoms as possible antecedents of a particular behavior.

Findings from this study should be considered based on some limitations. First, there are limitations in our method for identification of comorbid psychiatric diagnoses and symptoms via the MINI-KID-P. Specifically, the MINI- KID-P restricted assessment of psychiatric comorbidity from caregiver report only. Although the MINI-KID has a child report version in addition to the parent report, the decision was made to solely obtain parent report due to concerns about the accuracy of child report for this sample's age range of school-age children and the desire to minimize the time spent in assessments for the child. It is possible that this impacted the prevalence rates of the anxiety and mood disorders as these are symptoms that are often difficult for caregivers to report (Choudhury et al., 2003). Related, our research team adapted the MINI- KID-P to aid in differentiation between ASD symptoms and non-ASD psychiatric disorders but due to the caregiver-report nature of this assessment, it is still possible that caregivers had difficulty differentiating symptoms in their responses. Additionally, our adapted version of the MINI-KID-P does not have established psychometric properties to report and it is not normed for diagnosing psychiatric conditions in ASD populations, but based on the equal number of conditions identified with the original normed sample (that was not ASD-specific) (median=3 MH conditions) (Sheehan et al., 2010), it appears that the MINI-KID-P is operating as indicated with this ASD population. The prevalence findings reported in this study are for a subset of children with ASD receiving MH care and may not generalize to the general population of children with ASD. Related, the inclusion criteria for children in our sample was selected to best represent children with ASD who receive community-based MH services and such that they all had behavior problems. All children in our sample had received an ASD diagnosis from a community provider but these community providers may have used ASD diagnostic procedures less rigorous than those in structured research protocols as 6% of the sample with ASD did not meet criteria on the research administered ADOS-2. Finally, although the DSM-IV was the diagnostic system in use at the beginning of the study, the diagnoses reported do not reflect the current diagnostic system (*Diagnostic and Statistical Manual of Mental Disorders,* 5th ed.; DSM-V).

Implications of findings

Despite the limitations, this study contributes to the research in several areas, including in treatment development and workforce development.

Implications for treatment development.—The findings shed light on the clinical profile of children with ASD served in MH programs who commonly present with challenging behaviors— high rates of ADHD and ODD with comorbid anxiety or anxiety symptoms and/or depression symptoms or mood disorder—and highlight the importance of interventions for these conditions adapted for use with the ASD populations (e.g. Kenworthy et al., 2014; Reaven et al., 2012; Wood et al., 2009). Understanding the clinical needs of the clients within a service system is critical to the development and selection of intervention protocols for implementation. These findings are important in that many evidence-based behavioral interventions and pharmacological interventions exist for treating these co-occurring conditions and some have been specifically designed for individuals with ASD (Kenworthy et al., 2014; Reaven et al., 2012; Wood et al., 2009). There is also a movement towards utilization of modular approaches for children with ASD (Wood et al., 2015) to account for the clinical profile variability in children with ASD and the need to individualize treatments for multiple symptom targets. Such individually tailored treatments can only occur if there is a clear understanding of the complete clinical profile of the child including ASD and co-occurring MH symptomatology. It is imperative that current and future ASD treatment development research efforts explicitly consider or target co-occurring MH conditions in their assessment and treatment planning processes as 92% of the ASD children had at least one other MH condition with most having 2–3 additional conditions.

Implications for service systems and workforce development.—Children with ASD receive care from multiple systems including MH, Developmental Disability (DD), and Special Education, each intended to target different symptoms. Unfortunately, these service systems typically operate in a siloed fashion based on distinguishing care for core symptoms of the child: ASD symptoms (in DD services) versus MH conditions (for MH services). The data from this study suggest that these symptoms are very difficult to disentangle and need to be conceptualized collectively, which will require some degree of cross-fertilization between DD, education, and MH providers. Specifically, findings indicate that MH providers should receive training in the assessment of both ASD-specific symptoms like social functioning along with MH conditions and the interaction between MH symptoms and ASD symptoms. This may address the concerns that MH providers have strongly voiced in our previous research indicating that one of their frustrations in treating MH conditions (e.g. ADHD) of children with ASD to address MH conditions is that these children do not respond in the same way to MH treatments as children without ASD. This research also supports the need for cross-fertilization across service sectors related to caring for children with ASD who also have co-occurring mental problems. Understanding how MH and ASD symptoms interact has the potential to facilitate understanding of challenging behaviors and is being increasingly recognized as a need for providers. For example, data from a recent survey of over 300 educators focused on training needs to serve students with ASD in the state of California indicated that training in cognitive behavioral therapy (CBT) and behavioral interventions were identified as top training needs for educators (Schetter and

England, 2015). This study's findings combined with research to date indicate a need for future research that advances models of MH therapist training in case conceptualization and intervention selection for children with ASD.

Conclusion

Data from this study were drawn from a diverse sample representative of children receiving publicly funded MH services and is the largest sample of children with ASD using a structured diagnostic assessment to investigate the prevalence of comorbid MH conditions. The high rates of MH conditions in children with ASD found highlight the importance of developing community clinician training in psychiatric diagnostic assessment for children with ASD and treatment planning to address the multitude of psychiatric symptoms in this population while simultaneously understanding how the common presenting problem of challenging behaviors fit into the context of multiple psychiatric comorbidity.

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Table 1.

Participant characteristics (n = 201).

Child or caregiver characteristics	*M*(*SD*) or *n* (%)
Child sociodemographic characteristics	
Gender (male)	168 (84%)
Age (years)	9.13 (2.44); 4–14 years
Race/ethnicity	
Hispanic/Latino	121 (60%)
White	50 (25%)
African American	11 (6%)
Multiracial	9 (5%)
Asian/Pacific Islander	8 (4%)
American Indian/Alaskan Native	2 (1%)
Caregiver sociodemographic characteristics	
Gender (female)	183 (93%)
Relation to child (biological parent)	179 (91%)
Marital status (married)	100 (51%)
Household income (<US$35,000)	122 (62%)
Maternal education	
Less than high school	38 (20%)
High school/GED	74 (38%)
Associate's degree	29 (l5%)
Bachelor's degree	22 (11%)
Graduate degree	l2 (7%)
Other (e.g. trade/technical school)	l8 (9%)
Child clinical characteristics	
Cognitive Standard Score[a]	88.47 (16.53); 33 – 140
ADOS-2 Comparison Score	7.06 (2.02); l - l0
SRS-2 Total T-Score	79.98 (11.15); 41 – 104; 190 (95%) *T*-Score ⩾ 60
ECBI Intensity *T*-Score	63.01 (10.44); 38 – 94; 125 (63%) *T*-Score ⩾ 60

ADOS-2: Autism Diagnostic Observation Schedule-2; SRS-2: Social Responsiveness Scale-2; ECBI: Eyberg Child Behavior Inventory; WASI-II: Wechsler Abbreviated Scale of Intelligence-II; DAS-II: Differential Ability Scale-II.

[a] Cognitive scores are based on WASI-II or DAS-II.

Table 2.

Proportion of children meeting diagnostic criteria for adapted MINI-KID-P disorders and diagnostic categories.

Diagnostic categories and individual diagnoses (not mutually exclusive)	Met diagnostic criteria, *N* (%)
Any MINI-KID diagnosis	184 (92%)
Any ADHD disorder	156 (78%)
Combined	125 (62%)
Inattentive	23 (11%)
Hyperactive/impulsive	8 (4%)
Oppositional defiant disorder	115 (58%)
Any anxiety disorder	113 (56%)
Specific phobia	65 (33%)
Social phobia	47 (24%)
Separation anxiety disorder	29 (15%)
Generalized anxiety disorder	29 (15%)
Agoraphobia	21 (10%)
Obsessive compulsive disorder	19 (l0%)
Panic disorder (with or without agoraphobia)[a]	17 (9%)
Any mood disorder	60 (30%)
Major depressive disorder (lifetime)[a]	45 (22%)
Dysthymia	16 (8%)
Manic episode (lifetime)[a]	10 (5%)
Hypomanic episode (lifetime)[a]	6 (3%)
Patterns of comorbidity (mutually exclusive)	
ADHD + ODD + anxiety	34 (17%)
ADHD + ODD + anxiety + mood	32 (16%)
ADHD + ODD	30 (15%)
ADHD only	21 (10%)
ADHD + anxiety	l9 (9%)
Anxiety Only	l4 (7%)
ADHD + ODD + mood	l0 (5%)
ADHD + anxiety + mood	7 (4%)
ODD only	5 (3%)
ODD + mood + anxiety	3 (2%)
ADHD + mood	3 (2%)
Anxiety + mood	3 (2%)
Mood only	2 (1%)
ODD + anxiety	1 (1%)
No non-ASD disorder	l7 (8%)

MINI-KID-P: Mini-International Neuropsychiatric Interview, parent version; ADHD: attention deficit hyperactivity disorder; ODD: oppositional defiant disorder.

[a]Current or past (lifetime).

Table 3.

Differences in child characteristics by diagnostic category (initial bivariate analyses).

Child characteristics	ADHD		ODD		Anxiety		Mood	
	% or *M* (*SD*)		% or *M* (*SD*)		% or *M* (*SD*)		% or *M* (*SD*)	
	No, *N* = 44	Yes, *N*= 156	No, *N* = 85	Yes, *N*= 1 15	No, *N* = 88	Yes, *N*= 113	No, *N*= 140	Yes, *N* = 60
Age (years)	9.25 (2.51)	9.08 (2.43)	9.36 (2.62)	8.94 (2.30)	8.74 (2.62)	9.43 * (2.26)	8.99 (2.45)	9.43 (2.41)
Gender: male	72.70%	86.50% *	82.40%	84.30%	86.40%	81.40%	85.70%	78.30%
Ethnicity: Hispanic	61.40%	59.60%	62.40%	58.30%	62.50%	58.40%	61.40%	56.70%
Cognitive Standard Score	87.53 (18.65)	88.77 (16.01)	88.55 (18.38)	88.47 (15.20)	90.69 (15.1 1)	86.86 (17.38)	88.64 (17.24)	88.21 (15.13)
ADOS-2 Comparison Score (1–10)	7.29 (1.83)	7.00 (2.08)	7.25 (1.89)	6.93 (2.12)	7.31 (1.82)	6.86 (2.16)	7.24 (1.92)	6.62 (2.23)
SRS-2 Total *T*-Score	75.68 (13.34)	81.38 ** (9.90)	77.12 (12.07)	82.35 ** (9.55)	75.83 (1 1.91)	83.20 *** (9.36)	78.64 (1 1.61)	83.58 ** (8.43)
ECBI Intensity T-Score	55.25 (10.58)	65.38 *** (9.10)	56.15 (8.48)	68.37 *** (8.30)	62.40 (1 1.17)	63.49 (9.85)	61.64 (10.1 1)	66.53 ** (10.10)
ADHD	-	-	58.80%	92.20% ***	72.7%	82.1%	74.3%	86.7%
ODD	20.50%	67.90% ***	-	-	51.10%	62.50%	50.00%	75.00% **
Anxiety	45.50%	59.00%	49.40%	60.90%	-	-	47.90%	75.00% ***
Mood	18.20%	33.30%	17.60%	39.10% ***	17.00%	40.20% ***	-	-

ADHD: attention deficit hyperactivity disorder; ODD: oppositional defiant disorder; ADOS-2:Autism Diagnostic Observation Schedule-2; SRS-2:Social Responsiveness Scale-2;ECBI:Eyberg Child Behavior Inventory.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$. Indicates a significant difference between children who met criteria for a diagnostic category compared to those who did not meet criteria for a diagnostic category.

Table 4.

Multiple logistic regression analyses for diagnostic categories.

Predictor	Any ADHD		ODD		Any anxiety disorder		Any mood disorder	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Child age (years)	-	-	-	-	1.11	0.98–1.26	-	-
Child gender: male	3.37*	1.24–9.14	-	-	-	-	-	-
SRS-2 Total *T*-Score	1.02	0.98–1.06	0.99	0.96–1.03	1 07***	1.04—1.10	1.02	0.98–1.06
ECBI Intensity *T*-Score	1.08**	1.03–1.14	1.18***	1.11–1.24	-	-	1.02	0.98–1.07
ADHD	-	-	3.84**	1.40–10.49	-	-	-	-
ODD	3.40*	1.31–8.85	-	-	-	-	2.10	0.91–4.84
Anxiety	-	-	-	-	-	-	2.88**	1.40–5.96
Mood	-	-	2.35*	1.01–5.46	2.49*	1.23–5.04	-	-

SRS-2: Social Responsiveness Scale-2; ECBI: Eyberg Child Behavior Inventory; ADHD: attention deficit hyperactivity disorder; ODD: oppositional defiant disorder; - data not available.

* $p<0.05$;

** $p<0.01$

*** $p<0.001$.

Table 5.

Proportion of children meeting screening criteria for adapted MINI-KID-P internalizing disorders.

Individual diagnoses (not mutually exclusive)	**Screening criteria met, *N* (%)**
Anxiety disorders (current or past)	155 (77%)
Specific phobia	100 (50%)
Separation anxiety disorder	69 (34%)
Social phobia	67 (33%)
Obsessive compulsive disorder	59 (29%)
Panic disorder	37 (19%)
Generalized anxiety disorder	31 (15%)
Agoraphobia	20 (10%)
Mood disorders (current or past)	89 (44%)
Major depressive disorder or dysthymia[a]	68 (34%)
Manic or hypomanic episode[a]	39 (19%)

[a]These diagnostic categories were combined because the screening items were shared.

Table 6.

Differences in child characteristics for children meeting screening criteria for an anxiety or mood disorder (initial bivariate analyses).

Child characteristics	Screening criteria met for any anxiety disorder		Screening criteria met for any mood disorder	
	% or *M* (*SD*)		% or *M* (*SD*)	
	No, *n* = 46	Yes, *n* = 155	No, *n* = 112	Yes, *n* = 89
Age (years)	9.13 (2.83)	9.13 (2.32)	9.10 (2.47)	9.17 (2.41)
Gender: male	80.4%	84.5%	87.5%	78.7%
Ethnicity: Hispanic	65.2%	58.7%	56.3%	65.2%
Cognitive Standard Score[a]	92.27 (14.50)	87.39 (16.95)	87.55 (19.93)	89.55 (14.73)
ADOS-2 Comparison Score	7.27 (1.80)	6.99 (2.09)	7.50 (1.78)	6.47 (2.18)***
SRS-2 Total *T*-Score	75.28 (13.23)	81.37 (10.09)**	78.41 (11.93)	81.94 (9.79)*
ECBI Intensity *T*-Score	60.59 (11.14)	63.73 (10.15)	60.92 (10.10)	65.69 (10.32)**

ADOS-2:Autism Diagnostic Observation Schedule-2; SRS-2: Social Responsiveness Scale-2; ECBI: Eyberg Child Behavior Inventory; WASI- II: Wechsler Abbreviated Scale of Intelligence-II; DAS-II: Differential Ability Scale-II.

[a]Cognitive scores are based on WASI-II or DAS-II.

*$p<0.05$;

**$p<0.01$;

***$p<0.001$. Indicates a significant difference between children who met screening criteria for a diagnostic category compared to those who did not meet screening criteria for a diagnostic category.

Table 7.

Multiple logistic regression analyses predicting child clinical characteristics associated with anxiety and mood screening criteria.

Predictor	Any anxiety disorder		Any mood disorder	
	OR	95% CI	OR	95% CI
ADOS-2 Comparison Score (1–10)	-	-	0.79**	0.67–0.92
SRS-2 Total *T*-Score	1.05**	1.02–1.08	1.01	0.98–1.05
ECBI Intensity *T*-Score	-	-	1.04*	1.01–1.08

ADOS-2:Autism Diagnostic Observation Schedule-2; SRS-2: Social Responsiveness Scale-2; ECBI: Eyberg Child Behavior Inventory;–data not available.

* $p<0.05$;

** $p<0.01$.