



Prevalence and Phenomenology of Anxiety in Preschool-Aged Children with Autism Spectrum Disorder

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Abstract

Individuals with autism spectrum disorder (ASD) are at a higher risk for developing co-occurring anxiety symptoms and diagnosable anxiety disorders compared to children with neurotypical development (NTD). The objective of the current study was to characterize the prevalence and phenomenology of anxiety in preschool-aged children with ASD. Our sample consisted of preschoolers ($M=52.8$ months, $SD=10.8$ months) with ASD ($n=77$, 66% with co-occurring intellectual disability, ID) and NTD ($n=55$). We employed multi-method (questionnaire and semi-structured diagnostic interview) and multi-informant (parent- and teacher-report) assessments of anxiety. Children with ASD were significantly more likely to meet criteria for an anxiety disorder than children with NTD. Over 70% of our sample with ASD met DSM-5 criteria for an anxiety disorder, with Specific Phobia and Separation Anxiety Disorder being the most prevalent. A range of specific fears was endorsed in the group with ASD, many of which overlapped with ASD symptoms. Parents, but not teachers, also reported greater anxiety symptoms for children with ASD relative to the comparison sample. Prevalence and phenomenology of anxiety in our sample with ASD generally did not differ between those with and without co-occurring ID, with the exception of higher rates of generalized anxiety in those without ID. Results showed poor concordance between parent questionnaires and a semi-structured diagnostic interview in detecting clinically-elevated anxiety in children with ASD. Implications for clinical practice and research are discussed.

Keywords Autism spectrum disorder · Anxiety · Intellectual disability · Comorbidities · Preschool

Anxiety disorders are among the most prevalent co-occurring psychiatric conditions experienced by individuals with Autism Spectrum Disorder (ASD)¹ and adversely affect numerous life domains (Duvekot et al., 2018; White et al., 2014). Prevalence estimates of having at least one anxiety disorder in this population range from 40 to 78% (Salazar et al., 2015; Simonoff et al., 2008), almost four times the rate observed in children with neurotypical development (NTD; Costello et al., 2011). Substantial research has examined anxiety prevalence, phenomenology, and treatment in school-aged children and adolescents with ASD (Kreslins et al., 2015; White et al., 2009). Fewer studies have focused on young children, despite growing evidence that clinically significant anxiety also occurs

in preschoolers, including those with NTD (Birmaher et al., 2009) and those with ASD (Vasa et al., 2020). Given heightened risk for co-occurring psychopathology in youth with ASD across development (Gotham et al., 2015), improved understanding of the prevalence and phenomenology of anxiety during the preschool period may facilitate earlier detection and targeted intervention.

Parents of preschool-aged children with ASD often report more severe symptoms of child anxiety than do parents of same-aged children with NTD or other neurodevelopmental disorders (Chan et al., 2021; Havdahl et al., 2016). Indeed, 8% to 41% of preschool-aged children with ASD meet criteria for clinically-significant anxiety as per standardized parent-report questionnaires (Chan et al., 2021; Sukhodolsky et al., 2020; Vasa et al., 2013). The most commonly reported manifestations of anxiety for

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¹ We use person-first language throughout this manuscript, as this was the language form preferred by our participating families at the time the project was conducted.

preschoolers with ASD include symptoms of Generalized Anxiety Disorder, Specific Phobia, Social Anxiety Disorder, and to a lesser degree, Separation Anxiety Disorder (Driscoll et al., 2020). Although these data provide insight into anxiety in young children with ASD, the predominant focus on children without co-occurring intellectual disability (ID) constrains external validity and generalizability for the one- to two-thirds of youth estimated to have both ASD and ID (Thurm et al., 2019).

The assessment of anxiety in preschoolers has unique considerations. Conceptually, debate exists regarding the utility and validity of downwardly extending diagnostic classification systems to young children (e.g., Angold & Egger, 2004), an issue that is further complicated by the cognitive, linguistic, and behavioral heterogeneity present in ASD. The stability of early-onset anxiety is also a central question, with some evidence suggesting both homotypic and heterotypic continuity of preschool anxiety disorders (e.g., Finsaas et al., 2018; Steinsbekk et al., 2022) whereas other findings indicate greater discontinuity (e.g., Battaglia et al., 2016; Steinsbekk et al., 2022). Practically, there are a variety of complexities inherent in assessing internal experiences in young children. Preschoolers are still developing the metacognitive abilities necessary to reliably self-report on internal experiences (Carter et al., 2004). Thus, for young children, and especially for those with more limited verbal communication, anxiety is often extrapolated from observed behaviors via collateral report.

Additionally, a longstanding challenge in the field has involved determining whether symptoms of anxiety observed in individuals with ASD reflect ASD symptoms or a co-occurring condition that is distinct from ASD (Wood & Gadow, 2010). In fact, the current edition of the DSM-5 includes criteria that require diagnosticians to rule out an anxiety disorder if symptoms are better explained by another condition (e.g., ASD). This has created challenges in determining, for instance, whether the avoidance of social situations or of loud noises is better accounted for by ASD symptoms, or whether a co-occurring anxiety disorder is also warranted given the nature, intensity, and functional impact of presenting symptoms (e.g., social anxiety disorder or specific phobia, respectively). Nonetheless, there is growing evidence suggesting that symptoms of anxiety akin to DSM classifications of anxiety disorders (e.g., generalized, social, and separation anxiety) can be reliably distinguished from ASD symptoms among school-aged youth, especially when using semi-structured interviews (Kerns et al., 2017). This method, which permits follow-up questions to clarify symptoms and inform differential diagnosis, is recommended as best-practice (Vasa et al., 2016) and has revealed differences in the specific phobias of children with and without ASD (Kerns et al., 2017, 2020).

Multi-method, multi-informant assessment across settings is recommended when evaluating anxiety in youth with ASD (Vasa et al., 2016). However, apart from a small treatment study that used the Kiddie Schedule for Affective Disorders and Schizophrenia, Epidemiologic Version (KSADS-E; Driscoll et al., 2020), most studies examining anxiety in preschool-aged children with ASD have relied solely on rating scales, primarily parent report (Vasa et al., 2020). Recent research has identified concerns regarding reduced sensitivity of various parent rating scales in detecting clinically-significant anxiety in youth with ASD, particularly in those with cognitive delays (Kerns et al., 2020). Moreover, although parent rating scales are commonly used in research and practice, it is unclear how well these scales perform relative to a semi-structured interview for preschoolers with ASD, especially for those with ID.

The current study used a multi-informant, multi-method approach to examine the severity, prevalence, and phenomenology of anxiety in a sample of preschool-aged children with ASD, with and without co-occurring ID, and an age-matched sample with NTD. We hypothesized that children with ASD would show higher rates of anxiety disorders and greater anxiety symptoms relative to children with NTD. Additionally, based upon preliminary evidence from Kerns et al. (2020), we hypothesized that children with ASD would differ from children with NTD in the nature of parent-reported fears and specific phobias. As a secondary aim, we examined the concordance between a semi-structured diagnostic interview and briefer parent-report rating scales in detecting clinically-elevated anxiety in children with ASD.

Method

Participants

Participants included 132 families of children aged 3 to 5 years, including 77 families of children with ASD and 55 families of children with NTD. Table 1 presents demographic and clinical characteristics.

Families of children with ASD were drawn from two larger clinical trials examining stress-reduction interventions for parents of young children with ASD and other developmental delays (McIntyre & Neece, 2018; Neece & Fenning, 2018). The current study used pre-randomization baseline data only. Children's community diagnosis of ASD was confirmed by study-administered assessments, including a gold-standard direct assessment of ASD symptoms, the Autism Diagnostic Observation Schedule-2 (ADOS-2; Lord et al., 2012) administered by research-reliable assessors. One child did not meet the ADOS-2 criterion for an ASD classification, but was retained following completion of a multimethod clinical best estimate by a licensed clinical psychologist

Table 1 Group Differences in Demographic and Clinical Characteristics

	Diagnostic Group			ID Status in Group with ASD		
	ASD (n = 77)	NTD (n = 55)	p	ASD only (n = 26)	ASD+ID (n = 51)	p
Child Characteristics						
Age in months, <i>M (SD)</i>	52.7 (11.6)	53.0 (9.2)	.881	55.9 (10.7)	51.2 (11.8)	.101
Male, <i>n (%)</i>	62 (80.5%)	25 (45.5%)	<.001	22 (84.6%)	40 (78.4%)	.517
Race/Ethnicity, <i>n (%)</i>			.016			.159
White	16 (20.8%)	18 (32.7%)		5 (19.2%)	11 (21.6%)	
Latinx	34 (44.2%)	10 (18.2%)		13 (50.0%)	21 (41.2%)	
Black	3 (3.9%)	4 (7.3%)		1 (3.8%)	2 (3.9%)	
Asian	4 (5.2%)	1 (1.8%)		3 (11.5%)	1 (2.0%)	
Native American	1 (1.3%)	0 (0.0%)		1 (3.8%)	0 (0.0%)	
Other	2 (2.6%)	0 (0.0%)		1 (3.8%)	1 (2.0%)	
Multiracial	17 (22.1%)	22 (40.0%)		2 (7.7%)	15 (29.4%)	
SB-5 ABIQ, <i>M (SD)</i>	66.8 (17.3)	103.8 (11.9)	<.001	85.4 (13.3)	56.9 (9.2)	<.001
VABS-3, <i>M (SD)</i>	69.2 (9.8)	–		79.4 (6.3)	64.7 (7.3)	<.001
ASD Symptoms (ADOS-2 CS), <i>M (SD)</i>	7.3 (1.7)	–		6.8 (1.7)	7.5 (1.6)	.080
Anxiety Measures, <i>M (SD)</i>						
SPAS-P Total Score	23.9 (18.9)	12.6 (10.6)	.003 ^a	31.6 (24.3)	20.0 (14.2)	.036
CBCL DSM Anxiety Problems	7.2 (4.3)	2.3 (2.4)	<.001 ^a	7.7 (5.3)	7.0 (3.7)	.588
SPAS-T Total Score	11.8 (10.9)	9.9 (9.9)	.870	15.4 (13.8)	10.2 (9.4)	.620
C-TRF DSM Anxiety Problems	2.6 (2.7)	1.7 (2.3)	.223	2.9 (2.7)	2.5 (2.7)	.150
Primary Caregiver Characteristics						
Annual Household Income, <i>n (%)</i>			.967			.237
< \$30 k	20 (26.3%)	15 (27.9%)		4 (15.4%)	16 (32.0%)	
\$30 k to < \$50 k	13 (17.1%)	7 (13.0%)		3 (11.5%)	10 (20.0%)	
\$50 k to < \$70 k	17 (22.3%)	14 (26.0%)		9 (34.6%)	8 (16.0%)	
\$70 k to < \$90 k	9 (11.8%)	6 (11.1%)		3 (11.5%)	6 (12.0%)	
> \$90 k	17 (22.4%)	12 (22.2%)		7 (26.9%)	10 (20.0%)	
Education, <i>n (%)</i>			<.001			.927
High school or less	18 (23.4%)	9 (16.4%)		5 (19.2%)	13 (25.5%)	
Some college	15 (19.5%)	5 (9.1%)		5 (19.2%)	10 (19.6%)	
Technical Degree/AA	28 (36.4%)	8 (14.5%)		10 (38.5%)	18 (35.3%)	
Bachelor’s Degree	7 (9.1%)	22 (40.0%)		2 (7.7%)	5 (9.8%)	
Graduate	9 (11.7%)	11 (20.0%)		4 (15.4%)	5 (9.8%)	
Parenting Stress, <i>M (SD)</i>	38.7 (8.1)	24.3 (6.7)	<.001	39.3 (8.5)	38.5 (8.0)	.664

ASD autism spectrum disorder, NTD neurotypical development, ID intellectual disability, *Stanford-Binet-5 Abbreviated Battery IQ* SB-5 ABIQ, VABS-3 ABC Vineland Adaptive Behavior Scales-3 Adaptive Behavior Composite, ADOS-2 CS Autism Diagnostic Observation Schedule-2 Comparison Score, SPAS-P Spence Preschool Anxiety Scale-Parent-Report Form, CBCL Child Behavior Checklist for Children 1.5–5, SPAS-T Spence Preschool Anxiety Scale – Teacher-Report Form, C-TRF Caregiver-Teacher Response Form

^aGroup differences in parenting stress and child IQ were controlled

with ADOS-2 research reliability and significant expertise in assessment for ASD. To avoid potential confounds, the larger clinical trials excluded families if: (a) primary caregivers screened positively for active psychosis, substance abuse, or suicidality on the Structured Clinical Interview for DSM Disorders (First et al., 2002), or (b) parents were engaged in auxiliary mental health treatment or support groups. Children with motor impairments that would interfere with

laboratory tasks in the larger studies (e.g., difficulty sitting independently) were also excluded. Most children with ASD (66.2%) met DSM-5 criteria for co-occurring ID according to study-administered assessments of intellectual functioning (Stanford-Binet Intelligence Scales-5 Abbreviated Battery IQ—SB-5 ABIQ < 76; Roid, 2003) and adaptive behavior (Vineland Adaptive Behavior Scales-3 Adaptive Behavior Composite—VABS-3 ABC < 76; Sparrow et al., 2016).

Families of children with NTD were recruited from the community through local organizations, service providers, and social media postings. Exclusionary criteria involved: (a) community diagnosis of ASD or other developmental delay; (b) having a sibling with ASD or other developmental delay; (c) a total score of 12 or higher on the Social Communication Questionnaire (Rutter et al., 2003), which is the recommended screening cutoff for ASD in young children (Corsello et al., 2007); and (d) SB-5 ABIQ score below 85.

Procedure

Procedures were approved by the Institutional Review Board of participating universities. Following an initial phone screening, eligible families were scheduled for a baseline laboratory assessment. Parents provided informed consent prior to initiation of laboratory visits. For all children, laboratory assessments included direct testing of children's intellectual functioning and a semi-structured diagnostic interview with a parent to ascertain child anxiety disorders. Parents also completed a packet of questionnaire measures. For children with ASD only, direct testing of ASD symptoms and assessment of parent-reported adaptive behavior were also performed.

Following conclusion of the laboratory assessment, questionnaire measures were obtained from children's teachers or, when necessary, from an identified collateral informant not residing in the child's household (30% for ASD, 10% for NTD). Alternate collateral informants for children with ASD included therapists (ABA, OT, speech; 21.7%), non-relative babysitters (4.3%), and other relatives (4.3%). Additional collateral informants for children with NTD included non-relative babysitters (5.4%) and other relatives (5.4%).²

Measures

Spence Preschool Anxiety Scale (SPAS)

The SPAS is a questionnaire measure that assesses symptoms of anxiety in children three to five years of age (Spence et al., 2001). The SPAS has a 28-item parent-report form (SPAS-P) and a 22-item teacher-report form (SPAS-T). Items are rated on a 5-point Likert scale ranging from 0 (*not true at all*) to 4 (*very often true*). The SPAS yields a Total Anxiety Score, which was utilized in the current study. Standardized *T*-scores are available for the parent-report form, with *T*=60 indexing the cutoff for "*elevated anxiety*." Although SPAS psychometrics are not well-studied in children with ASD, Magiati et al. (2017) noted excellent reliability and validity for the Spence Child Anxiety Scale for

school-aged children with ASD. In the current study, internal consistency for the Total Anxiety scale was adequate for the SPAS-P (Combined Sample: $\alpha=0.92$; ASD: $\alpha=0.92$; NTD: $\alpha=0.88$) and SPAS-T (Combined Sample: $\alpha=0.88$; ASD: $\alpha=0.87$; NTD: $\alpha=0.89$).

Achenbach System of Empirically Based Assessment (ASEBA)

The ASEBA scales (Achenbach & Rescorla, 2000) measure child emotional and behavioral concerns, and include parent-report (Child Behavior Checklist for Ages 1½ to 5; CBCL) and teacher-report forms (Caregiver-Teacher Report Form; C-TRF). The CBCL and C-TRF each contain 99 items rated on a 3-point Likert scale: 0 (*not true*), 1 (*somewhat or sometimes true*), and 2 (*very true or often true*). We used the 10-item DSM Anxiety Problems scale, which has demonstrated utility as a screener for anxiety disorders in school-aged youth with ASD (Magyar & Pandolfi, 2017). This scale produces a standardized *T*-score, with *T*=60 and *T*=65 indicating borderline and clinical levels of anxiety, respectively. Internal consistency was adequate for the CBCL DSM Anxiety Problems scale (Combined Sample: $\alpha=0.83$; ASD: $\alpha=0.77$; NTD: $\alpha=0.70$) and C-TRF (Combined Sample: $\alpha=0.76$; ASD: $\alpha=0.75$; NTD: $\alpha=0.77$).

Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS)

To determine whether children met diagnostic criteria for an anxiety disorder, we administered the Anxiety Disorders module of the Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS) for the DSM-5 (Kaufman et al., 2016). Originally developed for youth ages 6–18 years, preliminary studies suggest acceptable psychometrics for preschool-aged children without ASD (Birmaher et al., 2009) and school-aged children with ASD (Mattila et al., 2010). Accessibility and low cost further render the K-SADS a strong candidate for community use.

Parents were interviewed following procedures outlined for preschool-aged children (Birmaher et al., 2009). Given the low incidence and prevalence of Panic Disorder and Agoraphobia in young children (APA, 2013), and to reduce participant burden, we completed the Screen Interview and Supplements for the following DSM-5 anxiety disorders: Separation Anxiety Disorder, Selective Mutism, Specific Phobia, Social Anxiety Disorder, and Generalized Anxiety Disorder. Full and subsyndromal manifestations were considered. The latter was defined as clusters of anxiety symptoms that caused clinically-significant, functional impairment but did not meet full criteria for one of the aforementioned diagnostic classifications (e.g., meeting all but one symptom criterion, duration criterion not met).

² Findings did not differ by source of collateral report.

Table 2 Intercorrelations for Parent- and Teacher-Report Anxiety Rating Scales by Diagnostic Group

Variable	1	2	3	4
1. SPAS-P Total Anxiety	–	.632***	-.045	-.168
2. CBCL DSM Anxiety Problems	.575***	–	-.012	-.080
3. SPAS-T Total Anxiety	.136	.097	–	.693***
4. C-TRF DSM Anxiety Problems	-.007	.077	.681***	–

The results for the sample with NTD are shown above the diagonal. The results for the sample with ASD are shown below the diagonal

SPAS-PSpence Preschool Anxiety Scale-Parent-Report Form, CBCLChild Behavior Checklist for Children 1.5–5, SPAS-TSpence Preschool Anxiety Scale – Teacher-Report Form, C-TRFCaregiver-Teacher Response Form

*** $p < 0.001$

K-SADS interviews were completed by trained clinical psychology doctoral students under the supervision of a licensed clinical psychologist with expertise in childhood psychopathology and developmental disabilities. Assessors were trained to reliability following a procedure that included didactics, observation, role-play, and supervised administration with research participants. Particular attention was devoted to differentiating between developmentally-normative experiences and symptoms suggestive of clinically-significant, functional impairment (Beesdo et al., 2009). Emphasis was also placed on careful consideration of the overlap between symptoms of anxiety and core features of ASD (Kerns et al., 2016). For example, interviewers were trained to differentiate sensory distress associated with ASD symptoms from the additional presence of anticipatory fears of a sensory-related stimulus (e.g., distress at the mention of alarms) akin to a phobia above and beyond noted distress in response to sensory experiences (e.g., crying only upon hearing an alarm; Kerns et al., 2016). K-SADS interviews were audio-recorded for later review. Inter-rater reliability for K-SADS anxiety disorder diagnoses, based upon 20% of interviews, was adequate in the combined sample ($K = 0.75 - 1.0$) and within each subsample, with the exception of subsyndromal Social Anxiety Disorder in children with NTD ($K = 0.62$, 91% agreement), which had low subsample prevalence and variability. No children received diagnoses of selective mutism (100% agreement).

Data Analytic Plan

All analyses were conducted in SPSS version 27. We used descriptive statistics to determine the proportion of each subsample meeting K-SADS criteria for each DSM-5 anxiety disorder, along with the percentage meeting subclinical ($T = 60-64$) and clinical ($T > 64$) thresholds on the SPAS-P

and CBCL/C-TRF. Symptom severity was assessed using raw scores on the SPAS-P/SPAS-T and CBCL/C-TRF. Intercorrelations among parent and teacher rating scales are presented in Table 2.

Given that families of children with ASD were drawn from larger clinical trials that recruited underserved families for participation in parent stress-reduction interventions, we systematically assessed and controlled for demographic and clinical characteristics that might confound examination of group differences (see Table 1). Independent sample t-tests were used for continuous variables, and chi-square tests were used for categorical variables. Parenting stress, caregiver education, and child IQ, gender, and race were significantly different between the groups with ASD and NTD ($ps < 0.05$). However, only parenting stress and child IQ were also significantly associated with outcome variables, specifically meeting criteria on the K-SADS for any anxiety disorder ($r_{pb} = 0.47$, $p < 0.001$; $r = -0.41$, $p < 0.001$; respectively), and raw scores on the SPAS-P ($r = 0.30$, $p < 0.001$; $r = -0.22$, $p < 0.05$; respectively) and CBCL DSM Anxiety Problems Scale ($r = 0.52$, $p < 0.001$; $r = -0.36$, $p < 0.001$; respectively). Thus, parenting stress and child IQ were controlled in analyses of group differences in these outcomes.

To examine differences between children with ASD and children with NTD in the prevalence of K-SADS DSM-5 anxiety disorders, we conducted a series of logistic regressions. Due to low frequency of certain diagnoses on the K-SADS in our preschool-aged sample, analyses focused on three primary K-SADS outcomes: 1) any anxiety disorder, 2) specific phobia, and 3) separation anxiety. Parenting stress and child IQ were included as covariates in the first step. Diagnostic group (ASD = 1, NTD = 0) was entered on the subsequent step.

Differences between diagnostic groups (ASD and NTD) in parent-reported symptom severity (SPAS-P and CBCL) were examined using Analysis of Covariance. Parenting stress and IQ were again included as covariates, and a square-root transformation was performed to normalize the SPAS-P and CBCL scores prior to analyses.

For children with ASD, chi-square analyses were used to examine concordance between the K-SADS and clinical/subclinical classifications on questionnaire measures. We also calculated sensitivity, specificity, predictive value, and likelihood ratios using the K-SADS as the reference standard (Kerns et al., 2020). Parallel analyses were not conducted for children with NTD due to low prevalence of identified anxiety disorders in this group. Additionally, for children with ASD, chi-square or Fisher's Exact tests were used to examine differences by ID status in K-SADS diagnoses and clinically-elevated symptoms on questionnaires. Independent-sample t-tests were used to examine differences in relative symptom severity between groups (ASD only vs. ASD and ID) on questionnaire measures across informants.

Table 3 Group Differences in K-SADS Diagnoses

	ASD (<i>n</i> = 69)	NTD (<i>n</i> = 55)	Wald	OR	95% CI	<i>p</i>
K-SADS						
Any Anxiety Dx (full criteria)	45 (65.2%)	8 (14.5%)	8.43	10.80	2.17–53.78	.004
Full + Subsyndromal	51 (73.9%)	10 (18.2%)	6.67	8.28	1.67–41.19	.009
Specific Phobia (full criteria)	42 (60.9%)	6 (10.9%)	7.09	8.99	1.79–45.29	.008
Full + Subsyndromal	44 (63.8%)	6 (10.9%)	6.44	8.10	1.61–40.81	.011
Separation Anxiety Dx (full criteria)	12 (17.4%)	2 (3.6%)	1.27	3.85	0.37–40.16	.260
Full + Subsyndromal	30 (43.5%)	3 (5.5%)	4.76	7.91	1.23–50.68	.029
Generalized Anxiety Disorder	3 (4.3%)	1 (1.8%)	–	–	–	–
Full + Subsyndromal	4 (5.7%)	1 (1.8%)	–	–	–	–
Social Anxiety Disorder	1 (1.4%)	0 (0%)	–	–	–	–
Full + Subsyndromal	6 (8.6%)	2 (3.6%)	–	–	–	–
Selective Mutism	0 (0%)	0 (0%)	–	–	–	–
Full + Subsyndromal	0 (0%)	0 (0%)	–	–	–	–
K-SADS Excluding Sensory-Related Specific Phobias						
Any Anxiety Disorder (full criteria)	33 (47.8%)	8 (14.5%)	6.32	7.43	1.56–35.49	.012
Full + Subsyndromal	44 (63.8%)	10 (18.2%)	6.17	7.21	1.52–34.22	.013
Specific Phobia (full criteria)	29 (42.0%)	6 (10.9%)	4.22	5.50	1.08–28.01	.040
Full + Subsyndromal	31 (44.9)	6 (10.9%)	3.82	5.01	1.00–25.22	.051

Due to low frequency of Generalized Anxiety Disorder, Social Anxiety Disorder, and Selective Mutism, logistic regressions were not performed for these outcomes. All logistic regression analyses controlled for parenting stress and child IQ. *Df* = 1. Diagnostic group was dummy coded (ASD = 1; NTD = 0)

Results

Missing Data

Two children were missing IQ data due to testing refusal, but met the adaptive behavior criterion for ID. Twelve children were missing VABS-3 scores due to parental non-response; of these, six met the IQ criterion for ID. The eight children meeting either the adaptive behavior or the IQ criterion were classified with ID for purposes of study analyses.³ Additionally, 40% and 33% of teacher-report data were missing for children with ASD and NTD, respectively. There were no significant differences in child/parent demographic variables or child clinical characteristics (IQ, adaptive behavior, ASD symptoms, parent-reported anxiety) between cases with and without missing teacher data. Teacher-report data were estimated across 20 datasets using multiple imputation, which can handle high rates of missing data (Enders, 2010). Pooled parameters from independent-sample t-tests were used to examine differences between children with and without ASD in teacher-reported outcomes.

³ Sensitivity analyses revealed no differences in the pattern or significance of results when these 8 participants were excluded from analyses or when these participants were reclassified as without ID.

K-SADS Anxiety Disorders within Diagnostic Groups

Table 3 presents the breakdown of K-SADS-identified anxiety disorders by diagnostic group. Relative to children with NTD, children with ASD more frequently met full diagnostic criteria and criteria for subsyndromal classification for all anxiety disorders assessed, with the exception of selective mutism, as no child in either group met criteria for the latter. Reasons for a subsyndromal classification included insufficient number of symptoms endorsed (Separation Anxiety Disorder: ASD, *n* = 18; NTD, *n* = 1), insufficient evidence that the child feared embarrassment or humiliation in social situations (Social Anxiety Disorder: ASD, *n* = 5; NTD, *n* = 1), and not meeting the duration criterion (Social Anxiety Disorder: NTD, *n* = 1; Specific Phobia: ASD, *n* = 2; and Generalized Anxiety Disorder: ASD, *n* = 1).

In the group with ASD, 26 of the 51 children who met criteria for any K-SADS anxiety disorder met criteria for multiple anxiety disorders, with the following breakdown: one anxiety disorder (*n* = 26, 36.2%), two anxiety disorders (*n* = 20, 29.0%), and three anxiety disorders (*n* = 6, 8.7%). Of the children with ASD who met criteria for multiple anxiety disorders, all but one had a Specific Phobia. In the group with NTD, two out of the 10 children who met criteria for any anxiety disorder met criteria for multiple anxiety disorders (i.e., two each).

K-SADS Specific Phobias within Diagnostic Groups

Among the children with ASD who met K-SADS criteria for specific phobia, 25 (56.8%) were reported to have one phobia, 16 (36.4%) had two phobias, one (2.3%) had three phobias, and two (4.5%) had four phobias. Thirteen children (29.5%) were reported to have phobias that solely overlapped with core symptoms of ASD, particularly as related to sensory aversions. An additional 11 children (25.0%) were reported to have a combination of phobias, at least one of which included specific fears related to core ASD symptoms. Phobic stimuli that appeared to overlap with core ASD symptoms included fears of loud noises (e.g., blenders, vacuums; $n = 18$), fears related to washing/grooming (e.g., cutting hair, hot water, nail clipping, changing clothes; $n = 10$), and fears of crowds ($n = 5$). Nineteen children were reported to have phobias that did not appear directly tied to ASD symptoms, although a sensory component may be present, including phobias related to needles and medical personnel ($n = 13$), animals and insects ($n = 11$), the dark ($n = 4$), and heights ($n = 2$). Among those who met criteria for a Specific Phobia in the group with NTD ($n = 6$), fear of needles was the most common ($n = 3$), followed by the dark ($n = 1$), death ($n = 1$), and heights ($n = 1$).

Clinically-Elevated Ratings on Questionnaire Measures within Diagnostic Groups

Rates of elevated anxiety on parent-report questionnaires were as follows: SPAS-P (ASD: clinical = 16.2%, sub-clinical = 5.4%; NTD: clinical = 1.8%, sub-clinical = 1.8%), CBCL (ASD: clinical = 46.7%, sub-clinical = 17.3%; NTD: clinical = 5.6%, sub-clinical = 5.5%). Rates of elevated anxiety on teacher-report questionnaires were as follows: C-TRF (ASD: clinical = 20.0%, sub-clinical = 18.0%; NTD: clinical = 8.1%, sub-clinical = 13.5%).

Group Differences in K-SADS Anxiety Disorders

Results from logistic regressions controlling for parenting stress and child IQ indicated that children with ASD were significantly more likely than children with NTD to have any anxiety disorder or Specific Phobia (Table 3). These group differences remained even after excluding phobias overlapping with ASD-related symptoms, though significance dropped for subsyndromal Specific Phobia. While the rates of Separation Anxiety Disorder were not significantly different between children with ASD and NTD according to full diagnostic criteria, parents of children with ASD were more likely to endorse subsyndromal presentations.

Group Differences in Anxiety Symptoms on Questionnaire Measures

ANCOVA results indicated that, on average, parent-rated anxiety scores were significantly higher for children with ASD than for children with NTD on the SPAS-P ($F[1, 123] = 9.47$, $p < 0.003$, partial $\eta^2 = 0.07$) and the CBCL ($F[1, 123] = 10.97$, $p < 0.001$, partial $\eta^2 = 0.10$). However, there were no significant group differences in severity of teacher-reported anxiety symptoms on the SPAS-T ($t = 0.16$, $p > 0.05$) or C-TRF ($t = 1.22$, $p > 0.05$).

Measurement Concordance for Children with ASD

For children with ASD, chi-square analyses revealed that there was no significant association between having any anxiety disorder on the K-SADS (including subsyndromal) and having a clinical/subclinical classification on the CBCL DSM Anxiety subscale ($\chi^2[1] = 0.59$, $p = 0.44$) or SPAS-P ($\chi^2[1] = 0.18$, $p = 0.67$). Sensitivity ranged from 0.20 (SPAS-P, 95% CI [0.10, 0.30]) to 0.65 (CBCL, 95% CI [0.50, 0.78]), and specificity from 0.25 (CBCL, 95% CI [0.07, 0.53]) to 0.75 (SPAS-P, 95% CI [0.48, 0.93]). Positive predictive value ranged from 0.71 (SPAS-P, 95% CI [0.48, 0.87]) to 0.73 (CBCL, 95% CI [0.66, 0.80]), and negative predictive value from 0.18 (CBCL, 95% CI [0.08, 0.36]) to 0.23 (SPAS-P, 95% CI [0.18, 0.29]). Positive likelihood ratio ranged from 0.80 (SPAS-P) to 0.86 (CBCL) and negative likelihood ratio from 1.07 (SPAS-P) to 1.41 (CBCL).

Group Differences by ID Status in Children with ASD

Rates of K-SADS anxiety disorders and clinically-elevated anxiety symptoms on questionnaires did not differ for children with ASD by ID status (Table 4), with the exception of Generalized Anxiety Disorder, for which rates were significantly higher in those without ID. Similarly, results of independent-sample t-tests indicated that symptom severity generally did not significantly differ by ID status for parent- (CBCL: $t = 0.55$, ns) or teacher-report (SPAS-T: $t = 0.50$, ns; C-TRF: $t = 1.47$, ns). The exception was the SPAS-P, for which parent-reported anxiety scores were significantly higher in those without ID, $t = 2.19$, $p < 0.05$.

Discussion

There is a large literature demonstrating that individuals with ASD are at an increased risk for developing anxiety symptoms and diagnosable anxiety disorders across the developmental trajectory (Gotham et al., 2015; Simonoff et al., 2008). However, the majority of studies examining anxiety in those with ASD include individuals starting at

Table 4 Frequency of DSM-5 Anxiety Disorders and Clinically-Elevated Anxiety by Intellectual Disability Status

K-SADS	ASD (n = 23)	ASD + ID (n = 39)	$\chi^2(1)^a$
Any Anxiety Dx (full criteria)	16 (69.6%)	29 (63.0%)	0.29
Full + Subsyndromal	17 (73.9%)	34 (73.9%)	0.00
Specific Phobia (full criteria)	13 (56.5%)	29 (63.0%)	0.27
Full + Subsyndromal	13 (56.5%)	31 (67.4%)	0.78
Separation Anxiety Dx (full criteria)	5 (21.8%)	7 (15.2%)	0.45
Full + Subsyndromal	13 (56.5%)	17 (37.0%)	2.39
Social Anxiety Dx (full criteria)	1 (4.4%)	0 (0.0%)	2.03
Full + Subsyndromal	3 (13.0%)	3 (6.5%)	0.82
Generalized Anxiety Disorder (full criteria)	3 (13.0%)	0 (0.0%)	6.27*
Full + Subsyndromal	3 (13.0%)	1 (2.2%)	3.32
Parent-Report Questionnaires	ASD (n = 26)	ASD + ID (n = 49)	$\chi^2(1)^a$
SPAS-P Total Anxiety (T > 64)	7 (28.0%)	5 (10.2%)	3.86
SPAS-P Total Anxiety (T > 59)	9 (36.0%)	7 (14.3%)	4.61*
CBCL DSM Anxiety (T > 64)	14 (53.8%)	21 (42.9%)	0.82
CBCL DSM Anxiety (T > 59)	15 (57.7%)	33 (67.3%)	0.69
Teacher-Report Questionnaire	ASD (n = 15)	ASD + ID (n = 35)	$\chi^2(1)^a$
C-TRF DSM Anxiety (T > 64)	3 (20.0%)	7 (20.0%)	0.00
C-TRF DSM Anxiety (T > 59)	8 (53.3%)	11 (31.4%)	2.14

ID Intellectual Disability, SPAS-P Spence Preschool Anxiety Scale – Parent-Report Form, CBCL Child Behavior Checklist for Children 1.5–5, C-TRF Caregiver-Teacher Response Form

* $p < 0.05$

^aChi-square or Fisher's Exact Test

school age, with only a few studies including preschool-aged children, and fewer yet including those with co-occurring ID (Vasa et al., 2020). The current study aimed to characterize the phenomenology, prevalence, and severity of anxiety symptoms and disorders in a relatively diverse sample of preschool-aged children with ASD alongside a comparison group of children with NTD. We employed a multi-method, multi-informant approach that utilized a clinician-administered, semi-structured diagnostic interview with the parent, as well as parent and teacher rating scales.

Our sample of preschool-aged children with ASD was significantly more likely than children with NTD to meet K-SADS DSM-5 criteria for an anxiety disorder and to exhibit more severe anxiety symptoms as per parent-report questionnaires. These results are consistent with the broader literature, and highlight that parents perceive higher levels of impairing anxiety in individuals with ASD starting at an early age. However, teacher-reported anxiety symptom severity did not differ statistically between children with ASD and children with NTD. Correlations between parent and teacher scales were also low, which is not uncommon (Achenbach & Rescorla, 2000). It is possible that the different settings in which parents and teachers are likely to observe a child's functioning may elicit different behavioral

and emotional responses from the child. Given that manifestations of anxiety tend to be most related to specific phobias and separation anxiety during the preschool years (Beesdo et al., 2009), and this was observed in our data as well, these particular symptoms of anxiety may be particularly salient for parents. Although teachers may certainly observe some separation-related distress in a classroom setting (e.g., at school drop-off), parents are likely in a position to observe separation anxiety on a more frequent, cross-context basis. Additionally, though there were no significant differences in ratings based on the type of collateral informant (e.g., teacher- vs. therapist), the variability in informants within the teacher-report data may also contribute to additional contextual differences that may influence ratings of symptom severity. Nevertheless, a substantial proportion of our sample with ASD (approximately 20%) were reported by teachers to be exhibiting clinically-significant anxiety.

In terms of phenomenology, children in our study displayed a range of DSM-5 anxiety disorders based on the K-SADS (Specific Phobia, Separation Anxiety Disorder, Social Anxiety Disorder, and Generalized Anxiety Disorder), with the former two being far more prevalent. This pattern is consistent with findings in the developmental psychopathology literature, which indicate that anxiety symptoms related to separation anxiety and specific fears

tend to emerge earlier in development, whereas those related to social anxiety and generalized anxiety tend to manifest later in childhood and adolescence (Beesdo et al., 2009). Although the prognostic significance of anxiety in young children remains a matter of ongoing debate in the general literature (e.g., Finsaas et al., 2018; Steinsbekk et al., 2022), less is known about the unfolding of anxiety in ASD, underscoring the need for longitudinal study. In addition to examining homotypic and heterotypic continuity, considering the meaning of early-emerging anxiety for the development and manifestation of core ASD symptoms is important also. Indeed, recent findings suggest that young children with ASD and high levels of both parent-reported anxiety and insistence on sameness behavior may be at particularly high risk for elevated anxiety over time (Baribeau et al., 2021). Improved understanding of the overlap and interplay between anxiety and ASD symptoms will promote diagnostic clarity and may have important implications for the nature and course of recommended intervention.

The overlap between anxiety and ASD symptoms has posed a longstanding challenge for diagnosticians. The differential diagnosis of anxiety disorders and ASD-related symptoms may be complicated by the phenomenon of “diagnostic overshadowing,” which refers to the attribution of symptoms of a co-occurring emotional/behavioral disorder as being subsumed under the child’s ASD diagnosis (Rosen et al., 2018). In the current study, issues of differential diagnosis were particularly pertinent to considering the presence of a co-occurring Specific Phobia in the context of ASD. A wide range of phobias was identified in the group with ASD, with over a third of the sample endorsing phobias involving a sensory component that appeared to overlap with core ASD symptoms (e.g., fear of loud noises). Other researchers have suggested that early sensory sensitivity may place individuals with ASD at increased risk for sensory-related specific phobias through a classical conditioning paradigm (Green et al., 2012). The DSM-5 currently recommends against providing a diagnosis of Specific Phobia if symptoms are better explained by another condition such as ASD (APA, 2013). Consequently, important questions remain regarding the conceptualization of sensory-related aversions in children with ASD that manifest at an intensity, and result in a level of impairment, that might warrant diagnosis in other populations. Further research examining manifestations of anxiety that overlay with ASD symptoms and may not conform with traditional DSM categories is needed.

A range of specific fears was reported for our sample with ASD, some of which were also endorsed in children with NTD (e.g., needles, the dark, and heights), but many of which were different (e.g., sensory-related, medical personnel). There is growing evidence from studies using standardized instruments that the fears of children with ASD may be qualitatively different from those that commonly present in

children with NTD (Kerns et al., 2020). Results from the current study indicate that children with ASD may generally be more susceptible to increased fears, including those that are common in children with NTD as well as those that are more distinct. As such, it is important for assessment instruments to probe not only for commonly reported fears (e.g., dark, heights, etc.), but to also include opportunities to capture other forms of specific fears, perhaps through the use of open-ended prompts.

Separation anxiety represented the next most frequent manifestation of anxiety in our preschool-aged sample. Given that anxiety surrounding separation generally occurs as part of neurotypical development in late infancy and early toddlerhood (Beesdo et al., 2009), the higher rates seen in the group with ASD may be partially explained by the presence of developmental delays in this subsample. Young children with needs that necessitate greater reliance on the caregiving environment may be more sensitive to separations from caregivers. Indeed, our rates of separation anxiety were comparable to those reported by Baker et al. (2010) for 5-year-old children with general developmental delays (13.7%) and those with NTD (5.0%). However, a substantial percentage (26.1%) of our sample with ASD only met diagnostic criteria for separation anxiety when considering subsyndromal presentations, primarily due to insufficient number of symptoms endorsed (i.e., only two out of three necessary symptoms were reported). Thus, developmental expectations embedded in measures such as the K-SADS may also require further adjustment for children with intellectual disability and other developmental delays.

We also examined whether phenomenology and prevalence of anxiety symptoms and disorders were different for children with ASD depending on the presence of co-occurring ID. Results suggest that the prevalence of anxiety disorders and level of symptom severity generally did not differ by ID status for children with ASD, with the exception of Generalized Anxiety Disorder and parent-reported symptoms on the SPAS-P, which were higher in those without co-occurring ID. These findings are consistent with previous studies that have demonstrated that children with ASD who have higher levels of measured IQ are at significantly increased risk for Generalized Anxiety Disorder relative to other manifestations of anxiety (Sukhodolsky et al., 2008). Additionally, in a sample of school-aged children with ASD, Kerns et al. (2020) found no significant differences in rates of anxiety disorders based on intellectual functioning; however, those in the group with $IQ < 70$ exhibited primarily Specific Phobia (and a few with Separation Anxiety Disorder), whereas the entire range of DSM-5 anxiety disorders was represented in the group with $IQ > 70$. The distribution of anxiety disorders in our children with ASD was different from what was reported in Kerns et al. (2020), such that Specific Phobia and Separation Anxiety Disorder were

predominant both for children with and without ID. However, this is unsurprising given the younger age of our sample and evidence that phobias and separation anxiety have an earlier onset than other forms of anxiety (Beesdo et al., 2009). Moreover, while previous studies have relied exclusively on IQ, our study included formal classification of ID.

An additional aim of this study was to examine the concordance between parent-report questionnaires (CBCL and SPAS) and a semi-structured interview (K-SADS) in detecting elevated levels of anxiety in preschool-aged children with ASD. Results showed poor concordance between the K-SADS and the CBCL/SPAS in our sample of children with ASD, with sensitivity, specificity, predictive values, and likelihood ratios inadequately low. This may be partially related to the high prevalence of specific phobias in this population and sample, with many having an overlay with sensory issues associated with ASD. The CBCL and SPAS include items that broadly survey various DSM anxiety presentations, and may thus be less effective in capturing anxiety presentations that may be more specific to children with ASD. Our findings parallel results from Kerns et al. (2020), which demonstrated poor sensitivity of parent-report questionnaires in detecting clinically-significant anxiety among school-aged children with ASD, particularly for those with intellectual delays. Given sample size considerations, it was not possible to examine measurement concordance by ID status; further investigation of the role of co-occurring ID in the manifestation of anxiety in young children with ASD is needed.

Limitations and Directions for Future Research

The results of this investigation should be interpreted in light of study limitations. Our sample with ASD was drawn from larger clinical trials in which parents elected to participate in stress-reduction interventions, which may limit generalizability. Diagnostic groups also differed in parent education, though parent education was not associated with anxiety outcomes. Furthermore, while managed statistically, a large percentage of teacher ratings was unavailable, which limited the sample size for those analyses. Additionally, the DSM-5 does not specify a minimum age at which an anxiety disorder diagnosis may be given. There is debate about the utility of applying DSM criteria to characterize anxiety in children as young as 3 to 5 years, particularly surrounding the developmental appropriateness of criteria regarding duration of symptoms (Whalen et al., 2017). Advocates for the validity of DSM classifications of anxiety disorders in preschoolers point to empirical data (Birmaher et al., 2009; Spence et al., 2001), and also posit that clearly defined diagnostic criteria are essential to informing treatment for young children experiencing clinically-significant anxiety (Pickles & Angold, 2003).

This remains an essential target of ongoing investigation in children with NTD and represents a critical research task in ASD. Important questions have been posed regarding the utility and applicability of conventional DSM diagnostic categories for individuals with ASD given evidence of meaningful heterogeneity, symptom overlap, and the potential for ASD-specific variants (e.g., Fenning et al., 2019; Kerns et al., 2020). Most existing measures have been adapted from other populations, suggesting a need for additional emic approaches (e.g., Scahill et al., 2019), with particular emphasis on improving measurement for children with ASD and ID.

Given high rates of impairing anxiety (phobias in particular) that are not commonly captured by rating scales, our findings underscore the likely benefit of incorporating clinician-administered interviews in assessments of co-occurring symptoms in young children with ASD. However, clinical interviews are often time- and labor-intensive, and may not always fit within the constraints of clinical or research protocols. Integrating additional measures that may proxy constructs relevant to the development and manifestation of anxiety in young children may be valuable (e.g., temperament, emotion regulation). In addition, exploring avenues for gaining children's perspective is needed, especially with respect to understanding the experiences of those with limited expressive communication. Considering opportunities for direct assessment, perhaps through physiological measurement, may provide further insight into arousal and regulatory processes in children with ASD (Fenning et al., 2019; Verneti et al., 2020).

Conclusion and Implications

Parents of preschoolers with ASD reported significantly higher rates of clinically-significant and functionally-impairing anxiety in their children with ASD than did parents of preschoolers with NTD. The consistency of these findings across methods and measures highlights the importance of recognizing heightened risk for early-onset anxiety in preschool-aged children with ASD. Evidence of poor concordance between parent rating scales and a clinician-administered interview underscores the importance of multi-method and multi-informant assessment. Improvements and expansion of assessment methods are crucial in order to identify early-emerging anxiety and inform targeted intervention efforts.

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Compliance with Ethical Standards

Ethics Approval All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study. Procedures were approved by the Institutional Review Board at Loma Linda University.

Conflicts of Interest The authors have no relevant financial or non-financial interests to disclose.

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