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Anxiety in a Preschool-Aged Sample with Autism Spectrum Disorder and Developmental Delay: Rates, Symptom Manifestation, and Parenting Risk Variables

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ABSTRACT

Introduction: Children with developmental delays (DD) and Autism Spectrum Disorder (ASD) are at a high risk for emotional and behavioral concerns. Research examining co-occurring anxiety in those with ASD during early childhood is scarce. The current study examined rates, symptom manifestation, and parenting risk correlates of anxiety among young children with ASD and those with a non-spectrum DD.

Method: The study included a sample of preschool-aged children (M = 4.18 years) with ASD (n = 56) and non-spectrum DD (n = 43). Anxiety symptoms were measured using the CBCL, and parenting was measured using parent-report and observational methods.

Results: Results indicated that those with ASD were at a greater risk for anxiety symptoms than those with a non-spectrum DD; however, ASD diagnosis did not differentiate the presentation of anxiety. Inconsistent parenting emerged as predictor of anxiety symptoms for children with ASD.

Conclusions: Given the high risk for anxiety in individuals with ASD, it is important to identify and treat anxiety in young children with ASD. The current study highlighted inconsistent parenting as a potential target to address in future parenting interventions for anxiety in young children with ASD.

KEYWORDS

ASD; developmental delay; anxiety; comorbidities; parenting

Individuals with developmental delays (DD) are at a heightened risk for numerous co-occurring emotional and behavioral concerns. Although the prevalence of specific psychiatric disorders varies greatly across studies, the most commonly diagnosed psychiatric comorbidities within this population include anxiety disorders, Attention-Deficit/Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), and depressive disorders (Baker et al., 2010; Leyfer et al., 2006; Salazar et al., 2015; Simonoff et al., 2008). Research suggests that the risk for developing these comorbidities appears even greater for those diagnosed with Autism Spectrum Disorder (ASD) compared to those with a non-spectrum DD (Gotham et al., 2015; Mayes et al., 2011). Studies suggest that nearly two-thirds of

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individuals with ASD meet criteria for a comorbid psychiatric diagnosis (De Bruin et al., 2006; Mannion & Leader, 2013; Salazar et al., 2015; Simonoff et al., 2008). It is possible that characteristics associated with ASD (e.g., cognitive rigidity, social communication deficits, higher rates of being bullied) may place those in this group at higher risk for various psychiatric disorders (Hollocks et al., 2014; Rowley et al., 2012), emphasizing the need for more research to better understand and support the mental health of those in this population.

Although the literature on comorbidities among individuals with DD and ASD is broad with respect to specific psychiatric conditions and developmental periods, we chose to focus specifically on the presentation of co-occurring anxiety during the preschool age range in the current study. Several epidemiological studies surveying children and adolescents with ASD consistently report anxiety disorders as the most prevalent co-occurring psychiatric condition (Leyfer et al., 2006; Salazar et al., 2015; Simonoff et al., 2008). Meta-analyses suggest that youth with ASD are almost four-times more likely to be diagnosed with an anxiety disorder than typically-developing (TD) youth (Costello et al., 2011; Van Steensel et al., 2011). Furthermore, researchers have suggested that youth with ASD who have clinical levels of anxiety may be predisposed to developing other types of psychopathology, especially mood disorders (Salazar et al., 2015; Vasa et al., 2013).

Given the high risk for developing psychiatric comorbidities in this population, there has been a growing interest in early identification of psychiatric symptoms to inform intervention. In a study by Fodstad et al. (2010), the researchers examined rates of comorbid psychiatric symptoms in children with developmental concerns both with and without ASD during infancy and toddlerhood. Results from this study indicated that toddlers with ASD had more severe symptoms compared to developmentally delayed toddlers without ASD, with symptoms of anxiety becoming especially prominent in the group with ASD by 32–39 months of age. With data suggesting that significant symptoms of anxiety develop as early as toddlerhood in those with DD (and especially ASD), researchers have underscored the importance of early detection to inform treatments lest more serious psychiatric problems develop in the future (Evans et al., 2005; Matson, 2007).

Most studies examining comorbidities among individuals with ASD and/or DD have sampled youth from school-age into adolescence, with only few empirical studies examining the rates and manifestation of anxiety in preschool-aged children (Baker et al., 2010; Sukhodolsky et al., 2008; Vasa et al., 2013). Drawing from the developmental psychopathology literature, the prevalence and presentation of anxiety symptoms and disorders (e.g., separation anxiety, social anxiety, etc.) vary across different developmental periods. As a result, less is known about the manifestation of anxiety symptoms during the preschool age range, which limits our ability to optimize screening tools to identify these symptoms early.

In addition to understanding the rates and manifestation of anxiety, identifying risk and protective variables associated with anxiety symptoms may further inform prevention and intervention efforts. Research has shown that parents play an imperative role in the development of children's behavioral and emotional competence in early childhood among TD children (Chang et al., 2003). While we are not suggesting that parenting variables in and of themselves cause anxiety disorders in children, there is a vast literature that notes how negative and positive parenting behaviors can serve as a risk or protective factor, respectively, in the emergence and/or persistence of anxiety symptoms and diagnosable disorders.

Specifically, among families of TD children, children whose parents display more negative parenting styles such as being power assertive, over-controlling, and demonstrate a lack of warmth, tend to have higher rates of anxiety and have a harder time self-regulating (McLeod et al., 2007; Rapee, 1997; Waite & Creswell, 2015; Wood et al., 2003). Furthermore, researchers have found that TD children whose parents display patterns of inconsistent discipline tend to have more irritability, decreased self-control, and overall poorer adjustment (Kochanska, 1995; Lengua & Kovacs, 2005). More recent research has emerged showing that inconsistent parenting has been linked to increased levels of child internalizing problems in both children with ASD (McRae et al., 2018) and TD children (Melis Yavuz et al., 2017; Sher-Censor et al., 2018).

Conversely, positive parenting behaviors have been linked with more positive child outcomes such as positive social development (Leidy et al., 2010), increased child empathy (Padilla-Walker & Christensen, 2010), and better emotional competence (Stack et al., 2010) in TD children. Accordingly, positive parenting strategies that are more warm, supportive, and responsive to the child have been linked with fewer symptoms of depression and anxiety as well as higher self-esteem among TD children (Belsky, 1984; Gottman et al., 1997; Lewis, 1981; Smokowski et al., 2015; Zhou et al., 2008), emphasizing the protective role that positive parenting practices can play in the child's mental health.

Although the existing literature on families with TD children provides a framework for understanding the relationship between parenting practices and children's mental health, research examining this relationship in families of children with DD and/or ASD is scarce. As a result, less is known about how early parenting strategies may ameliorate or exacerbate symptoms of anxiety among children with ASD/DD, an already at-risk population. By examining the relationship between parenting practices and child anxiety early on in this population, we may be able to more effectively target child anxiety through parenting interventions.

Given that children with ASD/DD are at high risk for developing anxiety disorders in later childhood and adolescence but less is known about the

clinical presentation and predictors of anxiety in preschool-aged children with ASD/DD, the current study had the following aims:

1. We examined the rates of clinical anxiety in preschool-aged children with DD (with and without ASD). Additionally, we examined whether these rates were different depending on whether the child has ASD or a non-spectrum DD. Given the heightened risk associated with an ASD diagnosis for developing comorbid psychiatric comorbidities in later childhood and adolescence, we hypothesized that children with ASD will have significantly higher rates of anxiety compared with our non-spectrum DD sample.
2. We also examined the symptom profile of anxiety in our ASD and non-spectrum DD samples, respectively. Because previous research examining the manifestations of anxiety symptoms in preschool-aged children in this population is scarce, this aim was exploratory in nature.
3. Finally, we examined whether parenting variables (positive parenting, inconsistent parenting, and negative parenting) were associated with anxiety symptoms in both our ASD and non-spectrum DD samples. Based on the vast literature among TD children suggesting that parenting variables play an important role in child mental health, we hypothesized that positive parenting would be inversely related to child anxiety symptoms, whereas inconsistent and negative parenting would have a direct relationship with anxiety symptoms in children with ASD and DD.

Method

Participants

In the current study, we used data from two cohorts of a larger randomized control trial examining the efficacy of Mindfulness-Based Stress Reduction in reducing parenting stress and child behavior problems among families of children with DD (Chan & Neece, 2018a; Neece, 2014). Eligibility criteria for the study included: (a) having a child ages 2.5 to 5 years, (b) child had been determined by the Inland Regional Center or by an independent assessment to have a developmental delay, (c) parent reported more than ten child behavior problems on the Eyberg Child Behavior Inventory, which is the recommended cutoff for screening disruptive behavior problems (Robinson et al., 1980), (d) parent was not receiving any form of psychological or behavioral treatment at the time of the referral, and (e) parent spoke and understood English (for the first cohort only). In the second cohort, we also enrolled parents who were monolingual Spanish speakers. There were no significant demographic differences between the two cohorts (see Chan & Neece, 2018a for more details). In this study, we use the term "developmental delay" rather than the more formal

diagnosis of intellectual or developmental disability for this sample of young children, as classification would be less stable over time than with school-aged and older children.

Our sample included 99 parent-child dyads. The majority of the children were boys (71.7%) with a mean age of 4.18 years (*SD* = 0.99 years). We had an ethnically diverse sample, with parents reporting 52.5% of the children to be Latino and 13.8% of parents as monolingual Spanish-speakers. The majority of parents were married (67.7%), and the mean age of the parents was 36.31 years (*SD* = 7.89). Parents completed an average of 14.32 years of education (*SD* = 2.86 years). Parents' family income ranged from $0 USD to $95,000 USD with 55.6% of parents reporting annual family income to be less than $50,000 USD. Demographic data are summarized in Table 1.

Regarding diagnostic classifications, 56 (56.6%) children had a diagnosis of Autism Spectrum Disorder (ASD group). Among those without ASD in our sample of developmentally delayed children (DD group; n = 43, 43.4%), there was a range of diagnoses reported, including Down's Syndrome (n = 13), Global Developmental Delay (n = 8), Intellectual Disability (n = 7), Language Delay (n = 7), Cerebral Palsy (n = 5) and other genetic disorders (n = 3). All diagnoses were given by a psychologist or physician in the community. A significantly higher percent of children in the ASD group had elevated levels of ASD symptoms reported on the CBCL DSM Autism Spectrum scale ($T > 64$) compared to those in the DD group ($\chi^2[1] = 15.08$, $p < .001$).

Although not formally assessed, the majority of children were estimated to have intellectual functioning in the mild to moderate range given the demands

Table 1. Demographic characteristics of participants by diagnostic group.

	Combined (n = 99)	ASD (n = 56)	DD (n = 43)
Child Characteristics			
Age, *M (SD)*	4.18 (0.99)	4.33 (0.93)	4.00 (1.05)
Male, *n (%)*	71 (71.1%)	46 (82.1%) [a]	25 (58.1%) [a]
Race, *n (%)*			
Caucasian	27 (27.3%)	16 (28.6%)	11 (25.6%)
Latinx	52 (52.5%)	29 (51.8%)	23 (53.5%)
Asian	2 (2.0%)	1 (1.8%)	1 (2.3%)
African American	2 (2.0%)	0 (0.0%)	2 (4.7%)
Other	16 (16.2%)	10 (17.9%)	6 (14.0%)
Special Education Classroom, *n (%)*	79 (79.8%)	49 (87.5%) [a]	30 (69.8%) [a]
Behavioral Services, *n (%)*	47 (47.5%)	36 (64.3%) [a]	11 (25.6%) [a]
Parent Characteristics			
Age, *M (SD)*	36.31 (7.89)	39.95 (7.38)	38.01 (8.26)
Grade in School, *M (SD)*	14.32 (2.86)	14.41 (2.47)	14.21 (3.33)
Married, *n (%)*	67 (67.7%)	42 (75.0%)	25 (58.1%)
Family Income >$50k, *n (%)*	44 (44.4%)	25 (44.6%)	19 (44.2%)

[a]Significant differences between ASD and DD group in frequencies per chi-squared analyses at $p < .05$.
ASD = Autism Spectrum Disorder. DD = Developmental Delay without Autism Spectrum Disorder.

of the laboratory assessment, in which the child had to understand and follow directions in a structured play task (see Procedures section below). Table 1 shows no significant differences in parent characteristics and child race between ASD diagnostic groups; however, the ASD group had a significantly higher number of children who were male ($\chi^2[1] = 6.91$, $p < .01$), in a special education classroom ($\chi^2[1] = 4.74$, $p < .05$), and receiving in-home behavioral services ($\chi^2[1] = 14.61$, $p < .001$).

Procedure

Procedures were approved by the Institutional Review Board at Loma Linda University. We recruited most of the participants through the Inland Regional Center, which is a government agency that provides services for individuals with DD; additional recruitment was done through the local newspaper, local elementary schools, and community disability groups. In order to ensure that families met the specified eligibility criteria, research staff first did a phone screening with all parents who had contacted the Mindful Awareness for Parenting Stress (MAPS) Laboratory and expressed interest in participating in the study. Eligible families were then scheduled for a baseline assessment and received a packet in the mail containing measures for the study's outcome variables, along with instructions to complete the packet before their baseline assessment.

At the baseline assessment, parents turned in the completed packet of questionnaires and participated in a 15-minute play assessment in the lab with their child, which was video-recorded for later coding. The play assessment included three parts: (1) a 5-minute child-led play, in which the parent was instructed to allow the child to choose any activity and to play along with the child; (2) a 5-minute parent-led play, in which the parent was instructed to select an activity and to keep the child playing according to the parent's rules; and (3) a 5-minute clean-up activity, in which the parent was instructed to give the child a command to clean up. After the play assessment, parents were interviewed by research staff to gather demographic data.

Video Coding

As part of the larger clinical trial, video recordings of each play assessment from baseline and post-treatment were randomized in order to ensure coder blindness to the assessment time points and parent group assignment. All coders trained to reliability (ICC = 0.60; Cicchetti, 1994) and 20% of coders' scores were compared against those of a master coder to ensure that reliability was maintained above the specified criterion. All recordings were coded by two coders using a consensus rating procedure in which coders discussed their individual their ratings and came to an agreed upon consensus code. For videos that included Spanish-speaking parent-child dyads, a linguistically

and culturally competent translator provided in-vivo translation for the coders.

Measures

Child Anxiety Symptoms

We assessed for symptoms of anxiety using the Child Behavior Checklist for Ages 1½ to 5 (CBCL; Achenbach & Rescorla, 2000). Parents rated the degree or frequency of 99 items on a scale of 0 (*not true*), 1 (*somewhat or sometimes true*), or 2 (*very true or often true*). For the purposes of this study, we focused on the DSM Anxiety scale, which contains 10 items that represent behaviors consistent with anxiety (e.g., "fears certain animals, situations, or places"; "clings to adults or too dependent"). In the current sample, the internal consistency reliability for the DSM Anxiety scale was α = .72. The CBCL also shows strong convergent validity with both diagnoses based on DSM-IV-TR diagnostic criteria and similar scales measuring child behavior problems (Achenbach & Rescorla, 2000). Monolingual Spanish-speaking participants completed the CBCL in Spanish using the translated version published and distributed by the measure's author (Achenbach & Rescorla, 2000). Research has demonstrated psychometric equivalence of this measure across English and Spanish translations (Gross et al., 2006).

Parenting Behaviors (Parent-Report)

We used the Alabama Parenting Questionnaire – Preschool Revision (APQ-PR; Clerkin et al., 2007) as a self-report measure parenting behavior. The APQ-PR consists of 32 items that parents rated on a 5-point Likert scale. The APQ-PR yields three subscales: (1) Positive Parenting (2) Inconsistent Parenting and (3) Punitive Parenting. In the current sample, internal consistency for the APQ-PR subscales was α = .77, .69, and .40 for the Positive Parenting, Inconsistent Parenting, and Punitive Parenting subscales, respectively. Due to the low internal consistency within the Punitive Parenting subscale, we did not include it in our analyses. Monolingual Spanish speakers completed the Spanish-language version of the APQ (Servera, 2007).

Parent-Child Interaction Rating System (Observation)

The Parent-Child Interaction Rating System (PCIRS; Belsky et al., 1995) is an observational coding system that measures parent and child behavior within a dyadic activity. The PCIRS measures parenting along six dimensions: positivity, negativity, sensitivity, intrusiveness, detachment, and stimulation of cognition. Each dimension was rated on a 5-point Likert scale for frequency and intensity of the expressed affect or behavior. This coding system has been found to be a reliable and valid measure of parent-child interaction (Fenning et al., 2007), and has been used in other studies that include children with DD

(Chan & Neece, 2018b; Fenning & Baker, 2012). In the current study, we used the PCIRS to rate dimensions of parenting across the three tasks in the play assessment. For the analyses, we used an average of the codes from the three tasks. Intra-class correlation coefficients (ICCs) for each dimension of parenting on the PCIRS across the three tasks were adequate, ranging from .60 to .97, with the exception of the sensitivity and intrusiveness code on the parent-led task, which had ICCs of .39 and .40, respectively. Inter-rater reliability for Spanish videos was high, ranging from .82 to .96. We excluded data from the parent-led task due to the poor inter-rater reliability for the first cohort of participants and used an average of the codes from the child-led and clean-up tasks for analysis. Furthermore, consistent with previous research conducted with this coding system (Aber et al., 1999; Fenning et al., 2014), parenting dimensions were organized into two main factors: *Positive Parenting* (comprised of sensitivity, positive affect, cognitive stimulation, and reverse coded detachment) and *Negative Parenting* (comprised of intrusiveness and negative affect).

Data Analysis

Demographic variables that had a significant relationship with one or more of the independent variables and one or more of the dependent variables were tested as covariates in the analyses; no demographic variables were identified as covariates. Additionally, we considered covarying externalizing problems in our analyses, given that those in the ASD group were more likely to be receiving in-home behavioral services in our sample and externalizing problems are commonly associated with internalizing problems such as anxiety. However, because there were no significant differences in parent-report of externalizing problems on the CBCL between the ASD and DD groups ($t[92] = 1.60$, $p > .05$), we did not include externalizing problems as a covariate.

For our first research question, we were interested in the rates of anxiety in our sample, and whether the rates were different depending on diagnostic group. We considered this research question by examining the rates of anxiety both categorically and continuously on the CBCL. In our categorical analyses, we examined the frequency of children that had a *t*-score in the elevated or clinically significant range on the DSM Anxiety scales of the CBCL (i.e., $t > 64$). We then conducted a chi-squared analysis on the CBCL to determine whether the frequency of children exhibiting elevated anxiety was significantly different between the ASD and DD groups. In our analysis with continuous variables, we conducted an independent-sample *t*-test to examine whether there were mean differences in the raw scores of the DSM Anxiety scale. Because Levene's test for the Equality of Variances was significant for our sample ($p < .05$), the independent-samples *t*-test was conducted with equal variances not assumed on IBM SPSS 20.

To examine the symptom manifestation of anxiety in the ASD and DD groups, we examined the frequency at which each item on the CBCL DSM Anxiety scale was endorsed as *Very True/Often True*. To determine whether the symptom profile of anxiety was the same in the ASD and DD groups, we examined the Spearman's rank correlation coefficient for symptoms endorsed on the CBCL.

Finally, our third aim was to examine parenting variables as predictors of anxiety (both categorically and continuously) in the ASD and DD sample. For our categorical analyses, we conducted logistic regression analyses within both samples, with the dependent variable being whether or not the DSM anxiety scale *t*-score was elevated (i.e., $t > 64$). For our continuous analyses, we conducted linear regression analyses within both samples, with the dependent variable being the raw score on the DSM Anxiety scale. Independent variables for the logistic and linear regression analyses included parent-report and observational measures of parenting behaviors using the APQ-PR (Positive Parenting subscale and Inconsistent Parenting subscale) and the PCIRS (positive parenting and negative parenting), respectively.

Results

Preliminary Data Analyses

Distributions for each variable were screened for univariate outliers with *z*-scores greater than three and multivariate outliers with Mahalanobis distances exceeding the critical value for $\alpha = .001$ (Tabachnick & Fidell, 2013). Following the recommendations by Cohen et al. (2002), all univariate outliers were set equal to plus or minus three standard deviations from the mean in order to reduce the influence of extreme data points on the results. No multivariate within-cell outliers were detected. Additionally, no group differences in any parenting variables were found (*p*s > .05).

Descriptive Analyses

Rates of Anxiety by ASD Vs. DD Groups

Table 2 summarizes the proportion of the combined sample – as well as for each diagnostic group – that were reported to exhibit elevated scores ($t > 64$)

Table 2. Percent of sample exhibiting elevated scores on CBCL DSM Anxiety Scale.

	Combined (*N* = 99)	ASD(*n* = 56)	DD (*n* = 43)	Relative Risk (ASD:DD)	χ^2	OR	95% CI for OR
DSM Anxiety	31.3	41.1	18.6	2.21:1	5.71*	3.05	1.20–7.76

ASD = Autism Spectrum Disorder. DD = Developmental Delay without Autism Spectrum Disorder. OR = Odds Ratio. Scores with $t > 64$ were considered elevated on the CBCL DSM Anxiety scale. $Df = 1$.
*$p < .05$.

on for the CBCL DSM Anxiety scale. Results showed that those in the ASD group are at a significantly higher risk of exhibiting elevated levels of anxiety symptoms than those in the DD group according to parents (relative risk = 2.21:1, $\chi^2(1) = 5.71$, OR = 3.05, $p < .05$). Results of the independent-sample *t*-test for the continuous scores on the CBCL DSM Anxiety scale revealed a similar pattern. Specifically, scores on this scale were significantly higher among children with ASD than children with DD, $t(96.96) = 2.97$, $p < .01$, $d = 0.59$. Results of the continuous scores are summarized in Table 3.

Post-Hoc Descriptive Statistics of Anxiety Scores in DD Group

Recognizing the heterogeneity in syndromes represented within the DD group, we conducted post-hoc analyses to examine whether differences in anxiety scores existed between each DD subgroup. Due to small cell sizes, we chose only to examine descriptive statistics of CBCL anxiety scores. Anxiety scores of each DD syndrome were as follows, from highest to lowest: Other Genetic Disorder ($n = 3$; $M = 6.33$, $SD = 1.16$), Intellectual Disability ($n = 7$; $M = 5.57$, $SD = 2.76$), Global Developmental Delay ($n = 8$, $M = 5.50$, $SD = 3.96$), Down's Syndrome ($n = 13$; $M = 5.23$, $SD = 2.59$), Language Delay ($n = 7$; $M = 5.00$, $SD = 3.65$), and Cerebral Palsy ($n = 5$; $M = 4.20$, $SD = 1.48$).

Symptom Profile of Anxiety

We examined the symptom presentation of anxiety in the ASD and DD groups in several ways. First, we examined the rate at which each anxiety symptom was endorsed to determine the most common symptoms in each diagnostic group. These results are summarized in Table 4. The three most commonly endorsed symptoms on the CBCL were consistent between the diagnostic groups, which included: "doesn't want to sleep alone," "clings to adults or too dependent," and "fears certain animals, situations, or places."

Second, we examined if specific anxiety symptoms were being endorsed at the same relative frequency in the two diagnostic groups for both the CBCL. Symptoms were ranked in each group by the percent at which they were endorsed (i.e., *Very True or Often True*). The Spearman's rank correlation coefficient on the endorsement frequency for the two groups on the CBCL was high ($\rho = .76$, $p < .05$), indicating that symptoms were endorsed at similar

Table 3. Group differences in CBCL DSM Anxiety Scores.

	ASD ($n = 56$)	DD ($n = 43$)	*t*	*Df*	Cohen's *d*
DSM Anxiety	7.23 (3.79)	5.26 (2.84)	2.97**	96.96	0.59

ASD = Autism Spectrum Disorder. DD = Developmental Delay without Autism Spectrum Disorder. CBCL = Child Behavior Checklist. Equal variances not assumed due to significant Levene's Test for Equality of Variances.
**$p < .01$.

Table 4. Percent of sample endorsed to exhibit symptom on CBCL DSM Anxiety Scale.

CBCL DSM Anxiety Scale Item	Combined (N = 99)	ASD (n = 56)	DD(n = 43)	χ^2 (1)
Doesn't want to sleep alone	33.3	37.5	27.9	0.857
Clings to adults or too dependent	33.3	33.9	32.6	0.016
Fears certain animals, situations, or places	30.3	32.1	27.9	0.144
Nervous, highstrung, or tense	13.1	10.7	16.3	0.918
Gets too upset when separated from parents	12.1	14.3	9.3	0.506
Shows panic for no good reason	7.1	12.5	0.0	–
Worries	6.1	7.1	4.7	–
Too fearful or anxious	5.1	8.9	0.0	–
Doesn't want to go out of home	3.0	3.6	2.3	–
Nightmares	2.0	3.6	0.0	–

ASD = Autism Spectrum Disorder. DD = Developmental Delay without Autism Spectrum Disorder. Missing chi-square values indicate that cell sizes were too small to yield a valid chi-square analysis.

relative frequencies within the two groups. Additionally, chi-squared analyses for each item revealed that there were no significant differences in the frequencies at which each item was endorsed.

Predictors of Anxiety

We conducted a logistic regression within each group to determine which parenting variables were unique predictors of having elevated scores ($t > 64$) on the CBCL DSM anxiety scale. Table 5 summarizes the results of the logistic regression analyses. In the ASD group, inconsistent parenting emerged as the only significant predictor of anxiety (OR = 1.20, $p < .05$). Specifically, for every one-unit increase in inconsistent parenting, the odds of those in the ASD group having elevated anxiety increased by 20%. None of the parenting variables examined were a significant predictor of elevated anxiety in the DD group.

Analyses examining predictors of continuous scores on the DSM anxiety scale on the CBCL were consistent with the categorical analyses. Again, multiple regression analyses within each group revealed that only inconsistent parenting significantly predicted anxiety scores after controlling for other parenting variables ($\beta = 0.34$, $sr^2 = .11$, $p < .05$). Specifically,

Table 5. Logistic regression predicting elevated CBCL Anxiety Scores from parenting variables by diagnostic group.

	ASD (n = 56)			DD (n = 43)		
Parenting Variable	b(SE)	Wald	Exp(B)	b(SE)	Wald	Exp(B)
APQ Positive Parenting	0.05(0.05)	1.14	1.05	0.01 (0.07)	0.02	1.01
APQ Inconsistent Parenting	0.18 (0.09)*	4.04	1.20	−0.10 (0.11)	0.82	0.90
PCIRS Positive Parenting	−0.13 (0.18)	0.52	0.88	0.12 (0.27)	0.20	1.13
PCIRS Negative Parenting	−0.70 (1.09)	0.41	0.50	1.70 (1.14)	2.22	5.45

ASD = Autism Spectrum Disorder. DD = Developmental Delay without Autism Spectrum Disorder. APQ = Alabama Parenting Questionnaire; self-report. PCIRS = Parent-Child Interaction Rating System; observational measure. Scores with $t > 64$ were considered elevated on the CBCL DSM scales.

*$p < .05$.

Table 6. Linear regression predicting CBCL Anxiety Scale raw scores from parenting variables by diagnostic group.

	ASD (n = 56)			DD (n = 43)		
Parenting Variable	b(SE)	β	sr^2	b(SE)	β	sr^2
APQ Positive Parenting	0.08 (0.07)	0.14	.02	0.01 (0.07)	0.02	.00
APQ Inconsistent Parenting	0.34 (0.13)*	0.34	.11	−0.15 (0.13)	−0.19	.03
PCIRS Positive Parenting	−0.31 (0.30)	−0.14	.02	−0.08 (0.28)	−0.05	.00
PCIRS Negative Parenting	−1.16 (1.69)	−0.10	.01	1.24 (1.24)	0.17	.02

ASD = Autism Spectrum Disorder. DD = Developmental Delay without Autism Spectrum Disorder. APQ = Alabama Parenting Questionnaire; self-report. PCIRS = Parent-Child Interaction Rating System; observational measure.*$p < .05$.

for those in the ASD group, as inconsistent parenting increased by one standard deviation, CBCL DSM anxiety raw scores increased by 0.34 standard deviations. None of the parenting variables significantly predicted anxiety scores in the DD group. Results of the multiple linear regression analyses are summarized in Table 6.

Discussion

Research has shown that children with ASD are at a high risk for developing comorbid emotional and behavioral problems compared to children with other DDs and TD children (Gotham et al., 2015; Mannion & Leader, 2013; Salazar et al., 2015; Van Steensel & Heeman, 2017). However, very little research has investigated comorbid anxiety in preschool-aged children with ASD and other DDs; therefore, less is known about the risk for anxiety early in development for these unique populations. Results from our study suggest that children with ASD are at a significantly greater risk for developing anxiety symptoms compared to children with a non-spectrum DD. Specifically, children in the current study with ASD were 2–3 times more likely to have elevated anxiety scores on the CBCL in comparison to children with a non-spectrum DD. Certainly, it is important to acknowledge that the DD group was heterogeneous with respect to syndromes represented within the group, with different syndromes possibly at varying risks for anxiety symptoms. Nonetheless, post-hoc descriptive analyses show that the mean anxiety scores for each syndrome ranged from 4.20 (cerebral palsy, n = 5) to 6.33 (other genetic disorders, n = 3), which were still lower than the mean anxiety score of 7.23 for the ASD group.

This increased risk for anxiety in the ASD group may be due, in part, to the association between specific ASD symptoms and anxiety. In particular, researchers have found that core ASD symptoms, such as restrictive and repetitive behaviors and insistence on sameness, are associated with higher levels of anxiety in children with ASD (Ben-Sasson et al., 2008; S. A. Green et al., 2012; Spiker et al., 2012). Furthermore, it is possible that the difficulties in social communication experienced by many children with ASD make it

more difficult to navigate social interactions. This may lead to more peer rejection and confusion in social domains, and thereby heighten this population's vulnerability to experiencing anxiety (Wood & Gadow, 2010).

Although children with ASD presented with higher rates of anxiety than those with a non-spectrum DD in our sample, our analyses revealed that having ASD did not differentiate the presentation of anxiety in our sample. The most frequently endorsed items on the CBCL in the combined sample include: "Doesn't want to sleep alone"; "Clings to adults or too dependent"; and "Fears certain animals, situations, or places," with each of these items being endorsed for approximately one-third of the sample. The developmental psychopathology literature indicates that manifestations of anxiety in early childhood most often represent those related to separation anxiety and specific phobias (Baker et al., 2010; Beesdo et al., 2009). While it is important to note the CBCL is not intended to be used to diagnose specific anxiety disorders, these aforementioned items on the CBCL may be reflective of symptoms associated with separation anxiety disorder and specific phobia.

At the same time, it is possible that these symptoms may also reflect forms of anxiety that are distinct from separation anxiety or specific phobias. Certainly, behavioral avoidance and clinginess as captured in these CBCL items are hallmark features of anxiety that are phenotypically indicative of various anxiety disorders (e.g., clinging to adults may also be indicative of social anxiety; not wanting to sleep alone may reflect a fear of the dark). Furthermore, although the underlying source or specific fearful stimuli were not identified in the current study, other studies with samples of school-aged children and adolescents have noted that the nature of fears exhibited by those with ASD may present qualitatively differently from those exhibited by TD children and even those with other DDs (Evans et al., 2005; Kerns et al., 2014). Specifically, those with ASD have been reported to be more fearful than TD children of medical-related stimuli (e.g., needles, physicians; Evans et al., 2005), loud noises (Leyfer et al., 2006), and other unusual specific fears (e.g., bubbles, balloons, radio jingles; Kerns et al., 2014). It may be beneficial for future studies to include an age-matched TD comparison group to better parse apart and examine the nature of fears and anxiety in younger children with DD and ASD. Nonetheless, results from the current study suggest that many symptoms of anxiety are present at an early age for children with DD and ASD, highlighting the importance of screening for such symptoms to best support this at-risk population.

For our third aim, we examined different parenting behaviors (inconsistent parenting, positive parenting, and negative parenting) as predictors of anxiety in each diagnostic group. Specifically, we hypothesized that more inconsistent parenting would predict higher levels of anxiety and higher odds of having clinical levels of anxiety in both diagnostic groups. Our hypothesis was partially supported, in that inconsistent parenting

significantly predicted anxiety in children with ASD, but not in children with DD. The literature on TD children suggests that when parents respond inconsistently, children are less aware of what to expect, which can impact their sense of security and control in their environment and subsequently increase anxiety (Laskey & Cartwright-Hatton, 2009). This may be further exacerbated in children with ASD who often show greater difficulty with cognitive flexibility and adapting to change (Memari et al., 2013), thus rendering them more vulnerable to anxiety when parental expectations are not consistent. These results suggest that more consistent parenting strategies may help to ameliorate symptoms of anxiety that are commonly seen in children with ASD. However, contrary to our hypothesis, our results also suggest that the relationship between inconsistent parenting and anxiety was not significant among those in our sample with a non-spectrum DD. Further research may be necessary to elucidate the nature of this relationship, given other studies in both the TD and DD literature highlighting the importance of consistent discipline strategies in improving various child outcomes including improved self-regulation and reduced behavior problems (Hawes et al., 2013; Pears et al., 2015).

With respect to the other parenting variables examined, also contrary to our hypotheses, positive parenting and negative parenting variables as measured through self-report and observational data did not emerge as significant predictors of anxiety in our sample of children with ASD and DD. More specifically, positive parenting as measured by self-report on the APQ and by coding observed parent-child interactions using the PCIRS was not significantly associated with anxiety in our sample. While there is growing literature suggesting that positive parenting is a significant protective factor for the development of anxiety in kids with and without ASD (Landry et al., 2008; Leidy et al., 2010), it may be that more negative, specifically inconsistent parenting is a stronger predictor (Sher-Censor et al., 2018). Interestingly, negative parenting as measured by our observational data also was not associated with anxiety in our sample. One possible explanation for this null finding is that perhaps the Intrusiveness code as measured on the PCIRS, which is part of the broader Negative Parenting composite, may be less applicable to parents of children with ASD and DD. More specifically, family researchers studying families of children with developmental disabilities have started to draw a distinction between two types of parenting behavior that are traditionally captured as "intrusive"; *supportive direction* which follows the child's goal and has been associated with positive child outcomes for children with developmental disabilities and *interference* which interferes with the child's goal and has been associated with more negative child outcomes (S. Green et al., 2014). Thus, the impact of parent intrusiveness on child anxiety may be specific to parent interference and not parent supportive direction;

however, both of these behaviors are coded as intrusive parenting behaviors in the PCIRS.

Limitations and Directions for Future Research

While our results are promising, there are several limitations to the current study that should be considered and inform directions for future research. First, although children in our sample had a community diagnosis of ASD provided by a physician or psychologist, we did not confirm their ASD diagnosis using gold-standard diagnostic instruments such as the Autism Diagnostic Observation Schedule, 2nd Edition (ADOS-2; Lord et al., 2012) and the Autism Diagnostic Interview-Revised (ADI-R ;Rutter et al., 2003). Nevertheless, ratings on the CBCL ASD scale demonstrated that those in the ASD group were reported to have significantly more ASD symptoms and higher rates of clinical elevations compared to the DD group ($ps < .001$), suggesting that the two groups are characteristically different in ASD symptoms.

Additionally, although each child in our study was determined by an independent evaluation to have a DD, we did not formally measure intellectual functioning using a standardized IQ test for the children in our sample. So, while we estimate that the majority of our sample has intellectual functioning in the mild to moderate range of impairment given the demands of our laboratory tasks (see Procedures), we do not have a precise measure of IQ in our sample. This may limit the extent to which we can generalize the results of our study to all children with ASD and DD. Among children without ASD, IQ has consistently been found to have an indirect association with anxiety, with having an intellectual disability significantly increasing risks (S. A. Green et al., 2015; Leech et al., 2006). However, the relationship between IQ and anxiety symptoms appears to be more complicated among those with ASD. A recent study by Kerns et al. (2020) suggested that while intellectual functioning may predict the presentation of anxiety in school-aged children with ASD (i.e., those with intellectual impairment are more likely to present with specific phobias or separation anxiety disorder whereas the broad range of anxiety disorders is seen among those without intellectual impairments), it does not predict the quantity of symptoms exhibited. Future studies should examine whether patterns of co-occurring anxiety symptoms are different depending on intellectual functioning among preschool-aged children with ASD.

Further, although the CBCL is a commonly used outcome measure of behavior problems among children with ASD and DD, it is important to acknowledge that the CBCL is a broad parent-report measure that was initially developed for neurotypical children. Thus, its utility to sensitively measure anxiety in children with ASD and DD may be limited in scope. Several studies have noted that the manifestation of anxiety symptoms in children with ASD

can be qualitatively different from those with typical development, such as unusual specific fears or excessive worries associated with restricted interests (Evans et al., 2005; Kerns et al., 2014, 2020). Thus, while the CBCL in the current study gave us cursory insight into symptoms of anxiety in our population, some of the nuances in the particular presentation of anxiety in our population may not have been fully captured. However, the authors are not aware of any measures that were designed specifically to measure anxiety in preschool-aged children with ASD. It would behoove researchers to use and develop measures specifically designed to capture anxiety in these populations for future studies. Furthermore, the CBCL does not tell us the degree to which symptoms of anxiety reported cause functional impairments. The utilization of semi-structured diagnostic interviews in future studies would help to identify children that meet criteria for a diagnosable anxiety disorder, which would help to better understand anxiety symptomology and would help to inform future parenting and anxiety interventions.

Finally, given that we used cross-sectional data in the current study to examine the relationship between parenting variables and child anxiety, we cannot definitively conclude the directionality of the effects seen. It is possible that there may be a bi-directional relationship between inconsistent parenting discipline and child anxiety symptoms. Certainly, parents may find it more difficult to be consistent in their parenting behaviors when their child displays higher levels of anxious behaviors. In fact, studies have demonstrated that parents of children with anxiety disorders are more likely to change their parental behaviors (i.e., accommodation) in an attempt to prevent or reduce their child's level of distress; however, this parental accommodation has been conceptualized to behaviorally reinforce the child's anxiety (Thompson-Hollands et al., 2014). Future studies would benefit from using longitudinal data to better understand the relationship between parenting variables and child outcomes. However, given the paucity of studies specifically examining these parenting constructs and anxiety among children with ASD and DD, the current study provides a foundation for future longitudinal research.

Implications and Conclusion

Despite the aforementioned limitations, data from the current study indicate that preschool-aged children with ASD are at risk for high rates of anxiety symptoms and clinical levels of anxiety early in development, with over 40% of children with ASD in our sample in the elevated range. This is concerning given that high rates of anxiety are associated with poorer outcomes over time for individuals with ASD, including exacerbating the impact of symptoms and impairments associated with ASD, as well as an increased risk for developing other comorbid psychopathology (Duvekot et al., 2018; Salazar et al., 2015; Vasa et al., 2013; White et al., 2014). Thus, given the high rates of anxiety symptoms and risk for

later developing anxiety disorders in young children with ASD, it is important to identify anxiety early and provide intervention.

It should be noted that the majority of evidence-based interventions that target childhood anxiety disorders in the existing literature utilize a cognitive-behavioral framework (e.g., Coping Cat; Kendall et al., 2010; Weisz & Kazdin, 2010), and were thus designed for children ages seven and older who have more advanced metacognitive and language abilities necessary for the treatment modality. Although a few studies have demonstrated preliminary feasibility and efficacy of adapting cognitive-behavioral interventions for preschool-aged typical children with anxiety (Hirshfeld-Becker et al., 2019, 2010), these adapted interventions require skills from children that likely exceed those with developmental delays. Nevertheless, our study suggests that parenting interventions that target parental consistency in particular may provide a different avenue for intervening with anxiety in younger children with ASD. There is a small but growing literature on adapted versions of behavioral parent training interventions that emphasize modifying parenting behaviors and increasing consistency in parenting strategies (e.g., Parent-Child Interaction Therapy; Brinkmeyer & Eyberg, 2003) to treat childhood anxiety disorders, particularly separation anxiety disorder. These interventions have yielded promising results among TD children in the amelioration of anxiety symptoms post-intervention (Pincus et al., 2008; Puliafico et al., 2012). For instance, these adapted behavioral parent training interventions highlight the importance of parental consistency in the parent ignoring inappropriate behaviors during separation (e.g., angry outbursts and demandingness) and reinforcing the child responding more bravely in entering new situations in the absence of a parent (Pincus et al., 2008). Taken together, in recognizing that symptoms of separation anxiety are among the most common presentations of anxiety in young children with ASD, it would be worthwhile for future studies to examine whether such interventions that target consistent parenting may also have downstream benefits in ameliorating symptoms of anxiety that are common in this vulnerable population.

COMPLIANCE WITH ETHICAL STANDARDS

All procedures performed in studies involving human participants 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 was obtained from all individual participants included in the study. Procedures were approved by the Institutional Review Board at Loma Linda University.

DISCLOSURE STATEMENT

The authors declare they have no competing interests.

AUTHOR CONTRIBUTIONS

Neilson Chan: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft. **Catherine Sanner**: Writing – Original Draft, Writing – Review & Editing. **Hadley McGregor**: Writing – Original Draft, Writing – Review & Editing. **Amanda Preston**: Writing – Original Draft, Writing – Review & Editing. **Cameron Neece**: Supervision, Funding Acquisition, Writing – Review & Editing.

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