Published in final edited form as:

J Autism Dev Disord. 2014 November ; 44(11): 2851–2861. doi:10.1007/s10803-014-2141-7.

Traditional and Atypical Presentations of Anxiety in Youth with Autism Spectrum Disorder

Connor Morrow Kerns^{1,2}, Philip C. Kendall², Leandra Berry^{1,3}, Margaret C. Souders¹, Martin E. Franklin⁴, Robert T. Schultz¹, Judith Miller¹, and John Herrington¹

¹Center for Autism Research, Children's Hospital of Philadelphia, Philadelphia, PA, USA

²Department of Psychology, Temple University, Philadelphia, PA, USA

⁴Department of Psychiatry, University of Pennsylvania, Philadelphia, PA, USA

Abstract

We assessed anxiety consistent (i.e. “traditional”) and inconsistent (i.e. “atypical”) with diagnostic and statistical manual (DSM) definitions in autism spectrum disorder (ASD). Differential relationships between traditional anxiety, atypical anxiety, child characteristics, anxiety predictors and ASD-symptomology were explored. Fifty-nine participants (7–17 years, $M_{age}=10.48$ years; $IQ>60$) with ASD and parents completed semi-structured interviews, self- and parent-reports. Seventeen percent of youth presented with traditional anxiety, 15% with atypical anxiety, and 31% with both. Language ability, anxious cognitions and hypersensitivity predicted traditional anxiety, whereas traditional anxiety and ASD symptoms predicted atypical anxiety. Findings suggest youth with ASD express anxiety in ways similar and dissimilar to DSM definitions. Similarities support the presence of comorbid anxiety disorders in ASD. Whether dissimilarities are unique to ASD requires further examination.

Keywords

Anxiety; Children; Adolescents; Comorbidity; Atypical; Tradition

Introduction

Autism spectrum disorder (ASD) is associated with deficits in social communication and interaction coupled with restricted and repetitive interests and behaviors. Within and across individuals, the level of impairment associated with any single characteristic of ASD can differ widely. Though less formally discussed, clinical observations and research findings also suggest that the distress and anxiety associated with any single characteristic of ASD are variable (Baron 2006). For example, whereas some individuals experience debilitating fears and worries related to any change in routine, others are more flexible; and whereas some show little interest in social interactions, others show distress, worry and loneliness

Corresponding Author: C. M. Kerns. A. J. Drexel Autism Institute, Drexel University, 3020 Market Street, Suite 560, Philadelphia, PA, 19104, USA. cmk352@drexel.edu.

³Present Address: Baylor College of Medicine, Texas Children's Hospital, Houston, TX, USA

Judith Miller and John Herrington contributed equally and share last authorship.

when their social bids are unsuccessful (White & Roberson-Nay 2009). Similarly, while some restricted interests and behaviors have a positive emotional valence, others have a pressured and distressed quality (Spiker et al 2012). Better understanding and differentiation of this variability in the experiences of youth with ASD has important implications for research, nosology and clinical practice. Do symptoms of anxiety reflect an expected, commensurate reaction to daily ASD-related challenges or the presence of impairing emotional *disorders* deserving of targeted intervention? Further, it is a complex question whether anxiety symptoms in ASD, and particularly those fears that are related to change, social interactions or unusual stimuli, reflect (1) a universal consequence of ASD, (2) a comorbidity, that is, a disorder distinct from ASD and akin to anxiety disorders outside of ASD, or (3), a unique manifestation of anxiety, altered by its co-occurrence with ASD (Wood and Gadow 2010).

Numerous studies suggest co-occurring anxiety difficulties are common, occurring in approximately 40% of youth with ASD, and are associated with poorer individual and family functioning (van Steensel et al. 2011; Kim et al. 2000; White et al. 2009). Yet research is inconsistent on the presentation of these symptoms. Though many studies find a prevalence of anxiety symptoms in youth with ASD that resemble those of typically developing children and conform to *Diagnostic Statistical Manual of Mental Disorders, Fourth Edition Revised (DSM)* (American Psychological Association 1994) criteria, a number of atypical and ambiguous fears and anxieties have also been noted.

Frequent fears of loud sounds in addition to unusual phobias, such as fears of beards, toilet bowls, and mechanical objects, are described in numerous studies of youth with ASD, including Kanner's seminal paper on the disorder, and may be related to atypical sensory experiences (Kanner 1943; Mayes et al. 2013; Muris et al. 1998; Leyfer et al. 2006). Studies also describe the presence of impairing social avoidance as well as social distress and nervousness in youth with ASD who have limited awareness or concern for social rejection – a common deficit in ASD that is at odds with the traditional diagnosis of social phobia (Leyfer et al. 2006; Muris et al. 1998). Similarly, Kanner (1943), Leyfer et al. (2006), Muris et al. (1998) and Ozsivadjian et al. (2012) describe excessive worry in individuals with ASD around changes in the environment, changes in schedule and other circumscribed rather than generalized topics, fears seemingly clustered around perseverative, obsessive and restricted features of ASD. Highly rigid behaviors, such as verbal rituals, compulsions (e.g. closing doors, keeping sleeves rolled down), and rule-governed preferences (e.g. eating only food of one color, or only eating certain foods in certain places) also occur and may be accompanied by distress. However, it is often extremely difficult to infer whether such behaviors are aimed at reducing distress or preventing a dreaded event or situation from occurring – as is required for a diagnosis of obsessive-compulsive disorder (OCD). OCD has historically been associated with anxiety, though it is no longer classified as an anxiety disorder in DSM-5; Muris et al. 1998; Leyfer et al. 2006; APA 1994, 2013). The reallocation of OCD in DSM-5 to a domain of habit-related disorders is consistent with the ambiguity of these behaviors. Overall, reviews of the literature on anxiety in ASD suggest fewer distressing obsessions, fears of social evaluation and self-consciousness in this population (see Kerns & Kendall 2012; White et al. 2009), a notable pattern given that evaluation concerns are central to

social phobia and negative thoughts linked to the etiology and maintenance of anxiety disorders (Kendall and Treadwell 2007).

Varied conceptualization of such atypical anxiety symptoms likely contributes to the wide range of specific anxiety disorder rates reported across studies (see White et al. 2009). There is a notable lack of consensus regarding the differential diagnosis and construct of anxiety in youth with ASD (Ollendick and White 2012). Studies examining the phenomenology of anxiety in ASD have generally used measures developed and standardized for typically developing children that may not adequately differentiate autism and anxiety symptoms or capture divergent manifestations of anxiety. Additionally, the way anxiety symptoms in ASD are measured and described varies substantially across studies, further limiting our ability to draw conclusions about the prevalence, presentation and correct diagnostic allocation of atypical symptoms. Inconsistencies in the literature around the most common anxiety disorder in ASD and the association of anxiety symptoms with autism severity, intellectual or verbal ability may be a reflection, in part, of this conceptual confusion. Rates of Social Phobia (6–37%; de Bruin et al., 2007; Leyfer et al. 2006), Generalized Anxiety Disorder (2–35%; Green et al. 2000; Leyfer et al. 2006), Specific Phobia (8–63%; Muris et al. 1998; Simonoff et al. 2008) and OCD (6–37% de Bruin et al. 2005; Leyfer et al. 2006) range widely across studies. Further, where several studies suggest no relationship between anxiety and ASD severity (Renno and Wood, 2013; Sukhodolsky et al. 2008), others suggest fewer anxiety symptoms, particularly fewer negative obsessions, generalized worries and separation concerns, in youth with more pronounced ASD deficits (Gadow et al. 2005; Muris et al. 1998). Sukhodolsky et al. (2008) found that only generalized, separation, and panic-related worries were associated with higher IQ in individuals with ASD, whereas specific and social phobias were equally prevalent across low and high IQ categories. Similarly, associations between language skills and anxiety in ASD are reported in some studies, but not others (Davis et al. 2011; Sukhodolsky et al. 2008).

In their review of the literature, Kerns and Kendall (2012) proposed that variable findings may reflect the presence and poor differentiation of anxiety symptoms in ASD that are (a) consistent and inconsistent with DSM criteria and (b) differentially related to child characteristics, such as their ASD symptoms, IQ and verbal skill. To test this proposal, we hypothesized that individuals with ASD experience anxiety in two ways. First, some experience anxiety in a manner associated with DSM-defined categories. Symptoms such as everyday worries, generalized and separation anxiety may present clinically as quite distinct from ASD symptoms and be more consistently associated with IQ and language ability. Much research suggests that this is the case (i.e., Leyfer et al. 2006; White et al. 2009), and that traditional, DSM-consistent symptoms may more often arise in youth with intact intellectual and language functioning along with risk factors for anxiety, such as negative automatic thoughts and sensory hypersensitivity, which have been associated with anxiety in youth with and without ASD (Farrugia and Hudson 2006; Green and Ben-Sasson 2010; Pfeiffer et al. 2005; Sukhodolsky et al. 2008).

Second, we proposed that some individuals with ASD experience anxiety that does not neatly conform to DSM-defined categories, but rather presents as exacerbated and clinically-impairing anxiety around the hallmark features of ASD. Such *atypical* anxiety symptoms are

likely related to measures of both ASD and anxiety severity, and may reflect an underlying, biologically-based tendency toward worry and fear that, when present in an individual with ASD, manifests in domains of particular salience to that individual. Further, anxiety-related behaviors such as social avoidance, anxiety around changes in routine, compulsiveness and simple phobias may not require the language and cognitive abilities associated with other anxiety disorders. We hypothesized that, in contrast to DSM-consistent anxiety, atypical symptoms would be unrelated to intellectual and language abilities and predicted by the convergence of ASD and anxiety symptoms. These questions reflect a first step to exploring the phenomenology of anxiety in ASD and, particularly, the potentially distinct ways that anxiety may manifest in this population.

Methods

This study was part of a larger research initiative on the phenotypic expression and neurobiology (electrophysiology, neuroimaging, genetics) of anxiety in ASD. Participants were 59 youth (7 – 17 years) diagnosed with ASD and their parents recruited by phone call or email to families affiliated with the Center for Autism Research at Children Hospital of Philadelphia and through an online research registry. Most were Caucasian (93%) and male (78%) with moderate to high family income (75% \$60,000). Anxiety symptoms did not factor into sample selection. The autism diagnostic interview-revised (ADI-R; Lord et al. 1994), Autism Diagnostic Observation Scale (ADOS; Lord et al. 2000) and clinical judgment were used to determine that youth met ASD criteria. Children were required to have a full scale IQ of 60 or greater as determined by the Differential Ability Scales (DAS-II; Elliot 2007) or, in one case, the Wechsler Intelligence Scale for Children (WISC-IV)¹. IQ and language abilities, as determined by the Clinical Evaluation of Language Fundamentals – Fourth Edition (CELF-4; Semel et al. 2003) were relatively broad (Table 1). Exclusionary criteria included a lack of proficiency in English, chronological age <7 or >17, active psychosis or sensory-motor difficulties that would preclude use of diagnostic instruments.

Measures

Child and Parent Report Measures

Behavior Assessment System for Children, Second Edition: Parent Rating Scale (BASC2)—The BASC2 (Reynolds and Kamphaus 2002) assesses problem behaviors, including internalizing, externalizing, and atypical behaviors, as well as adaptive skills in children and adolescents. For the present study, the Anxiety and Atypicality clinical scales, Externalizing composite, and Activities of Daily Living adaptive scale of the BASC2 were used to assess convergent and divergent validity. The BASC2 has concurrent validity with other behavior scales and has been studied in ASD (Volker et al. 2010). Internal consistency ranged from $\alpha = .80-.92$ across the different age-normed BASC2 versions (children aged 6–11; adolescents aged 12–21).

¹Previous research suggests that agreement between the DAS and WISC-IV is high ($r = .77$; Dumont et al. 1996)

Negative Affectivity Self-Statement Questionnaire (NASSQ)—The NASSQ (Ronan et al. 1994) is a 70-item self-report measure assessing negative and anxious self-statements with a 33-item anxiety subscale, the NASSQ-A, that has been found to differentiate anxious from non-anxious youth without ASD (Sood and Kendall 2007). It has acceptable sensitivity (.81) and specificity (.80), and 2-week retest stability ($r = .73-.96$) (Ronan et al. 1994; Sood and Kendall 2007) as well as acceptable internal consistency in this sample ($\alpha = .80$).

Screen for Child Anxiety and Related Emotional Disorders (SCARED): Parent Report—The SCARED (Birmaher et al. 1999) is a 41-item inventory of anxiety symptoms, including separation, social, generalized and panic-related anxiety concerns used previously in samples of youth with ASD (Reaven et al. 2012). Internal consistency of the total score, used in this sample for convergent validity analyses, was acceptable ($\alpha = .91$).

Sensory Profile (SP)—The SP (Dunn 1999) is a parent-report of behaviors associated with abnormal sensory responses that generates four factors, two related to hypersensitivity: sensory sensitivity, sensory avoidance, and two related to hyposensitivity: low registration, sensory seeking (internal consistency range: .70–.90). The SP has discriminative validity in identifying children with sensory modulation dysfunction (McIntosh et al. 1999) and sensory hypersensitivity ratings have been found to predict anxiety in youth with and without ASD (Pfeiffer et al. 2005; Reynolds and Lane 2009). Given their consistency ($\alpha = .83$), Likert ratings derived from the sensitivity and avoidance domains were averaged to create a general hypersensitivity variable.

Social Responsiveness Scale-Parent Version (SRS-P)—The SRS (Constantino and Gruber 2005) is a 65-item, parent report measuring a continuum of social deficits characteristic of ASD that are relatively independent of other psychopathology and IQ (Constantino et al. 2003). The SRS has evidenced retest reliability ($r = .83$), inter-rater reliability (between parents, $r = .91$), internal consistency ($\alpha = .97$) and convergent validity with ADI-R (Constantino and Gruber 2005; Constantino et al. 2003). For the present study, in addition to the traditional SRS total score, a second raw total score ($\alpha = .79$) was calculated without the SRS Mannerisms, given potential overlap with atypical anxiety symptoms (e.g. “Does your child dislike changes in his/her routine?”). This second total score was used only as specified in posthoc analyses.

Semi-structured Interview

Anxiety Disorders Interview Schedule: Child and Parent Versions (ADIS-C/P)—

The ADIS-C/P (Silverman and Albano 1996) is a semi-structured interview for diagnosing childhood DSM-IV anxiety and other disorders with favorable psychometrics (March and Albano 1998). Parent and child reports inform clinician severity ratings (CSRs) for each disorder, which range from 0 (not a problem) to 8 (debilitating problem), with ratings 4 indicating a diagnosis. Anxiety symptoms that lack sufficient severity or duration to meet diagnostic criteria receive a subclinical rating (CSR = 3). Composite CSR scores (i.e., the highest CSR awarded based on parent or child report) are generated for each disorder. The

ADIS-C/P was administered concurrently to parents and youth to encourage engagement and understanding for all but 6 participants (interviewed separately per their request).

ASD-Specific Addendum to the ADIS-C/P—The ADIS-C/P was expanded to assess symptoms that did not meet DSM criteria, but which nonetheless were endorsed as distressing and/or interfering (i.e., “atypical anxiety”). Like traditional anxiety, atypical anxiety that was reported, but which did not cause substantial interference, received a subclinical rating (CSR = 3).

Differential diagnosis of traditional and atypical presentations was guided by DSM-IV criteria for anxiety disorders, clinical knowledge of ASD, and prior research (Leyfer et al. 2006; Muris et al. 1998; Wood and Gadow 2010). Atypical and traditional CSRs could occur in the same child. For example, a child could receive CSR scores for both a traditional phobia of dogs and an atypical phobia of running water.

Operationalization and Assessment of Atypical Anxiety—Each DSM-defined anxiety disorder was aligned with an “atypical” counterpart to capture anxiety reported that did not meet DSM definitions but which might reflect anxiety in ASD. For example, youth who endorsed interfering, daily worries regarding schedule or environmental changes or other unusual, likely ASD-related concerns, such as worry related to intense preoccupations, received a CSR for “atypical anxiety” rather than GAD. Youth who lacked a fear of negative social evaluation, but displayed consistent social discomfort and fearfulness also received a CSR for “atypical anxiety.” CSRs for social phobia were only assigned to youth who expressed a desire for social interaction, an undue fear of social ridicule or rejection, and impaired functioning attributable to social anxiety as opposed to ASD alone. This approach is consistent with distinctions made by Leyfer et al. (2006). Similarly, as unusual fears have also traditionally been considered features of ASD (Kanner 1943), specific phobias of an unusual focus (e.g., fears of graffiti, running water, mechanical objects, beards) were given a CSR for “atypical anxiety” rather than DSM-consistent specific phobia. Finally, a CSR for OCD was only given when reported obsessive-compulsive behaviors could be clearly connected to a need to escape or eliminate obsessional content (as opposed to perseverating on a preferred thought), prevent or mitigate distress, or prevent a dreaded situation or experience from occurring, an approach consistent with prior work and theory (Muris et al. 1998; Scahill 2012). By comparison, a CSR for *atypical* anxiety was assigned for compulsive and ritualistic behaviors that were associated with negative affect but which could not be clearly linked to an effort by the child to prevent or reduce distress or a dreaded scenario or experience. Examples of such atypical anxiety include compulsive rigidity such as insisting that sleeves be rolled down rather than up, that shoes remain on in the car, that phrases be used exactly (e.g., “two-thirty” rather than “half past two”), that doors be closed, or that certain foods be eaten in a specific order, manner, or place, all with a negative valence but *without* clear report from child or parent that these behaviors were aimed at preventing or reducing distress, achieving a “just right” feeling or preventing a dreaded event or situation. Though Leyfer et al. (2006) allowed parents to infer the mental states of their children to diagnose OCD, in the present study the function of these behaviors was *not* assumed unless it could be clearly described, consistent with Muris et al. (1998). Repetitive

and ritualistic language or behaviors were *not* counted as atypical anxiety if described as self-stimulatory, enjoyable or emotionally neutral for the child.

Study Procedures

All study participants completed comprehensive diagnostic evaluations for ASD (ADI-R, ADOS by a research reliable clinician), cognitive (DAS-II) and language (CELF-4) assessments, as well as parent questionnaires of ASD symptomology (SRS) and sensory hypersensitivity (SP) within 6 months of completing the anxiety measurements central to this study. Parents also provided information on child medical history and medications. Participants completed the semi-structured interview (ADIS-C/P) and the BASC2, NASSQ-A, and SCARED within a single study visit. ADIS-C/P inter-rater reliability and 2-week retest reliability (using the same assessor at test and retest; $M = 10$ days) were assessed in 35% ($n = 20$) and 25% ($n = 15$) of the sample respectively. To achieve inter-rater reliability, 35% of ADIS-C/P interviews were observed in their entirety, either via live observation of the testing room or review of the complete interview administration videotape, by a second ADIS-C/P trained clinician. Observers and interviewers completed separate interview records and provided independent CSR ratings for all DSM-consistent and atypical anxiety categories to research staff. Staff then entered scores into the database for reliability analyses. Observers and interviewers were not permitted to discuss their impressions of this child until after providing their independent ratings. This research was approved by the local Institutional Review Board; all participants gave informed consent or assent. Families received \$10/h for assessment time and travel expenses, as well as a summary of diagnostic results, recommendations and referrals.

Statistical Analyses

For each child, the highest composite CSR scores given within the traditional and atypical categories were the dependent variables or measures of traditional and atypical anxiety. Inter-rater reliability and retest reliability of these scores were tested using intra-class correlation coefficients (ICC). Zero-order correlations were also computed to determine the convergent and divergent validity of the ADIS-C/P traditional and atypical anxiety CSR scores. Two hierarchical multiple regressions examined the associations between hypothesized predictors of (a) traditional anxiety [IQ, language ability, NASSQ-A, sensory hypersensitivity (Block 1), but not SRS scores (Block 2)] and (b) atypical anxiety [SRS scores; NASSQ-A; sensory hypersensitivity (Block 1), but not language ability or IQ (Block 2)]. Post-hoc partial correlations examined the relationship between ASD symptoms (with and without SRS Mannerisms domain) with traditional and atypical anxiety. Data were missing at random for some measures (5 BASC2, 4 CELF, 3 NASSQ, 3 SCARED, and 2 SP); thus, regressions were conducted with smaller sample ($n = 54$) as were convergent and divergent validity analyses.

Results

Preliminary Analyses and ADIS-C/P Reliability and Validity

Mean ratings for the NASSQ-A were in the “at risk” range for anxiety disorders. Youth displayed more ASD symptomology and greater amounts of sensory hypersensitivity on

average than a normative sample (Table 1). Forty-nine percent of the sample took medication (31% SSRIs, 19% stimulants, 7% sympatholytics, 7% antipsychotics, 5% Buspar). Chi square and analysis of variance suggested no significant differences in the rates or severity of traditional and atypical anxiety by medication status. Mean CSRs for principal traditional and atypical anxiety were not significantly different.

Retest reliability ($n=15$) for traditional (ICC range .77–.95) and atypical CSRs (ICC range .88–1.00) suggested consistency over time. Percent exact agreement regarding all anxiety diagnoses from Time 1 to Time 2 was 100%. Youth who completed the retest had significantly higher IQ [$t(58) = -2.16, p = .04$]. Inter-rater reliability ($n = 21$) of ADIS-C/P CSR for both traditional anxiety (ICC range .89–.98) and atypical anxiety (ICC range .96–.99) was excellent. Percent exact agreement regarding traditional anxiety disorders and impairing atypical anxiety, calculated instead of Cohen's Kappa due to lower base rates of disorders in the sub-sample, was also consistent (95–100%).

With regard to convergent validity, the SCARED parent total score correlated with both traditional anxiety CSR scores ($r = .46, p < .01$) and atypical anxiety CSR scores from the expanded ADIS-C/P ($r = .51, p < .01$), providing support for the role of anxiety in both the traditional and the newly developed atypical ADIS-C/P categories. The BASC2 anxiety subscale also correlated with traditional anxiety CSR scores ($r = .47, p < .01$) and, to a lesser extent, with atypical anxiety CSR ratings ($r = .30, p = .03$). Evidence of divergent validity was found; the BASC2 Activities of Daily Living subscale was not significantly correlated with either traditional anxiety CSR scores ($r = -.12, n.s.$) or atypical anxiety CSR scores ($r = .03, n.s.$). Similarly, the BASC2 Externalizing subscale was not significantly correlated with either traditional anxiety CSR scores ($r = .21, n.s.$) or atypical anxiety CSR scores ($r = .26, n.s.$), suggesting that these variants of anxiety severity can be differentiated from both greater functional impairment and behavioral disturbance in ASD. Notably, whereas traditional anxiety CSRs were *not* significantly associated with the BASC2 Atypicality subscale ($r = .17, n.s.$), atypical anxiety CSRs were ($r = .36, p < .01$).

Rates of Traditional Disorders and Impairing Atypical Anxiety

Sixty-three percent of youth presented with impairing anxiety: 17% with traditional anxiety disorders, 15% with impairing atypical symptoms, and 31% with both (Fig. 1). Among *all* traditional anxiety disorders (that may or may not have been the principal comorbidity), specific phobias (30%) and GAD (22%) were most common, followed by social phobia (17%), and separation anxiety disorder (10%). OCD was also apparent (2%). Of the *principal* anxiety disorders (i.e. the most severe anxiety disorder experienced by the child), specific phobia was the most common (20%), followed by GAD (13%), social phobia (8%) and separation anxiety disorder (7%). No youth presented with principal OCD, and post-traumatic stress disorder and panic disorder were not reported (Table 2).

Regarding impairing atypical anxiety (occurring anywhere in the diagnostic profile; see Table 3), 22% presented with interfering worry and fear around routine, novelty and restricted interests, 12% with unusual fears, 8.5% with social fear without concern for social rejection and 8.5% with compulsive/ritualistic behaviors that did not meet full OCD criteria due to an inability to clearly determine their function (e.g., to prevent distress or a dreaded

outcome). Within the atypical category, the most common *principal* concerns were worries about routine, novelty and restricted interests (20%), unusual specific fears (12%), social fear (9%) and compulsive behaviors (5%).

Fifty percent of youth with one DSM-consistent anxiety disorder also had another. Impairing attention and hyperactivity symptoms (39%) and Major Depressive Disorder (20%) were common. Overall, 25% of youth presented with ASD alone (i.e., no co-occurring psychological disorders).

Predictors of Traditional Anxiety

Consistent with hypotheses, hierarchical multiple regressions revealed that anxious cognitive style (NASSQ-A $\beta = .32$, $t = 2.49$, $p = .02$), hypersensitivity ($\beta = .33$, $t = 2.61$, $p = .01$) and language ability ($\beta = .43$, $t = 2.42$, $p = .02$) were independently associated with traditional anxiety, whereas ASD severity (SRS total) was not ($\beta = -.001$, $t = -.004$, $n.s.$). Intellectual ability was not significantly associated with traditional anxiety ($\beta = -.33$, $t = -1.74$, $n.s.$) as hypothesized. The cumulative contribution of IQ, NASSQ-A, language and hypersensitivity variables to the model was significant ($R^2 = .31$, $p = .001$), explaining 32% of the variance in traditional anxiety severity (Fig. 2).

Predictors of Atypical Anxiety

When the same variables were examined as predictors of atypical anxiety, a different pattern emerged (Fig. 2). Consistent with hypotheses, hierarchical regression revealed that while greater ASD severity (SRS $\beta = .31$, $t = 2.30$, $p = .03$) and anxious cognitive style (NASSQ-A $\beta = .28$, $t = 2.08$, $p = .04$) were significantly associated with atypical anxiety symptoms, IQ ($\beta = .001$, $t = .004$, $n.s.$) and language ($\beta = .06$, $t = .33$, $n.s.$) were not. In contrast to hypotheses, hypersensitivity was also not significantly related to atypical anxiety ($\beta = .19$, $t = 1.51$, $p = .14$). Whereas intellectual and language abilities explained little variance in atypical anxiety ($R^2 = .02$), the contribution of the SRS, NASSQ-A, and hypersensitivity variables was significant ($R^2 = .23$, $p = .005$), explaining 25% of the variance in atypical anxiety.

Post-hoc Analyses

Partial correlations between traditional anxiety, atypical anxiety and SRS severity assessed whether associations between traditional anxiety and atypical anxiety might reflect a more severe ASD profile. Whereas there was no significant relationship between traditional anxiety and SRS scores ($R = .07$, $n.s.$), both traditional anxiety ($R = .44$, $p < .01$) and SRS scores ($R = .33$, $p < .01$) were significantly associated with atypical anxiety. This association remained significant after overlapping items from the SRS Mannerisms domain were removed ($R = .34$, $p = .01$). Moreover, the relationship between traditional anxiety and atypical anxiety ($R = .44$, $p < .01$) was not diminished after controlling for SRS ratings.

Discussion

Anxiety and anxiety-like behaviors have long been observed in ASD; however, whether the expression of anxiety in youth with ASD mirrors that of typically developing youth is

unclear. To explore the potentially distinct phenomenology of anxiety disorders in youth with ASD, the present study examined the occurrence and predictors of both “traditional”, DSM-consistent anxiety disorders and atypical expressions of anxiety in a well-characterized ASD sample. Results indicate the presence of traditional anxiety disorders, which closely resemble anxiety as it presents in typically developing children and appear independent of ASD severity (consistent with Renno and Wood 2013). Traditional anxiety disorders were found in 48% of this sample, and were associated with stronger language abilities as well as known predictors of anxiety in youth without ASD, namely, a more anxious cognitive style and sensory hypersensitivity (Bellini 2006; Kendall and Treadwell 2007; Pfeiffer et al. 2006). Notably, negative automatic thoughts have been associated with anxiety in youth with ASD and appear sensitive to cognitive-behavioral intervention in this population (Chalfant et al. 2007; Farrugia and Hudson 2006). Similarly, hypersensitivity has been associated with increased anxiety in youth with and without ASD (Green and Ben-Sasson 2010; Reynolds and Lane 2009). Findings are consistent with hypotheses that heightened physiological arousal predisposes youth with ASD to anxiety problems (Bellini 2006), and that traditional anxiety symptoms may be harder to recognize, or alternatively, less prevalent in youth with more severe language impairments (Davis et al. 2011). Though intellectual ability was not associated with traditional anxiety as hypothesized, it may be that associations between IQ and anxiety reflect the stronger communication abilities of high functioning youth.

Results also support the notion that youth with ASD experience varying levels of anxiety around ASD-related challenges. Many anxiety-like behaviors arise in youth with ASD that may not meet DSM criteria (outside of Anxiety Disorder – Not Otherwise Specified) and complicate differential diagnosis (Seahill 2012). In contrast to prior work, this study used an expanded diagnostic interview to differentiate these symptoms from DSM-consistent anxiety and therein assess a broader range of symptoms than routinely captured by standard anxiety measurements. Results provide preliminary support for the reliability and validity of this assessment approach. Inter-rater and retest reliability of both traditional and atypical CSR scores from the expanded ADIS-C/P, assessed in subsample of youth, were acceptable (*ICC* range .77 – .98). Both traditional and atypical anxiety CSRs scores were significantly correlated with parent-rated anxiety symptoms across several measures (e.g., BASC2, SCARED), lending convergent validity to the role of anxiety in both traditional and atypical symptoms. By comparison, neither traditional nor atypical anxiety CSR ratings were significantly correlated with measures of externalizing behavior or daily living skills, suggesting that these symptoms can be successfully differentiated from greater functional impairment and behavioral disturbance in ASD (i.e., divergent validity). Further, atypical but not traditional anxiety CSR scores were correlated with the BASC2 Atypicality scale. This subscale assesses odd, asocial and inappropriate behaviors and is thus one of the most strongly related subscales to core symptoms of ASD (Volker et al, 2010). Results support the notion that atypical anxiety symptoms are thus both qualitatively distinct from traditional anxiety categories and potentially related to difficulties common, but not necessarily unique, to individuals with ASD.

Forty-six percent of youth displayed impairing symptoms of anxiety that were not consistent with any DSM psychological disorders. Parent and child reports from an adapted diagnostic

interview revealed excessive, but circumscribed worries (e.g., fears of change, novelty; 22%), social fearfulness (i.e., without social awareness, 8.5%), distressed but functionally ambiguous rituals and compulsions (8.5%), and a number of impairing unusual fears (12%). Fifty-four percent of youth did not demonstrate such clinically significant anxiety associated with their ASD-related social impairments or restricted/repetitive behaviors, suggesting that distress may be something different from impairment. Atypical symptoms may reflect a more diffuse form of anxiety, not currently captured in the DSM, but which nonetheless may be impairing, partially captured by broader, continuous measures of anxiety and deserving of clinical and scientific attention.

Atypical symptoms were independently associated with more ASD symptomology, traditional anxiety symptoms and anxious automatic thoughts. These findings are consistent with the overlap and association of anxiety and repetitive and restricted behaviors in ASD, and support hypotheses that meaningful anxiety may arise around restricted interests, that restricted and repetitive behaviors may reflect a maladaptive coping response, or both (Hartley and Sikora 2009; Spiker et al. 2012). The association of traditional and atypical anxiety symptoms did not diminish after controlling for ASD severity, suggesting that it is not driven by simply a more severe profile in some ASD youth. Further, results do not support the notion that such atypical symptoms reflect traditional anxiety disorders in lower functioning youth: atypical symptoms were not correlated with language or IQ level. Language difficulties may thus limit the diagnosis of traditional anxiety disorders, but may not account for atypical expressions of anxiety apparent in ASD youth.

Findings support the presence of co-occurring anxiety in youth with ASD (i.e., traditional anxiety) that may be considered a *true comorbidity*, that is, a co-occurring or secondary condition that is separable from ASD and strictly resembles the condition (e.g., the anxiety disorder) as it occurs in youth without ASD. They also suggest the presence of impairing unusual fears, worries, compulsive/ritualistic behaviors that, though often attributed to ASD, appear associated with both ASD-related traits and anxiety disorder risk upon closer examination. Such symptoms may reflect a *distinct manifestation* of anxiety symptoms that do not correspond with traditional criteria, but which nonetheless reflect an anxiety construct (Wood and Gadow 2010). Though these symptoms are observable in youth with ASD, it is unclear at present if they are unique to this clinical group. Symptoms of ASD potentially related to these atypical presentations likely occur on a continuum in the general population (Constantino et al. 2003). Moreover, rigid thinking, restricted, repetitive behavior, sensory sensitivities, and asocial behavior are apparent in various diagnostic groups, including those with attention deficits, OCD, anxiety and mood disorders (Ivarsson and Melin 2008; Pine et al. 2008; Reiersen et al. 2007). It is thus likely that atypical anxiety symptoms may occur outside of ASD, perhaps often captured by the diagnosis of Anxiety Disorder, Not Otherwise Specified. Future research is needed to evaluate this hypothesis.

A substantial portion of youth (63%) displayed impairing symptoms of anxiety in the present study, whether traditional or atypical, a finding consistent with the increased rate of anxiety problems found in ASD relative to other at-risk groups (see White et al. 2009). Deficits inherent – but not necessarily unique – to ASD may predispose youth to both traditional and atypical manifestations of anxiety. For example, Ollendick and White (2012)

proposed dimensional processes that are (a) specific to anxiety as displayed in ASD (e.g., cognitive rigidity, social confusion, limited emotional insight), and (b) processes that are shared (or not specific to ASD; e.g., negative thinking, physiological arousal, experience of negative life events). Consistent with this model, traditional anxiety was associated with shared processes (anxious cognitive style; hypersensitivity), whereas only atypical symptoms were also associated with ASD symptoms, or those deficits that may represent particular risk factors for anxiety in ASD. Further study of the distinct dimensions of vulnerability that may underlie ASD, anxiety disorders and their traditional and atypical co-occurrence across samples of youth meeting varied diagnostic criteria is warranted.

Potential limitations include the higher intellectual abilities of youth who participated in the retest assessment and the matching of test and retest raters, factors that may have inflated reliability. The developmental heterogeneity of the sample was also not ideal given the wide IQ range of participants. Given the ambiguity of atypical symptoms and historical classification of at least some of these symptoms (e.g., insistence on sameness, unusual fears) as part of ASD, it is also possible that symptom overlap drove the association of SRS and atypical anxiety severity. This explanation is unlikely given that visual examination of the SRS items found few similar items, which when removed did not significantly alter results. Future studies should include a more demographically diverse sample to ensure the generalizability of these results across ethnicities and socio-economic groups. Future studies can explore the potentially unique phenomenologies of atypical anxiety symptoms by assessing whether specific symptoms cluster together or are differentially related to traditional anxiety or ASD deficits, questions that could not be properly addressed in the current sample.

Consistent with hypotheses, current findings suggest that diverse results in the literature may be attributable to the presence of two qualitatively and phenomenologically distinct mechanisms of anxiety in ASD: one akin to anxiety as it occurs in youth without ASD (e.g., traditional anxiety) and one wherein anxiety is altered in its pathogenesis and presentation by its interaction with ASD-related traits (e.g., atypical anxiety) (Kerns and Kendall 2012). They also raise the question of whether such atypical symptoms are restricted to individuals with ASD or apparent across varied diagnostic groups, related more to characteristics of cognition, emotion regulation and social skill than any diagnoses per se. Additional research is needed to address these questions as well as corroborate and clarify findings.

Nonetheless, the present results may have important implications for measurement and future investigations, particularly given that 15% of youth with ASD presented with solely atypical anxiety symptoms (i.e., no significant traditional anxiety symptoms). The majority of available anxiety measures are neither designed nor validated for ASD samples; as such, the manner in which they may or may not capture traditional and atypical concerns is unknown and likely to vary by instrument (Scahill 2012). More standardized, comprehensive and multidimensional characterization of atypical anxiety concerns is needed to inform these questions, to fully understand the experience and manifestation of anxiety in ASD as well as other clinical groups, and to elucidate how traditional versus atypical anxiety symptoms respond to existing pharmacological and cognitive-behavioral treatments.

Acknowledgments

We are grateful to the families who participated in this research and to Ivy Giserman for her assistance in the collection of this data. Funding was provided by the Pennsylvania Department of Health (SAP # 4100042728 to R. Schultz), the National Institute of Mental Health (RC1MH8879 to R. Schultz; MH063747; MH086438 to P. Kendall) and Shire Pharmaceuticals (to J. Herrington).

References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington DC: American Psychiatric Association; 1994.
- American Psychiatric Association. Diagnostic and statistical manual of mental disorders, fifth Edition (DSM 5). Washington DC: American Psychiatric Association; 2013.
- Baron, MG., editor. Stress and coping in autism. Oxford University Press; 2006.
- Bellini S. The development of social anxiety in adolescents with autism spectrum disorders. Focus on Autism and Other Developmental Disabilities. 2006; 21:138–145. DOI: 10.1177/10883576060210030201
- Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baugher M. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. Journal of the American Academy of Child and Adolescent Psychiatry. 1999; 38:1230–1236. DOI: 10.1097/00004583-199910000-00011 [PubMed: 10517055]
- Chalfant AM, Rapee R, Carroll L. Treating anxiety disorders in children with high functioning autism spectrum disorders: A controlled trial. Journal of Autism and Developmental Disorders. 2007; 37(10):1842–1857. DOI: 10.1007/s10803-006-0318-4 [PubMed: 17171539]
- Constantino JN, Davis SA, Reich W, Schindler MK, Gross MM, Brophy SL, et al. Validation of a brief quantitative measure of autistic traits: Comparison of the Social Responsiveness Scale with the Autism Diagnostic Interview – Revised. Journal of Autism and Developmental Disorders. 2003; 33:427–433. DOI: 10.1023/A:1025014929212 [PubMed: 12959421]
- Constantino, JN., Gruber, CP. Social Responsiveness Scale (SRS) Manual. Los Angeles, CA: Western Psychological Services; 2005.
- Davis TEIII, Moree BN, Dempsey T, Reuther ET, Fodstad JC, Hess JA, et al. The relationship between autism spectrum disorders and anxiety: The moderating effect of communication. Research in Autism Spectrum Disorders. 2011; 5:324–329. DOI: 10.1016/j.rasd.2010.04.015\
- de Bruin EI, Ferdinand RF, Meester S, de Nijs PF, Verheij F. High rates of psychiatric co-morbidity in PDD-NOS. Journal of Autism and Developmental Disorders. 2007; 37(5):877–886. DOI: 10.1007/s10803-006-0215-x [PubMed: 17031447]
- Dumont R, Cruse CL, Price L, Whelley P. The relationship between the Differential Ability Scales (DAS) and the Weschler Intelligence Scale for Children – Third edition (WISC-III) for students. Psychology in the Schools. 1996; 33:203–209.
- Dunn, W. The sensory profile examiner’s manual. San Antonio, TX: The Psychological Corporation; 1999.
- Elliot, C. Differential abilities scale—2nd edition (DAS-II) Manual. San Antonio, TX: Harcourt Assessment, Inc; 2007.
- Farrugia S, Hudson J. Anxiety in adolescents with Asperger syndrome: Negative thoughts, behavioral problems, and life interference. Focus on Autism and Other Developmental Disabilities. 2006; 21:25–35. DOI: 10.1177/10883576060210010401
- Gadow KD, DeVincent CJ, Pomeroy J, Azizian A. Comparison of DSM-IV symptoms in elementary school-age children with PDD versus clinic and community samples. Autism. 2005; 9:392–415. DOI: 10.1177/1362361305056079 [PubMed: 16155056]
- Green SA, Ben-Sasson A. Anxiety disorders and sensory-over-responsibility in children with autism spectrum disorders: Is there a causal relationship? Journal of Autism and Developmental Disorders. 2010; 40:1495–1504. DOI: 10.1007/s10803-010-1007-x [PubMed: 20383658]

- Green J, Gilchrist A, Burton D, Cox A. Social and psychiatric functioning in adolescents with Asperger syndrome compared with conduct disorder. *Journal of Autism and Developmental Disorders*. 2000; 30:279–293. DOI: 10.1023/A:1005523232106 [PubMed: 11039855]
- Hartley S, Sikora D. Which DSM-IV-TR criteria best differentiate high-functioning autism spectrum disorder from ADHD and anxiety disorders in older children? *Autism*. 2009; 13:485–509. [PubMed: 19759063]
- Ivarsson T, Melin K. Autism spectrum traits in children and adolescents with obsessive-compulsive disorder (OCD). *Journal of Anxiety Disorders*. 2008; 22:969–978. DOI: 10.1016/j.janxdis.2007.10.003 [PubMed: 18053683]
- Kanner L. Autistic disturbances of affective contact. *Nervous Child*. 1943; 2:217–250.
- Kendall PC, Treadwell KRH. The role of self-statements as a mediator in treatment for youth with anxiety disorders. *Journal of Consulting and Clinical Psychology*. 2007; 75:380–389. DOI: 10.1037/0022-006X.75.3.380 [PubMed: 17563155]
- Kerns CM, Kendall PC. Anxiety in autism spectrum disorders: Core or comorbid psychopathology? *Clinical Psychology: Science and Practice*. 2012; 12:323–347. DOI: 10.1111/cpsp.12009
- Kim JA, Szatmari P, Bryson SE, Streiner DL, Wilson FJ. The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism*. 2000; 4:117–132. DOI: 10.1177/1362361300004002002
- Leyfer OT, Folstein SE, Bacalman S, Davis NO, Dinh E, Morgan J, et al. Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders*. 2006; 36:849–861. DOI: 10.1007/s10803-006-0123-0 [PubMed: 16845581]
- Lord C, Risi S, Lambrecht L, Cook EH, Leventhal BL, DiLavore PC, et al. The autism diagnostic observation Schedule—Generic: A standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders*. 2000; 30:205–223. DOI: 10.1023/A:1005592401947 [PubMed: 11055457]
- Lord C, Rutter M, LeCouteur A. Autism diagnostic interview-revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders*. 1994; 24:659–685. DOI: 10.1007/BF02172145 [PubMed: 7814313]
- March JS, Albano AM. New developments in assessing pediatric anxiety disorders. *Advances in Clinical Child Psychology*. 1998; 20:213–241.
- Mayes SD, Calhoun SL, Aggarwal R, Baker C, Mathapati S, Molitoris S, et al. Unusual fears in children with autism. *Research in Autism Spectrum Disorders*. 2013; 7:151–158. DOI: 10.1016/j.rasd.2012.08.002
- McIntosh DN, Miller L, Shyu V, Hagerman R. Sensory-modulation disruption, electrodermal responses, and functional behaviors. *Developmental Medicine and Child Neurology*. 1999; 41:608–615. DOI: 10.1111/j.1469-8749.1999.tb00664.x [PubMed: 10503919]
- Muris P, Steerneman P, Merckelbach H, Holdrinet I, Meesters C. Comorbid anxiety symptoms in children with pervasive developmental disorders. *Journal of Anxiety Disorders*. 1998; 12:387–393. DOI: 10.1016/S0887-6185(98)00022-X [PubMed: 9699121]
- Ollendick TH, White SW. The presentation and classification of anxiety in autism spectrum disorder: Where to from here? *Clinical Psychology: Science and Practice*. 2012; 19(4):352–355. DOI: 10.1111/cpsp.12013
- Ozsivadjian A, Knott F, Magiati I. Parent and child perspectives on the nature of anxiety in children and young people with autism spectrum disorders: A focus group study. *Autism*. 2012; 16(2):107–121. DOI: 10.1177/1362361311431703 [PubMed: 22297200]
- Pfeiffer B, Kinnealey M, Reed C, Herzberg C. Sensory modulation and affective disorders in children and adolescents with Asperger's disorder. *The American Journal of Occupational Therapy*. 2005; 59:335–345. DOI: 10.5014/ajot.59.3.335 [PubMed: 15969281]
- Pine DS, Guyer AE, Goldwin M, Towbin KA, Leibenluft E. Autism spectrum disorder scale scores in pediatric mood and anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2008; 47:652–661. DOI: 10.1097/CHI.0b013e31816bffa5 [PubMed: 18434923]

- Reaven J, Blakeley-Smith A, Culhane-Shelburne K, Hepburn S. Group cognitive behavior therapy for children with high-functioning autism spectrum disorders and anxiety: A randomized trial. *Journal of Child Psychology and Psychiatry*. 2012; 53(4):410–419. DOI: 10.1111/j.1469-7610.2011.02486.x [PubMed: 22435114]
- Reiersen AM, Constantino JN, Volk HE, Todd RD. Autistic traits in a population-based ADHD twin sample. *The Journal of Child Psychology and Psychiatry*. 2007; 48:464–472. DOI: 10.1111/j.1469-7610.2006.01720.x [PubMed: 17501727]
- Renno P, Wood JJ. Discriminant and convergent validity of the anxiety construct in children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*. 2013; 43:2135–2146. DOI: 10.1007/s10803-013-1767-1 [PubMed: 23354538]
- Reynolds, CR., Kamphaus, RW. *The clinician's guide to the behavior assessment system for children (BASC)*. New York: Guilford Press; 2002.
- Reynolds S, Lane SJ. Sensory overresponsivity and anxiety in children with ADHD. *The American Journal of Occupational Therapy*. 2009; 63(4):433–440. DOI: 10.5014/ajot.63.4.433 [PubMed: 19708472]
- Ronan KR, Kendall PC, Rowe M. Negative affectivity in children: Development and validation of a self-statement questionnaire. *Cognitive Therapy and Research*. 1994; 18:509–528. DOI: 10.1007/BF02355666
- Scahill L. Commentary on Kerns and Kendall. *Clinical Psychology: Science and Practice*. 2012; 19(4): 348–351. DOI: 10.1111/cpsp.12018
- Semel, E., Wiig, EH., Secord, WA. *Clinical evaluation of language fundamentals-4 (CELF-4)*. The Psychological Corporation; 2003.
- Silverman, WK., Albano, AM. *Psychological Corporation. Anxiety disorders interview schedule for DSM-IV: Child version*. Oxford, UK: Oxford University Press; 1996.
- Simonoff E, Pickles A, Charman T, Chandler S, Loucas T, Baird G. Psychiatric disorders in children with autism spectrum disorders: prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2008; 47:921–929. DOI: 10.1097/CHI.0b013e318179964f [PubMed: 18645422]
- Sood E, Kendall PC. Assessing anxious self-talk in youth: The negative affectivity self-statement questionnaire-anxiety scale. *Cognitive Therapy and Research*. 2007; 31:603–618. DOI: 10.1007/s10608-006-9043-8
- Spiker MA, Lin CE, Van Dyke M, Wood JJ. Restricted interests and anxiety in children with autism. *Autism*. 2012; 16:302–320. DOI: 10.1177/1362361311401763
- Sukhodolsky DG, Scahill L, Gadow KD, Arnold LE, Aman MG, McDougle CJ, et al. Parent-rated anxiety symptoms in children with pervasive developmental disorders: Frequency and association with core autism symptoms and cognitive functioning. *Journal of Abnormal Child Psychology*. 2008; 36:117–128. DOI: 10.1007/s10802-007-9165-9 [PubMed: 17674186]
- van Steensel FJ, Bögels SM, Perrin S. Anxiety disorders in children and adolescents with autistic spectrum disorders: A meta-analysis. *Clinical child and family psychology review*. 2011; 14(3): 302–317. DOI: 10.1007/s10567-011-0097-0 [PubMed: 21735077]
- Volker MA, Lopata C, Smerbeck AM, Knoll VA, Thomeer ML, Toomey JA, et al. BASC-2 PRS profiles for students with high-functioning autism spectrum disorders. *Journal of Autism and Developmental Disorders*. 2010; 40(2):188–199. DOI: 10.1007/s10803-009-0849-6 [PubMed: 19705267]
- White SW, Oswald D, Ollendick T, Scahill L. Anxiety in children and adolescents with autism spectrum disorders. *Clinical Psychology Review*. 2009; 29:216–229. DOI: 10.1016/j.cpr.2009.01.003 [PubMed: 19223098]
- White SW, Roberson-Nay R. Anxiety, social deficits, and loneliness in youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders*. 2009; 39:1006–1013. DOI: 10.1007/s10803-009-0713-8 [PubMed: 19259802]
- Wood JJ, Gadow KD. Exploring the nature and function of anxiety in youth with autism spectrum disorders. *Clinical Psychology: Science and Practice*. 2010; 17:281–292. DOI: 10.1111/j.1468-2850.2010.01220.x

Fig. 1. Rates of impairing (CSR = 4) traditional and atypical anxiety (N = 59). Breakdown of youth with impairing (i.e., CSR = 4) traditional and atypical anxiety. CSR = Clinician Severity Rating on Anxiety Disorders Interview Schedule – Child/Parent Report.

Fig. 2.
Predictors of traditional and atypical anxiety. * = $p < .05$

Table 1

Characteristics of sample (n = 59)

Descriptive Variables	N (%)		M (SD)	Range
Male	46 (78%)	Child Age in months	10.48 (2.63)	7–17
Race		IQ	104.69 (19.05)	67–58
Caucasian	54 (93%)	CELF (n = 55)	96.84 (19.61)	48–138
Black	2 (3.5%)	SRS Total Raw Score	77.76 (10.67)	52–90
Biracial	2 (3.5%)	NASSQ Anxiety (n = 56)	58.47 (21.59)	33–123
Family income (n=53)		Sensory profile (n=58)	3.95 (.83)	1–5
< 60k	8 (15%)	Sensory Hypersensitivity		
60k to < 100k	15 (25%)			
100k or more	30 (50%)			
Not Reported	6 (10%)	ADIS-C/P Clinical Severity Ratings		
Taking Medication	29 (49%)	Traditional Anxiety	3.12 (2.13)	0–8
		Atypical Anxiety	2.61 (2.26)	0–7

IQ calculated from the General Conceptual Abilities index of the Differential Abilities Scale or the Full Scale IQ of the Wechsler Intelligence Scale for Children (n=1)

CELF = Clinical Evaluation of Language Fundamentals, SRS = Social Responsiveness Scale, NASSQ = Negative Affective Self-Statement Questionnaire, ADIS-C/P = Anxiety Disorders Interview-Child/Parent version.

Table 2

Correlations between ADIS-C/P traditional and atypical CSR scores and other parent report measures

Measures	Construct	Traditional Anxiety CSR <i>r</i>	Atypical Anxiety CSR <i>r</i>
SCARED - Total Score	Anxiety	0.46 ^{**}	0.51 ^{**}
BASC2 - Anxiety	Anxiety	0.47 ^{**}	0.30 [*]
BASC2 - Externalizing	Externalizing problems	0.21	0.26
BASC2 - Daily Living	Daily living skills	-0.12	0.03
BASC2 - Atypicality	Atypical behaviors	0.17	0.37 ^{**}

CSR = most severe clinician severity rating given to child by either parent or child ADIS-C/P interview within either the traditional or atypical anxiety category; SCARED = Screen for Anxiety and Related Emotional Disorders, Parent Report; BASC2 = Behavior Assessment System for Children, Second Edition, Parent Report

*
 $p < .05$,

**
 $p < .01$

Table 3

Atypical fears and anxieties

Atypical anxiety	% Total	Examples from sample
Anxiety around routine, novelty and restricted interests	22	<i>In the absence of generalized worry:</i> Anticipatory worry or fear related to minor changes in routine (e.g., new or aberrant traveling routes); changes in daily schedule; excessive worry about losing access to special interest or about rule-breaking
Unusual specific fears	12	<i>In the absence of a generalized sensitivity to noise or sensory stimuli:</i> Fears of baby crying; coughing; radio jingle; spider webs; happy birthday song; supermarkets; bubbles; balloons; thorns; fire
Social fearfulness	8.5	<i>In youth who lack an awareness of social judgment:</i> somatic symptoms in social settings; frantic efforts to escape and avoid settings where other persons are present; increased self-injurious and aggressive behavior in social settings
Compulsive/ritualistic behavior	8.5	<i>In the absence of clear desire to prevent distress or a feared outcome:</i> Mealtime rituals, verbal rituals, insistence on use of specific phrases, insistence that computers be turned off, doors closed, sleeves rolled down, shoes kept on in car