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Exploring the Symptom Profiles of Intolerance of Uncertainty in Autistic Children

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Abstract

Intolerance of uncertainty (IU) is a multidimensional construct involving maladaptive responses to uncertainty. IU is strongly associated with autism and anxiety, yet no studies have examined its symptom profile in autistic children. This study compares IU symptom profiles in autistic and NT children and in autistic children with and without anxiety using the Intolerance of Uncertainty Scale for Children. Compared to NT peers, autistic children exhibited heightened IU symptoms in all domains, affective, behavioral, and cognitive; affective symptoms had the highest association with autism. Autistic children with anxiety also exhibited elevated IU symptoms in all domains compared to those without anxiety; behavioral IU symptoms had the highest association with anxiety. IU symptom profiles should be considered in assessment and treatment.

Keywords

Autism spectrum disorder; Intolerance of uncertainty; Anxiety

Intolerance of uncertainty (IU) has recently garnered attention as an important clinical and empirical construct (Carleton, 2016). Broadly conceptualized, IU refers to “an incapacity to endure the aversive response triggered by the perceived absence of salient, key, or sufficient

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Declarations

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information" (Carleton, 2016, p. 31) and consists of affective, behavioral, and cognitive symptoms (Bottesi et al., 2020). In studies of neurotypical (NT) individuals, IU increases risk for anxiety disorders and major depressive disorder and has been linked to other psychiatric disorders including obsessive-compulsive disorder, attention-deficit/hyperactivity disorder, and eating disorders (Bijsterbosch et al., 2021; Carleton, 2012; Gramszlo et al., 2017; Mahoney & McEvoy, 2012; Pinciotti et al., 2021). IU has been identified as a National Institute of Mental Health Research Domain Criteria (NIMH RDoC) construct in the negative valence domain and has been implicated as an important treatment target to reduce a range of psychiatric symptoms in NT adults and children (Kendall et al., 2020; Kozak & Cuthbert, 2016; McEvoy & Erceg-Hurn, 2016).

Over the past few years, interest in IU as a treatment target for psychiatric disorders has burgeoned in the autism research community, and IU research in autistic individuals has yielded important findings. The primary measure used to assess IU in these studies is the Intolerance of Uncertainty Scale for Children (IUSC; Comer et al., 2009), which assesses various components of IU such as affective, behavioral, and cognitive symptoms (Jenkinson et al., 2020). Findings in autism show robust associations between IU and core autism characteristics, including sensory over-responsivity and repetitive behaviors (Neil et al., 2016), as well as heightened levels of IU in autistic individuals compared to NT children across the lifespan (Jenkinson et al., 2020; Vasa et al., 2021). Additionally, evidence indicates that IU and anxiety are strongly associated in autistic individuals (Jenkinson et al., 2020), and that IU may be related to other transdiagnostic processes in autism including emotion dysregulation (Cai et al., 2018; Vasa et al., 2018). Preliminary data indicate that IU mediates the relationship between autism and anxiety and predicts response to anxiety intervention in autistic children (Boulter et al., 2014; Keefer et al., 2017). Pilot studies have demonstrated the feasibility of IU interventions for autistic children and adults (Hallett et al., 2020; Rodgers et al., 2019). In these treatments parents are taught to introduce small doses of uncertainty into their child's daily life and to help the child cope by using relaxation and other coping strategies (Hallett et al., 2020; Rodgers et al., 2017). More research is needed to examine the efficacy of this approach and to refine current treatment models.

Despite this growing body of research, no studies have investigated the symptom profiles of IU in autistic children, which may lead to an overly simplified perspective of IU. For the purposes of this paper, the term "symptom profile" refers to differences within IU symptom domains, i.e., affective, behavioral, and cognitive, as well as individual IU symptoms within each domain as measured on the IUSC. Most factor analyses of the IUSC in NT individuals have suggested that IU is primarily characterized by cognitive and behavioral symptoms, i.e., prospective and inhibitory IU (Mahoney & McEvoy, 2012; Norton, 2005; Sexton & Dugas, 2009). Given that psychiatric disorders may present uniquely in autistic individuals compared to NT children, it is likely that the IU symptom profile may also differ between these groups (Pezzimenti et al., 2019; Kerns et al., 2014). Identifying the symptoms of IU that are most distinct to autistic individuals can provide a framework to guide current efforts to develop IU-focused treatments specifically designed for autistic children and adults.

The overarching goal of this study is to explore the symptom profile of IU in autistic children by examining parent responses on the IUSC both at the domain level as well

as the item level within each domain. This project has two specific aims. The first is to investigate which IU symptom domains and which individual IU symptoms are more strongly associated with autistic children compared to NT children. The purpose of this comparison is to evaluate potential differences in IU symptoms at the group level in autistic children (both with and without anxiety) compared to NT children. Based on previous studies reporting an association between IU and emotional dysregulation and the high rates of emotional dysregulation experienced by autistic children, we hypothesize that affective IU symptoms will be the highest rated symptom domain in autistic children compared to NT children. The second aim focuses only on the autistic group and examines which IU domains and symptoms are associated with anxiety compared to no anxiety. The purpose of this comparison is to assess how the presence of anxiety may differentially influence IU symptoms in autistic children. Since there are no previous studies comparing IU in autistic children with and without anxiety, we have no a priori hypotheses for our second aim.

Methods

Participants

The sample consisted of 94 participants, 54 autistic children and 40 NT children. Participants in this study are a subset of children who enrolled in a larger neuroimaging study of motor skill learning in autism that was conducted at a pediatric university-affiliated tertiary-care clinic. The authors have previously published data on IU in this subset of children and found that IU is higher in autistic compared to NT children and is associated with both anxiety and autism (Vasa et al., 2018). Ages ranged from 8.2 to 16.9 years of age.

Methods of the larger study, including participant recruitment, are described elsewhere (e.g., Ament et al., 2015; Marko et al., 2015; Mostofsky et al., 2009). Study eligibility criteria for this study were the same as the original larger study. Children in the autism group were required to meet or exceed published cut-offs on the Autism Diagnostic Observation Schedule (ADOS or ADOS-2; Lord et al., 2002; Lord et al., 2012) and Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994). Children in the NT group could not meet published cutoff criteria for autism on the Social Responsiveness Scale, Second Edition (SRS-2; Constantino & Gruber 2012) or have autistic siblings or parents. Children in both groups were administered either the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV; Wechsler 2004) or the Wechsler Intelligence Scale for Children-Fifth Edition (WISC-5; Wechsler 2014). Children were included if they had a Full Scale IQ (FSIQ) greater than 80 or, if there was a 12-point or greater discrepancy between the index scores, either the Verbal Comprehension Index, Visual Spatial Index, or Fluid Reasoning Index was greater than 80 and the lowest score was greater than 65.

Exclusion criteria for the larger study included (a) history of a definitive neurological disorder (e.g., seizures, tumor, severe head injury, stroke); (b) presence of a severe chronic medical disorder; (c) presence of a major visual impairment; (d) history of alcohol/substance abuse or dependency; or (e) conditions that contraindicated an MRI (cardiac pacemaker, surgical clips in the brain or blood vessels, dental braces, etc.). Autistic children were also excluded if they had a history of known autism etiology (e.g., fragile X syndrome, tuberous sclerosis, phenylketonuria, congenital rubella) or history of documented prenatal/perinatal

insult that could impact neurological or developmental functioning. These criteria were assessed through a telephone screening interview completed with parents as part of the eligibility process.

Developmental and psychiatric diagnoses were also assessed for both groups using maternal and child responses on the Diagnostic Interview for Children and Adolescents (DICA; Reich 2000) or the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Aged Children – Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997). Autistic children were excluded if they showed evidence for meeting criteria for bipolar disorder, conduct disorder, or adjustment disorder, and NT children were excluded if they met criteria for any developmental or psychiatric disorder other than specific phobia.

Measures

Intolerance of Uncertainty Scale for Children (IUSC; Comer et al., 2009). This 27-item rating scale, adapted from the adult IUS (Freeston et al., 1994), was designed to measure the IU construct in children. The IUSC is the most commonly utilized IU measure in NT and autistic children, and both parent and child report versions are available (Jenkinson et al., 2020; Osmanağaoğlu et al., 2018). Although only the parent report version of the IUSC was used in the current analyses, child report measures were also completed as part of the larger study. To support children's ability to complete this measure, the complexity of the 5-point Likert scale was reduced to a 4-point scale (1 = Never true, 2 = Sometimes true, 3 = Almost always true, 4 = Always true). Total scores on this modified version have a possible range of 27 to 108. The same modifications were also made to the parent report version to allow for comparison of the child and parent measures. The modified IUSC scales had good to excellent internal consistency in a sample of autistic children with co-occurring anxiety disorders (IUSC [parent report] $\alpha = 0.96$; Keefer et al., 2017) as well as in the present study (α's = 0.95).

Given that there are no factor analyses of the IUSC in autistic children, the authors chose to divide each IUSC item into one of three symptom domains, affective, behavioral, cognitive, based on the wording of each item (Cai et al., 2018). Items were assigned to the affective domain if they included a word describing an emotional state (9 items), e.g., "anxious," "stress," "upset" or associated mood symptom, e.g., sleep disturbance; to the behavioral domain if they referenced action oriented symptoms (6 items), e.g., "paralyzes", "can't go forward;" and to the cognitive domain if they referenced a belief or general mind set (12 items), e.g., "My child believes…" "Other children seem more certain…" These domains were utilized to frame study findings.

Screen for Childhood Anxiety Related Disorders: Child and Parent Versions (SCARED; Birmaher et al., 1999). The SCARED is a 41-item scale that screens for anxiety symptoms and can be divided into five subscales (Panic Disorder, Generalized Anxiety Disorder, Separation Anxiety Disorder, Social Anxiety Disorder, and School Avoidance). Though the SCARED was developed for NT children, psychometric studies support its use to assess anxiety in autistic children (Lohr et al., 2017; Schiltz & Magnus, 2021). Items are rated using a 3-point Likert Scale (0 = not true or hardly ever true, 1 = somewhat true or

sometimes true, 2 = very true or often true). Parent report was utilized in this study (anxiety cut-off = 25).

Procedure

Parents were given the IUSC and SCARED along with other rating scale measures that were administered as part of the larger study of motor learning. Parents were given the option of completing these two measures onsite or at home. Those that completed the measures at home returned them by mail.

Data Analysis

Demographic differences between the autistic and NT groups were examined using T-tests and chi-square analyses. T-tests were also used to analyze differences in IU symptom domains i.e., affective, behavioral, and cognitive in the full sample of autistic and NT children (Aim 1). To better understand if the IU profiles in the full sample were driven by anxiety, a follow-up analysis using the same approach was conducted comparing IU symptom domains between the autistic children with no anxiety and NT children with no anxiety. T-tests were also used to examine IU symptom domains between autistic children with anxiety versus autistic children without anxiety (Aim 2). Cohen's D was used to quantify if the effect size (ES) of the differences was small (0.2–0.5), medium (0.5–0.8) or large (> 0.8; Cohen 1988).

For both aims 1 and 2, multivariate mixed ANOVA (MANOVA) was then used to examine differences in the pattern of response on individual IUSC items in each domain. If a significant difference in the pattern of response was found, chi-square tests were used to find which items within that domain were different when comparing the two diagnostic groups (autistic children versus NT children; autistic children with anxiety versus autistic children without anxiety). To identify the most elevated of these items, Cramer's V (range 0–1) was used to measure the effect size of these differences (0.0–0.1 little to no association, 0.1–0.3 low association, 0.3–0.5 moderate association, and 0.5–1.0 high association). Higher effect sizes indicate stronger associations between the IUSC item and diagnostic group, i.e., autism or autism and anxiety. P-values were not adjusted for multiple comparisons as this would inflate type II error and potentially mask important differences between the domains and individual symptoms of IU (Perneger, 1998). All analyses were conducted using Stata 15.0 and R (R Core Team, 2014; StataCorp, 2017).

Results

Sample Characteristics

Table 1 presents the sample characteristics. Children in the NT group had higher IQ scores (WISC-IV/WISC-V FSIQ) and also were somewhat younger than children in the autistic group. As expected, anxiety levels (SCARED total score) were elevated in the autistic group compared to the NT group. Among the autistic children 32 had anxiety and 24 did not.

Aim 1: IU domain and symptom-level differences in autistic versus NT children: Full sample and follow-up (no anxiety) analysis.—Table 2 presents

comparisons of total and domain IUSC scores. The total IUSC score was significantly higher in the autistic group compared to the NT group and the effect size of this difference was large. Further, the means of all three symptom domains were significantly higher in the autistic compared to the NT group with large effect sizes. The affective domain had the strongest association with autism. A follow-up analysis comparing autistic and NT children without anxiety (autistic group n = 24, NT group n = 30) was conducted to investigate if the group differences in IU symptom domains were driven by the higher rates of anxiety in the autistic group. These results were highly consistent with those in the full sample indicating a significantly higher total IUSC score and higher symptom domain scores (all $p < 0.001$) in the autistic group with no anxiety compared to the NT group with no anxiety. The affective domain also had the highest effect size in this comparison (Total IUSC ES = 1.54, affective domain ES = 1.44, behavioral domain ES = 1.18, cognitive domain ES = 1.36).

MANOVA analysis indicated differing item level responses on all IU symptom categories: cognitive ($F(12,84) = 4.97$; $p < 0.001$), affective ($F(9,87) = 7.68$; $p < 0.001$) and behavioral ($F(6,91) = 7.53$; $p < 0.001$). Table 3 presents the IUSC item level comparisons for the full sample. Most items (22 out of 27) were significantly elevated in the autistic compared to the NT group. All nine items in the affective and all six items in the behavioral domains were significantly higher in the autistic versus NT groups with moderate to high effect sizes; whereas, seven out of twelve cognitive items were significant in the autistic versus NT groups with moderate to high level effect sizes. No items were elevated in the NT group compared to the autistic group. The six items with the highest associations to the autistic group across all three domains included three affective symptoms, two behavioral items, and one cognitive item. The three affective items were: *Unforeseen events upset my child greatly* ($\chi^2(3) = 30.32$; $p < 0.001$; CramerV = 0.56), *The ambiguities of life stress my child* ($\chi^2(3) = 28.11$; $p < 0.001$; CramerV = 0.54), and *My child's mind can't be relaxed if he/she doesn't know what will happen tomorrow* ($\chi^2(3) = 25.90$; $p < 0.001$; CramerV = 0.51). The two behavioral items were *When my child is uncertain, he/she can't function very well* ($\chi^2(3) = 29.49$; $p < 0.001$; CramerV = 0.55) and *My child tries to get away from all uncertain situations* ($\chi^2(3) = 28.16$; $p < 0.001$; CramerV = 0.54). The cognitive symptom was: *Other children seem to be more certain than my child* ($\chi^2(3) = 35.35$; $p < 0.001$; CramerV = 0.60). Of note, some items with moderate associations to the autistic group included items in the affective domain pertaining to mood (e.g., *IU makes my child's life intolerable* ($\chi^2(3) = 20.28$; $p < 0.001$; CramerV = 0.46), *Uncertainty makes my child unhappy or sad* ($\chi^2(3) = 21.16$; $p < 0.001$; CramerV = 0.46), *Uncertainty keeps my child from sleeping soundly* ($\chi^2(3) = 13.79$; $p = 0.001$; CramerV = 0.38)).

Aim 2: IU domain and symptom-level differences in autistic children with and without anxiety—As shown in Table 2, total IUSC score was significantly ($p < 0.01$) elevated in the autistic children with anxiety group compared to the autistic children without anxiety group, and the effect size was large. The means of all three symptom domains were also significantly higher (all $p < 0.01$) in the autistic children with anxiety group compared to the autistic children without anxiety group with large effect sizes. The behavioral symptom domain had the largest association with the autistic and anxiety group (ES = 0.85) and was the only category with differing item level response patterns using

MANOVA analysis (F (6, 50) = 2.85; p = 0.02). When comparing IUSC items within the behavioral domain, two items had significant ($p < 0.05$) and moderate associations with the autistic group with anxiety: *When my child is uncertain he/she can't function very well* $x^2(3) = 10.12; p = 0.02; CramerV = 0.42)$ and *My child tries to get away from all uncertain situations* ($\chi^2(2) = 10.72; p = 0.005; CramerV = 0.43$).

Discussion

This study is the first to explore the symptom profiles of IU in autistic children, which is important to guide the development of IU based treatments for autistic individuals. Replicating previous work, we found that total IU levels were higher in autistic compared to NT children. Novel findings from this study and pertinent to the first aim, our results showed that all three IU symptom domains, i.e., affective, behavioral, and cognitive, are higher in autistic children compared to NT children. Further, consistent with our hypothesis, affective IU symptoms were the highest symptom domain amongst the three domains. These findings were not driven solely by the higher rates of anxiety in the autistic group as this profile was also observed when comparing symptom domains in autistic and NT children without anxiety. Item level comparisons identified the individual symptoms of IU that were most strongly associated with autism, i.e., increased stress, difficulty relaxing, avoidance of stressors, difficulty functioning in daily life, and less certainty than other children. Other studies in NT adults and children have focused on cognitive and behavioral IU symptoms that include worries about uncertainty (prospective IU) and an inability to act when faced with uncertainty (inhibitory IU; Cornacchio et al., 2018; Mahoney & McEvoy, 2012; Norton, 2005; Sexton & Dugas, 2009). However, this study emphasizes the affective symptoms of IU experienced by autistic children and suggests the importance of carefully considering these symptoms in future studies of IU in this group.

Several hypotheses may explain why IU is uniquely characterized by affective symptoms in autistic individuals. One hypothesis is that some autistic children may become easily dysregulated in response to stressors as indicated by the high rates of dysregulation in autism (Conner et al., 2020). Another possibility is that IU and affective distress co-occur due to common underlying physiological mechanisms such as heightened levels of arousal as assessed by fear-potentiated startle (Chamberlain et al., 2013; Seligowski et al., 2016). Last, the elevated levels of affective symptoms could suggest emerging symptoms of an anxiety or depressive disorder. Children in this sample were in the prepubertal to pubertal age range, 8 to 16 years old, which is a time when risk for anxiety and depressive disorders increases (Beesdo et al., 2009). The IU item level symptoms pertaining to stress, inability to relax, and sleep problems could lead to chronic hyperarousal symptoms associated with anxiety disorders. Similarly, uncertainty that causes unhappy mood and a feeling that life is intolerable could lead to pervasive sadness or anhedonia that is inherent to depression. These nuanced relationships between the affective symptoms of IU and symptoms of psychopathology are speculative and require further study.

Results from our second aim indicate that autistic children with anxiety experience higher levels of IU than autistic children without anxiety and are more likely to react behaviorally when presented with uncertainty, i.e., trying to avoid uncertainty and difficulty functioning,

than autistic children without anxiety. This finding aligns with the clinical features of anxiety, which indicate that anxious individuals often over-rely on avoidance strategies, e.g., distraction, avoiding emotionally triggering stimuli, to regulate emotional states associated with uncertainty (Arnaudova et al., 2017). Although this strategy may assist with reducing immediate distress, it is well-established that avoidance negatively reinforces anxiety and IU (Arnaudova et al., 2017; Flores et al., 2018). Last, one of the two elevated items in the behavioral domain pertains to difficulty functioning. The observed difference in scores may therefore reflect additional impairment associated with the presence of co-occurring anxiety in comparison to children without anxiety.

Despite the prominence of cognitive IU symptoms in factor analyses of the IUSC in NT adults and children, fewer cognitive symptoms were associated with autism compared to the affective and behavioral domains (McEvoy & Mahoney, 2012; Norton, 2005; Sexton & Dugas, 2009). This difference could be due to the fact that some autistic children have difficulty communicating about their cognitive symptoms, and, since these symptoms are primarily internal, their parents are not aware of the full extent of these symptoms. However, behavioral and affective symptoms are more readily observable. Future studies examining child reported IU symptoms are needed to further evaluate this hypothesis.

Taken as a whole, findings from this study have important clinical implications for both assessment and treatment. Although not listed in the DSM-5 criteria for autism spectrum disorder, several studies have now demonstrated IU to be a highly prevalent feature of autism as well as anxiety (American Psychiatric Association, 2013; Boulter et al., 2014, Neil et al., 2016; Vasa et al., 2018). Given the significant affective distress associated with IU and its associated risk for psychopathology, clinicians may want to consider screening for IU when conducting autism evaluations. Although research is needed to validate the IUSC in autistic children, several of the IUSC's questions are clinically relevant and can be used to probe for IU. Based on the findings of this study, clinicians may wish to utilize the six IUSC items with the highest associations with autism to directly assess IU's affective, behavioral, and cognitive symptoms. Positive responses to these items suggest the need for IU-focused intervention as well as careful monitoring of anxiety and mood.

From a treatment standpoint, our findings provide an empirically based framework for designing treatments that target the various symptoms of IU in autistic individuals. Given the prominence of affective symptoms, child IU interventions should target emotion regulation skills including interoceptive awareness, emotion recognition, and relaxation to reduce distress when facing uncertainty (Conner et al., 2019; Weiss et al., 2018). Some autistic children with high levels of affective IU symptoms may also benefit from mindfulness based activities and practicing distress tolerance skills, such as those utilized in dialectical behavior therapy (Neacsiu et al., 2014; Semple, 2019). Cognitive based strategies such as cognitive restructuring that directly target maladaptive beliefs about uncertainty, e.g., that uncertainty always leads to negative outcomes, might also be helpful if these symptoms are contributing to the child's distress (Wenzel, 2017). Notably, these strategies often require some adaptation to be effective with autistic children.

IU interventions for autistic children with anxiety should also directly target avoidance given its role in maintaining both anxiety and IU (Arnaudova et al., 2017; Flores et al., 2018). The inclusion of exposure is critical to teach autistic children how to systematically approach rather than avoid uncertain situations. Furthermore, parents would also benefit from learning about the chronic stress of uncertainty on their child and strategies to increase predictability (e.g., visual schedules, warnings for impending changes and transitions). Parent training regarding the negative impact of avoidance and how to help autistic children to face small amounts of uncertainty may also be helpful.

This study has several limitations. Although the IUSC is the primary measure utilized in studies of IU in autistic children, its psychometrics have never been studied in this group. Studies examining its validity and reliability in this population are needed, and factor analyses would offer additional insights into the latent structure of IU in autistic children. Additionally, this study included children who did not have any major neurologic or psychiatric illnesses, other than anxiety disorder, and had cognitively average or above average capacities, which limits the generalizability of findings to children with more complex presentations. Comparison of the IU symptom profiles of autistic and NT children with anxiety is also needed to understand specific features of IU that could be associated with anxiety. In future work, developing alternative IU evaluation methods such as behavioral paradigms and other objective assessment methods are needed to include children who may have limited capacity to verbally communicate their experiences of IU. These measures could also be useful in future experimental studies examining cognitive and emotional processes associated with IU in autistic individuals. Despite the various limitations, this study provides an important initial foray into the symptom profiles of IU in autistic individuals. The findings offer a deeper understanding of IU and emphasize the need to consider IU as a multidimensional construct in future studies and how affective symptoms associated with IU may have potential relevance for early intervention and treatment of psychopathology in autistic children.

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Table 1

Sample Characteristics

	All	Autism	No Autism	p
	N = 94	***N = 56***	***N = 38***	
Anxiety:				0.001
No	54 (57.4%)	24 (42.9%)	30 (78.9%)	
Yes	40 (42.6%)	32 (57.1%)	8 (21.1%)	
VCI*	110 (16.8)	103 (17.7)	119 (9.3)	< 0.001
PRI**	107 (13.3)	104 (14.0)	112 (10.6)	0.003
FSIQ***	105 (16.0)	98.6 (15.5)	115 (10.7)	< 0.001
Sex:				0.410
F	15 (16.0%)	7 (12.5%)	8 (21.1%)	
M	79 (84.0%)	49 (87.5%)	30 (78.9%)	
Age (years)	10.8 (1.8)	11.3 (2.0)	10.1 (1.1)	< 0.001
SCARED****	27.7 (22.2)	35.1 (23.1)	16.8 (15.5)	< 0.001

*Verbal Comprehension Index

**Perceptual Reasoning Index (WISC-IV) or Mean of the Fluid Reasoning Index and Visual Spatial Index (WISC-V)

***Full Scale IQ

****Screen for Child Anxiety Related Disorders

Table 2

IU Symptom Domain Comparison[†]

	Full Sample[**]			Autism[*]		
	Autism	**Neuro-typical**	**Effect Size**	**Anxiety**	**No Anxiety**	**Effect Size**
	N = 56	***N = 38***		***N = 32***	***N = 2***	
	M (SD)	**M (SD)**		**M (SD)**	**M (SD)**	
IUSC[^] Total	47.0 (10.4)	33.6 (6.3)	1.45	50.7 (10.0)	42.2 (8.9)	0.89
IUSC Domains						
Affective	17.4 (4.8)	11.5 (2.6)	1.39	18.9 (4.8)	15.3 (4.0)	0.80
Behavior	10.2 (2.9)	6.97 (1.7)	1.22	11.2 (2.9)	8.88 (2.4)	0.85
Cognitive	20.0 (4.5)	15.1 (2.9)	1.22	21.3 (4.6)	18.2 (3.7)	0.73

[†] T-tests utilized for comparisons

[^] *Intolerance of Uncertainty Scale for Children*

[*] = all $p < 0.01$

[**] = all $p < 0.001$

Table 3

Item Level Comparisons on the IUSC^

Domain		Sample	Full sample Effect Size† Autism vs. Neurotypical	Autism group only Effec† Sizef Anxiety vs. No Anxiety
Affective	3	Uncertainty makes my child's life intolerable	0.46***	
	5	My child's mind can't be relaxed if he/she doesn't know what will happen tomorrow	q ***	
	6	Uncertainty makes my child uneasy, anxious, or stressed	0.33*	
	7	Unforeseen events upset my child greatly	0.56***	
	8	It frustrates my child to not have all the information he/she needs in a situation	0.45***	
	17	Uncertainty makes my child unhappy or sad	0.46***	
	19	My child can't stand being taken by surprise	0.46***	
	24	Uncertainty keeps my child from sleeping soundly	0.38***	
	26	The ambiguities of life stress my child	0.54***	
Behavior	9	Uncertainty keeps my child from living a full life	0.43***	0.29 *NS*
	12	When it's time to act, uncertainty paralyzes my child	0.35**	0.22 *NS*
	14	When my child is uncertain he/she can't go forward	0.43***	0.30 *NS*
	15	When my child is uncertain he/she can't function very well	Q ^***	0.42*
	20	The smallest doubt can stop my child from acting	041***	0.31 *NS*
	25	My child tries to get away from all uncertain situations	0.54***	0.43**
Cognitive	1	Uncertainty stops my child from having strong opinions	0.28*	
	2	My child believes that being uncertain means one is mixed-up	0.33*	
	4	My child thinks it's unfair that we can't predict the future	0.34**	
	10	My child believes that one should always look ahead so as to avoid surprises	0.21*NS*	
	11	My child believes that a small unforeseen event can spoil everything, even with the best planning	0 40***	
	13	My child believes that being uncertain means that he/she is not first rate	0.28 *NS*	
	16	Other children seem to be more certain than my child	0.60***	
	18	My child always wants to know what the future has in store for him/her	0.36**	

J Autism Dev Disord. Author manuscript; available in PMC 2024 February 16.

Domain		Sample	Full sample Effect Size† Autism vs. Neurotypical	Autism group only Effec† Sizef Anxiety vs. No Anxiety
	21	My child feels as though he/she should be able to organize everything in advance	0.20 *NS*	
	22	My child feels as though being uncertain means that he/she lacks confidence	0.21 *NS*	
	23	My child feels as though it's unfair that other people seem to be sure about their future	0.22 *NS*	
	27	My child can't stand being undecided about the future.	0.34 ***	
Not significant		Significant - mild ES (0.1–0.3)	**Significant - moderate ES (0.3–0.5)**	**Significant - high ES (>0.5)**

^ *Intolerance of Uncertainty Scale for Children*

† Cramer's V (effect size) indicating association with autism in full sample analysis and anxiety in autism group analysis

NS =Not Significant ($p > 0.05$)

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$