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UNIVERSITY OF CALIFORNIA

Los Angeles

The Construct Validity of Anxiety Disorders in Children

with Autism Spectrum Disorder

A thesis submitted in partial satisfaction

of the requirements for the degree Master of Arts

in Education

by

Patricia Ann Renno

2013

ABSTRACT OF THE THESIS

The Construct Validity of Anxiety Disorders in Children

with Autism Spectrum Disorder

by

Patricia Ann Renno

Master of Arts in Education

University of California, Los Angeles, 2013

Professor Jeffrey J. Wood, Chair

The literature indicates that children with Autism Spectrum Disorder (ASD) are at a heightened risk for developing anxiety disorders. Between 11% and 84% of individuals with ASD are also diagnosed with a co-occurring anxiety disorder (Muris, 1998; de Bruin et al., 2007; Green et al., 2000; Simonoff et al., 2008; Sukhodolsky et al., 2007). Despite the high frequency of co-occurrence, little research has investigated the validity of the DSM-IV Anxiety Disorder classification system in the ASD population. The present study examined 85 children, aged 7-11, with ASD and anxiety. A multitrait- (social phobia, separation anxiety disorder, and total anxiety) multimethod (self, parent, and diagnostician report) analysis was examined. Results from confirmatory factor analysis (CFA) suggest good convergent and discriminant validity for social phobia, separation anxiety disorder, and

total anxiety severity. These findings provide preliminary evidence for the construct

validity of the current classification system for anxiety disorders in children with ASD.

The thesis of Patricia Ann Renno is approved.

Connie Kasari

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2013

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Children with autism spectrum disorder (ASD) are at a heightened risk for developing anxiety disorders. While anxiety disorders are one of the most prevalent childhood psychiatric disorders in typically developing children, affecting 10% of elementary-aged children, rates are even higher in children with ASD (Craske & Zucker, 2002). Between 30% and 84% of children with ASD are also diagnosed with a co-occurring anxiety disorder (Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998; de Bruin, Ferdinand, Meester, Nijs, & Verheij, 2007; Green, Gilchrist, Burton, & Cox, 2000; Simonoff et al., 2008; Sukhodolsky, Scahill, Woods, Piacentini & Walkup, 2007). Muris and colleagues (1998) found that in a sample of children with ASD, 84% had at least one concurrent anxiety disorder. Other studies have noted the high prevalence of anxiety in individuals with high functioning autism, Asperger's syndrome, and pervasive developmental disorder-not otherwise specified (PDD-NOS), making it one of the most frequent conditions in children with ASD (Simonoff et al., 2008; Green et al., 2000; Sukhodolsky et al., 2007). Additionally, anxiety in children with ASD has been associated with greater impairments in social responsiveness (Sukhodolsky et al., 2008), social skills deficits (Bellini, 2004), repetitive behaviors (Sukhodolsky et al., 2008), and total ASD symptoms (Kelly et al., 2008). Furthermore, parents rate anxiety as one of the greatest problems for their children with ASD (Mills & Wing, 2005).

Although anxiety disorders occur in the ASD population more frequently than in the typically developing population and potentially worsen ASD symptoms, researchers are still unsure of the relation between anxiety disorders and ASD. Common to all psychiatric symptoms in the ASD population, considerable controversy exists over whether "true" psychiatric syndromes occur in the ASD population or if they are part of the ASD diathesis

or predisposition (Gadow, DeVincent, & Pomeroy, 2006; White, & Roberson-Nay, 2009; Gillot, Furniss, & Walter, 2001; Green et al. 2000; Lecavalier, Gadow, DeVincent, & Edwards, 2009; Muris et al., 1998; Wood & Gadow, 2010). Four hypotheses describing the relationship between ASD and anxiety have been proposed (Wood & Gadow, 2010). The first hypothesis proposes true comorbidity of anxiety and ASD indicating that anxiety experienced by children with ASD is phenotypically and etiologically identical to anxiety disorders that occur in typically developing children. This would indicate that anxiety symptoms in children with ASD would match features of anxiety disorders as defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; APA 2000). The second hypothesis suggests true anxiety may be altered by ASD resulting in a variant of anxiety unique to ASD. Anxiety altered by ASD would indicate that psychobiogenic variables, associated with the origin and development of ASD, alter true anxiety creating a different syndrome unique to ASD. A third hypothesis indicates anxiety as a symptom of ASD in certain subtypes of ASD. In this case, anxiety as a proxy of ASD symptoms would indicate anxiety as a symptom of ASD in a subgroup of children with ASD. The fourth hypothesis suggests false comorbidity (Wood & Gadow, 2010). False comorbidity would occur from inaccurate differential diagnoses of anxiety and ASD.

The purpose of the current study is to further clarify the relation between anxiety and ASD by testing the true comorbidity hypothesis (hypothesis one) against the false comorbidity hypothesis (hypothesis four). Due to limited understanding in the current literature on the origins and development of anxiety disorder in typically developing children and children with ASD, it is most reasonable to examine these two hypotheses at this time. One way of providing support for a comparable anxiety syndrome in children

with ASD (true comorbidity) as is seen in typically developing children, is by examining the construct validity of the current DSM-IV anxiety classification system in children with ASD. Little, if any, research has been conducted on evaluating the construct validity of the current classification system in this population (Witwer & Lecavalier, 2010). Campbell and Fiske (1959) indicate construct validity is determined by convergent and discriminant validity. Convergent validity is the degree to which different methods of measuring the same trait correspond with each other. For example, parent and diagnostician reports of separation anxiety disorder that correspond with each other would have good convergent validity. Discriminant validity is the degree to which traits have independent unique variances. For example, ratings of separation anxiety disorder and social phobia, which may be somewhat related, but still have unique independent variances would show good discriminant validity. If anxiety in children with ASD occurs similarly as in typically developing children, independent raters will agree on manifestations of anxiety in the ASD population as independent raters agree on anxiety disorders in the typically developing population (convergent validity). Additionally, anxiety disorders will cluster into the established anxiety disorders in the ASD population as they have been found to cluster in the typically developing population (discriminant validity).

Recent research in typically developing children has shown evidence for the construct validity of the current DSM-IV anxiety disorder classification system. Children with anxiety disorders can be reliably distinguished from children without anxiety disorders (Silverman, Saavedra & Pina, 2001; Tracey, Chorpita, Douben & Barlow, 1997; Silverman & Nelles, 1988). Additionally, certain anxiety disorders can be distinguished from others. Langer and colleagues (2010) used a multitrait-multimethod (MTMM)

analysis, which supported the DSM-IV classification system for social phobia, separation anxiety disorder, generalized anxiety disorder, and panic disorder. The authors found discriminant validity for social phobia, separation anxiety disorder, generalized anxiety disorder, and panic disorder, as well as convergent validity for each disorder among the different raters (self, parent, clinician), which supports the current DSM-IV classification system.

Preliminary studies of the construct validity of psychiatric disorders in the ASD population are currently being conducted. While to our knowledge no studies have examined the construct validity of separation anxiety disorder and social phobia in the ASD population using a multitrait-multimethod analysis, studies in the literature have begun to examine the validity of DSM-IV disorders in the ASD population. Gadow and colleagues (2005) examined the DSM-IV attention deficit hyperactivity disorder (ADHD) classification system in children with Pervasive Developmental Disorder (PDD). The authors compared two samples of children, one PDD sample and one non-PDD sample, on ADHD behaviors. They also looked at differences between children in the PDD sample with and without ADHD behaviors. The authors found preliminary evidence for ADHD as the same disorder in the PDD and non-PDD populations, which suggests ADHD is a "true" clinical syndrome in children with PDD. Furthermore, confirmatory factor analysis conducted by Lecavalier and colleagues (2009) supported the construct validity of ADHD, oppositional defiant disorder, generalized anxiety disorder, and depression in the ASD population, based on parent and teacher measures.

Previous studies have demonstrated a mix of findings regarding anxiety symptom agreement from multiple methods. Teachers have rated anxiety symptoms as more severe

than mothers in children with ASD (Weisbrot et al., 2005; Gadow et al., 2005). Additionally, White and Roberson-Nay found little correlation between parent and child reports of anxiety in children with ASD. In contrast to these findings, however, Farrugia and Hudson (2006) found that self-reports of anxiety in children with HFA did correlate with the parent reports.

Varying accounts of anxiety in children with ASD may be partially due to difficulties in measuring anxiety in children with ASD because of the wide variability of ASD symptomatology (Bellini, 2004). Some symptoms of anxiety and ASD may appear similar and be hard to distinguish. For example, social avoidance in children could reflect social anxiety or ASD-related deficits in social interaction (Wood & Gadow, 2010). Further, it may be difficult to distinguish between repetitive compulsions symptomatic of obsessive compulsive disorder and repetitive behaviors characteristic of ASD.   Due to a paucity of research on psychometrically valid measures of anxiety in individuals with ASD, researchers are largely using measures of anxiety commonly used in the typically developing population that have not been validated in the ASD population (White & Roberson-Nay, 2009).   It is unclear whether these measures are accurately assessing levels of anxiety in this population or symptoms of ASD (White & Roberson-Nay, 2009).

Due to the high prevalence of anxiety in children with ASD, it is imperative to resolve whether anxiety experienced by these children reflects "true anxiety" as experienced by typically developing children versus false differential diagnoses. The DSM-IV anxiety classification system is largely used for children with ASD in research and clinical settings; however, the validity of this diagnostic system in the ASD population needs to be investigated. The present study will examine 85 children, aged 7-11, referred

to a cognitive behavioral therapy study for children with high functioning autism and anxiety. We employed a multitrait- (social phobia, separation anxiety disorder and total anxiety) multi-method (self, parent, clinician report) analysis to examine the construct validity of social phobia, separation anxiety disorder, and total anxiety severity in children with ASD.

Methods

Participants

The sample included 85 children (60 males, 25 females), aged 7-11 years old and their primary parent (defined as parent who was primarily responsible for overseeing child's daily activities). The mean age of the child sample was 9.29 (S.D.= 1.65). The sample was 52% Caucasian, 19% mixed/other, 13% Asian, 13% Latino, and 3.5% African American. In addition, 64% of the primary parents had graduated from college and 84% of the families had an income of over $40,000 a year.

Participants were recruited for a randomized controlled trial (RCT) to examine the efficacy of 16 weeks of modified cognitive behavioral therapy to treat anxiety disorders in children with ASD (Wood et al., 2009). All families that participated in the intake assessment of the Wood et al. RCT were included in this sample. Children with ASD and anxiety were referred to the study by a medical center-based autism clinic, parent support groups, school personnel, and regional centers. Participants had an IQ > 70. This study was approved by the UCLA Institutional Review Board. Participants were assented and consented in accordance with the UCLA Institutional Review Board.

Measures

ASD measures

Autism Diagnostic Interview – Revised (ADI-R; Le Couteur et al., 2003) The ADI-R is a standardized parent interview with well-established psychometric properties in ASD samples (Lecavalier et al., 2006). It is aimed at obtaining detailed descriptions of child behaviors associated with the diagnostic criteria for ASD. The focus of the interview is on the three main areas affected by ASD: reciprocal social interaction, communication and language, and repetitive, restricted and stereotyped behaviors.

Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2002*)* The ADOS is a semi-structured child interview assessing the child's level of social and communication functioning. It has well-established psychometric properties in ASD samples (Lord et al., 2000). The interviewer provides a variety of social presses to elicit certain behaviors relevant to the diagnosis of ASD. The current study used Module 3, which is designed for individuals who are verbally fluent.

Anxiety measures

Anxiety Disorders Interview Schedule for DSM-IV – Child and Parent (ADIS C/P; Silverman & Albano, 1996) The ADIS is a semi-structured interview done separately with the child and parent in order to assess the child's level of anxiety with regard to several different anxiety disorders. The ADIS has very favorable psychometric properties (Wood et al., 2002) in the typically developing population with preliminary evidence for acceptable psychometric properties in ASD (Wood et al., 2009a, b). From the interview, the Clinician's Severity Rating (CSR) scores are generated ranging from 0 to 8 (with higher scores representing more anxiety) for each anxiety disorder diagnosis. A severity score of 4 or greater is deemed as clinically significant. The current study uses each participant's highest

anxiety diagnosis CSR score, number of clinically significant anxiety disorders, social phobia CSR score, and separation anxiety disorder CSR score.

Multidimensional Anxiety Scale for Children – Child and Parent (MASC C/P; March, 1998) The MASC is a 39-item paper and pencil measures where children and parents rate the child's level of anxiety on a 4-point Likert scale. The MASC is composed of four subscales (physical symptoms, social anxiety symptoms, harm/avoidance, and separation/panic). The current study used total scores as well as the parent and child separation/panic and social anxiety subscale scores. The MASC has robust psychometric properties (March, Parker, Sullivan, Stallings, & Conners, 1997) in typically developing samples and has been used in ASD samples (Bellini, 2004). Alphas on the MASC-C were .85 for the total anxiety scale, .70 for the separation/panic subscale, and .82 for the social anxiety subscale. Alphas on the MASC-P were .88 for the total anxiety scale, .72 for the separation/panic subscale, and .85 for the social anxiety subscale.

Procedure

Research staff contacted families that had called the study phone line and conducted an initial phone screen with the primary caregiver to determine child's age, prior ASD diagnosis, symptoms of anxiety or shyness, and IQ. If the child met inclusion criteria based on the phone screen questions previously described, families were invited to participate in the intake evaluation. The intake evaluation was conducted over two appointments. Study staff conducted an ASD assessment at the first appointment and an anxiety assessment at the second appointment. 240 families were phone screened and 85 families participated in the intake evaluation. The Multidimensional Anxiety Scale for Children-Parent Version (MASC-P) was mailed to parents to complete and return at the intake evaluation. Primary

caregivers either brought the form completed or completed it at the evaluation. Children completed the Multidimensional Anxiety Scale for Children-Child Version (MASC-C) with a research assistant at the intake evaluation.

Trained doctoral students and clinical psychologists administered the Autism Diagnostic Observation Schedule (ADOS), the Autism Diagnostic Interview-revised (ADI-R), and the Anxiety Diagnostic Interview Schedule for DSM-IV – Child and Parent (ADIS C/P). The doctoral students and clinical psychologists received appropriate training and certification in administration of the ADOS and ADI-R. The ADIS training consisted of a presentation on the administration of the interview, observation and coding of a videotaped interview, co-rating multiple live interviews, and conducting one interview under the supervision of a trained diagnostician. Additionally, the diagnostic team reviewed 15 percent of the ADIS assessments to ensure inter-rater reliability. The agreement between clinician and the diagnostic team severity ratings (intraclass correlations: social phobia, .86; separation anxiety disorder, .76) and diagnoses (kappas: social phobia, .84; separation anxiety disorder, .86) was adequate. Research staff completed both parent and child interviews individually in private rooms in the Graduate School of Education building at UCLA. Participants received a $20 -dollar honorarium for participating in the intake assessment.

Analysis

A multitrait (social phobia, separation anxiety disorder, total anxiety severity) mulitimethod (self, parent, clinician report) analysis was used to examine the construct validity of social phobia and separation anxiety disorder in children with ASD. While the MTMM approach described by Campbell and Fiske (1959) does allow for simultaneous

evaluation of convergent and discriminant validity, limitations, such as the subjective nature of correlation interpretation as well as the reliance on correlations and observed data, have been suggested (Byrne, 1994). Confirmatory factor analysis (CFA) an application of structural equation modeling (SEM) addresses the concerns by analyzing the trait and method factors as latent variables and constructing clear hypothesis tests to demonstrate convergent and discriminant validity. In addition to social phobia and separation anxiety disorder, generalized anxiety disorder was originally proposed as an additional trait. However, no good measure of generalized anxiety disorder was available at this time. Instead a total anxiety severity trait was analyzed in addition to the two anxiety disorders. The clinician's ADIS CSR scores of social phobia and separation anxiety disorder were used as indicators of social phobia and separation anxiety disorder. Additionally, the MASC subscales for social phobia and separation anxiety disorder were used as indicators for social phobia and separation anxiety disorder for parent and child. The clinician's report of total anxiety was operationalized as a composite of the child's total number of anxiety disorders and highest severity score of an anxiety disorder. The total raw scores on the MASC-P and MASC-C were used as indicators for parent and child's total anxiety.

Data were analyzed using EQS version 6.2 (Bentler, 2006). Data were checked for outliers and was normally distributed. All subjects were used regardless of missing data. Rates of missing data varied from 14% missing on the MASC-P, 18% missing on the MASC-C, and 31% missing on diagnostician ADIS CSR scores. Values for missing data were imputed using the Maximum Likelihood function in EQS.

A series of models were constructed to test for construct validity as described by Byrne (1994). Model 1, the least restrictive of the models, allowed for method and trait factors to freely correlate (see Model 1). Model 2 contained correlated method factors and no trait factors. Model 3 contained perfectly correlated trait factors and freely correlated method factors. Lastly, Model 4 was composed of freely correlated trait factors and perfectly correlated method factors. Through comparisons of Models 2, 3, and 4 to the least restrictive Model 1, we can determine if there is evidence for construct validity. A significant difference in model fit between Model 1 (with the trait factors) and Model 2 (with no trait factors) would indicate evidence of convergent validity. Discriminant validity of traits would be determined through comparison of Model 1 (with freely correlated traits) and Model 3 (with traits perfectly correlated). Lastly, discriminant validity of methods is determined through comparison of Model 1 (with freely correlated methods) and Model 4 (with perfectly correlated methods).

Results

Results of the correlation analysis showed preliminary evidence of convergent and discriminant validity (see table 1). Table 2 displays summary results from the goodness-of-fit indexes for the four models that were examined. Model 1, the least restrictive of the models demonstrated the best fit with a Comparative Fit Index (CFI) of .996 and a Normed Fit Index of .942. Model 2, the model with no trait factors, showed the worst fit with a CFI of .784 and a NFI of .720. Model 3, with perfectly correlated traits and freely correlated methods, showed good fit with a CFI of .980 and a NFI of .920; however, Model 3 still had poorer fit than Model 1. Lastly Model 4, with freely correlated traits and perfectly correlated methods, had a CFI of .894 and a NFI of .845, demonstrating poor model fit.

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Model comparisons, based on chi-square differences and degrees of freedom were examined to determine convergent and discriminant validity. A summary of model comparisons is displayed in table 3. A significant chi-square difference between models 1 and 2 was found (p< .0001). Model 1 with freely correlated traits fit significantly better than model 2 with no trait factors demonstrating evidence for convergent validity. Additionally, significant chi-square differences between models 1 and 3 demonstrated evidence for discriminant trait validity (p< .05). The model fit significantly better when traits freely correlated with each other than when they were perfectly correlated with each other. Lastly, significant chi-square differences between models 1 and 4 demonstrated discriminance among the methods, signifying that unique information was gathered from each of the methods.

Discussion

Due to the high percentages of children with ASD and anxiety disorders, it is imperative to resolve whether symptoms of anxiety represent "true anxiety" or are the result of incorrect different diagnoses between ASD symptoms and anxiety symptoms. These findings provide preliminary support for true comorbidity, such that anxiety disorders that occur in children with ASD are the same as those that occur in typically developing children. These findings suggest that anxiety disorders clump similarly in the ASD population as in the typically developing population (discriminant validity) and that independent raters agree on manifestations of anxiety similarly as in the typically developing population (convergent validity; Langer et al., 2010). Through evidence of convergent and discriminant validity, these findings suggest preliminary evidence for the construct validity of social phobia and separation anxiety disorder in children with ASD.

Additionally, they support the use of the current DSM IV anxiety disorder classification system in ASD population. While the DSM-IV anxiety classification system is largely used for children with ASD in research and clinical settings, the validity of this diagnostic system in this population had not yet been established.

Our findings suggested strong evidence of convergent validity among diagnostician, parent, and child report, with a large difference in model comparisons. This was particularly interesting due to many findings in the literature that have not found self reports of anxiety in ASD samples to correspond well with parent and diagnostician reports. Although our discriminant validity findings were significant, there was not as large of a difference in model comparisons. In part, this is due to the large amount of shared variance between the separate anxiety disorders. For example, all traits in our model were related to anxiety, while other models, which include more varied traits such as externalizing behaviors, anxiety, and depression, would show stronger discriminant validity. Future studies should be conducted to verify our findings of discriminant validity.

These findings also have significant treatment implications. Childhood anxiety disorders are among the most treatable mental health disorders in typically developing children, and successful interventions could likely be modified in the treatment of anxiety in children with ASD. The extant literature of anxiety disorders in typically developing children can be used to further our understanding of anxiety in children with ASD. Unfortunately, at this time, we did not have good measures of other DSM-IV anxiety disorders to include in this analysis. Further research should examine the construct validity of other anxiety disorders, such as Panic Disorder (PD) and Generalized Anxiety Disorder (GAD), in the ASD population.

Figure 1:

Main Model (freely correlated traits and methods)
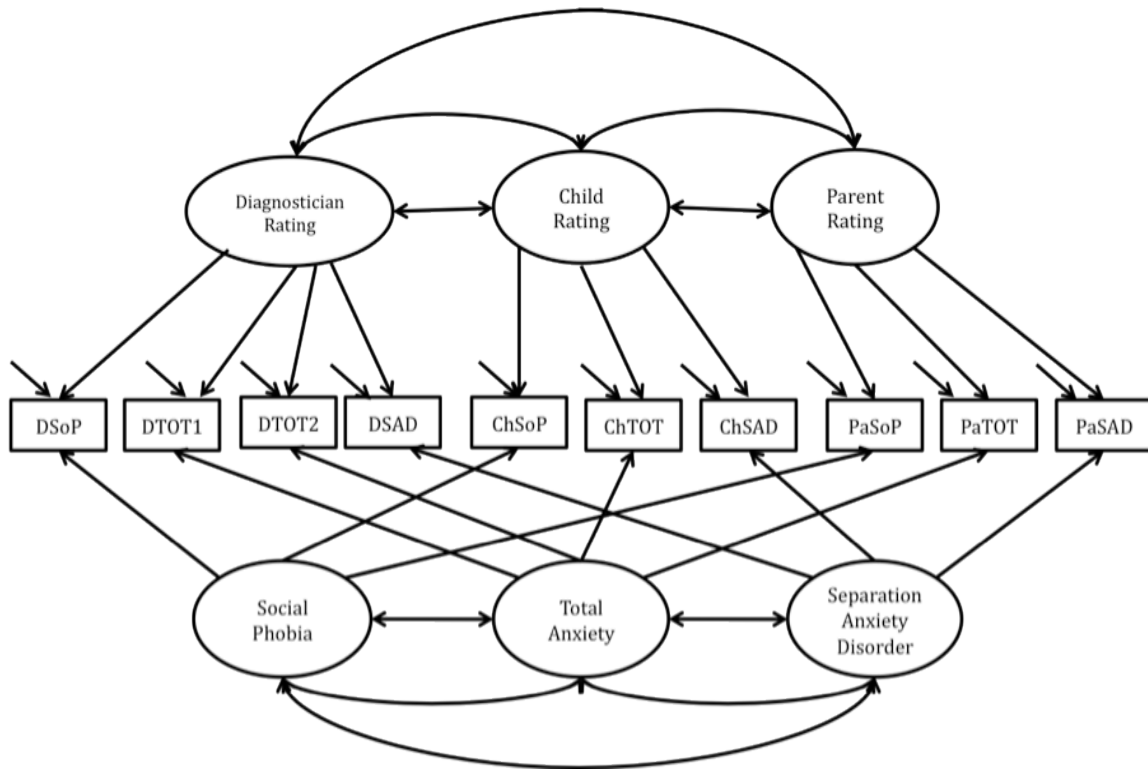
Note: DSoP Diagnostian CSR rating of social phobia, DTotAnx1 Total Anxiety from number of anxiety disorders, DTotAnx2 Total Anxiety from highest severity rating of anxiety disorder, DSAD Diagnostician CSR rating of separation anxiety disorder, ChSoP Child rating of social phobia, ChTOT Child rating of total anxiety severity, ChSAD Child rating of separation anxiety disorder, PaSoP Parent rating of social phobia, PaTOT Parent rating of total anxiety severity, PaSAD Parent rating of separation anxiety disorder

Table 1

Multitrait-Multimethod Correlation Matrix of study measures

	DSoP	DSAD	DTot Anx1	DTot Anx2	PaSoP	PaSAD	PaTot Anx	ChSoP	ChSAD	ChTot Anx
DSoP	1									
DSAD	-.010	1								
DTotAnx1	.104	.652**	1							
DTotAnx2	.299*	.420**	.462**	1						
PaSoP	.177	.071	.091	.003	1					
PaSAD	.106	.584**	.359**	.285*	.244*	1				
PaTotAnx	.140	.451**	.343**	.305*	.579**	.804**	1			
ChSoP	.092	.060	.105	.103	.064	.065	.100	1		
ChSAD	.095	.467**	.383**	.372**	-.019	.502**	.305**	.429**	1	
ChTotAnx	.045	.329**	.313**	.310*	-.055	.276*	.169	.766**	.729**	1
Mean	4.36	3.57	2.54	5.24	19.53	17.2	73.12	13.84	13.30	60.64
SD	1.23	2.00	.96	.63	5.43	5.50	14.58	6.54	5.105	17.51

Note: SD Standard deviation, SoP Social Phobia, SAD Separation Anxiety Disorder, TotAnx1

Total Anxiety from number of anxiety disorders, TotAnx2 Total Anxiety from highest severity

rating of anxiety disorder

*$p < .05$, **$p < .01$*

Table 2

Summary of Goodness-of-Fit Indexes for MTMM models

Model	χ^2	df	CFI	NFI
1 Freely correlated traits, freely correlated methods	20.139	19	.996	.942
2 No traits, freely correlated methods	97.758	32	.784	.720
3 Perfectly correlated trait, freely correlated methods	28.00	22	.980	.920
4 Freely correlated traits, perfectly correlated methods	54.288	22	.894	.845

Note: CFI Comparative fit index; NFI Normed fit index

Table 3

Differential Goodness-of –Fit Indices for MTMM Model Comparisons

Model Comparisons	Δ χ²	Δ *df*	P-value	Δ CFI	Δ NFI
Test of Convergent validity					
Model 1 vs. Model 2 (traits)	77.619	13	<.0001	.212	.222
Test of Discriminant validity					
Model 1 vs. Model 3 (traits)	7.861	3	<.05	.016	.022
Model 1 vs. Model 4 (methods)	34.149	3	<.0001	.102	.097

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