PARENTING STRESS AND PARENT- AND CLINICIAN-RATED MEASURES OF AUTISM SPECTRUM DISORDER SYMPTOMS

by

COURTNEY ANN PAISLEY

THEODORE S. TOMENY, CHAIR
SARAH M. RYAN
ROBIN McWILLIAM

A THESIS

Submitted in partial fulfillment of the requirements for the degree of
Master of Arts in the Department of Psychology in the Graduate
School of The University of Alabama

TUSCALOOSA, ALABAMA

2018

ABSTRACT

Parents of children with autism spectrum disorder (ASD) report higher levels of stress than do parents of typically developing (TD) children and children with other developmental disabilities (DD). Parenting stress has been linked to low quality of life and is thought to affect the parent-child relationship. Throughout the diagnostic process, both parents and clinicians typically act as informants or raters of a child's symptoms and behaviors. Research indicates that parents' perceptions and understanding of their child's symptoms may be influenced by their stress levels. Therefore, because parents' stress may influence their report of their child's characteristics, it is essential to understand if and how parenting stress impacts the level of agreement between clinician and parent ratings, particularly when assessing for ASD symptom severity. This study examined the relation between parent- and clinician-rated ASD symptom severity as a function of parenting stress in a sample of children with and without ASD. Additionally, this study examined the potential influence of child restrictive and repetitive behaviors (RRBs) and age on the relation between raters of ASD symptom severity. Results indicated no relation between parent- and clinician-rated ASD symptom severity and a negative relation between parenting stress and clinician-rated ASD symptoms. Interactions between predictor variables were also examined. Overall, results demonstrate the complexity of parents' stress levels and their perception of their child's symptom severity that might play a role in the relation between raters. Future research should aim to shed more light on parental factors other than stress, such as parent knowledge, that may play a role in the diagnostic process.

LIST OF ABBREVIATIONS AND SYMBOLS

α	Cronbach's index of internal consistency
B	Beta coefficients: the estimates resulting from a regression analysis
f^2	Cohen's f^2*:* standardized measure of effect size
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
N	Total sample size
n	Subset sample size
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation: a measure of the strength of the linear relationship between two variables
R^2	Explained variation
ΔR^2	Change in variance explained
SD	Standard Deviation: the amount of variation or dispersion of a set of data values
<	Less than
=	Equal to

ACKNOWLEDGEMENTS

I would like to thank the committee members, Dr. Theodore Tomeny, Dr. Sarah Ryan and Dr. Robin McWilliam for their support, guidance and input on this project. I would especially like to thank Dr. Theodore Tomeny for his encouragement, expertise and patience throughout the duration of this project. I would like to thank the current and former staff at The University of Alabama Autism Spectrum Disorders Clinic for allowing me the opportunity collaborate on this research. Specifically, I would like to thank Debbie Koffman for her organizational and moral support. I would also like to thank my labmates, Lorien Baker, Sophia Eldred, and James Rankin, for their never-ending support, assistance in organizing the database used for the current study, as well as the undergraduate research assistants for their assistance in data entry. Lastly, this project would not have been possible without the support of my family, friends and fellow graduate students.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and restrictive and repetitive behaviors and interests (RRBs; American Psychiatric Association, 2013). Specifically, individuals diagnosed with ASD have persistent difficulties interacting and communicating with others across environmental contexts (i.e. home, school, community) with signs often observed between the ages of 18 months and 2 years of age (Siegel, Pliner, Eschler, & Elliot, 1988). Symptom severity ranges from mild to severe and varies in the level of impact on a child's day-to-day functioning. Furthermore, individuals with ASD are at a heightened risk for comorbid psychiatric disorders compared to typically developing (TD) children, with up to 70% of children with ASD receiving a diagnosis of one comorbid psychiatric disorder and 41% receiving a diagnosis of two or more additional disorders (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Siminoff, Pickles, Charman, Chandler, Loucas, & Baird, 2008). Additionally, children with ASD often experience problems regulating their emotions and mood (Loveland, 2005), express the need for routines and rituals (Stoppelbein, Biasini, Pennick, & Greening, 2016), and exhibit inattention and hyperactivity (Bradley & Isaacs, 2006), specific sensory interests or aversions (Tomchek & Dunn, 2007), and aggression and/or irritability (Farmer & Aman, 2011).

Impact of ASD on Parents

The various symptoms of ASD and the common comorbid disorders not only influence the child's functioning and quality of life, but also impact parents' and families functioning (Dumas, Wolf, Fisman, & Culligan, 1991). Parents of children with

ASD experience higher levels of stress than parents of TD children and parents of children with other developmental disabilities (DD; Hayes & Watson, 2012). Parenting stress encompasses multiple factors, usually resulting from the numerous responsibilities associated with parenting. Deater-Deckard (1998) breaks parenting stress into four different domains: (1) the demands of the parent, (2) the parent's psychological well-being and behavior, (3) the quality of the parent-child relationship, and (4) the child's adjustment. Due to difficulty with social communication skills and the increased risk for other psychiatric disorders experienced by children with ASD, their parents often experience an increase in the demands in their everyday lives (Krakovich, McGrew, Yu, & Ruble, 2016). However, per Deater-Deckard (1998), stress does not occur from parenting demands alone, rather it is the collective product of multiple factors. Therefore, to gain a comprehensive understanding of stress in parents of children with ASD, we should examine not only the demands, but Deater-Deckard's other three components as well.

As part of the overall increased parenting stress in parents of children with ASD (Davis & Carter, 2008), decreased mood (Benson, 2006), decreased physical health (Johnson, Frenn, Feetham, & Simpson, 2011), and a greater number of day-to-day stressors have been observed in parents of children with ASD in comparison to control groups (Ingersoll & Hambrick, 2011). Studies have examined the differences in parenting stress between mothers and fathers with results indicating consistently higher levels of depression among mothers compared to fathers of school age children and/or young toddlers with a recent ASD diagnosis (Davis & Carter, 2008). It is hypothesized that these differences may occur because mothers are generally the primary caregivers and take a more active role in the day-to-day tasks (Davis & Carter, 2008). Although mother's and father's psychological well-being may be influenced

in different ways, they both experience heightened stress (Davis & Carter, 2008).

ASD impacts the dynamics within the family. Hutton and Caron (2014) interviewed 21 primary caregivers about the impact of their child with ASD on their family. Seventy-five percent of caregivers indicated that their other children felt jealousy or resentment, over half noted that their family had to adjust or add more structure to their schedule, and 48% of caregivers responded that there was little to no time for fun/family vacations. Moreover, research suggests that mothers of children with ASD need increased support from their family relationships and from outside supports (e.g., community supports, friends) compared to the normative data (Johnson, Frett, Feetham, & Simpson, 2011). When mothers and fathers feel that their family social support needs (e.g., economic, child rearing, communication, caregiving) do not match the support they are receiving, research demonstrates that their stress levels increase and mental health worsens for both parents (Johnson et al., 2011).

To understand better the factors that contribute to increased parent stress in parents of children with ASD, the relation between child characteristics and parenting stress has been widely studied, with results showing child behavior problems and autism symptom severity are two factors that consistently are related to parenting stress (Brei, Schwarz, & Klein-Tasman, 2015; Estes et al., 2009; Zaidman-Zait et al., 2017). Problem behaviors most often include externalizing-type behaviors such as disruptive behavior problems (Brei et al., 2015; Tomanik, Harris, & Hawkins, 2004), hyperactivity (Bradley & Isaacs, 2006), and RRBs (McStay, Dissanayake, Scheeren, Koot, & Begeer, 2014). Although internalizing, externalizing, and repetitive behaviors all correlate with parenting stress, Zaidman and colleagues (2017) found that only externalizing behaviors in children with ASD are found to significantly predict parenting stress when all variables are considered simultaneously.

However, RRBs are often included in measures of behavior problems. Therefore, it can be difficult to parse apart how RRBs (i.e., stereotyped movements, compulsive/ritualistic behaviors, repetitive language, unusual or intense preoccupations) contribute to caregiver stress in comparison to other behavioral problems.

A few studies have specifically examined the relation between caregiver stress and RRBs. Hayes and Watson (2015) found RRBs to be strongly associated with caregiver stress, and Bishop and colleagues (2007) found that RRBs contributed unique variance to the perceived negative impact of parenting a child with ASD. It is theorized that the unusual or odd behaviors that often encompass RRBs may lead to stigmatization, therefore, increasing caregiver stress (Gabriels et al., 2005). Harrop and colleagues (2016) examined child repetitive behaviors and caregiver stress over time, and found that repetitive behaviors predicted caregiver stress initially and the change in stress over time. As explained in more detail below, Achenbach, McConaughy, and Howell (1987) found that there was greater concordance between raters when they were reporting on more overt behaviors, such as repetitive behaviors, than more covert behaviors. Altogether, these studies indicate that RRBs relate to caregiver stress; however, it remains unknown if/how RRBs impact the relation between parents and clinicians during the diagnostic process.

Parent's Role in Assessment

In addition to influencing a parent's overall psychological well-being, stress may influence the way in which parents perceive and report their child's symptoms (Brei et al., 2015; Kissel & Nelson, 2016). Although clinicians have a primary role during the diagnostic process, parents act as important informants throughout this process (Glascoe & Dworkin, 1995). Specifically, parents typically spend more time with their children than anyone else in

the home and community (i.e., their natural environment) and observe development over time, allowing parents to provide information about their child's behavior in these settings and at different time points (Diamond & Squires, 1993). Clinicians generally ask details of parents, such as background information about the child, the family, and the child's symptomatology; responses on rating scales about a variety of different behaviors; and structured interviews to understand their primary/initial concerns and day-to-day life. Clinicians typically observe a child for a limited amount of time, thus, only observing a restricted range of a child's behavior. The child is often participating in unique activities with an unfamiliar adult (i.e., the clinician) in a novel environment. Therefore, the behavior that is observed may not be fully representative of the child's usual behavior (Diamond & Squires, 1993). As such, parents are an essential part to the process as they can communicate concerns, other remarkable behaviors, or notable patterns of behavior that the clinician may not observe during the assessment session.

Multi-Informant Discrepancy

During the assessment process, gaining insight from multiple sources is critical because children may exhibit different behaviors across different contexts and at varying levels of severity (De Los Reyes et al., 2015). Understanding the contexts in which these behaviors occur aids clinicians in diagnostic determinations and in treatment plan formation and implementation.

Multi-informant assessment (i.e. involving parents, teachers, and patients themselves) is considered the most efficient way to understand behavioral differences across contexts (Kraemer, 2013). "Informants" are typically considered those who spend large amounts of time with, or have a close relationship with, the child (Achenbach, 2006). Nevertheless, low

concordance between informants is common when rating children's behavior, both in the general population and in children with ASD (Achenbach, 2011).

Theoretical frameworks for research focused on informant discrepancies are scarce within the literature. However, De Los Reyes and Kazdin (2005) propose the ABC Model, or Attribution Bias Context Model, to guide a further understanding of informant discrepancies in clinical child research. Specifically, the ABC Model comprises theories of informant attributions, informant perspectives, the clinical assessment process, and the interaction between all three of these components (De Los Reyes & Kazdin, 2005). Most relevant to the present study, observers, or informants, often attribute the behaviors of the child to the child's disposition rather than the context in which the behavior occurs. Additionally, the informants of the child's behavior are often the same individuals identifying behaviors that need treatment. As such, when informants recall information about the child's behavior, they may be more likely to report the negative aspects of the child's behavior, which is more consistent with their perspective and the goal of the assessment, to get treatment (De Los Reyes & Kazdin, 2005). Altogether, these components provide a framework for how the informants attributions and perspectives, as well as the goal of the clinical assessment, play a complimentary role in the frequent discrepancies present among raters.

Achenbach, McConaughy, and Howell (1987) described in their meta-analysis three key factors that play a role in the low correspondence of informants about children's mental health. First, informants who observed the child in the same context tended to show greater concordance than those who observed a child in different contexts. Age was the second important factor: those rating younger children tended to exhibit higher correspondence than those rating older children, suggesting that younger children (6-11 years) behave more

similarly across settings and that their behaviors may be more observable to multiple raters compared to older children (12-19 years; Achenbach, et. al 1987). Lastly, raters reporting on more overt behaviors (e.g., aggression, hyperactivity, repetitive behaviors) exhibited stronger agreement than those reporting about more covert behaviors (e.g., anxiety, emotions).

Diagnostic clinics frequently use questionnaires to examine ASD symptoms, emotional and behavioral patterns, and social and communication skills in children. Duvekot and colleagues (2015) conducted one of the few studies examining how parent- and teacher-rated versions of the SRS predict ASD classification as determined by two diagnostic tools: the ADOS (a clinician observation) and the Developmental, Dimensional, and Diagnosis Interview (3Di; a parent interview). Researchers examined how the screening accuracy of the parent-rated SRS related to the autism classifications from the ADOS and 3Di separately (meeting criteria for a single instrument), and classifications derived from the ADOS and 3Di together (meeting criteria for both instruments; Duvekot, van der Ende, Verhulst, & Greaves-Lord, 2015). The screening accuracy of the SRS was good when the 3Di classification was used alone and when the ADOS and 3Di were used together; however, the screening accuracy was poor when the ADOS was used alone (Duvekot et al., 2014). Furthermore, as the parent-rated SRS did not accurately screen those children diagnosed with ASD (per the ADOS), the ability of the teacher-rated SRS to predict ASD classification was examined. The teacher-rated SRS showed a significant independent contribution to the autism classification, over and above the parent-rated SRS, per the ADOS alone and when the diagnostic tools were used together (Duvekot et al., 2015).

This difference in how teacher- and parent-ratings predict ASD classification may be due, in part, to the different contexts in which parents and teachers observed the child. Because

teachers typically have more opportunity than parents to observe same-age children together on a regular basis, it is possible that teachers have a better sense for what is developmentally appropriate for a given age group (Duvekot et al., 2015). This may be similar for practicing clinicians who interact with children daily and who possess specialized training in child development. Furthermore, Duvekot and colleagues (2015) demonstrate the differential predictive ability of the SRS during the ASD assessment process. Although teachers will not be included in the proposed study, this study highlights how children's behaviors may be observed differently across contexts, aligning with conclusions of Achenbach and colleagues (1987) and underscoring the importance of gaining a full picture across contexts. Additionally, the rater's knowledge of and experience with child development and age appropriate behaviors, which may differ between parents and clinicians, may impact how they perceive child behaviors.

Although environment is a key factor in discrepancy, research indicates that other variables may also play an important role. Previous research has shown that mother and father agreement and parent and child agreement of child symptoms may be related to a parent's own psychiatric symptoms (Jensen, Traylor, Xenakis, & Davis, 1988). Because parents of children with ASD experience heightened levels of stress (Hayes & Watson, 2012), this is a particularly important factor to consider within the context of multi-informant assessments with this population.

When examining stress among parents of children with ASD, it is important to distinguish between stress stemming from parental psychopathology and stress from their child's characteristics (Davis & Carter, 2008). Studies often examine a total score of parenting stress and sequentially examine subscales or specific domains of a measure. For example,

Davis and Carter (2008) examined the Parenting Stress Index-Short Form in a group of parents of children with ASD, and found total PSI-SF scores in the Clinically Significant range in 39% of mothers and 28% of fathers. When examining the PSI-SF at the subscale level, results indicated that the most elevated area of stress for mothers and fathers related to the parent-child relationship.

Specifically, half of mothers and 39% of fathers scored in the clinically significant range on the Parent-Child Dysfunctional Interaction subscale, which measures the level of dysfunction or stress in the parent-child interaction (Davis & Carter, 2008). Fewer mothers and fathers scored in the Clinically Significant range on the Difficult Child subscale and the Parent Distress subscales, which measure how easy or difficult the parent perceives the child and to what extent the parent is experiencing stress in his/her role as a parent, respectively. Given these results, it is important to delve more deeply and not only examine overall parenting stress, but also examine the different domains of stress. Stress stemming from different reasons may impact the parent's perceptions of their child and how he/she rates their child's behavior in varying ways.

Although there is little research examining how parent and clinician ratings relate, studies have examined the relation between parent- and child-report. Ooi and colleagues (2016) conducted a study examining anxiety symptoms in children with ASD and found the agreement between the child- and parent-ratings was greater when the symptoms were more overt. Lastly, results indicated that increased stress in parents related to greater discrepancy between raters, highlighting the importance of understanding the impact parenting stress may have on the agreement between informants, and providing support for further investigating the discrepancy between parent- and clinician-rated measures (Ooi et al., 2016).

Brei, Schwarz, and Klein-Tasman (2015) explored parenting stress in parents of children with and without ASD as it relates to clinician- and parent-ratings. Higher stress was reported by parents who reported more behavior problems and greater ASD symptom severity. Brei and colleagues (2015) also examined how parent-reported (via the SRS) and clinician-reported (via the ADOS) measures of ASD symptoms related to parenting stress, and found parent-reported ASD symptoms related to parenting stress whereas the clinician's report did not. However, to our knowledge, no study has examined the relations between all three of these variables (parenting stress and parent- and clinician-report of ASD symptoms) simultaneously.

Unfortunately, parent report can often be unreliable due to external factors (Jensen, Traylor, Xenakis, & Davis, 1988), likely reducing diagnostic reliability. Therefore, it is essential to understand variables related to how parents perceive, understand, and report their child's symptoms as these results are frequently used to inform diagnoses and treatment plans. The goal of this study was to identify how levels of parenting stress influence the agreement between a parent-report measure of ASD and a clinician-report measure of ASD.

Current Study and Purpose

Stress in parents of children with autism has been widely studied (Davis & Carter, 2008; Estes et al., 2009; Hastings, 2003); however, many of these studies have limited sample sizes including restricted age ranges and limited, uniform demographics. Previous research has examined the relation between parenting stress and clinician-rated or parent-rated autism symptom severity and restricted and repetitive behaviors and interests, but no study to date has examined the relations between these variables *together*. Specifically, it is documented that parenting stress may impact a parents' perspective of their child's symptoms and how they

inform the diagnostic process (Brei et al., 2015); however, it is not yet understood how parenting stress impacts the agreement between the clinician- and parent-rated autism symptom severity measures. Additionally, it has been established that child age may impact the level of agreement between raters. As observable behaviors vary at each developmental stage, further investigation is necessary to understand how child age impacts the relation between parenting stress and clinician- and parent- rated autism symptom severity (Achenbach, 2011). Similarly, research indicates that RRBs in children with ASD correlate with parenting stress (Garbiels et al., 2005; Bishop et al., 2007); however, it is not well understood how RRBs impact the relation between clinician- and parent-rated autism symptom severity as a function of parenting stress.

This study had three goals. The first goal was to examine the agreement between the parent-rated SRS-2 and the clinician-rated ADOS-2 when used to assess children for ASD. Second, this study examined how parenting stress influences the relation between parent- and clinician-rated ASD symptoms. The third goal was to investigate how restricted and repetitive behaviors and child age influence the relation among parenting stress, parent-report of autism symptom severity, and clinician-report of autism symptom severity. Because this study aimed to inform clinicians during the diagnostic process, the participants included both children who received a diagnosis of ASD and children who received another diagnosis or no diagnosis. Additionally, the term "parent" is used to represent all types of caregivers serving in a parenting role (i.e., mothers, fathers, grandparents, legal guardians). The following hypotheses were offered:

1) Parent- and clinician-rated autism symptom severity will be positively related.
2) Parenting stress will be positively related to parent- and clinician-rated autism symptom

severity and RRBs. Specifically, the Parent-Child Dysfunctional Interaction domain and the Difficult Child domain will be more strongly related to parent- and clinician-rated autism symptom severity than the Parent Distress domain.

3) Parent- and clinician-rated autism symptom severity will be positively related to RRBs.

4-6) Parenting stress will moderate the relation between parent- and clinician-rated autism symptom severity scores. Specifically, it is predicted that the PSI-SF subscales (Parent-Child Dysfunctional Interaction [Hypothesis 4], Difficult Child [Hypothesis 5], and Parent Distress [Hypothesis 6]) will separately moderate the relation between parent- and clinician-rated autism symptom severity. Furthermore, it is predicted that the relation between parent- and clinician-rated autism symptom severity will be strongest at lower levels of each parenting stress subscale.

7-8) Prior to testing the proposed three-way interaction (i.e., Hypothesis 9), five additional 2-way interactions will be examined: it is expected that child RRBs (Hypothesis 7a) and child age (Hypothesis 7b) will separately moderate the relation between parent- and clinician-rated autism symptom severity (parent-rated autism symptom severity X repetitive behaviors/age; Hypothesis 7a/7b). Specifically, it is expected that the relations between parent- and clinician-rated autism symptom severity will be strongest when more repetitive behaviors are present and when children are younger. It is also hypothesized that RRBs will moderate the relation between parenting stress (Parental Distress [Hypothesis 8a], Difficult Child [Hypothesis 8b], and Parent-Child Dysfunctional Interaction [Hypothesis 8c]) and clinician-rated autism symptom severity (each parenting stress subscale X child RRBs). It is expected that the relations between

parenting stress and clinician-rated autism symptom severity will be strongest when more repetitive behaviors are present.

9-10) Child RRBs (Hypothesis 9a, 9b, 9c) and child age (Hypothesis 10a, 10b, 10c) will serve as second moderators of the relation between parent- and clinician-rated autism symptom severity scores. Specifically, when predicting clinician-rated autism symptom severity scores, six three-way interactions are expected between parent-rated autism symptom severity, parenting stress, and child repetitive behaviors or age (parent-rated autism symptom severity X each parenting stress subscale X RRBs/age will be examined separately). Specifically, it is predicted that the relation between parent- and clinician-rated autism symptom severity will be strongest at high levels of repetitive behaviors and low levels parenting stress. Additionally, the relation between parent- and clinician-rated ASD symptom severity will be strongest when children are younger and when parents report lower levels of stress.

CHAPTER 2. METHODOLOGY

Participants

Eighty-one families that provided consent as part of routine ASD evaluations were included in this study. These families participated in evaluations featuring a demographics questionnaire, autism-specific assessment instruments, and general measures of cognitive, adaptive, emotional, and behavioral functioning. Families were typically referred for evaluation by a physician to determine if a diagnosis of ASD was appropriate for their child.

Although information was gathered about both parents if present at the evaluation, only the information about the rater of the Parenting Stress Index-Short Form was used in the current study's final analyses. As such, final analyses included 72 mothers, three fathers, five grandparents, and one guardian. The sample was racially and socioeconomically diverse: 49% of families identified as White and 49% of families used Medicaid to pay for services. Children ranged in age from two to eight years. Following the complete evaluation, 51 children (63%) received a diagnosis of ASD. Of those children who did not receive an ASD diagnosis, eight children received a diagnosis of developmental delay, four received a diagnosis of attention-deficit/hyperactivity disorder, two received a diagnosis of oppositional defiant disorder, six received another diagnosis (e.g., receptive language disorder), and 10 received no diagnosis.

Table 1

Sample Characteristics: Child and Rater Demographics

Characteristic			
Child		*n*	%
Gender			
	Male	71	87.7
	Female	10	12.3
Age (years)			
	2	14	17.3
	3	17	21.0
	4	27	33.3
	5	12	14.8
	6	8	9.9
	7	2	2.5
	8	1	1.2
Race			
	White	40	49.4
	Non-White	41	50.6
Child Diagnosis			
	ASD	51	63.0
	Developmental Delay	8	9.9
	ADHD	4	4.9
	ODD	2	2.5
	Other	6	7.4
	No Diagnosis	10	12.3
ADOS Calibrated Severity Score			
	1	9	11.1
	2	9	11.1
	3	13	16.0
	4	3	3.7
	5	5	6.2
	6	9	11.1
	7	13	16.0
	8	4	4.9
	9	5	6.2
	10	11	13.6

Table 1 (continued).

Rater			
PSI-SF Rater			
	Father	3	3.7
	Mother	72	88.9
	Grandparent	5	6.2
	Other legal guardian	1	1.2
Rater Education			
	Junior high	1	1.2
	Some high school	6	7.4
	High school degree	32	39.5
	Some college	19	23.5
	Bachelor's degree	14	17.3
	Graduate degree	4	4.9

Note. ASD = Autism Spectrum Disorder; ADHD = Attention Deficit/Hyperactivity Disorder; ODD = Oppositional Defiant Disorder; ADOS = Autism Diagnostic Observation Schedule; PSI-SF = Parenting Stress Index – Short Form.

Measures

Demographic Information. Parents completed a demographic form to provide information about themselves, their children, and their family including child and parent age, race/ethnicity, parents' education and occupation, and parents' marital status.

Autism Symptom Severity. The Social Responsiveness Scale-2 (SRS-2; Constantino & Gruber, 2012) is a 65-item parent-report questionnaire used to assess severity of ASD symptoms in children between the ages of 2.5 and 18 years. Based on age, there are two different versions of the SRS-2, a preschool version and a school-age version. Both versions of the questionnaire measure the individual's social abilities in a natural setting using a 4-point Likert scale from 0 (not true) to 3 (almost always true). Results yield a total score and five subscales: Social Awareness, Social Cognition, Social Communication, Social Motivation, and Restrictive Interests and Repetitive Behaviors. Raw scores are converted to T-scores based on norms for rater type, and gender and age of the child. T-scores of 60 to 65 are categorized as mild levels of social deficiency, whereas scores from 66 to 75 are considered moderate in social impairments and interference with day-to-day functioning. Scores greater than 75 are considered severe and consistent with a clinical diagnosis of ASD. As both versions yield the same scores, results from the preschool and school-age versions can be analyzed together. Constantino and Gruber (2012) found high internal consistency for the school-age form with all alpha values ranging between .92 and .95 and interrater reliability for their entire sample was r = .61. The SRS-2 total score from the parent-report preschool and school-age version was used in the current study. Estimates of internal consistency among total scores for the current sample were found to be excellent, with alpha coefficients $\alpha = .90$ and $\alpha = .92$.

The Autism Diagnostic Observation Schedule-2 (ADOS-2; Lord et al., 2012) is a

clinician-administered, standardized and semi-structured, play-based observation tool used to elicit and assess symptoms of ASD in children, adolescents, and adults. This measure consists of two domains: Social Affect (SA) and Restrictive and Repetitive Behaviors (RRB). The ADOS-2 encompasses a toddler module and four others (1 through 4); one module is administered to an individual based on his or her level of expressive language and chronological age. The scoring algorithm for modules 1 through 4 yields cutoff scores with the following categories: "autism" (more severe symptoms), "autism spectrum", and "non-spectrum". Due to the difference in cutoff scores in each module, modules 1 through 4 yield a calibrated severity score (CSS), which allows for the examination of scores across time or modules and comparison to those in the normative sample of the same age group and similar language levels. Recently, Ensler and colleagues (2015) developed a CSS for the Toddler Module to increase comparability between this Module and Modules 1-4. McRimmon and Rostad (2014) found moderate internal reliability for the RRB domain (α = .51-.66) and high internal reliability for the SA domain (α = .87-.92). Interrater reliability coefficients were good to excellent (r = .79-.98). To ensure comparability across the different modules due to the range of age groups and developmental levels within the sample, the current study used the CSS calculated from the algorithm in modules 1-4 and the table provided by Ensler and colleages (2015) to calculate the CSS from raw totals in the toddler module. Internal consistency for each of the ADOS-2 modules was calculated for the current sample and was found to be good to excellent, ranging from α = .86 to α = .93.

Parenting Stress: The Parenting Stress Index, 3rd Edition, Short Form (PSI-SF; Abidin, 1995) is an abbreviated 36-item self-report measure that assesses stress-related child characteristics, parent characteristics, and parenting situations that can potentially impede

child development or parenting. This measure is used with parents of children between the ages of one month and 12 years and parents rate his or her response on a 5-point Likert scale with 1 indicating, "strongly disagree" and 5 indicating, "strongly agree." The PSI-SF results in a Total Stress scale and three subscales: Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child. The PSI-SF has been validated against the full version of the PSI across U.S. populations. In previous research, internal consistencies of $\alpha = .88$ were observed for both the Parental Distress and Parent-Child Dysfunctional Interaction subscales; $\alpha = .89$ was observed for Difficult Child; and $\alpha = .95$ for Total Stress (Reitman, Currier, & Sickle, 2002). In the current study, the Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child subscale scores will be of interest as measures of different aspects of parenting stress. Internal consistency was good across all three subscales. Specifically, Parental Distress yielded a $\alpha = .88$, Parent-Child Dysfunctional Interaction $\alpha = .80$, and Difficult Child $\alpha = .90$.

Restrictive and Repetitive Behaviors: The Repetitive Behaviors Scale- Revised (RBS-R; Lam & Aman, 2007) is a 44-item parent-report measure that assesses repetitive behaviors in children with autism spectrum disorder. The RBS-R yields a total score of repetitive behaviors as well as six subscales: Stereotyped Behavior, Self-Injurious Behavior, Compulsive Behavior, Routine Behavior, Sameness Behavior, and Restricted Behavior. Lam and Aman (2006) indicate that the RBS-R has good internal consistency (ranging from .78 to .91) as well as good interrater reliability (ranging from .57 to .73). The RBS-R yielded an excellent alpha coefficient ($\alpha = .95$) for its total score, which was used in this study.

Cognitive Functioning: The Differential Ability Scales-Second Edition (DAS-II; Elliott et al., 2007) is a comprehensive, individually administered measure of cognitive skills

for children between the ages 2 years, 6 months and 17 years, 11 months. The DAS-II yields a General Conceptual Ability Score (GCA), and verbal, non-verbal, and spatial scores. This cognitive assessment has been standardized across representative US populations and diverse racial and ethnic populations (Elliott et al., 2007). The DAS-II correlates with the WISC-IV (Wechsler, 2003) consistently with a reliability correlation coefficient of .84. The nonverbal reasoning and nonverbal standard scores were used in the study as a covariate.

The Stanford-Binet Intelligence Scales- Fifth Edition (SB5; Roid, 2013) assesses cognitive skills of individuals between the ages of 2 and 85 years. This measure yields a Full Scale IQ (FSIQ) as well as Nonverbal and Verbal IQ scores. This cognitive assessment tool has been normed with a sample that nearly represents the characteristics of the 2000 US Census. In alignment with the DAS-II, the Nonverbal IQ score was examined as a covariate in the present study.

The Mullen Scales of Early Learning (MSEL; 1995) measure motor development and cognitive abilities in children from birth to 68 months of age and is often given as part of a comprehensive battery. The MSEL assesses gross and fine motor skills, visual reception, and expressive and receptive language. The four cognitive scales (fine motor, visual reception, and expressive and receptive language) are combined to yield an Early Composite Score which measures overall cognitive abilities. As the MSEL does not yield a FSIQ or a Nonverbal or Verbal IQ comparable to the DAS-II and SB5, Bishop, Futhrie, Coffing, and Lord (2011) offer a method to convert age-equivalents obtained from the MSEL into a nonverbal IQ and a verbal IQ. Specifically, to yield a Nonverbal IQ score, the domains of Fine Motor and Visual Reception are averaged, divided by the child's chronological age, and then multiplied by 100. Similarly, to yield a Verbal IQ, Receptive and Expressive Language domains are averaged,

divided by the child's chronological age, and then multiplied by 100. The Nonverbal IQ that results from these calculations were used to ensure comparability between the MSEL, SB5, and DAS-II.

Procedure

Prior to the evaluation, parents completed a demographic form requesting information about their family and their child's developmental history. Additionally, children had to have passed a hearing test to rule-out hearing problems. Upon arrival, families were given measures that assess child symptoms within home, school, and community contexts and parents completed a form about their own stress levels. Prior to any testing, informed consent was obtained both for clinical services and for inclusion in the research database. Parents were assured of the voluntary nature of being included in the research database and that their receipt of clinical services was not contingent upon their participation in the database. There were two or three parts to the ASD evaluation depending on the child's age and symptomatology: a psychological evaluation, a speech and language evaluation, and a medical evaluation. A licensed clinical psychologist, a certified speech and language pathologist, and a pediatrician conducted these evaluations, each with specialized training in ASD. The psychological evaluation included an ASD-specific assessment, a parent interview, and a variety of questionnaires depending on the child's age and symptoms observed.

Families that allowed their data from the evaluation to be included in the research database for analyses were assigned an ID number, and all data included in the database were completely deidentified. Each participant must have completed an ADOS-2, PSI-SF, RBS-R, SRS-2, and the DAS-II, SB5, or MSEL to be included in this study.

CHAPTER 3. RESULTS

Prior to completing any data analysis, the number of missing items per PSI-SF subscale was examined. If one item was missing per subscale for a given participant, the missing item was replaced with the average of the other 11 items in that subscale as recommended in the PSI-SF user manual (Abidin, 1995). If two or more items were missing, that specific subscale total was not calculated and, therefore, not included in analyses. Due to the three different types of cognitive measures completed by participants, a new variable was created to combine these measures. The computed Mullen Scale of Early Learning Nonverbal IQ (as described above), the Differential Ability Scale-II Nonverbal Reasoning Standard or Nonverbal Standard (depending on the child's age), and the Stanford-Binet Nonverbal IQ were combined to create a single Nonverbal IQ variable used in analyses. Additionally, the SRS-2 Preschool and School-Age Totals were combined into a single variable for analyses. Lastly, descriptives and skewness and kurtosis were examined for all variables of interest (Table 3) and all fell within the acceptable range (Field, 2009; Gravetter & Wallnau, 2014).

Table 2

Descriptives of Variables of Interest

	n	*M*	*SD*	Min.	Max.	Skewness	Kurtosis
ADOS CSS	81	5.37	3.00	1.00	10.00	.09	-1.28
PR SRS	81	71.32	13.08	42.00	101.00	.13	-.31
RBSR Total	74	45.84	26.44	5.00	111.00	.50	-.61
PSI-SF-PD	79	25.06	8.97	12.00	48.00	.62	-.10
PSI-SF-PCDI	74	24.98	7.25	12.00	56.00	.66	.12
PSI-SF-DC	71	36.05	10.20	13.00	56.00	.08	-.47
Child Age	81	53.67	16.20	25.00	99.00	.62	.01

Note. ADOS = Autism Diagnostic Observation Schedule; CSS = Calibrated Severity Score; PR = Parent-Rated; SRS = Social Responsiveness Scale; RBSR = Repetitive Behavior Scale – Revised; PSI-SF = Parenting Stress Index-Short Form; PD = Parental Distress; PCDI = Parent-Child Dysfunctional Interaction; DC= Difficult Child; Min.= Minimum; Max.= Maximum. Child age presented in months.

Preliminary Analyses

All data analyses were completed using SPSS statistical software. Tables 3 through 5 report descriptive statistics and the intercorrelations of the variables of interest. Demographic variables (cognitive functioning, gender, and race/ethnicity) were correlated with the criterion variable (clinician-rated autism symptom severity; Table 3) to identify covariates. Nonverbal IQ was statistically significantly negatively correlated with clinician-rated autism symptom severity, $r = -.29$, $p = .01$, and therefore, was included as a covariate in all moderated hierarchical regression analyses. Race/Ethnicity did not significantly relate to clinician-rated autism symptom severity, $r = -.10$, $p = .39$, nor did child gender, $r = .11$, $p = .31$.

Table 3

Intercorrelations of Possible Covariates with Outcome Variable

	Race/Ethnicity	Nonverbal IQ	CR ASD Severity
Child Gender	-.01	-.08	-.10
Child Race (Dich.)	---	-.16	.11
Nonverbal IQ		---	-.29*
CR ASD Severity			---

Note. CR = Clinician Rated; ASD = autism spectrum disorder. Dich. = Dichotomized. Child race coded such that 0 = White, 1 = Nonwhite.
* $p < .05$.

Preliminary Hypothesis Testing

Hypothesis 1. Hypothesis 1 (that parent- and clinician-rated ASD symptom severity would be correlated) was examined through a bivariate correlation (see Table 5). Parent-rated and clinician-rated ASD symptom severity were not significantly related, $r = -.06$, $p = .59$.

Hypothesis 2. Hypothesis 2 (that parenting stress subscales would be correlated with parent- and clinician-rated ASD symptom severity and child RRBs) was examined via a series of bivariate correlation analyses (see Table 5). As predicted, the Parent-Child Dysfunctional Interaction (PCDI) and Difficult Child (DC) PSI-SF subscales more strongly related to parent-rated and clinician-rated ASD symptom severity than the Parental Distress (PD) PSI-SF subscale. Specifically, the PSI-SF PD subscale did not significantly correlate with parent-rated ASD symptom severity, $r = .08$, $p = .50$, clinician-rated autism symptom severity, $r = -.19$, $p = .09$, or child RRBs, $r = .07$, $p = .57$. Alternatively, the PSI-SF PCDI subscale significantly negatively correlated with clinician-rated ASD symptom severity, $r = -.36$, $p = .002$, and significantly positively related to parent-rated ASD symptom severity, $r = .50$, $p < .001$, and child RRBs, $r = .26$, $p = .03$. The PSI-SF DC subscale also significantly negatively correlated with clinician-rated ASD symptom severity, $r = -.41$, $p < .001$, and significantly positively

related to parent-rated ASD symptom severity, $r = .44$, $p < .001$, and child RRBs, $r = .51$, $p < .001$.

Hypothesis 3. Next, Hypothesis 3 (that parent- and clinician-rated ASD symptom severity would be correlated with child RRBs) was examined via two bivariate correlations (Table 5). Child RRBs was not significantly related to clinician-rated ASD symptom severity, $r = -.06$, $p = .60$. However, child RRBs was significantly positively correlated with parent-rated ASD symptom severity, $r = .69$, $p < .001$.

Table 4

Interrcorrelations of Variables of Interest

		2.	3.	4.	5.	6.	7.	8.	9.
1.	CR ASD Severity	-.06	-.19	-.36**	-.41**	-.06	-.49**	-.11	-.29*
2.	PR ASD Severity	---	.08	.50**	.44**	.69**	-.08	-.02	-.13
3.	PSI-SF PD		---	.44**	.32**	.07	.16	.02	.14
4.	PSI-SF PCDI			---	.42**	.26*	.28*	.09	-.08
5.	PSI-SF DC				---	.51**	.35**	.02	.38**
6.	RRB Total					---	.01	-.02	.03
7.	Child Age						---	.11	.18
8.	Child Race (Dich.)							---	-.01
9.	Child Cognitive Functioning								---

Note. CR = Clinician Rated; ASD = Autism Spectrum Disorder; PR = Parent-Rated; PSI-SF = Parenting Stress Index – Short Form; PD = Parental Distress; PCDI = Parent-Child Dysfunctional Interaction; DC = Difficult Child; RRB = Repetitive and Repetitive Behaviors. Dich. = Dichotomized. Child race coded such that 0 = White, 1 = Nonwhite.
* p < .05. ** p < .01. *** *p* < .001.

Main Hypothesis Testing

Prior to examining each of the below moderated hierarchical regression analyses, the predictor variables of interest (each PSI-SF subscale, parent-rated ASD symptom severity, child age, and child RRBs) were mean-centered. Moderation analyses were completed using the PROCESS tool in SPSS (Hayes, 2017).

Hypothesis 4. Hypothesis 4 (that the PSI-SF Parental Distress [PD] subscale would moderate the relation between parent-rated and clinician-rated ASD symptom severity) was examined via one moderated hierarchical multiple regression analysis (Table 5). Nonverbal IQ was entered into Model 1 as a covariate. When the PSI-SF PD subscale and parent-rated ASD symptom severity were entered, Model 2 (main effects) was not statistically significant when predicting clinician-rated ASD symptom severity. Furthermore, the PSI-SF PD subscale did not emerge as a moderator of the relation between parent-rated and clinician-rated ASD symptom severity in Model 3, $B = .002$, $SE = .003$, $p = .49$.

Hypothesis 5. Hypothesis 5 (that the PSI-SF Parent-Child Dysfunctional Interaction [PCDI] subscale would moderate the relation between parent-rated and clinician-rated ASD symptom severity) was examined via a single moderated hierarchical multiple regression analysis with nonverbal IQ entered as a covariate in Model 1 (Table 5). When the PSI-SF PCDI subscale and parent-rated ASD symptom severity were entered in Model 2, a significant main effect emerged for the PSI-SF PCDI subscale, $B = -.18$ $SE = .05$, $p = .001$, when predicting clinician-rated ASD symptom severity. However, in Model 3, the PSI-SF PCDI subscale did not emerge as a moderator of the relation between parent-rated and clinician-rated ASD symptom severity, $B = .005$, $SE = .003$, $p = .15$.

Hypothesis 6. Hypothesis 6 (that the PSI-SF Difficult Child [DC] subscale would

moderate the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 5). Nonverbal IQ was entered into Model 1 as a covariate. When PSI-SF DC and parent-rated ASD symptom severity were entered in Model 2, a significant main effect emerged for PSI-SF DC, B = -.11 SE = .04, p = .02, when predicting clinician-rated ASD symptom severity. However, PSI-SF DC did not emerge as a moderator of the relation between parent-rated and clinician-rated ASD symptom severity, B = .002, SE = .003, p = .40.

Table 5

Parent-Reported ASD Severity by Each PSI-SF Subscale Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
PSI-SF PD as a Moderator	
Model 1	
Nonverbal IQ	-.03* (.01)
R^2	.08*
Model 2	
PR ASD severity	-.02 (.03)
PSI-SF PD	-.05 (.04)
ΔR^2	.03
Model 3	
PR ASD severity X PSI-SF PD	.002 (.003)
ΔR^2	.01
PSI-SF PCDI as a Moderator	
Model 1	
Nonverbal IQ	-.04* (.01)
R^2	.10*
Model 2	
PR ASD severity	.02 (.03)
PSI-SF PCDI	-.18**(.05)
ΔR^2	.15***
Model 3	
PR ASD severity X PSI-SF PCDI	.005 (.003)
ΔR^2	.02
PSI-SF DC as a Moderator	
Model 1	
Nonverbal IQ	-.04** (.01)
R^2	.10**
Model 2	
PR ASD severity	.03 (.03)
PSI-SF DC	-.11*(.04)
ΔR^2	.08*
Model 3	
PR ASD severity X PSI-SF DC	.002 (.003)
ΔR^2	.009

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder; PC = Parent-child; PSI-SF = Parenting Stress Index – Short Form; PD = Parental Distress; PCDI = Parent-Child Dysfunctional Interaction; DC = Difficult Child. * $p < .05$. ** $p < .01$*** $p < .001$.

Hypothesis 7a. Hypothesis 7a (that child RRBs would moderate the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via one moderated hierarchical regression analysis (Table 6). Nonverbal IQ was entered into Model 1 as a covariate. When child RRBs and parent-rated ASD symptom severity were entered, Model 2 (main effects) was not statistically significant when predicting clinician-rated ASD symptom severity. Furthermore, child RRBs did not emerge as a moderator of the relation between parent-rated and clinician-rated ASD symptom severity, $B = .001$, $SE = .001$, $p = .42$.

Table 6

Parent-Reported ASD Severity by Child Repetitive Behaviors Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04** (.01)
R^2	.10**
Model 2	
PR ASD severity	-.001 (.04)
Child repetitive behaviors	-.01 (.02)
ΔR^2	.004
Model 3	
Child repetitive behaviors X PR ASD severity	.001 (.001)
ΔR^2	.01

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder

** $p < .01$.

Hypothesis 7b. Hypothesis 7b (that child age would moderate the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via moderated hierarchical regression analysis (Table 7), with nonverbal IQ entered as a covariate in Model 1. When child age and parent-rated ASD symptom severity were entered in Model 2, a significant main effect emerged for child age, B = -.10 SE = .02, p < .001, when predicting clinician-rated ASD symptom severity. However, child age did not emerge as a moderator of the relation between parent-rated and clinician-rated ASD symptom severity, B = -.002, SE = .002, p = .18.

Table 7

Parent-Reported ASD Severity by Child Age Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.03* (.01)
R^2	.08*
Model 2	
PR ASD severity	-.03 (.02)
Child age	-.10*** (.02)
ΔR^2	.26***
Model 3	
Child age X PR ASD severity	-.002 (.002)
ΔR^2	.02

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder.
* p < .05. *** p < .001.

Hypothesis 8a. Next, Hypothesis 8a (that child RRBs would moderate the relation between the PSI-SF Parental Distress [PD] subscale and clinician-rated ASD symptom severity) was also examined via moderated hierarchical regression analysis (Table 8), with nonverbal IQ entered as a covariate in Model 1. When child RRBs and the PSI-SF PD subscale were entered, Model 2 was not statistically significant (Table 8). However, child RRBs emerged as a moderator of the relation between PSI-SF PD and clinician-rated autism symptom severity, B = .004, SE = .001, p = .007. A post hoc plot of the interaction (Figure 1) indicated a negative relation between PSI-SF PD scores and clinician-rated ASD symptoms when RRBs were less frequent. Specifically, when parents reported lower stress and fewer RRBs were present, clinician-rated ASD symptom severity was higher, whereas clinician-rated ASD symptom severity was lower when parents were more stressed.

Table 8

PSI-SF Parental Distress Subscale by Child Repetitive Behaviors, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04* (.01)
R^2	.10*
Model 2	
PSI-SF PD	-.04 (.04)
Child repetitive behaviors	-.01 (.01)
ΔR^2	.02
Model 3	
Child repetitive behaviors X PSI-SF PD	.004** (.001)
ΔR^2	.10**

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PSI-SF = Parenting Stress Index – Short Form; PD = Parental Distress
* $p < .05$. ** $p < .01$

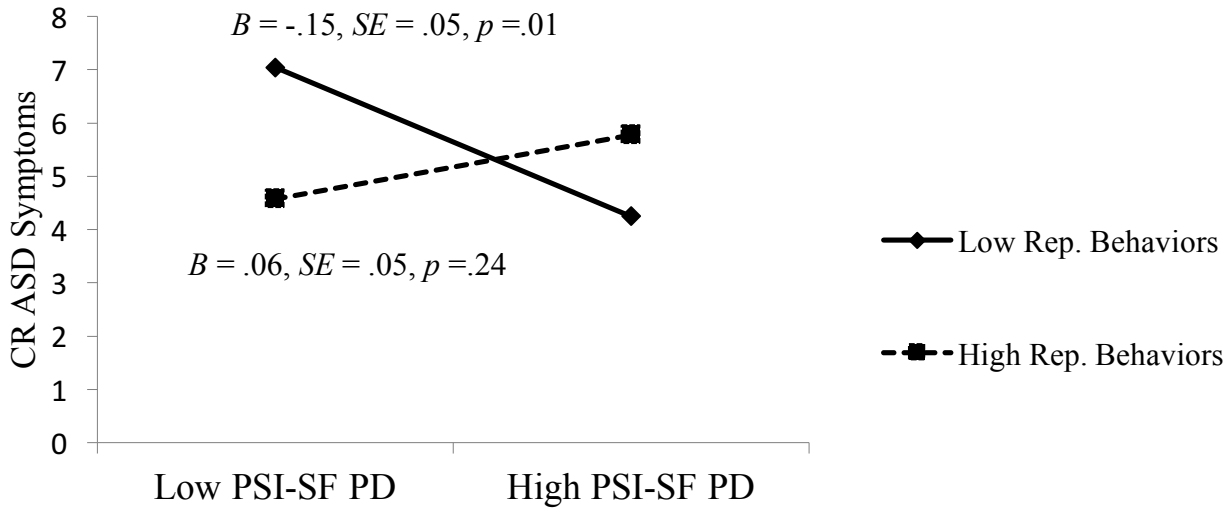


Fig. 1. Interactions between PSI-SF PD and child repetitive and restrictive behaviors predicting clinician-rated ASD symptom severity. Analyses are controlling for child nonverbal IQ. Unstandardized coefficients for the simple slopes for low and high RRBs are presented within the plot.

Hypothesis 8b. Hypothesis 8b (that child RRBs would moderate the relation between the PSI-SF parent-child dysfunctional interaction [PCDI] subscale and clinician-rated ASD symptom severity) was also examined via moderated hierarchical regression analysis (Table 9), with nonverbal IQ entered as a covariate in Model 1. When child RRBs and the PSI-SF parent-child dysfunctional interaction subscale were entered into Model 2, a significant main effect emerged for PSI-SF PCDI, B = -.15 SE = .05, p = .004, when predicting clinician-rated ASD symptom severity. However, child RRBs did not emerge as a moderator of the relation between parent-child dysfunctional interaction and clinician-rated ASD symptom severity, B = .002, SE = .002, p = .43.

Table 9

PSI-SF Parent-Child Dysfunctional Interaction Subscale by Child Repetitive Behaviors, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04** (.01)
R^2	.12**
Model 2	
PSI-SF PCDI	-.15** (.05)
Child repetitive behaviors	.00 (.01)
ΔR^2	.12*
Model 3	
Child repetitive behaviors X PSI-SF PCDI	.002 (.002)
ΔR^2	.009

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PSI-SF = Parenting Stress Index – Short Form; PCDI= Parent-Child Dysfunctional Interaction.
* $p < .05$. ** $p < .01$.

Hypothesis 8c. Hypothesis 8c (that child RRBs would moderate the relation between the PSI-SF difficult child [DC] subscale and clinician-rated ASD symptom severity) was also examined via moderated hierarchical regression analysis (Table 10). Nonverbal IQ was entered into Model 1 as a covariate. When child RRBs and the PSI-SF DC subscale were entered in Model 2, a significant main effect emerged for PSI-SF difficult child subscale, $B = -.13$, $SE = .05$, $p = .01$, when predicting clinician-rated ASD symptom severity. However, child RRBs did not emerge as a moderator of the relation between difficult child parenting stress and clinician-rated ASD symptom severity, $B = .002$, $SE = .001$, $p = .22$.

Table 10

PSI-SF Difficult Child Subscale by Child Repetitive Behaviors, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04** (.01)
R^2	.11
Model 2	
PSI-SF DC	-.13**(.05)
Child repetitive behaviors	.02 (.02)
ΔR^2	.11*
Model 3	
Child Repetitive behaviors X PSI-SF DC	.002 (.001)
ΔR^2	.02

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PSI-SF = Parental Stress Index – Short Form; DC = Difficult Child.
* $p < .05$. ** $p < .01$.

Hypothesis 9a. Hypothesis 9a (that child RRBs and the PSI-SF Parental Distress [PD] subscale would simultaneously serve as moderators of the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 11), with nonverbal IQ entered as a covariate in Model 1. When child RRBs, the PSI-SF PD subscale, and parent-rated ASD symptom severity were entered, Model 2 (main effects) was not statistically significant. However, there was no three-way interaction between child RRBs, the PSI-SF PD subscale, and parent-rated ASD symptom severity, B = -.0001, SE = .0001, p = .17.

Table 11

Parent-Reported ASD Severity by the PSI-SF Parental Distress Subscale by Child Repetitive Behaviors, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04* (.01)
R^2	.10*
Model 2	
PR ASD severity	-.001 (.04)
PSI-SF PD	-.04 (.04)
Child repetitive behaviors	-.01 (.02)
ΔR^2	.02
Model 3	
PSI-SF PD X PR ASD severity	-.01 (.004)
Child repetitive behaviors X PR ASD severity	.001 (.001)
PSI-SF PD X Child repetitive behaviors	.01** (.002)
ΔR^2	.13*
Model 4	
PSI-SF PD X Child repetitive behaviors X PR ASD severity	-.0001 (.0001)
ΔR^2	.02

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PSI-SF = Parenting Stress Index – Short Form; PD = Paternal Distress; PR= Parent-Reported; ASD = autism spectrum disorder
* $p < .05$. ** $p < .01$.

Hypothesis 9b. Hypothesis 9b (that child RRB and the PSI-SF Parent-Child Dysfunctional Interaction [PCDI] subscale would simultaneously serve as moderators of the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 12), with nonverbal IQ entered as a covariate in Model 1. When child RRBs, the PSI-SF PCDI subscale, and parent-rated ASD symptom severity were entered into Model 2, the PSI-SF PCDI subscale emerged as a main effect, B = -.18, SE =.05, p = .002, when predicting clinician-rated ASD symptom severity. However, there was no three-way interaction between child RRBs, the PSI-SF PCDI subscale, and parent-rated ASD symptom severity, B = .0000, SE = .0001, p = .80.

Table 12

Parent-Reported ASD Severity by the PSI-SF Parent-Child Dysfunctional Interaction Subscale by Child Repetitive Behaviors, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04 (.01)
R^2	.11**
Model 2	
PR ASD severity	.05 (.04)
PSI-SF PCDI	-.18** (.05)
Child repetitive behaviors	-.02 (.02)
ΔR^2	.15*
Model 3	
PR ASD severity X PSI-SF PCDI	.01 (.01)
Child repetitive behaviors X PR ASD severity	.002 (.001)
PSI-SF PCDI X Child repetitive behaviors	-.01 (.003)
ΔR^2	.09
Model 4	
PSI-SF PCDI X Child repetitive behaviors X PR ASD severity	.0000 (.0001)
ΔR^2	.001

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder; PSI-SF = Parenting Stress Index – Short Form; PCDI = Parent-Child Dysfunctional Interaction.
* $p < .05$. ** $p < .01$.

Hypothesis 9c. Hypothesis 9c (that child RRB and the PSI-SF Difficult Child [DC] subscale would simultaneously serve as moderators of the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 13), with nonverbal IQ entered as a covariate in Model 1. When child RRBs, the PSI-SF DC subscale, and parent-rated ASD symptom severity were entered into Model 2, the PSI-SF DC subscale emerged as a main effect, B = -.14, SE =.05, p = .006, when predicting clinician-rated ASD symptom severity. However, there was no three-way interaction between child RRBs, the PSI-SF DC subscale, and parent-rated ASD symptom severity, B = -.0001, SE = .0001, p = .54.

Table 13

Parent-Reported ASD Severity by PSI-SF Difficult Child Subscale by Child Repetitive Behaviors, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04 (.01)
R^2	.11**
Model 2	
PR ASD severity	.03 (.04)
PSI-SF DC	-.14** (.05)
Child repetitive behaviors	.01 (.02)
ΔR^2	.11
Model 3	
PR ASD severity X PSI-SF DC	.000 (.01)
Child repetitive behaviors X PR ASD severity	.001 (.001)
PSI-SF DC X Child repetitive behaviors	.001 (.002)
ΔR^2	.07
Model 4	
PSI-SF DC X Child repetitive behaviors X PR ASD severity	-.0001(.0001)
ΔR^2	.005

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder; PSI-SF = Parenting Stress Index – Short Form; DC = Difficult Child
** $p < .01$.

Hypothesis 10a Hypothesis 10a (that child age and the PSI-SF Parental Distress [PD] subscale would simultaneously serve as moderators of the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 14), with nonverbal IQ entered as a covariate in Model 1. When child age, the PSI-SF PD subscale, and parent-rated ASD symptom severity were entered into Model 2, child age emerged as a main effect, $B = -.10$, $SE = .02$, $p < .001$, when predicting clinician-rated ASD symptom severity. Additionally, a three-way interaction emerged between child age, the PSI-SF PD subscale, and parent-rated ASD symptom severity when predicting clinician-

rated ASD symptom severity, $B = .0004$, $SE = .0002$, $p = .03$. A post hoc plot of the interaction (Figure 2) revealed a negative relation between parent- and clinician-rated ASD symptom severity, but only when children were older and parents reported lower stress.

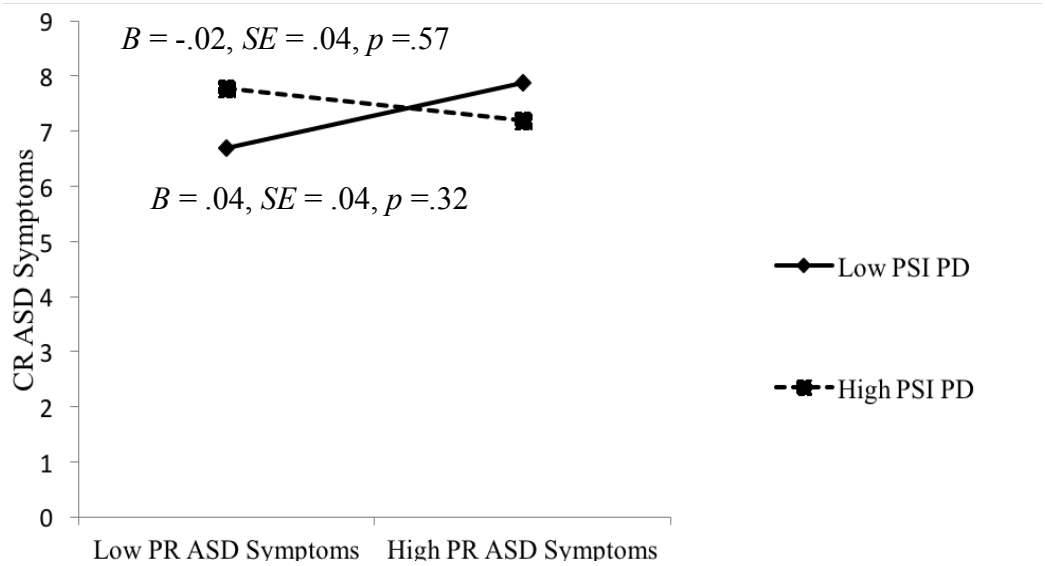
Table 14

Parent-Reported ASD Severity by PSI-SF Parental Distress Subscale by Child Age, Predicting Clinician-Rated ASD Severity

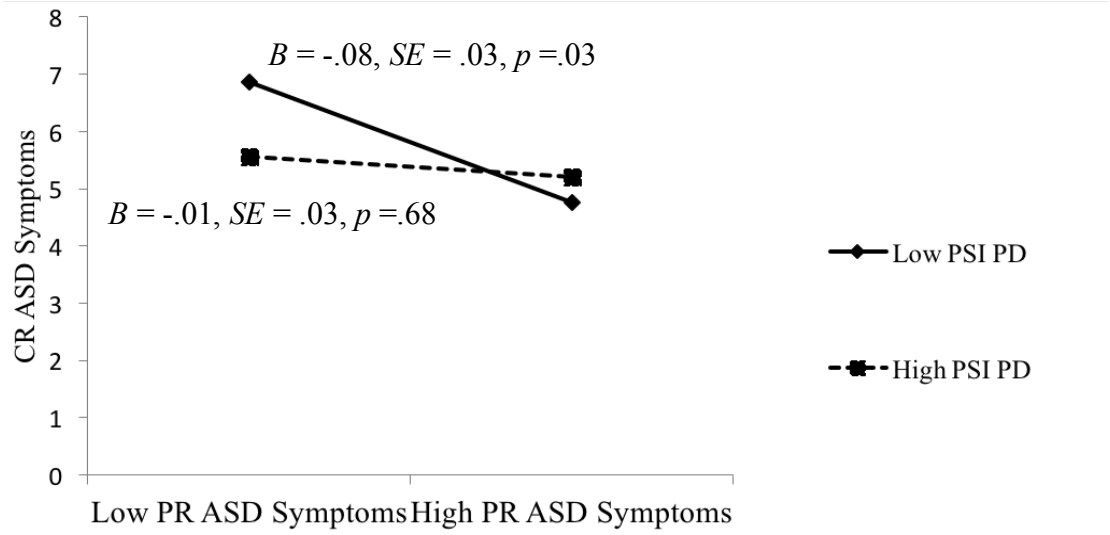
Predictor Variables	Criterion Variable: Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.03 (.01)
R^2	.08*
Model 2	
PR ASD severity	-.03 (.02)
PSI-SF PD	-.03 (.03)
Child age	-.10 (.02)
ΔR^2	.28***
Model 3	
PR ASD severity X PSI-SF PD	.00 (.002)
PR ASD severity X Child age	-.002 (.002)
PSI-SF PD X Child age	-.001 (.002)
ΔR^2	.02
Model 4	
PR ASD severity X PSI-SF PD X Child age	.0004* (.0002)
ΔR^2	.05

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder; PSI-SF = Parenting Stress Index – Short Form; PD = Parental Distress.
* $p < .05$. ** $p < .01$.

A – Low Child Age



B- Medium Child Age



C- High Child Age

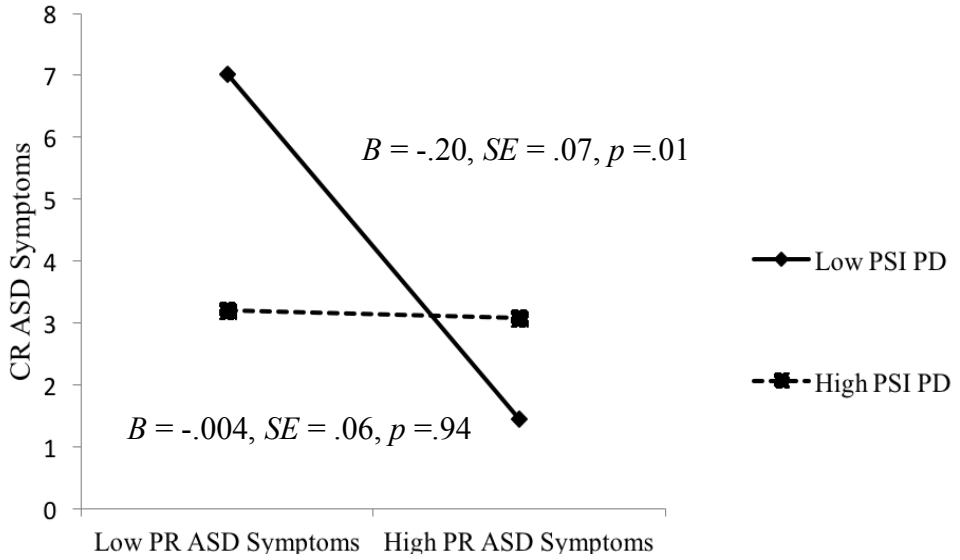


Fig. 2. Interactions between PSI-SF PD and parent-rated ASD symptom severity predicting clinician-rated ASD symptom severity at low (Panel A), medium (Panel B), and high (Panel C) levels of child age. Analyses are controlling for child nonverbal IQ. Unstandardized coefficients for the simple slopes for low and high PSI-SF PD are presented within the plot.

Hypothesis 10b. Hypothesis 10b (that child age and the PSI-SF Parent-Child Dysfunctional Interaction [PCDI] subscale would simultaneously serve as moderators of the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 15), with nonverbal IQ entered as a covariate in Model 1. When child age, the PSI-SF PCDI subscale, and parent-rated ASD symptom severity were entered into Model 2, child age emerged as a main effect, B = -.09, SE = .02, $p < .001$, when predicting clinician-rated ASD symptom severity. However, there was no three-way interaction between child age, the PSI-SF PCDI subscale, and parent-rated ASD symptom severity, B = .0004, SE = .0002, p = .11.

Table 15

Parent-Reported ASD Severity by the PSI-SF Parent-Child Dysfunctional Interaction Subscale by Child Age, Predicting Clinician-Rated ASD Severity

Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04* (.01)
R^2	.10*
Model 2	
PR ASD severity	-.01 (.03)
PSI-SF PCDI	-.09 (.05)
Child age	-.09*** (.02)
ΔR^2	.31***
Model 3	
PR ASD severity X PSI-SF PCDI	.004 (.003)
PR ASD severity X Child age	-.004* (.002)
PSI-SF PCDI X Child age	.01 (.003)
ΔR^2	.05
Model 4	
PR ASD Severity X PSI-SF PCDI X Child age	.0004 (.0002)
ΔR^2	.02

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder; PSI-SF = Parenting Stress Index – Short Form; PCDI = Parent-Child Dysfunctional Interaction.
* $p < .05$. ** $p < .01$.

Hypothesis 10c. Hypothesis 10c (that child age and the PSI-SF Difficult Child [DC] subscale would simultaneously serve as moderators of the relation between parent-rated and clinician-rated ASD symptom severity) was also examined via a moderated hierarchical regression analysis (Table 16), with nonverbal IQ entered as a covariate in Model 1. When child age, the PSI-SF DC subscale, and parent-rated ASD symptom severity were entered into Model 2, child age emerged as a main effect, $B = -.10$, $SE = .02$, $p < .001$, when predicting clinician-rated ASD symptom severity. Additionally, child age and the PSI-SF DC subscale moderated the relation between parent-rated ASD symptom severity and clinician-rated ASD symptom

severity, B = .001, SE = .0002, p = .01. A post hoc plot of the interaction (Figure 3) revealed a negative relation between parent- and clinician-rated ASD symptom severity, but only when children were older and parents reported lower stress.

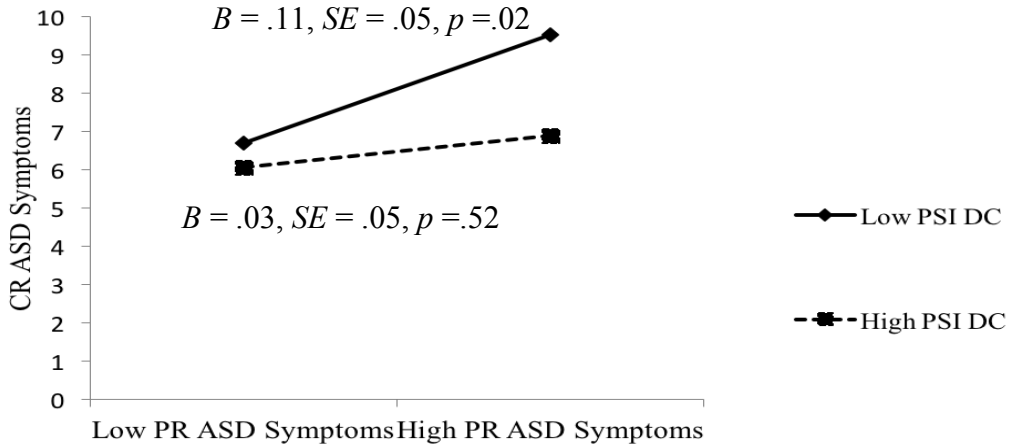
Table 16

Parent-Reported ASD Severity by the PSI-SF Difficult Child Subscale by Child Age, Predicting Clinician-Rated ASD Severity

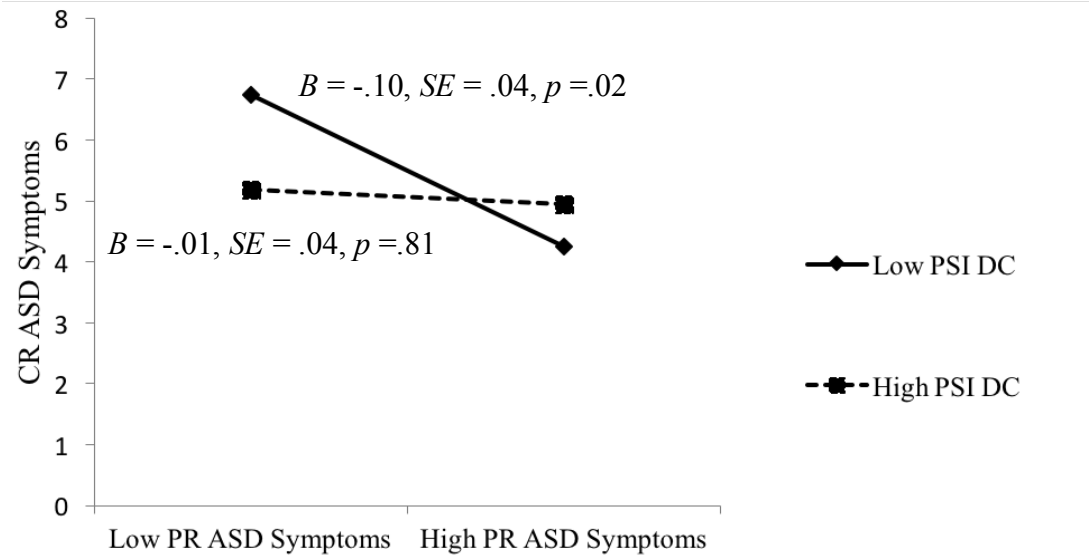
Predictor Variables	Criterion Variable
	Clinician-Rated ASD Severity
Model 1	
Nonverbal IQ	-.04** (.01)
R^2	.10**
Model 2	
PR ASD severity	-.01 (.03)
PSI-SF DC	-.04 (.04)
Child age	-.10*** (.02)
ΔR^2	.28***
Model 3	
PR ASD severity X PSI-SF DC	.002 (.002)
PR ASD severity X Child age	-.004* (.002)
PSI-SF DC X Child Age	.003 (.002)
ΔR^2	.05
Model 4	
PR ASD severity X PSI-SF DC X Child age	.001*** (.0002)
ΔR^2	.07**

Note. Unstandardized regression coefficients reported for each predictor with standard errors in parentheses; PR= Parent-Reported; ASD = autism spectrum disorder; PSI-SF = Parenting Stress Index – Short Form; PCDI = Parent-Child Dysfunctional Interaction.
* $p < .05$. ** $p < .01$. *** $p < .001$

A- Low Child Age



B- Medium Child Age



C- High Child Age

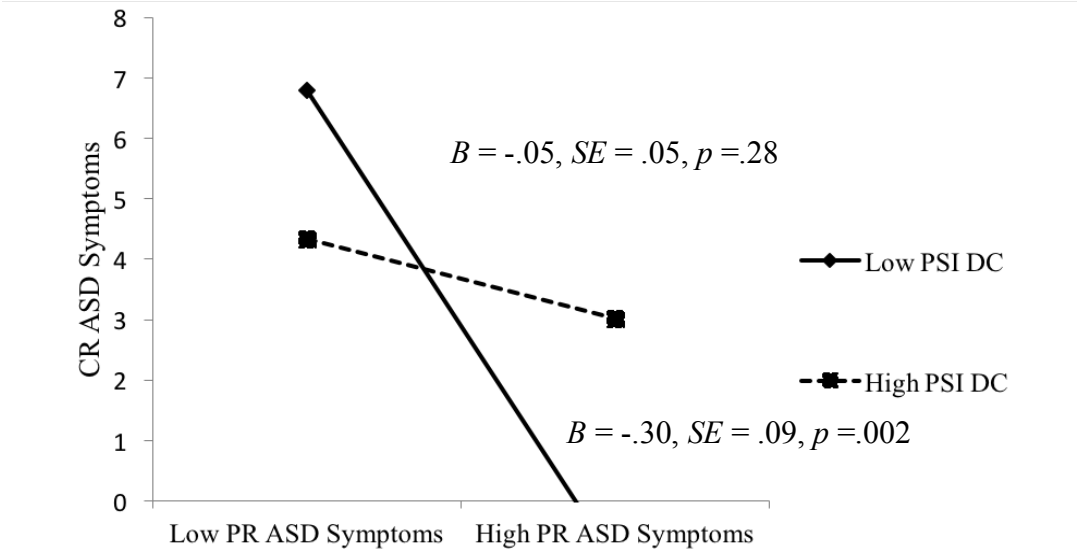


Fig. 3. Interactions between PSI-SF DC and parent-rated ASD symptom severity predicting clinician-rated ASD symptom severity at low (Panel A), medium (Panel B), and high (Panel C) levels of child age. Analyses are controlling for child nonverbal IQ. Unstandardized coefficients for the simple slopes for low and high PSI-SF DC are presented within the plot.

CHAPTER 4. DISCUSSION

The current study examined the extent to which three domains of parenting stress (Parental Distress [PD], Parent-Child Dysfunctional Interaction [PCDI], and Difficult Child [DC]), child age, and child RRBs individually strengthened or weakened the relation between parent-rated and clinician-rated autism symptom severity in a sample of children with and without ASD.

Results of this study indicated that parent- and clinician-rated ASD symptom severity were not significantly related. PSI-SF PCDI and PSI-SF DC, however, positively related to parent-reported ASD symptom severity and child RRBs. Child RRBs also positively related to parent-rated ASD symptom severity. In contrast, PSI-SF PCDI and DC were negatively related to clinician-rated ASD symptom severity and PSI-SF PD did not relate to parent- or clinician-rated ASD symptom severity. Together, these results suggest that parental stress involving child characteristics is related to parents' perceptions of their child's ASD symptoms as well as their relationship with their child. However, there was no relation between parent's perceptions of their child's ASD symptom severity and the clinician's rating of child symptom severity.

When examining PSI-SF subscales, child RRBs, and child age as moderators of the relation between parent- and clinician-rated ASD symptom severity, no two-way interactions emerged. However, main effects emerged for PSI-SF PCDI, PSI-SF DC, and child age, negatively predicting clinician-rated ASD symptom severity over and above nonverbal cognitive abilities. A two-way interaction emerged when examining child RRBs as a moderator of the relation between the PSI-SF PD subscale and clinician-rated autism symptom severity.

Specifically, clinician-rated ASD symptom severity was highest when there were fewer child RRBs and less parental distress. PSI-SF PCDI and DC emerged as main effects over and above nonverbal cognitive abilities when examining child RRBs as a potential moderator of the relation between parenting stress and clinician-rated ASD symptom severity. Specifically, the PSI-SF PCDI and DC subscales were negative predictors of clinician-rated ASD symptom severity.

When examining each PSI-SF subscale and child RRBs as moderators of the relation between parent-rated ASD symptom severity and clinician-rated ASD symptom severity, PSI-SF PCDI and DC, again, emerged as main effects, negatively predicting clinician-rated ASD symptom severity. Additionally, a three-way interaction emerged when parent-rated ASD symptom severity, child age, and PSI-SF PD and PSI-SF DC, respectively, were examined as predictors of clinician-rated ASD symptom severity. Specifically, there was a negative relation between parent- and clinician-rated ASD symptoms, but only when children were older and parental stress was relatively low. Lastly, when PSI-SF PCDI and child age were examined as moderators of the relation between parent-rated ASD symptom severity and clinician-rated ASD symptom severity, child age emerged as a main effect, negatively predicting clinician-rated ASD symptom severity over and above nonverbal cognitive abilities.

Links to Previous Literature

A debate surrounds the extent to which research can be applied to clinical settings (Kazdin, 2008; Stirman, DeRubeis, Crits-Christoph, & Brody, 2003). Often, criteria are specified prior to participants enrolling in a study, which leads to less variability in the sample demographics or symptomatology (Westen & Morrison, 2001). Therefore, individuals participating in such studies may not be representative of the community in terms of background complexity, diagnostic comorbidity, and/or symptom severity, suggesting that

when interpreting results, findings may have limited generalizability to other populations or the community (Kazdin, 2008). The present study used a community-based sample that included children with and without an ASD diagnosis to better capture populations typically encountered by clinicians during the diagnostic process in hopes of achieving more generalizable results. This may, in part, explain some of the unsupported hypotheses and the findings that contrast with previous literature.

This study found no relation between clinician-rated ASD symptom severity and parent-rated ASD symptom severity or between clinician-rated ASD symptom severity and child RRBs. Although it is unexpected to find no relation between raters on a similar construct, past research has found relatively weak relations between clinicians and parents as informants (Achenbach et al., 1987). Previous research on multiple informants has indicated that discrepant ratings may be, in part, due to assessing symptoms in different settings (Achenbach et al., 1987). Moreover, the novel environment and short duration in which the clinician assesses the child may impact the child's behavior and the clinician's ability to gain a full picture. Lastly, the difference in the clinician's level of knowledge about autism symptoms and what is and is not developmentally expected in comparison to a parent's may also contribute to discrepant reports.

Consistent with previous literature that parenting stress and child characteristics relate (Davis & Carter, 2008), this study found that PSI-SF PCDI and DC positively related to parent-rated ASD symptom severity and child RRBs. The PSI-SF PD subscale did not relate to child RRBs, parent-rated ASD symptom severity, or clinician-rated ASD symptom severity. Given the PCDI and DC subscales relate to the parent-child dynamic and child characteristics, respectively, it was expected that these subscales would relate more strongly to child characteristics than the PD subscale, which assesses stress related to overall parenting.

Unexpectedly, however, the PSI-SF PCDI and DC subscales consistently emerged as negative predictors of clinician-rated ASD symptom severity. To gain a better understanding of this negative relation, PSI-SF subscales were examined separately within the ASD and non-ASD groups following main analyses. Results indicated that mean scores for all PSI-SF subscale scores were higher for the non-ASD group than the ASD group. This finding may explain the negative relation between PSI-SF subscales and clinician-rated ASD symptom severity; on average, parents whose child did not receive an ASD diagnosis reported higher levels of stress than parents whose child did receive an ASD diagnosis. As previously mentioned, studies have found that child characteristics, such as externalizing behaviors, repetitive behaviors, and hyperactivity, relate most strongly to parenting stress (Brei, Schwarz, & Klein- Tasman, 2015; Estes et al., 2009; Zaidman-Zait et al., 2017). The negative relation between PSI-SF subscales and clinician-rated ASD symptom severity may align with this previous literature, indicating that, relative to symptoms more typical of ASD, parents of children with more externalizing behavior problems (i.e., difficulties more commonly associated with ODD, ADHD) or behaviors that do not fit into a specific diagnosis may be experiencing higher stress in all three domains. It is also possible that parents of children who do not receive a diagnosis of ASD may experience more stigmatization. Prior research indicates that symptoms consistent with a diagnosis of ODD, ADHD, or others externalizing disorders lead to greater stigmatization, in turn, leading to greater parenting distress (Bishop, 2008). Alternatively, parents whose children eventually receive a diagnosis of ASD may have done prior research about ASD, feel more informed leading up to the evaluation, and face less stigmatization for their child's core symptoms of ASD (difficulty with socialization and communication), leading to less stress in these parenting stress domains. The two-way interaction between child RRBs and PSI-SF PD indicated that there is a negative

relation between PSI-SF PD and clinician-rated ASD symptom severity when child RRBs are low. This negative relation between PSI-SF PD and clinician-rated ASD symptom severity may be due to the previously mentioned higher levels of stress reported by parents whose children did not receive a diagnosis of ASD. Although this interpretation does not integrate all three variables, it is possible that this negative relation is due to the PSI-SF PD scale not relating to child characteristics specifically. In addition, the relation between PSI-SF PD and clinician-rated ASD symptom severity may be explained by greater stigmatization (Bishop et al., 2008). As the PSI-SF PD assesses parent's competency and skill, parents of children with higher levels of RRBs may feel that they are unable to or are inadequately managing their children's behavior, thus resulting in higher parental stress. However, this finding may be spurious due to small sample size and should be interpreted with caution.

The two three-way interactions between child age, parent-rated ASD symptom severity, and PSI-SF PD and DC, respectively, indicated a negative relation between parent-rated ASD symptom severity and clinician-rated ASD symptom severity when parents were less stressed and children were older. It is possible that some parents are less attuned to the severity of their children's difficulties (rating their child low on ASD symptoms when the clinician rates the child high) whereas other parents may overestimate the severity of their children's difficulties (rating their child high on ASD symptoms when the clinician rates the child low). Therefore, this significant discrepancy between parent and clinician ratings may indicate that, when parents are experiencing low stress, some parents may be over-estimating and some may be under-estimating child symptoms. Moreover, parents may over- or under-estimate their child's symptoms due to a limited understanding of developmentally appropriate behavior. As the negative relation emerged only when children were older, some parents may become accustomed

to their child's behaviors, not viewing them as atypical or adapting coping mechanisms and/or techniques to handle their child's challenging behaviors. Therefore, parents may experience less stress related to overall parental competency and their child's difficult behavior. It is important, though, to not only consider parent factors, but also to consider those factors that may impact the clinician; clinicians are subject to error in their interpretation, although they are less likely to be impacted by parental stress. However, it is important to note that this negative relation between parent- and clinician-ratings does not coincide with the literature. Therefore, this finding may be spurious due to small sample size and should be interpreted with caution.

Limitations and Future Directions

This study has important limitations that warrant consideration. Although the sample includes children with and without ASD, which is thought to be representative of the population that is assessed in specialty psychology clinics, the small sample size limits the overall generaliziability of the results, as well as the ability to examine only children with ASD and/or to make comparisons between an ASD group and a non-ASD group. Moreover, the small sample size limits the statistical power to detect the proposed effects, thus increasing the chance of Type II error. As such, these results should be interpreted with caution and future research should aim to examine these questions with larger samples. Furthermore, the current study examined how parenting stress influences the agreement between parent- and clinician- reported ASD symptoms; however, this study did not measure other factors involved in parental mental health. Parenting stress is unlikely to be the only psychological factor that influences the ways in which parents rate their children. Moreover, clinician factors such as knowledge about ASD, assessment experience, and experience with children in a clinical setting may be important to consider when trying to understand the ways in which clinicians

rate children. Lastly, this study examined restrictive and repetitive behaviors, child age, and parenting stress; however, other demographic and parent-level variables such as parent education, parent knowledge about ASD symptoms and developmentally-appropriate behaviors, and access to resources and support may be additional predictors of the agreement between parent- and clinician-ratings of ASD symptoms.

Future research is necessary to better understand any differences in parenting stress between mothers and fathers. The present study largely included mothers, therefore limiting generalizability to the stress of all parents. Additionally, research should further examine the specific repetitive and restrictive behaviors that are related to parental stress, as well as examine the variables of interest in samples of preschoolers, school-age children, and adolescents. As this study showed that parents who did not receive a diagnosis of ASD for their children exhibited higher stress, future research should further examine the factors that differentiate parents' stress levels and the specific characteristics of their children that may lead to heightened or reduced stress.

Clinical Implications and Conclusions

As previous studies have illustrated, a comprehensive understanding is needed of not only the subject of an evaluation, but also those who supply the critical information during the diagnostic process. Although this study did not indicate that parenting stress influences the relation between parent-rated and clinician-rated ASD symptom severity, it sheds light on the complexity of the diagnostic process. The unexpected findings of no relation between parent- and clinician-rated symptoms and a negative relation between parenting stress and clinician-rated ASD symptoms further demonstrates the necessity for more research to better understand informant discrepancy and how parenting experiences and knowledge may

influence the diagnostic process. However, clinicians may find it beneficial to gather more information about the parent's knowledge of developmentally-appropriate behaviors and ASD symptoms during the diagnostic process as it may influence their ratings of their child's symptoms.

As the results indicate, parents of children with and without ASD in the current sample experienced different levels of stress. Children with and without ASD are likely exhibiting different symptoms or behavioral problems that may contribute to their parent's increased levels of stress. Clinicians who collect information about parents' experiences and understanding of their child's behaviors may be better equipped to provide tailored strategies to be used at home, at school and in the community (Brei et al., 2015). Therefore, it is not only important for clinicians to discuss the diagnostic outcome and support systems with parents whose child receives a diagnosis, but it may be even more important to discuss resources with parents who do not receive a diagnosis for their child. Services and resources for children with ASD may be more clearly defined or more readily accessible relative to services and resources for children who receive a different diagnosis or no diagnosis. Clinicians who are aware of what aspect of a child's behavior or symptoms is most stressful for parents may be better able to incorporate effective parent-training techniques and coping mechanisms throughout interventions to decrease their child's challenging behaviors and their own stress related to their child's characteristics. Similarly, as some parents may not be aware of what is and is not appropriate for their child's developmental level, psychoeducation about developmentally-appropriate behaviors and expectations may help in guiding parents to cope with challenges their child's diagnosis, whether it is or is not ASD.

REFERENCES

Abidin, R. R. (1990). *Parenting stress index-short form*. Charlottesville, VA: Pediatric Psychology Press.

Achenbach, T. M. (2006). As others see us clinical and research implications of cross-informant correlations for psychopathology. *Current Directions in Psychological Science*, *15*(2), 94-98.

Achenbach, T. M. (2011). Commentary: Definitely more than measurement error: But how should we understand and deal with informant discrepancies? *Journal of Clinical Child and Adolescent Psychology*, *40*(1), 80-86.

Achenbach, T. M., McConaughy, S. H., & Howell, C. T. (1987). Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. *Psychological Bulletin*, *101*(2), 213-232.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5.* Washington, D.C: American Psychiatric Association.

Benson, P. R. (2006). The impact of child symptom severity on depressed mood among parents of children with ASD: The mediating role of stress proliferation. *Journal of Autism and Developmental Disorders*, *36*(5), 685-695.

Bradley, E. A., & Isaacs, B. J. (2006). Inattention, hyperactivity, and impulsivity in teenagers with intellectual disabilities, with and without autism. *The Canadian Journal of Psychiatry*, *51*(9), 598-606.

Brei, N. G., Schwarz, G. N., & Klein-Tasman, B. P. (2015). Predictors of parenting stress in children referred for an autism spectrum disorder diagnostic evaluation. *Journal of Developmental and Physical Disabilities*, *27*(5), 617-635.

Constantino, J. N., & Gruber, C. P. (2023). *Social responsiveness scale, Second Edition (SRS-2)*. Los Angeles, CA: Western Psychological Services.

Davis, N. O., & Carter, A. S. (2008). Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. *Journal of Autism and Developmental Disorders*, *38*(7), 1278-1291.

Deater-Deckard, K. (1998). Parenting stress and child adjustment: Some old hypotheses and new questions. *Clinical Psychology: Science and Practice*, *5*(3), 314-332.

De Los Reyes, A., Augenstein, T. M., Wang, M., Thomas, S. A., Drabick, D. A., Burgers, D. E., & Rabinowitz, J. (2015). The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychological Bulletin, 141*(4), 858-900.

Diamond, K. E., & Squires, J. (1993). The role of parental report in the screening and assessment of young children. *Journal of Early Intervention*, *17*(2), 107-115.

Dumas, J. E., Wolf, L. C., Fisman, S. N., & Culligan, A. (1991). Parenting stress, child behavior problems, and dysphoria in parents of children with autism, Down syndrome, behavior disorders, and normal development. *Exceptionality: A Special Education Journal*, *2*(2), 97-110.

Duvekot, J., van der Ende, J., Verhulst, F. C., & Greaves-Lord, K. (2015). The screening accuracy of the parent and teacher-reported Social Responsiveness Scale (SRS): Comparison with the 3Di and ADOS. *Journal of Autism and Developmental Disorders*, *45*(6), 1658-1672.

Elliott, C. (2007). Differential Ability Scales (2nd ed.). San Antonio, TX: Harcourt Assessment.

Estes, A., Munson, J., Dawson, G., Koehler, E., Zhou, X. H., & Abbott, R. (2009). Parenting stress and psychological functioning among mothers of preschool children with autism and developmental delay. *Autism*, *13*(4), 375-387.

Farmer, C. A., & Aman, M. G. (2011). Aggressive behavior in a sample of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 317-323.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research methods*, *39*(2), 175-191.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149-1160.

Firth, I., & Dryer, R. (2013). The predictors of distress in parents of children with autism spectrum disorder. *Journal of Intellectual and Developmental Disability*, *38*(2), 163-171.

Glascoe, F. P., & Dworkin, P. H. (1995). The role of parents in the detection of developmental and behavioral problems. *Pediatrics*, *95*(6), 829-836.

Hastings, R. P. (2003). Child behaviour problems and partner mental health as correlates of stress in mothers and fathers of children with autism. *Journal of Intellectual*

Disability Research, *47*(4-5), 231-237.

Hayes, S. A., & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *43*(3), 629- 642.

Hutton, A. M., & Caron, S. L. (2005). Experiences of families with children with autism in rural New England. *Focus on Autism and Other Developmental Disabilities*, *20*(3), 180-189.

Ingersoll, B., & Hambrick, D. Z. (2011). The relationship between the broader autism phenotype, child severity, and stress and depression in parents of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 337-344.

Jensen, P. S., Traylor, J., Xenakis, S. N., & Davis, H. (1988). Child psychopathology rating scales and interrater agreement: I. Parents' gender and psychiatric symptoms. *Journal of the American of Child and Adolescent Psychiatry, 27*(4), 442-450.

Jepsen, M. I., Gray, K. M., & Taffe, J. R. (2012). Agreement in multi-informant assessment of behaviour and emotional problems and social functioning in adolescents with Autistic and Asperger's Disorder. *Research in Autism Spectrum Disorders*, *6*(3), 1091-1098.

Johnson, N., Frenn, M., Feetham, S., & Simpson, P. (2011). Autism spectrum disorder: parenting stress, family functioning and health-related quality of life. *Families, Systems, &Health*, *29*(3), 232-252.

Kazdin, A. E. (2008). Evidence-based treatment and practice: new opportunities to bridge clinical research and practice, enhance the knowledge base, and improve patient care. *American Psychologist*, *63*(3), 146-159.

Kim, J. A., Szatmari, P., Bryson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism*, *4*(2), 117-132.

Kissel, S. D., & Nelson, W. M. (2014). Parents' perceptions of the severity of their child's autistic behaviors and differences in parental stress, family functioning, and social support. *Focus on Autism and Other Developmental Disabilities, 31*(2), 152-160.

Kraemer, H. C., Measelle, J. R., Ablow, J. C., Essex, M. J., Boyce, W. T., & Kupfer, D. J. (2003). A new approach to integrating data from multiple informants in psychiatric assessment and research: Mixing and matching contexts and perspectives. *American Journal of Psychiatry*, *160*(9), 1566-1577.

Krakovich, T. M., McGrew, J. H., Yu, Y., & Ruble, L. A. (2016). Stress in parents of children with autism spectrum disorder: An exploration of demands and resources. *Journal of Autism and Developmental Disorders*, *46*(6), 2042-2053.

Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., ... & Lainhart, J.E. (2006). Comorbid psychiatric disorders in children with autism: Interview development and rates of disorders. *Journal of Autism and Developmental Disorders*, *36*(7), 849-861.

Lord, C., DiLavore, P. C., & Gotham, K. (2012). *Autism diagnostic observation schedule*. Torrance, CA: Western Psychological Services.

Loveland, K. A. (2005). Social-emotional impairment and self-regulation in autism spectrum disorders. In J. Nadel & D. Muir (Eds.), *Emotional development: Recent research advances,* (pp. 365-382). New York, NY, US: Oxford University Press.

Lyons, A. M., Leon, S. C., Phelps, C. E. R., & Dunleavy, A. M. (2010). The impact of child symptom severity on stress among parents of children with ASD: The moderating role of coping styles. *Journal of Child and Family Studies*, *19*(4), 516-524.

McCrimmon, A. & Rostad, K. (2014). Review of Autism Diagnostic Observation Schedule, second edition (ADOS-2) manual (Part II): Toddler module and Autism Diagnostic Observation Schedule, second edition. *Journal of Psychoeducational Assessment*, *32*(1), 88-92.

McStay, R. L., Dissanayake, C., Scheeren, A., Koot, H. M., & Begeer, S. (2013). Parenting stress and autism: The role of age, autism severity, quality of life and problem behaviour of children and adolescents with autism. *Autism*, *18*(5), 502-510.

Ooi, Y. P., Weng, S. J., Magiati, I., Ang, R. P., Goh, T. J., Fung, D. S., & Sung, M. (2016). Factors influencing agreement between parent and child reports of anxiety symptoms among children with high-functioning Autism Spectrum Disorders. *Journal of Developmental and Physical Disabilities*, *28*(3), 407-424.

Reitman, D., Currier, R. O., & Stickle, T. R. (2002). A critical evaluation of the Parenting Stress Index-Short Form (PSI-SF) in a Head Start population. *Journal of Clinical Child and Adolescent Psychology*, *31*(3), 384-392.

Reynolds, C. R., & Kamphaus, R. W. (2004). *Behavior assessment system for children-Second edition*. Circle Pines, MN: AGS.

Reynolds, C., & Kamphaus, R. (2015). *Behavioral assessment system for children—Third edition.* Circle Pines, MN: AGS.

Siegel, B., Pliner, C., Eschler, J., & Elliott, G. R. (1988). How children with autism are diagnosed: difficulties in identification of children with multiple

developmental delays. *Journal of Developmental & Behavioral Pediatrics*, *9*(4), 199-204.

Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T., & Baird, G. (2008). 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 & Adolescent Psychiatry*, *47*(8), 921-929.

Stirman, S. W., DeRubeis, R. J., Crits-Christoph, P., & Brody, P. E. (2003). Are samples in randomized controlled trials of psychotherapy representative of community outpatients? A new methodology and initial findings. *Journal of Consulting and Clinical Psychology*, *71*(6), 963-972.

Stoppelbein, L., Biasini, F., Pennick, M., & Greening, L. (2016). Predicting internalizing and externalizing symptoms among children diagnosed with an autism spectrum disorder: the role of routines. *Journal of Child and Family Studies*, *25*(1), 251-261.

Tomanik, S., Harris, G. E., & Hawkins, J. (2004). The relationship between behaviours exhibited by children with autism and maternal stress. *Journal of Intellectual and Developmental Disability*, *29*(1), 16-26.

Tomchek, S. D., & Dunn, W. (2007). Sensory processing in children with and without autism: a comparative study using the short sensory profile. *American Journal of Occupational Therapy*, *61*(2), 190-200.

Wechsler D. (2003). *WISC-IV technical and interpretive manual*. San Antonio, TX: The Psychological Corporation.

Wechsler D. (2014). *Wechsler Intelligence Scale for Children, Fifth Edition*. (WISC-V). San Antonio, TX: The Psychological Corporation.

Westen, D., & Morrison, K. (2001). A multidimensional meta-analysis of treatments for depression, panic, and generalized anxiety disorder: an empirical examination of the status of empirically supported therapies. *Journal of Consulting and Clinical Psychology*, *69*(6), 875-899.

Zaidman-Zait, A., Mirenda, P., Duku, E., Vaillancourt, T., Smith, I. M., Szatmari, P., ... & Zwaigenbaum, L. (2016). Impact of personal and social resources on parenting stress in mothers of children with autism spectrum disorder. *Autism*, *21*(2), 155-166.

APPENDIX

THE UNIVERSITY OF ALABAMA | Office of the Vice President for Research & Economic Development
Office for Research Compliance

January 9, 2017

Sarah M. Ryan, Ph.D.
Administrative Director of Autism Services
Department of Psychology
College of Arts & Sciences
The University of Alabama
Box 870348

Re: IRB # 06-OR-022-R11 "Autism Spectrum Disorders Clinic Research Database"

Dear Dr. Ryan:

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your renewal application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on January 8, 2018. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Study Closure Form.

Please use reproductions of the IRB approved stamped consent/assent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

Carpantato T. Myles, MSM, CIM, CIP
Director & Research Compliance Officer
Office of Research Compliance