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EXPLORING THE RELATIONSHIP BETWEEN RESTRICTED AND REPETITIVE BEHAVIORS, ANXIETY, AND AGGRESSION IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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EXPLORING THE RELATIONSHIP BETWEEN RESTRICTED AND REPETITIVE BEHAVIORS, ANXIETY, AND AGGRESSION IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

EXPLORING THE RELATIONSHIP BETWEEN RESTRICTED AND REPETITIVE BEHAVIORS, ANXIETY, AND AGGRESSION IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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Previous research has demonstrated associations between restricted and repetitive behaviors (RRBs) and anxiety, RRBs and aggression, and anxiety in aggression in youth with autism spectrum disorder (ASD), yet no study has investigated the nature of the relationship between all three constructs. As such, the goal of the present study was to test the hypothesis that anxiety mediates the relationship between RRBs and aggression. Participants consisted of 115 parent(s)/guardian(s) of children with ASD who completed parent/caregiver-report questionnaires on the frequency and severity of their child's RRBs, anxiety symptoms, and aggressive behaviors. The present study is the first to use construct-specific measures of anxiety and aggression that were normed on and developed for youth with ASD, as well as the first to use Bishop and colleagues' (2013) five-factor RRB structure (which divides RRBs into sensory-motor, self-injurious, compulsive, restricted interests, and ritualistic/sameness behaviors) to test this association. Results of this study suggest that anxiety significantly mediated the relationship between overall RRBs (as a unitary construct) and aggression. At a more granular level, anxiety significantly mediated the relationship between four out of five RRB subcategories (self-injury, compulsive, restricted interests, and ritualistic behaviors/sameness) and aggression. These findings contribute to the limited literature on

the relationship between RRBs, anxiety, and aggression in youth with ASD and have important implications for treatment and clinical practice.

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Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social communication and the presence of restricted and repetitive behaviors (*Diagnostic and Statistical Manual of Mental Disorders – Fifth Edition* [*DSM-5*]; American Psychiatric Association, 2013). According to the most recent prevalence statistics, 1 in 54 children meet diagnostic criteria for ASD (Center for Disease Control and Prevention, 2020), and research on comorbidity suggests that up to 70% of these youth meet criteria for at least one additional DSM diagnosis or disorder (Simonoff et al., 2008). Anxiety disorders and externalizing disorders are two of the most common co-occurring conditions observed in children with ASD (Kanne & Mazurek, 2011; Mazurek, Kanne, & Wodka, 2013; Salazar, 2015; Skokauskas & Gallagher, 2010) and often compound the distress and impairment associated with this disorder (Kerns et al., 2015; Matson & Adams, 2014). Comorbid anxiety and/or aggression often make integration into the learning environment and/or local community more challenging for youth with ASD and their families, may magnify difficulties in certain functional domains (Kerns et al., 2015; Mazurek, Kanne, & Wodka, 2013; Stith et al., 2009; Stormshak et al., 1999), and tend to exacerbate or amplify the core symptoms of ASD (Canitano, 2006; Hartley et al., 2008; Kerns et al., 2015).

Given the abundance of, and impairment associated with, these common comorbidities, a new wave of research has attempted to shed light on the ways in which the two "core" symptoms of ASD (i.e., social communication impairments and restricted and repetitive behaviors [RRBs]) may relate to the expression of anxiety and aggression within this population. To date, this research has focused disproportionately on the

relationship between social communication impairments and these common comorbidities (Bishop et al., 2006; Lewis & Bodfish, 1998). This comparative lack of focus on RRBs is surprising and concerning, given that parents often cite RRBs as the most difficult symptom of ASD to manage (South et al., 2005).

The subset of the literature that has focused on RRBs has demonstrated that the frequency and severity with which RRBs occur is often associated with heightened levels of anxiety (Rodgers et al., 2012; Sukhodolsky et al., 2008), and increased rates of aggression (Dominick et al., 2007; Kanne & Mazurek, 2010; Oliver et al., 2012) in children with ASD. At a more granular level, several studies have illustrated links between some specific subcategories of RRBs and anxiety (Black et al., 2017; Factor et al., 2016; Uljarevic et al., 2017), some specific subcategories of RRBs and aggression (Kanne & Mazurek, 2011), as well as anxiety and aggression (Ambler et al., 2016; Cervantes, et al., 2013; Matson & Adams, 2014) within this population. Nonetheless, however, significant gaps in the literature remain.

There is little research that uses construct-specific measures that have been designed for and normed on individuals with ASD to explore the relationship between RRBs (both overall RRBs and RRB subcategories), anxiety, and aggression within this population. Several studies have come close (i.e., they have used measures that were developed for typically developing [TD] populations that have been normed on individuals with ASD, or they have used measures that were developed for individuals with ASD but were not explicitly designed to measure the target construct) but none to date have satisfied these exact criteria. This is a considerable problem, given that measures not explicitly designed to measure the target construct (i.e., anxiety and/or

aggression) and/or measures that assess the target construct but were not developed for and normed on individuals with ASD may not produce valid and reliable results. Further, although evidence suggests that RRBs, anxiety, and aggression are interrelated, no study to date has explored the nature of this relationship. Therefore, the purpose of this study was twofold. First, this study used measures of anxiety and aggression, specific to the target population, to examine the relationship between these variables and RRBs at the overall and subcategory levels. Second, this study directly tested the hypothesis that anxiety mediates the relationship between RRBs and aggression.

ASD and Restricted and Repetitive Behaviors (RRBs)

What are RRBs? RRBs represent a broad class of behaviors, interests, or activities including stereotyped or repetitive motor movements, use of objects, or speech; insistence on sameness or inflexible adherence to routines; ritualized patterns of behavior; highly restricted and fixated interests; and hypo- or hyper-reactivity to sensory input (American Psychiatric Association, 2013). To better understand, study, and categorize these behaviors, researchers have posed two-factor (Lidstone et al., 2014; Szatmari et al., 2006), three-factor (Lam et al., 2008), four-factor (Russell et al., 2019), and five-factor (Bishop et al 2012; Lam & Aman, 2007) structures that divide RRBs into discrete subcategories.

Empirically supported two-factor models divide RRBs into repetitive sensory motor (RSM) and insistence on sameness (IS) subcategories (Lidstone et al., 2014; Szatmari et al., 2006) or create classes of "lower-order" RRBs, which include stereotyped and ritualized motor actions, and "higher-order" RRBs, which represent more complex and cognitively mediated behaviors such as insistence on sameness, circumscribed

interests, and inflexible adherence to routines (Turner, 1999). Lam et al.'s (2008) three-factor structure offers the addition of a discrete circumscribed interests category and Russell et al.'s (2019) four-factor structure more explicitly divides the lower-order category into stereotypic and self-injury factors while sorting the higher-order behaviors into compulsive, and rituals/sameness factors. Finally, Bishop et al.'s (2012) five-factor structure divides RRBs into discrete sensory-motor, self-injury, compulsive, restricted interests, and ritualistic behaviors/sameness subcategories. Unlike most research in this area, the present study used Bishop et al.'s (2012) five-factor structure when examining subcategories of RRBs, given that previous researchers have suggested that two- or three-factor structures may obscure important differences across RRBs subcategories (Turner, 1999).

ASD, RRBs, and Anxiety

ASD and anxiety. In earlier versions of the *DSM*, such as the *DSM-III*, core diagnostic criteria for Autistic Disorder included symptoms of anxiety such as "intense unusual anxieties" and "sudden, excessive anxiety" (Hallett et al., 2013). However, later versions of this manual, such as the most recent version, the *DSM-5* (APA, 2013), do not include anxiety and/or excessive worries in the diagnostic criteria for ASD. Yet, these features continue to be present across much of this population. It is estimated that approximately 40% of all children with ASD meet diagnostic criteria for an anxiety disorder (van Steensel et al., 2011) while 69% of youth with ASD present with clinically significant levels of anxiety (Kerns et al., 2020) and as many as 84% show at least subclinical levels of anxiety (White et al., 2009).

RRBs and anxiety. Heightened levels of anxiety and/or the presence of comorbid anxiety disorder(s) have been associated with more RRBs (Rodgers et al., 2012; Sukhodolsky et al., 2008). In fact, a recent longitudinal study by Baribeau and colleagues (2020) found that the severity of RRBs at the time of diagnosis is predictive of anxiety across time. This relationship, however, may be complicated, and many studies have produced conflicting findings regarding the role that IQ and age may play in this relationship. Whereas some studies have found stronger relationships between anxiety and RRBs in children with ASD who have higher IQs (Sukhodolsky et al., 2008), others have found stronger relationships between anxiety and RRBs in children with ASD who have lower IQs (Edirisooriya et al., 2020; van Steensel et al., 2011), and others have failed to demonstrate any relationship at all (Simonoff et al., 2008; Sukhodolsky et al., 2019). Differences in study design and methodology (epistemological v. meta-analytical), sample size and composition, and measurement may explain, in part, the observed discrepancies. The types of RRBs in question may also influence the relationship, a realization that has driven the need for research that breaks RRBs into discrete subcategories.

RRB subcategories and anxiety. Higher-order insistence-on-sameness (IS) behaviors have been shown to relate strongly to higher levels of anxiety across multiple studies (Black et al., 2017; Factor et al., 2016; Green & Ben-Sasson, 2010; Rodgers et al., 2012; Uljarevic et al., 2017), as have ritualistic and sameness behaviors (Russel et al., 2019; Stratis & Lecavalier, 2013), and circumscribed interests (Rodgers et al., 2012), which are subsets of IS behaviors. Inflexibility (a construct that shares many conceptual similarities to IS and/or ritualistic/sameness) also appears to be predictive of anxiety in

youth with ASD (Lawson et al., 2015; Ozsivadjian et al., 2021), although research suggests that this may be mediated by a variety of factors such as sensory responsiveness (Black et al. 2017; Wigham et al., 2015), effortful control (Uljarevic et al., 2017), and/or social motivation (Factor et al. 2016).

Regarding lower-order RRBs, studies have demonstrated links between anxiety and higher rates of self-injurious behavior (SIB) (Cervantes et al., 2013; Kerns et al., 2015; Muskett et al., 2019; Russell et al., 2019; Stratis & Lecavalier, 2013), an RRB that sometimes falls under the umbrella of repetitive motor behaviors (RMBs) but, in other studies, serves as its own separate factor. Stratis and Lecavalier (2013) found, however, that other variables, such as levels of adaptive functioning, might play an important role in moderating the relationship between SIB and anxiety. Some researchers have found relationships between RMBs (which included SIB) and anxiety (Cervantes et al., 2013; Wigham et al., 2015), while others have failed to illustrate consistent relationships between the two constructs (Factor et al., 2016; Leekam et al., 2011; Muskett et al., 2019). Discrepancies across studies may be explained by differences in authors' conceptualization and/or measurement of repetitive motor/lower-order RRBs, differences in how anxiety was measured, and variability in the level of adaptive functioning across each sample.

ASD, RRBs, and Aggression

ASD and aggression. Relatively high rates of aggression have also been observed in children with ASD, though prevalence estimates vary significantly across studies and range from 8–68% (Hill et al., 2014). This wide variation in prevalence estimates is likely due to differences in how researchers define aggressive behavior, the measurement tools

used to assess aggression, differences in perception across raters, the application of clinical cutoffs, and/or differences in sample size and composition (i.e., participants' age range, cognitive ability, etc.). As with anxiety, the relationship between aggression and intellectual ability within this population remains unclear, as some studies have found links between aggression and low nonverbal cognitive ability (Hartley et al., 2008) while others have failed to demonstrate such effects (Dominick et al., 2007; Kurzius-Spencer et al., 2018; Matson & Rivet, 2007; McClintock et al., 2003; Oliver et al., 2012; Kanne & Mazurek, 2010). These discrepant findings may be attributed to a variety of factors, such as child age, differences in measurement, and sample size.

RRBs and aggression. Research suggests that youth with ASD who engage in higher rates of RRBs are more likely to engage in aggressive behaviors (Dominick et al., 2007; Kanne & Mazurek, 2010; Matson & Rivet, 2008) and that RRBs may serve as a significant predictor of aggression amongst adults with comorbid ASD and ID (Matson & Rivet, 2008).

RRB subcategories and aggression. Across a representative sample of 993 youth with ASD, Kanne and Mazurek (2011) found that parental endorsement of resistance to change and ritualistic behavior items on the Repetitive Behavior Scale – Revised (RBS-R) predicted aggression, demonstrating a link between two subcategories of higher-order RRBs and aggressive behavior. Later studies have provided further support for this relationship, as they have demonstrated associations between aggression and constructs that are conceptually similar, such as inflexibility (Lawson et al., 2015; Ozsivadjian et al., 2021), cognitive rigidity (Matson & Adams, 2014), cognitive shifting impairments (Visser et al., 2014), and sameness (Sullivan et al., 2019). Kanne and Mazurek (2011),

however, did not find a relationship between compulsive behaviors (another subcategory of higher-order RRB) and aggression.

Regarding lower-order RRBs, several studies have demonstrated associations between SIB and aggression (Dominick et al., 2007; Kanne & Mazurek, 2011; Soke et al., 2017). Kanne and Mazurek (2011), however, found that stereotypic behaviors were not predictive of aggression. This finding comes in contrast to observations from many other studies which note that children with ASD often engage in aggressive behavior when RMBs are interrupted (Murphy et al., 2000; Reese et al., 2005).

ASD, Anxiety and Aggression

Previous research has demonstrated associations between anxiety and aggression in infants and toddlers with ASD (Cervantes et al., 2013), school-aged children with ASD (Kim et al., 2021; Sullivan et al., 2019; Sukhodolsky et al., 2019), and adolescents with ASD (Ambler et al., 2016). Many researchers propose that anxiety likely exacerbates aggression in individuals with ASD (Matson & Adams, 2014), may serve as an internal antecedent to problem behaviors such as aggression (Romanczyk & Matthews, 1998), and/or may be causally or functionally related to problem behavior (Bronsard et al., 2010; Moskowitz et al., 2013), in that some children with ASD appear to engage in problem behavior as a maladaptive strategy to avoid, escape, reduce, or otherwise alleviate their anxiety (Ambler et al., 2016; Kim et al., 2021).

ASD, RRBs, Anxiety, and Aggression

To date, no study has been published that directly explores the nature of the relationship between RRBs, anxiety, and aggression in youth with ASD. It is plausible to assume that all three variables relate to one another, given that research has drawn

connections from RRBs to anxiety, RRBs to aggression, and aggression to anxiety; that researchers have hypothesized that anxiety may serve as an internal antecedent to RRBs and aggression (Romanczyk & Matthews, 1998); and that neuroimaging studies have demonstrated relationships between the amygdala, RRBs, anxiety disorders and aggression (Eisenberg et al., 2015; Kim et al., 2011; Mattheis et al., 2012). However, the nature of the relationship between RRBs, anxiety, and aggression in youth with ASD remains unclear and untested.

Two recent studies, one performed by Lawson and colleagues (2015), and one performed by Ozsivadjian and colleagues (2021), attempt to close some of this gap by examining the relationship between inflexibility (which shares many conceptual similarities to IS and may be considered an example of IS), anxiety, and aggression. Both of their path model supported direct links between inflexibility, anxiety, and aggression in children and adolescents with ASD, such that inflexibility predicted parent-reported symptoms of anxiety, which in turn, predicted aggressive behavior. However, inflexibility does not represent a subcategory of RRB on its own and, as such, provides only preliminary support for the hypothesis that IS predicts anxiety, which in turn, predicts aggression. To my knowledge, no other studies have examined the relationships between any lower-order RRBs, anxiety, and aggression.

Present Study and Hypotheses

The associations that exist between ASD and anxiety, RRBs and anxiety, ASD and aggression, and RRBs and aggression are well-documented throughout the literature. More research has consistently demonstrated associations between anxiety and specific subcategories of RRBs as compared to aggression and subcategories of RRBs, yet no

study to date has done so, across either construct, using a five-factor model of RRBs. Further, all the existing research in this domain measures anxiety and/or aggression using scales that are not construct-specific and/or were designed for and normed on TD populations rather than on individuals with ASD. As such, many of these scales rely too heavily on language and one's ability to express their internal feelings and states (something that many individuals with ASD struggle to do; Scahill et al., 2019), lack construct validity, and/or may obscure or fail to accurately capture differences in how these constructs present in this population.

The primary purpose of the present study was to explore whether anxiety mediates the relationship between RRBs and aggression. First, however, this study needed to establish associations between all three constructs. Therefore, the present study first explored whether there is a relationship between RRBs and anxiety, between RRBs and aggression, and between anxiety and aggression based on parent-report measures designed for youth with ASD. RRBs were examined both as a unitary construct and broken down sub-categorically according to Bishop et al.'s (2012) five factors (sensory-motor, self-injury, compulsive, restricted interests, and ritualistic behaviors/sameness) across all analyses.

The present study examined the following research questions:

1. What are the associations between total RRBs (i.e., RRBs as a unitary construct) and anxiety, as well as Bishop et al.'s (2012) five subcategories of RRBs and anxiety, amongst youth with ASD?

2. What are the associations between total RRBs (i.e., RRBs as a unitary construct) and aggression, as well as Bishop et al.'s (2012) five subcategories of RRBs and aggression, amongst youth with ASD?
3. Does anxiety mediate the relationship between total RRBs (i.e., RRBs as a unitary construct) and aggression, as well as each of Bishop et al.'s (2012) five subcategories of

   RRBs and aggression, amongst youth with ASD?

Regarding the first research question, I hypothesized that the four RRB subcategories of restricted interests, self-injury, compulsive behaviors, and ritualistic behaviors/sameness would all correlate with anxiety. This is consistent with previous research that has demonstrated links between higher-order RRBs/IS, SIB, and anxiety (Black et al., 2017; Factor et al., 2016; Kerns et al., 2015; Rodgers et al., 2012). Regarding the fifth subcategory, sensory motor behaviors/RMBs, research findings have been mixed, rendering this relationship more difficult to predict. While the results from this study alone cannot resolve discrepant findings, the hope was that the present study, which examines sensory-motor RRBs as a separate class of behaviors from lower-order RRBs (which often include SIBs) and uses construct-specific measures that have been designed for and normed on the target population, would serve to provide compelling support for one of the two battling hypotheses.

Regarding the second research question, I hypothesized that I would find relationships between the two RRB subcategories of compulsive behaviors and ritualistic behaviors/sameness and aggression, as research has demonstrated links between similar RRBs (i.e., insistence on sameness) and/or conceptually similar constructs (i.e.,

flexibility, cognitive rigidity, and cognitive shifting) and aggression (Lawson et al., 2015; Matson & Adams, 2014; Visser et al., 2014). Self-injury was also expected to relate to aggression, as it has in previous studies (Kanne & Mazurek, 2011; Soke et al., 2017). The extent to which the sensory-motor and restricted interest subcategories of RRBs may relate to aggression was, again, more difficult to predict, given that only one study has examined these two subcategories. Kanne and Mazurek (2011) failed to demonstrate associations between sensory-motor and restricted interest RRBs and aggression. However, other research has shown that children with ASD who engage in disruptive behavior often do so to escape demands that interfere with repetitive behaviors, to obtain access to an item used in repetitive routines (Reese et al., 2005), and/or when stereotyped behaviors and rituals are interrupted (Murphy et al., 2000). Therefore, it seemed plausible to hypothesize that both sensory-motor and restricted interest RRBs would relate to aggression in this study.

Finally, regarding the third research question, I hypothesized that anxiety would mediate the relationship between RRBs and aggression, such that heightened levels of anxiety would explain the link between RRBs and higher rates of aggressive behavior. Further, if relationships exist between all subcategories of RRBs and aggression, I hypothesized that anxiety would mediate each of these associations as well. The path model demonstrated by Lawson and colleagues (2015), whereby inflexibility predicted anxiety, which in turn predicted aggression in children with ASD, as well as Bronsard et al.'s (2010) observation that anxiety often precedes the expression of physically aggressive behavior, drove my hypothesis and provided preliminary support for the proposed model.

Method

Participants

Recruitment. Study participants ($N = 156$) were recruited through a series of online forums and email listservs. Recruitment flyers were uploaded to various social media platforms and posted to pages and groups comprised of parents that identified as having a child with ASD. They were also emailed to listservs from Special Education Parent-Teacher Associations (SEPTAs) across Long Island and other parts of New York State.

Inclusion/Exclusion Criteria. Parents of school-aged children with a DSM-V or DSM-IV autism spectrum disorder diagnosis (e.g., Asperger's syndrome) were recruited to participate in this study. ASD diagnoses were parent-reported and supported by their score on the Social Communication Questionnaire (SCQ). Child age was also parent-reported, with reported ages ranging from 2 to 21 years. Individuals with comorbid diagnoses or conditions were not excluded from the present study.

Measures

Demographics questionnaire. Participants completed a demographic questionnaire that measured several parent and child variables. These included, but were not limited to, age, sex, race, ethnicity, education, household composition, parent employment status, parent marital status, child cognitive and adaptive functioning, child medication history, and child psychological, neurological, medical, and/or physical conditions/diagnoses (see Appendix A).

Social Communication Questionnaire (SCQ: Rutter, Bailey, & Lord, 2003). The SCQ Lifetime form is a 40-item caregiver-report form designed to screen for the

presence of ASD (see Appendix B). This measure consists of simple yes/no response items that map directly onto the core symptoms of ASD and as such, it is widely used in research for screening purposes and/or to confirm parent-reported diagnoses of ASD (Marvin et al., 2017). The SCQ was modeled after the Autism Diagnostic Interview - Revised (ADI-R), the gold standard measure for ASD (LeCouteur et al., 1989), and has acceptable levels of sensitivity and specificity, particularly for school-aged children (Berument, Rutter, Lord, Pickles, & Bailey, 1999; Corsello et al., 2007). The Lifetime form of this scale also has a stable factor structure, making it a good choice of measurement for this study (Wei et al., 2015). Although the specificity of this measure is not as good when it is used amongst individuals with comorbid ID and/or individuals less than 5 years of age (Berument et al., 1999; Marvin et al., 2017), it appears to be better than other measures at properly identifying individuals with ASD with comorbid behavioral problems (Moody et al., 2017) and, as such, remained the best option for the present study.

Repetitive Behavior Scale-Revised (RBS-R: Bodfish et al. 2000). The Repetitive Behavior Scale-Revised (RBS-R) is a 43-item caregiver-report questionnaire that measures the presence and severity of RRBs (see Appendix C). To complete this measure, parent(s)/ guardian(s) rate each behavior on a four-point Likert scale (ranging from 0 [behavior does not occur] to 3 [behavior occurs and is a severe problem]) and consider the frequency of the behavior, how difficult the behavior is to interrupt, and how much the behavior interferes with the individual's daily functioning when selecting their answer option. Unlike the Autism Diagnostic Observation Schedule, 2nd Edition (ADOS-2) or the Autism Diagnostic Interview (ADI or ADI-R), two measures that have been

used to assess RRBs in the literature, the RBS-R separates RRBs into different subscales, allowing for greater specificity and analyses at each subcategory level (Bishop et al., 2012). The RBS-R has been widely used with individuals with ASD and has shown to have a reliable factor structure, as well as acceptable psychometric properties (Bishop et al., 2012; Lam & Aman, 2007).

Parent-Rated Anxiety Scale for Youth with Autism Spectrum Disorder (PRAS-ASD: Scahill et al., 2019). The PRAS-ASD **(**see Appendix D**)** is a 25-item parent-report measure that was designed to assess symptoms of anxiety within the target population**.** To complete this scale, parent(s)/guardian(s) are asked to select the number, on the four-point Likert scale (with values ranging from 0 [none/not present] to 3 [severe/very frequent/is a major problem]), that best describes their child's worries and/or anxiety-related behaviors over the course of the past two weeks. Although the PRAS-ASD is relatively new, and therefore has not been independently validated, the authors showed it to be a reliable and valid measure of anxiety in youth with ASD (aged 5-17; Scahill et al., 2019). All PRAS-ASD scale items were developed over multiple stages and were designed to depend minimally on the verbal expression and/or vocalization of worries/thoughts as Scahill et al. (2019) found that parents of youth with ASD rarely endorsed language-dependent items that began with "worries" and "complains," particularly when the child was nonverbal or had an IQ below 70.

The Children's Scale of Hostility and Aggression: Reactive/Proactive, Version 2.0 (C-SHARP: Farmer & Aman, 2009). The C-SHARP is a 48-item measure designed to assess aggressive behavior in children with developmental disabilities (including ASD) (see Appendix E). On the C-SHARP parent/caregiver form, informants

rate all items on a four-point Likert "Problem Scale" (with values ranging from 0 [does not happen] to 3 [severe and/or very frequent problem]), as well as a five-point Likert "Provocation Scale" (with values ranging from -2 [only when provoked and/or unplanned] to 2 [always "starts it," without provocation]) to provide information about the frequency/intensity of the aggression, as well as the presumed motivation (i.e., reactive vs. proactive) of the aggression. The C-SHARP has acceptable psychometric properties, and its factor structure has been confirmed for samples of individuals with and without ASD, as well as for individuals with ASD with and without comorbid ID (Farmer et al., 2016).

Procedure

Participants completed all measures electronically through the Qualtrics survey platform. Before participating, all parent(s)/guardian(s) were informed of the general purpose of the current study, to "learn more about the symptoms and behaviors of kids with autism," and were asked to provide informed, written consent by selecting the following: "I have read the above information. I have asked any questions I had regarding this study, and they have been answered to my satisfaction. I would like to be a volunteer to participate in this research study." At that time, participants were provided with the opportunity to select the option "No. I do not wish to participate in this research study," in which case the survey was immediately terminated. Two participants accessed this study and indicated that they did not wish to participate after reading the consent form. These individuals were removed from the data set.

After completing all measures, participants were provided with the opportunity to input their email address for potential compensation. All participants that inputted a valid

email address were provided access to a free parent training webinar and entered into a raffle to win a $50 Amazon gift card. One participant was chosen at random and awarded this gift card.

Results

Missing Data

Participants who completed 66.6% or less of the survey questions displayed (n = 27), and/or failed to complete any of the outcome measures (n = 14) were deleted listwise. This decision to remove this set of participants (n = 41) was based on the assumption that their data was missing completely at random and is considered acceptable given that little to no usable data was recorded (Woods et al., 2021). The final usable data set, therefore, consisted of a total of 115 participants.

Missing Value Analyses were conducted on remaining cases (N = 115) and demonstrated that data were missing completely at random across all variables of interest. Multiple Little's MCAR tests were conducted due to the size of the data set and yielded chi square values that ranged from 404.791 to 762.472 and p-values ranging from .056-.411, confirming the assumption that the data was missing completely at random.

The influence of missing data was minimized through Multiple Imputation (MI) where appropriate. MI was used to replace missing values for 7-15 participants across measures. MI was not used for certain demographic variables (i.e., race, sex, etc.) or in cases of attrition in which participants neglected to complete full measures (Woods et al., 2021).

Data Transformations

As previously mentioned, the C-SHARP, used to measure aggression in this study, contained two scales: a Problem Scale and Provocation Scale. Participants were instructed to complete the Problem Scale first, and the Provocation Scale second, so long as they did not select "0" on the Problem Scale to indicate that the behavior never occurs.

Several participants (n = 7) completed this measure incorrectly and responded only to the Provocation Scale, resulting in missing data on the Problem Scale. It is unknown if this was due to user error or the result of a display error. A score of "1" (indicative of "mild or infrequent problem") was imputed for all seven participants that recorded responses on the Provocation Scale but failed to respond to the Problem Scale. The rationale for this imputation was based on the assumption that, if the participant was able to select a rating for who started the behavior on the Provocation Scale, then there had to be a behavior to have been provoked/started, meaning that the behavior must occur at *some* frequency/severity (on the Problem Scale).

Participant Demographics

A total of 156 survey responses were recorded. As discussed above, participants with a large percentage of missing data were removed (n = 41) resulting in a final data set that included 115 respondents. Most caregivers who participated in the present study identified as female (85.2%) biological mothers (80.9%) to male children (79.1%). Children's ages ranged from 2 years, 1 month to 20 years, 6 months, with an average age of 10.1 years. A little less than half of the sample (41.7%) was reportedly diagnosed with an Intellectually Disability, which is consistent with the CDC estimate that 31-50% of those diagnosed with ASD also meet criteria for ID (Christensen et al., 2019; Maenner et al., 2020). Regardless of ID status, most children were reported to require support to complete activities of daily living, regardless of their level of intellectual functioning (69.6%). All demographic information collected for the parents and children can be found in Tables 1 and 2, respectively. In addition, descriptive statistics, including means and

standard deviations, for all outcome measures (the SCQ, RBS-R, PRAS-ASD, and C-SHARP) can be found in Table 3.

Participants were asked to complete the SCQ as part of the survey packet to support their endorsement of an ASD diagnosis for their child. Many studies utilize the SCQ cutoff score of 15 that is suggested by the authors; however, others have suggested a cutoff score of 11 (Allen et al., 2007) while others still have cautioned against using static cutoff scores at all, as some studies have shown lower sensitivity when doing so (Corsello et al., 2007). A total of 15 participants from this study recorded SCQ scores below 15 (ranging from 7.4 to 14.2, with a mean of 12.9). Independent samples t-tests were conducted to examine the differences between those with SCQ scores below 15 and those with scores of 15 or higher to determine if this subset of participants (n = 15) should be excluded from future analyses. These analyses revealed that there were no statistically significant differences between participants' scores on the SCQ and their RBS-R (t = 1.200, p = .233), PRAS-ASD (t = -1.980, p = .050), and/or C-SHARP (t = -1.661, p = .100) scores at the p <.05 level; thus, these 15 participants were retained in all analyses.

Correlations

A series of bivariate correlations revealed associations between RRBs and anxiety (r = .535), RRBs and aggression (r = .398), and anxiety and aggression (r = .485) that were significant at the p <. 01 level. According to the benchmarks outlined by Cohen (1988), these represent medium to large effect sizes. Anxiety was significantly correlated with four of the five RRB subcategories: ritualistic behaviors/sameness (r = .630; representing a large effect size), self-injury (r = .307; representing a medium effect size),

compulsive behaviors (r = .442; representing a medium effect size), and restricted interests (r = .254; representing a small effect size) at the $p < .01$ level. Sensory-motor behaviors were the only RRB subcategory that did not significantly correlate with anxiety (r = .119; p = .229). Aggression was significantly correlated with three of the five RRB subcategories: ritualistic behaviors/sameness (r = .297; representing a small effect size), self-injury (r = .610; representing a large effect size), and compulsive behaviors (r = .336; representing a medium effect size) at the $p < .01$ level. Aggression was not significantly correlated with the remaining two subcategories of RRBs: sensory-motor behaviors (r = .179, p = .075) and restricted interests (r = .091, p = .370).

Mediation Analyses

Using the SPSS macro PROCESS, a series of mediation models were tested to examine the effect of anxiety on the relationship between RRBs and aggression. All mediation analyses were conducted using bootstrapping, which is a robust nonparametric resampling procedure that involves taking 5,000 random samples, with replacement, from the existing data set. By way of this method, indirect path estimates are generated from each random sample and these values are then used to construct an upper and lower confidence interval. When the confidence interval does not contain zero, the effect of the mediation is thought to be statistically significant. This method has many notable strengths, particularly compared to Baron and Kenny's (1986) traditional "causal steps approach." Furthermore, unlike other models for testing mediation, the bootstrapping method does not require the assumption that the paths from the independent variable to the mediator and from the mediator to the dependent variable are uncorrelated or that the data collected is normally distributed (Hayes, 2013). All models tested included the same

mediating variable (M), anxiety, and the same outcome variable (Y), aggression. The only thing that changed across each model was the independent or predictor variable (X). Three covariates were added to each model: child age, child sex, and child Intellectual Disability (ID) status.

The first model tested examined the extent to which anxiety mediates the relationship between RRBs, as a unitary construct, and aggression (Figure 1). In this model, RRBs significantly predicted anxiety (b = .4265, t (87) = 7.0071, p = .0000), anxiety significantly predicted aggression (b = .6529, t (86) = 3.9543, p = .0002), and RRBs significantly predicted aggression (b = .3746, t (86) = 3.6965, p = .0004). The indirect effect was statistically significant as well, indicating that anxiety significantly mediated the observed relationship (indirect = .2785, *SE* = .0785, 95% CI [.1375, .4463]). The direct effect, the effect of RRBs on aggression, without the influence of anxiety, was not significant (direct = .0961, *SE* = .1173, p = .4149).

The first subcategory of RRBs that was isolated for mediation analysis was self-injurious behavior (SIB) (Figure 2). In this model, SIB significantly predicted anxiety (b = 1.2884, t (87) = 3.9236, p = .0002), anxiety significantly predicted aggression (b = .4837, t (86) = 3.8457, p = .0002), and SIB significantly predicted aggression (b=2.7699, t (86) = 6.6798, p=.0000). The indirect effect of anxiety on the relationship between SIB and aggression was significant (indirect = .6232, *SE* = *.2347*, 95% CI [.2334, 1.1513]), as was the direct effect of SIB on aggression (direct = 2.1467, *SE*=.4180, p=.0000).

The second subcategory of RRBs that was examined was restricted interests/behaviors (Figure 3). Restricted interests significantly predicted anxiety, (b = 1.4539, t (87) = 2.7036, p = .0082) and anxiety significantly predicted aggression (b =

.7787, *t* (86) = .1369, *p* = .0000). This time, however, restricted interests did not significantly predict aggression (*b* = .2984, *t* (86) = .3726, *p* = .0000) and, as such, there was also there was no statistically significant total or direct effect (direct = -.8337, *SE* = .7150, *p* = .2496). A unique advantage to the Hayes (2013) approach to mediation is that the total effect does not have to be significant. As such, the complete model was interpreted and it was revealed that the indirect effect of anxiety was significant (indirect = 1.1321, *SE*=.5250, 95% CI [.2043, 2.2562]).

The third subcategory of RRBs that was examined was ritualistic behavior/sameness (Figures 4). Ritualistic behaviors/sameness significantly predicted anxiety (*b* = .9002, *t* (87) = 8.0771, *p* = .0000), anxiety significantly predicted aggression (*b* = .8306, *t* (86) = 4.7565, *p* = .0000), and ritualistic behaviors significantly predicted aggression (*b* = .5453, *t* (86) = 2.6889, *p* = .0086). The indirect of anxiety on the relationship between ritualistic behavior/sameness and aggression was significant (indirect = .7476, *SE* = .1828, 95% CI [.4269, 1.1539]), but the direct effect of ritualistic behaviors/sameness on aggression was insignificant (direct = -.2023, *SE* = .2401, *p* = .4019).

The fourth subcategory of RRBs that was examined, compulsive behaviors, produced the same effects as the latter (Figure 5). Like the model for ritualistic behaviors/sameness, the relationship between compulsive behaviors and anxiety was significant (*b* = 1.4642, *t* (87) = 5.3052, *p* = .0000), the relationship from anxiety to aggression was significant (*b* = .6680, *t* (86) = 4.4006, *p* = .0000) and the relationship from compulsive behaviors to aggression was significant (*b* = 1.3749, *t* (86) = 3.1973, *p* = .0019). The indirect effect of anxiety on the relationship between compulsive behaviors

and aggression was significant as well (indirect = .9780, *SE*=.2817, 95% CI [.4852, 1.5929]), but the direct effect of compulsive behaviors on aggression was not (direct = .3969, *SE* = .4495, *p* = .8828).

The fifth and final RRB subcategory isolated for analysis, sensory-motor behaviors, yielded the least powerful results (Figure 6). Sensory-motor behaviors failed to significantly predict anxiety (*b* = .5731, *t* (87) = 1.2923, *p* = .1997). However, anxiety continued to significantly predict aggression (*b* = .7274, *t* (86) = 5.4405, *p* = .0000). The total effect of sensory-motor behaviors on aggression (*b* = .6256, *t* (86) = .9813, *p* = .3291), the direct effect of sensory-motor behaviors on aggression (direct = .2087, *SE* = .5583, *p* = .7094), and the indirect effect of anxiety on the relationship between sensory-motor behaviors and aggression (indirect = .4168, *SE* = .3067, 95% CI [-.1714, 1.0492]) were all statistically insignificant.

Discussion

Anxiety and aggression, two of the most common comorbid conditions amongst youth with ASD (Kanne & Mazurek, 2011; Salazar, 2015) have been shown to correlate strongly with the frequency and severity of RRBs, a core symptom of ASD (Rodgers et al., 2012; Matson & Adams, 2014). However, there is relatively little research that examines the interconnectedness of these three variables. Therefore, the goal of the present study was to address this gap in the literature by further examining the relationship between these three constructs.

Consistent with previous research, significant relationships were found between RRBs and anxiety, RRBs and aggression, and anxiety and aggression. As predicted by my first set of hypotheses, all subcategories of RRBs (apart from sensory-motor behaviors) shared significant associations with anxiety. This finding supports longitudinal data from a recent study showing that restricted/repetitive behavior severity at the time of ASD diagnosis predicts future parent-reported anxiety, with sameness and restricted behavior being the most predictive of future anxiety (Baribeau et al., 2020). The non-significant relationship between sensory-motor behaviors and anxiety in the current study is consistent with the previous findings of Factor et al., (2016) and Leekam et al.'s (2011) systematic review, but in contrast to what Cervantes et al., (2013) and Wigham et al., (2015) found in their research. Wigham et al., (2015) utilized different measures for both variables (the RBQ to measure RRBs and the SCAS to measure anxiety), which may play a role in explaining the different outcomes, and Cervantes et al., (2013) recruited a much younger sample (ages 17-39 months) than the present study. These conflicting findings may also be attributed to the fact that the present study is the first to separate self-

injurious behaviors (SIB) from the broad sensory-motor behavior umbrella when examining the relationship between anxiety and sensory-motor RRBs. This suggests that previous studies that have found significant relationships between sensory-motor/lower order RRBs and anxiety may have been able to do so because of the strong relationship between anxiety and SIB (when SIB was considered part of sensory-motor RRBs). Combining SIB with other sensory-motor RRBs (such as rocking back and forth, hand flapping, finger flicking, etc.) may have obscured important nuanced differences in how these behaviors relate to symptoms of anxiety within this population.

This is the first study to date that has explored the relationship between RRBs and anxiety using the PRAS-ASD, an anxiety measure specifically designed for and normed on individuals with ASD. For years, researchers have discussed the limitations of using traditional diagnostic tools to accurately assess for and identify symptoms of anxiety in youth with ASD due to a myriad of different factors such as informants' inability to identify and articulate recurring anxious thoughts and differences in presentation or manifestation of anxious symptoms; the PRAS-ASD was designed to address some of these limitations (Scahill et al., 2019; Lecavalier et al., 2014). The results obtained in this study, however, are largely consistent with previous research on the relationship between RRBs and anxiety that has not used this measure.

All five subcategories of RRBs were predicted to relate strongly to aggression, yet only sameness/ritualistic behaviors, self-injury, and compulsive behaviors shared significant relationships with parent-reported frequency of aggressive behavior. The associations of sameness/ritualistic behaviors and aggression, and SIB and aggression, are consistent with previous research (Kanne & Mazurek, 2011; Dominick et al., 2007;

Soke et al., 2017). However, the finding that compulsive behaviors and aggression shared a significant correlation differs from those produced by Kanne and Mazurek (2011). Their study, which also used the RBS-R and looked across a similar age range, utilized four items on the ADI-R to measure aggression and it is possible that this difference in measurement explains, at least in part, the conflicting findings. Although previous research has demonstrated relationships between disruptive behavior and access to or ability to engage in stereotyped behaviors (Reese et al., 2005; Murphy et al., 2000), neither sensory-motor nor restricted interest RRBs correlated strongly with parent-reported levels of aggression. These results, however, closely mirror those of Kanne and Mazurek (2011) in which no significant relationships between either of these RRB subcategories and aggression were revealed.

This is also the first study that has explored the relationship between RRBs and aggression using the CSHARP, an aggression measure specifically designed for and normed on individuals with ASD. The results of this study mostly converge with those of Kanne and Mazurek (2011), who, again, utilized the ADI-R to measure aggression. The ADI-R is another measure that was designed for and normed on individuals with ASD, but is not construct-specific (i.e., was not designed with the intention of measuring aggression).

To examine the third set of hypotheses, a series of mediation models were tested to explore the extent to which anxiety mediates the relationship between RRBs and aggression at the overall and subcategory levels. Anxiety served as a powerful mediator in the relationship between overall RRBs and aggression, as more RRBs were associated with higher rates of anxiety, which in turn, was associated with more aggressive

behavior. When anxiety was controlled for, or removed from the model, the relationship between RRBs and aggression failed to reach significance, suggesting that anxiety may be the pathway or mechanism by which RRBs relate to aggression.

These findings for overall RRBs were mirrored across mediation models that featured two of the five RRB subcategories tested: ritualistic behaviors/sameness and compulsive behaviors. Specifically, more ritualistic behaviors/sameness were associated with higher levels of anxiety which, in turn, was associated with more aggressive behavior. Similarly, higher rates of compulsive behaviors were associated with higher levels of anxiety which, in turn, was associated with more aggressive behavior. Anxiety, once again, served as a powerful mediator in both relationships, so much so that, once it was controlled for, the relationship between each RRB subcategory (ritualistic behaviors/sameness and compulsive behaviors) and aggression failed to reach statistical significance. This suggests that, for ritualistic behaviors/sameness and compulsive behaviors, anxiety plays a particularly integral role in how these subtypes of RRBs relate to the expression of aggression in youth with ASD. It could be that some children with ASD engage in ritualistic/sameness and/or compulsive behaviors that reduce their anxiety in the moment (via negative reinforcement), but that this ultimately leads to increased anxiety over time. This increased anxiety then, may in turn, lead to increased aggression, especially when those ritualistic and compulsive behaviors are interrupted. That is, it could be that children with ASD engage in aggression to escape/avoid anxiety-inducing interruptions to their ritualistic or compulsive behaviors (Murphy et al., 2000; Reese et al., 2005), thereby reducing anxiety in the moment but maintaining it over time. In this scenario, anxiety is the mechanism by which ritualistic and compulsive behaviors lead to

aggression, although it is important to note that non-experimental, cross-sectional data cannot establish a causal or temporal relationship (e.g., it could be bi-directional, or a shared risk factor could contribute to RRBs, anxiety, and aggression).

Anxiety also served as a powerful mediator for two additional RRB subcategories: SIB and restricted interest/behaviors. However, these results differed slightly from the others already discussed, as well as each other. Higher rates of restricted interests/behaviors were associated with higher levels of anxiety which, in turn, was associated with more aggressive behavior. However, restricted interests were not associated with higher rates of aggression, regardless of whether or not anxiety was included in the model. Nonetheless, anxiety remained a statistically significant mediator. Higher rates of SIB were associated with higher levels of anxiety which, in turn, was associated with more aggressive behavior and anxiety was a statistically significant mediator, meaning that it plays a critical role in the existing. This time, however, the direct effect of SIB on aggression remained significant. As such, even when the influence of anxiety was removed, SIB and aggression were still significantly related to one another, which suggests that the relationships between SIB and aggression is so strong that even when anxiety symptoms are considered and controlled for, the association remains statistically significant. In other words, rather than anxiety being a causal pathway or mechanism, it could be that SIB may lead to aggression independent of anxiety. (Once again, given the cross-sectional nature of the present study, it is also plausible that the relationship could go in the other direction or that a shared risk factor could contribute to both.)

Anxiety did not mediate the relationship between the final RRB subcategory, sensory-motor behaviors, and aggression. In this model, there was a significant association between rates of anxiety and rates of aggression, but no significant relationships between sensory-motor behaviors and anxiety or sensory-motor behaviors and aggression were observed.

Strengths, Limitations, and Future Directions

These findings contribute to the limited literature on the relationship between RRBs, anxiety, and aggression in youth with ASD. The results of the mediation analyses are of particular importance as they illustrate how underlying symptoms of anxiety explain the relationship between RRBs and aggression that has been observed in the present study, as well as several others. This helps explain, at least in part, why more RRBs and, particularly, why higher rates of SIB, ritualistic behaviors/sameness, restricted interest/behaviors, and/or compulsive behaviors, tend to correlate with higher rates of aggressive behavior.

Although this study adds to the existing literature on RRBs, anxiety, and aggression, there are several limitations that temper the significance and generalizability of these findings. First, although the mediation models tested in the present study assess possible causal associations between the variables, given the lack of experimental manipulation, the data are unable to provide proof of any causal relationships. Furthermore, the cross-sectional design of this study renders it impossible to establish directionality. For instance, the results of the mediation model showing that RRBs are associated with increased levels of anxiety, which in turn are associated with increased levels of aggression, suggest a particular pathway from RRBs to anxiety to aggression.

However, it is possible that the relationship could go the other way (e.g., aggression could lead to higher rates of anxiety, which could in turn lead to more RRBs), or, that another factor could cause or contribute to all three variables. Furthermore, this study was unable to assess and/or control for all variables that are likely to contribute to the relationships between RRBs and aggression (e.g., IQ, school and home-based environmental factors, sleep patterns, social skills, language skills, etc.).

Second, the decision to use parent-report measures resulted in some potential limitations as well, since parent-report is subject to different types of response and recall biases. The use of parent reports may not produce the most accurate assessment of anxiety levels, aggression, and/or RRBs, given that parents may over- or under-report the prevalence and severity of these behaviors, either intentionally or unintentionally, for a variety of reasons. While parent-reports continue to be the dominant form of data collection for research targeting this population, future research should attempt to obtain direct measures of children's anxiety and aggression through naturalistic observation and other sources of data (e.g., self-report anxiety data) to supplement parent reports.

Third, although the measures of anxiety (PRAS-ASD) and aggression (C-SHARP) used in this study offered a unique advantage to those typically administered, as they were strategically designed for and normed on the target population, both measures are relatively new and therefore lack reliability and/or validity studies from independent investigators.

A fourth potential limitation is that a handful of study participants ranged in age from 2-4 years (n = 5) and 18-21 years (n = 8), and the following measures: the SCQ (normed on children > 4 years), the RBS-R (normed on children 6-17 years), and the

PRAS-ASD (normed on children 5-17 years) have not been normed on individuals at either extreme of the current age range.

A fifth limitation to the present study is that the readability of the C-SHARP was compromised when it transferred to an online survey platform, resulting in a series of response errors from participants. Due to the inconsistency of participants responding to both the Problem Scale and Provocation Scale, only the data from the Problem Scale was used in analyses. Furthermore, as mentioned in the Results section, responses were manually inputted for the seven participants who failed to respond to the Problem Scale but did respond to the Provocation Scale. These respondents were conservatively given a "1" on the Problem Scale, which signified that the behavior described is a "mild problem" that "presents sometimes" but "is not a real problem". This is the lowest "problem" score (aside from "0", which signifies that the behavior is not present) available and may have resulted in an underestimation of the levels of aggression truly present amongst the current sample.

Sixth, although online recruitment methods made it possible for this study to reach a broader range of individuals, it also limited the amount and type of information that could be gathered. My inability to have direct contact with participants limited my opportunity to screen respondents and collect additional pieces of information that online participants were assumed to not reliably have access to, such as proof of diagnosis, IQ scores and/or adaptive behavior scores. Although recruitment efforts strategically targeted groups of parents that self-identified as having a child with an autism spectrum disorder, a small percentage of the sample (n = 9; 7.8% of the sample) failed to indicate that their child had an ASD or comparable diagnosis (i.e., Asperger's Syndrome, PDD-

NOS, etc.) on the demographics questionnaire. Almost all these individuals obtained an SCQ score of above 15 (n = 8), justifying the decision to include them in the final data set, yet this continues to serve as a limiting factor. Future research should attempt to recruit participants through other means which better allow them to verify their child's diagnosis.

Furthermore, while online recruitment removed some geographic limitations, the sample obtained is still not representative of the general population of the United States. Organizations local to the New York Tristate Area assisted in distributing this survey and it is likely that many participants of this study live in this region. Participants were predominantly white (78.3%), non-Hispanic (84.3%) mothers (85.2%) to male (79.1%) children. While a range of household income levels were reported, the survey consisted mostly of participants with at least some college education (89.6%).

Finally, it is important to note that the data collection period for this study spanned from January 2020 to January 2021. As such, a significant portion of the data was collected at the time that the COVID-19 pandemic forced global shutdowns and quarantines, and preliminary studies suggest that youth with ASD and their caregivers may have been particularly vulnerable to the negative impacts of the COVID-19 pandemic. It has been hypothesized that youth with ASD may have faced heightened levels of anxiety, experienced a worsening of ASD symptoms and higher levels of RRBs, and/or more frequently communicated their distress surrounding factors related to the pandemic (i.e., school closures, disruptions to daily routines, etc.) through aggression (Bellomo et al., 2020; Casey et al., 2020; Martínez-González et al., 2021). In addition, results from Kalb and colleagues (2021) indicate that parents raising children with ASD

reported significantly higher levels of psychological distress compared to parents of children without ASD during the COVID-19 pandemic. Thus, it is possible that parents who completed the questionnaires during the pandemic may have rated their children's RRBs, anxiety, and/or aggression more severely than they would have rated those same factors pre-pandemic, and/or more severely than parents who completed the survey prior to the pandemic. It is also possible, however, that the removal of some demands (i.e., attending school) may have resulted in lower reports of RRBs, anxiety, and/or aggression for a portion of this sample during the pandemic. Therefore, the true impact of the COVID-19 pandemic on participant responses in this study is unknown.

Implications for School Psychology

The findings of this study have important implications for clinical practice and intervention. Individuals who work with youth with ASD that have high rates of restricted and repetitive behaviors, as well as comorbid anxiety and aggression, are likely to benefit from better understanding the mechanisms through which these three constructs relate to one another, as this understanding can guide treatment planning. If anxiety represents a pathway from RRBs to aggression, then interventions targeting anxiety should be incorporated into function-based treatments for youth who display RRBs and aggression. Even amongst youth who display high rates of RRBs and anxiety only, but no aggression, interventions that target anxiety may prevent RRBs from leading to aggression.

Research has shown that interventions rooted in ABA, including functional communication training (FCT) and reinforcement, as well as certain pharmacological treatments, often in combination, may be effective at reducing rates of aggressive

behavior in some youth with ASD, but these treatments are not effective for all cases (Fitzpatrick et al., 2016). With an enhanced understanding of the role that anxiety plays in the relationship between all classes of RRBs (except for sensory-motor behaviors) and aggression, clinicians may be able to refocus their interventions to target the true underlying or root cause of aggression for some children with ASD (i.e., anxiety) and choose to utilize other intervention techniques, such as CBT or other psychotherapies, as a replacement or supplement to other treatment methods.

Table 1

Parent Demographics

Characteristics	*n*	%
Sex		
Female	98	85.2
Male	17	14.8
Age		
24-29	7	6.1
30-39	43	37.4
40-49	48	41.7
50-59	17	14.8
Relationship Status		
Married	92	80.0
Single	10	8.7
Divorced	10	8.7
Widowed	3	2.6
Separated	0	0
Relationship to Child		
Biological Mother	93	80.9
Biological Father	16	13.9
Adoptive Mother	2	1.7
Adoptive Father	1	0.9
Stepparent	0	0
Parent's partner (living in household)	0	0
Legal Guardian	2	1.7
Foster Parent	0	0
Other Adult Relative	1	0.9
Race		
White	90	78.3
Black or African American	6	5.2
Native Hawaiian or Pacific Islander	1	0.9
American Indian or Alaska Native	4	3.5
Asian	6	5.2
Multiracial	2	1.7
Missing	6	5.2
Ethnicity		
Hispanic/Latino	17	14.8
Not Hispanic/Latino	97	84.3
Missing	1	0.9
Educational Level		
Some High School	3	2.6
High School Diploma or Equivalent (GED)	9	7.8
Some College	41	35.7
4-Year College Degree	33	28.7
Post-college Graduate Degree	29	25.2
Employment Status		
Part-time	19	16.5
Full-time	60	52.2
Unemployed	5	4.3
Homemaker	25	21.7
Student	2	1.7
Other	4	3.5

Table 1 continued

Parent Demographics

Characteristics	*n*	%
Estimated Total Family Income		
$0 to $30,000	17	14.8
$30,001 to $60,000	20	17.4
$60,001 to $90,000	27	23.4
$90,001 to $120,000	22	19.1
$120,000 or more	29	25.2
Household Size (excluding participant)		
0	1	0.9
1	8	7.0
2	20	17.4
3	55	47.8
4	22	19.1
5	7	6.1
6	2	1.7

Table 2

Child Demographics

Characteristics	*n*	%
Sex		
Female	23	20.0
Male	91	79.1
Missing	1	0.9
Age		
2-4	5	4.3
5-11	65	56.5
12-17	37	32.2
18-20	8	7.0
Race		
White	89	77.4
Black or African American	9	7.8
Native Hawaiian or Pacific Islander	5	4.3
American Indian or Alaska Native	1	0.9
Asian	6	5.2
Missing	5	4.3
Ethnicity		
Hispanic/Latino	14	12.2
Not Hispanic/Latino	100	87.0
Missing	1	0.9
Intellectual Disability		
Yes	48	41.7
No	59	51.3
Missing	8	7.0
ADLs		
Needs Support to Complete	80	69.6
Does Not Need Support to Complete	33	28.7
Missing	2	1.7
School Placement		
District/Local School	66	57.4
Out of District/Specialized School	47	40.9
Missing	2	1.7
Class Placement/Ratio		
General Education	33	28.7
Integrated/Co-Teaching Classroom	17	14.8
15:1:1 special class	5	4.3
12:1:1 special class	5	4.3
9:1:1 special class	1	0.9
8:1:1 special class	4	3.5
6:1:1 special class	15	13.0
2:1:1 special class	4	3.5
Other	18	15.7
Homeschooled	8	7.0
Missing	5	4.3
Daily Medication		
Medicated	65	56.5
Not Medicated	50	43.5

Table 2 continued

Child Demographics

Characteristics	*n*	%
Academic Standing		
Below grade level in most subjects	71	61.7
On grade level in most subjects	34	29.6
Above grade level in most subjects	10	8.7
Shared Aide	11	9.6
Behavior Intervention Plan (BIP)	8	7.0
Behavior Consultation	5	4.3
Communication Abilities		
Does not have any ability to communicate verbally	20	17.4
Has minimal language and can speak in only 1–2-word phrases	16	13.9
Has some functional phrases that consist of 2-3 words	13	11.3
Can use functionally, grammatically correct simple sentences composed of 3 or more words	8	7.9
Can use functionally, grammatically correct complex sentences composed of 3 or more words	12	10.4
Can string multiple functional, grammatically correct sentences together	46	40.0
Neurological and Psychological Diagnoses		
Autism Spectrum Disorder	106	92.2
ADHD	39	33.9
An Anxiety Disorder	34	29.6
A Depressive Disorder	14	12.2
Bipolar Disorder	2	1.7
A Learning Disability (LD)	27	23.5
Oppositional Defiant Disorder (ODD)	3	2.6
Other	19	16.5
Medical Diagnoses and Physical Disabilities		
Blindness	1	0.9
Cerebral Palsy	1	0.9
Coronary Heart Disease	0	0.0
Deafness	1	0.9
Diabetes	0	0.0
Epilepsy	7	6.1
Gastrointestinal Disorder	10	8.7
Osteoporosis	2	1.7
A Respiratory Disorder	8	7.0
Headaches/Migraines/Seizures	1	0.9
Severe Allergies	10	8.7
Other	14	12.2
None	61	53.0
Missing	13	11.3

Table 3

Outcome Measure Descriptive Statistics

Characteristics				
	Mean	Standard Deviation	Minimum	Maximum
SCQ	21.7	6.2	7.43	38.0
RBS-R	45.5	23.9	1.3	105.0
PRAS-ASD	28.4	16.2	0.0	60.0
C-SHARP	30.3	22.2	2.0	101.7

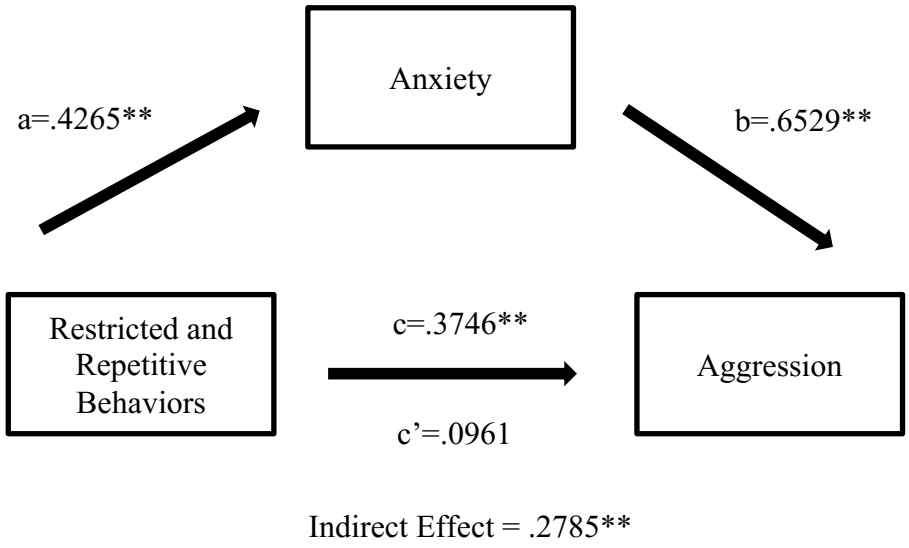


Figure 1. Mediation model with anxiety as the mediating variable in the relationship between restricted and repetitive behaviors and aggression.

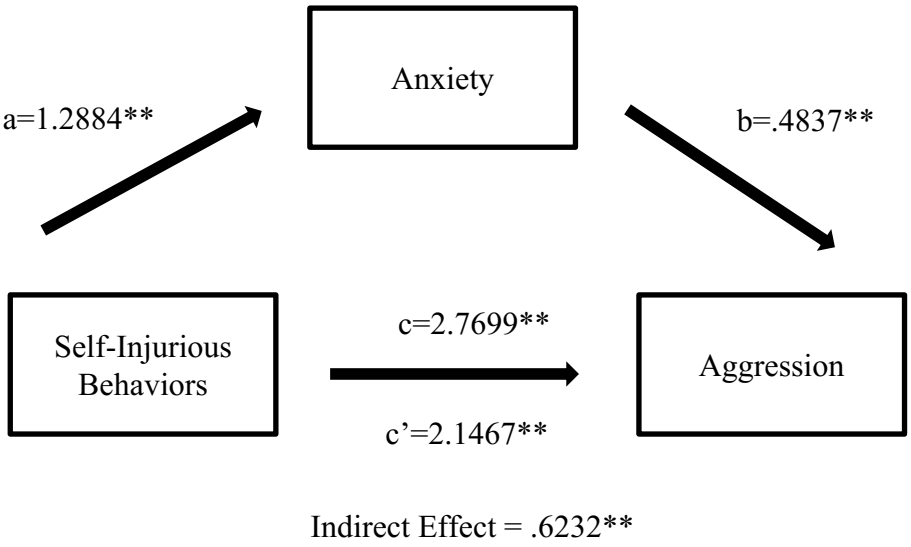


Figure 2. Mediation model with anxiety as the mediating variable in the relationship between self-injurious behaviors and aggression.

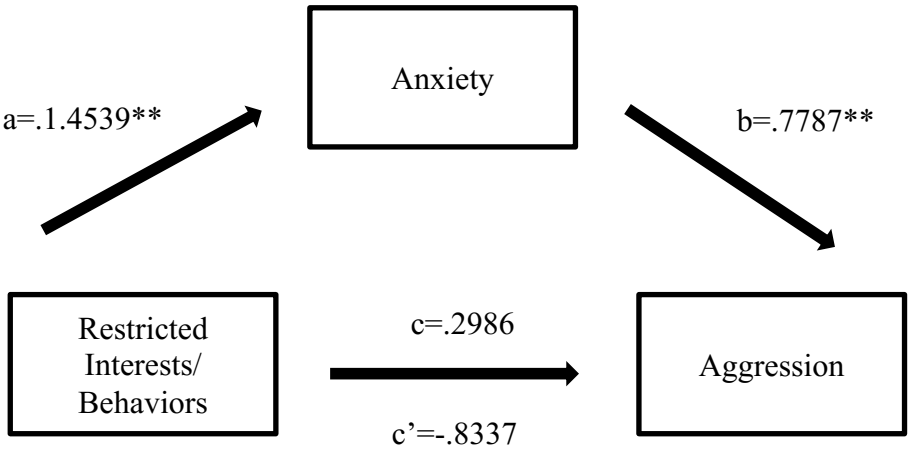


Figure 3. Mediation model with anxiety as the mediating variable in the relationship between restricted interests/behaviors and aggression.

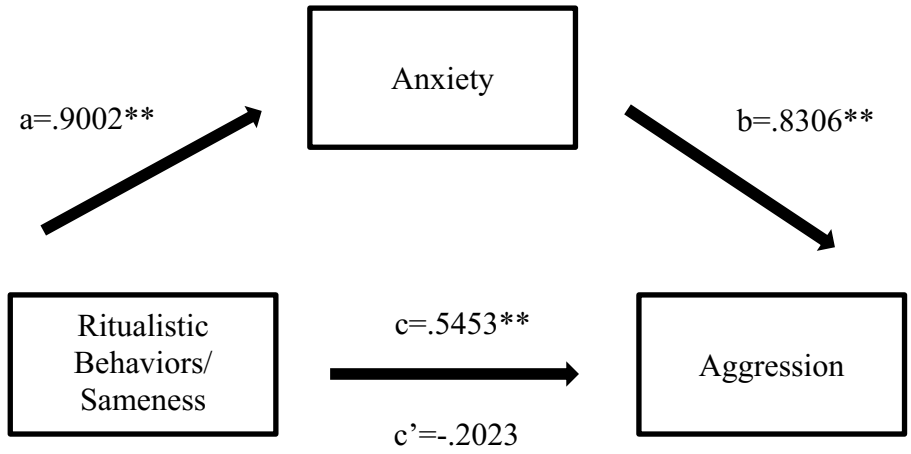


Figure 4. Mediation model with anxiety as the mediating variable in the relationship between sameness/ritualistic behaviors and aggression.

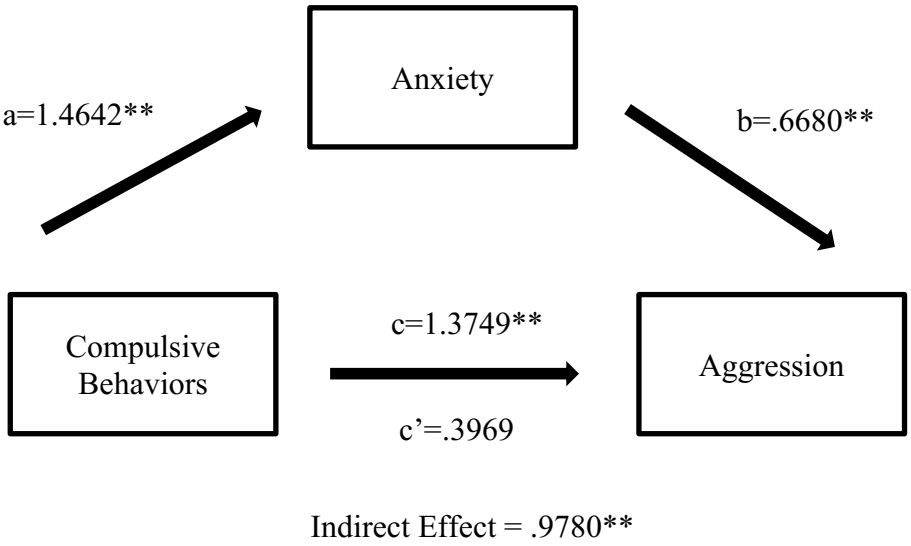


Figure 5. Mediation model with anxiety as the mediating variable in the relationship between compulsive behaviors and aggression.

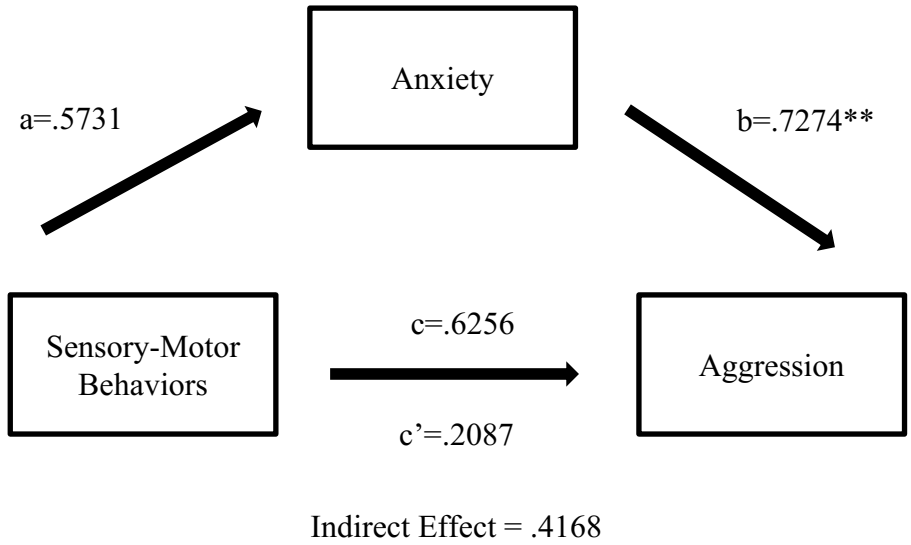


Figure 6. Mediation model with anxiety as the mediating variable in the relationship between stereotypic behaviors and aggression.

Appendix A

Demographics Questionnaire

Please answer the following questions about yourself, your family, and your child to the best of your ability.

About you:

1. Age: ____

2. Sex: ____ Male
____ Female

3. Please check one or more categories below to indicate what race(s) you consider yourself to be.

____ American Indian or Alaska Native
____ Asian
____ Black or African American
____ Native Hawaiian/Pacific Islander
____ White

4. Are you Spanish, Hispanic, or Latino? ____ Yes
____ No

5. What is the highest level of education that you have completed?

____ Some high school
____ High school diploma or Equivalent (GED)
____ Some college
____ Bachelor's degree
____ Post-college graduate degree (e.g., M.A., M.S., Ph.D.)

6. What is your current employment status?

____ Part time
____ Full time
____ Unemployed
____ Homemaker
____ Student
_____Other

7. What is your current relationship status?

____ Married

____ Single (never married)
____ Divorced
____ Widowed
____ Separated

8. What is your estimated total family income?

____$0-30,000
____$30,001-$60,000
____$60,001-$90,000
____$90,001-$120,000
____$120,000 or more

9. How many people currently live in your household, excluding you? _____

10. What is/are their relationship(s) to this child?

---

10. What is your relationship to this child?
____ Biological mother
____ Biological father
____ Adoptive mother
____ Adoptive father
____ Stepparent
____ Parent's partner (living in household)
____ Legal Guardian
____ Foster parent
____ Other adult relative

About your child:

11. Age: _____ year(s)_____month(s) Birthdate:_____
Please note that this information is needed to ensure that your child is within the age-range identified for this study.

12. Sex: ____ Male
____ Female

13. Please check one or more categories below to indicate what race(s) you consider your child to be:

____ American Indian or Alaska Native
____ Asian
____ Black or African American
____ Native Hawaiian/Pacific Islander
____ White

14. Is your child Spanish, Hispanic, or Latino? ____ Yes
____ No

15. Has your child been diagnosed with an Intellectual Disability (ID)? ____ Yes
____ No
____I don't know

16. Does your child struggle to complete daily living tasks (i.e., toileting, dressing, bathing, feeding/preparing meals, etc.) that most children their age can complete independently?
____ Yes
____ No

17. Does your child have any neurological or psychological diagnoses? (Check all that apply):
____ Autism Spectrum Disorder (or Autistic Disorder, Asperger's Disorder, or Pervasive Developmental Disorder – Not Otherwise Specified [PDD-NOS])
____ Attention Deficit-Hyperactivity Disorder (ADHD)
____ An Anxiety Disorder
____ A Depressive Disorder
____ Bipolar Disorder
____ Learning Disability (LD)
____ Oppositional Defiant Disorder (ODD)
____ Other: _____
____ None

18. Does your child have any medical diagnoses or physical disabilities? (Check all that apply):

____ Blindness
____ Cerebral Palsy
____ Coronary Heart Disease
____ Deafness
____ Diabetes
____ Epilepsy
____ Gastrointestinal Disorder
____ Osteoporosis
____ Respiratory Disorder
____ Severe headaches, migraines, and/or seizures
____ Severe allergies. If so, to what_____
____ Other:_____
____ None

19. Does your child take any daily medications? ____ Yes
____ No

If so, what is the name of the medication and what does your child take this/these medication(s) for?

---

20. Which of the following best describes your child's current school placement?

____ In district/local school
____ Out of district/specialized school

21. Which of the following best describes your child's current classroom placement?
____ General education student in a general education/integrated co-teaching classroom
____ Special education student in an integrated co-teaching classroom
____ 15:1 special class
____ 12:1:1 special class
____ 9:1:1 special class
____ 6:1:1 special class
____ Other: _____

22. Which of the following services/supports does your child presently receive in school (Please check all that apply)
____ 504 Plan
____ Individualized Education Plan (IEP)
____ Assistance from a 1:1 aide/teacher's assistant
____ A personalized behavior intervention plan (BIP)
____ Behavior consultation services

23. Which of the following best describes your child's current academic standing?
____ Below grade level in most subjects
____ On grade level in most subjects
____ Above grade level in most subjects

24. Which of the following best describes your child's language abilities?
____ Does not have any ability to communicate verbally
____ Has minimal functional language (i.e., can use one word to request objects, can identify objects or people, etc.)
____ Can use functional phrases that consist of two or more words
____ Can use functional, grammatically correct simple sentences
____ Can use functional, grammatically correct complex sentences
____ Can string multiple functional, grammatically correct sentences together to communicate ideas or tell a story

Appendix B

Social Communication Questionnaire

Directions: Thank you for taking the time to complete this questionnaire. Please answer each question by circling ***yes*** or ***no***. A few questions ask about several related types of behavior; please circle *yes* if *any* of these behaviors have ever been present. Although you may be uncertain about whether some behaviors were ever present or not, please answer *yes* or *no* to every question based on what you think.

1	Is she/he now able to talk using short phrases or sentences? If *no*, skip to question 8.	Yes	No
2	Can you have a to and fro "conversation" with her/him that involves taking turns or building on what you have said?	Yes	No
3	Has she/he ever used odd phrases or said the same thing over and over in almost exactly the same way (either phrases that she/he has heard other people use or ones that she/he has made up)?	Yes	No
4	Has she/he ever used socially inappropriate questions or statements? For example, has he/she ever regularly asked personal questions or made personal comments at awkward times?	Yes	No
5	Has she/he ever got her/his pronouns mixed up (e.g., saying *you* or *she/he* for *I*)?	Yes	No
6	Has she/he ever used words that she/he seemed to have invented or made up her/himself; put things in odd, indirect ways; or used metaphorical ways of saying things (e.g., saying *hot rain* for *steam*)?	Yes	No
7	Has she/he ever said the same thing over and over in exactly the same way or insisted that you say the same thing over and over again?	Yes	No
8	Has she/he ever had things that she/he seemed to have to do in a very particular way or order or rituals that she/he insisted that you go through?	Yes	No
9	Has her/his facial expression usually seemed appropriate to the particular situation, as far as you could tell?	Yes	No
10	Has she/he ever used your hand like tool or as if it were part of her/his own body (e.g., pointing with your finger, putting your hand on a doorknob to get you to open the door)?	Yes	No
11	Has she/he ever had any interests that preoccupy her/him and might seem odd to other people (e.g., traffic lights, drainpipes, or timetables)?	Yes	No
12	Has she/he ever seemed to be more interested in parts of toy or an object (e.g., spinning the wheels of a car), rather than using the object as it was intended?	Yes	No
13	Has she/he ever had any special interests that were *unusual* in their intensity but otherwise appropriate for her/his age and peer group (e.g., trains, dinosaurs)?	Yes	No
14	Has she/he ever seemed to be *unusually* interested in the sight, feel, sound, taste, or smell of things or people?	Yes	No
15	Has she/he ever had any mannerisms or odd ways of moving her/his hands or fingers, such as flapping or moving her/his fingers in front of her/his eyes?	Yes	No
16	Has she/he ever had any complicated movements of her/his whole body, such as spinning or repeatedly bouncing up and down?	Yes	No

17	Has she/he ever injured her/himself deliberately, such as by biting her/his arm or banging her/his head?	Yes	No
18	Has she/he ever had any objects (*other* than a soft toy or comfort blanket) that she/he *had* to carry around?	Yes	No
19	Does she/he have any particular friends or a best friend?	Yes	No
For the following behaviors, please focus on the time period between the child's fourth and fifth birthdays. You may find it easier to remember how things were at that time by focusing on key events, such as starting school, moving house, Christmastime, or other specific events that are particularly memorable for you as a family. If your child is not yet 4 years old, please consider her/his behavior in the past 12 months.			
20	When she/he was 4 to 5, did she/he ever talk with you just to be friendly (rather than to get something)?	Yes	No
21	When she/he was 4 to 5, did she/he ever *spontaneously* copy you (or other people) or what you were doing (such as vacuuming, gardening, or mending things)?	Yes	No
22	When she/he was 4 to 5, did she/he ever spontaneously point at things around her/him just to show you things (not because she/he wanted them)?	Yes	No
23	When she/he was 4 to 5, did she/he ever use gestures, other than pointing or pulling your hand, to let you know what she/he wanted?	Yes	No
24	When she/he was 4 to 5, did she/he nod her/his head to mean *yes*?	Yes	No
25	When she/he was 4 to 5, did she/he shake her/his head to mean *no*?	Yes	No
26	When she/he was 4 to 5, did she/he usually look at you directly in the face when doing things with you or talking with you?	Yes	No
27	When she/he was 4 to 5, did she/he smile back if someone smiled at her/him?	Yes	No
28	When she/he was 4 to 5, did she/he ever show you things that interested her/him to engage your attention?	Yes	No
29	When she/he was 4 to 5, did she/he ever offer to share things other than food with you?	Yes	No
30	When she/he was 4 to 5, did she/he ever seem to want you to join in her/his enjoyment of something?	Yes	No
31	When she/he was 4 to 5, did she/he ever try to comfort you if you were sad or hurt?	Yes	No
32	When she/he was 4 to 5, when she/he wanted something or wanted help, did she/he look at you and use gestures with sounds or words to get your attention?	Yes	No
33	When she/he was 4 to 5, did she/he show a normal range of facial expressions?	Yes	No
34	When she/he was 4 to 5, did she/he ever spontaneously join in and try to copy the actions in social games, such as *The Mulberry Bush* or *London Bridge is Falling Down*?	Yes	No
35	When she/he was 4 to 5, did she/he play and pretend or make-believe games?	Yes	No
36	When she/he was 4 to 5, did she/he seem interested in other children of approximately the same age whom she/he did not know?	Yes	No
37	When she/he was 4 to 5, did she/he respond positively when another child approached her/him?	Yes	No

38	When she/he was 4 to 5, if you came into a room and started talking to her/him without calling her/his name, did she/he usually look up and pay attention to you?	Yes	No
39	When she/he was 4 to 5, did she/he ever play imaginative games with another child in such a way that you could tell that they each understood what the other was pretending?	Yes	No
40	When she/he was 4 to 5, did she/he play cooperatively in games that required joining in with a group of other children, such as hide-and-seek or ball games?	Yes	No

Appendix C

REPETITIVE BEHAVIOR SCALE – Revised (RBS-R)

Name: _____ **ID#:** _____

Gender: female male **Date of Birth:** ___/___/_____ **Today's Date:** ___/___/_____

Informant's Name: _____

Instructions:
Please rate this person's behavior by reading each of the items listed and then choosing the score that best describes how much of a problem the item is for the person. Be sure to read and score all items listed. Make your ratings based on your observations and interactions with the person over the last month. Use the definitions in the box given below to score each item.

0 = behavior does not occur
1 = behavior occurs and is a mild problem
2 = behavior occurs and is a moderate problem
3 = behavior occurs and is a severe problem

When deciding on a score for each item, consider: (a) how frequently the behavior occurs (e.g. weekly versus hourly), (b) how difficult it is to interrupt the behavior (e.g. can be easily redirected versus becomes distressed if interrupted) and (c) how much the behavior interferes with ongoing events (e.g. easy to ignore versus very disruptive).

I. Stereotyped Behavior Subscale

(DEFINITION: apparently purposeless movements or actions that are repeated in a similar manner)

1	WHOLE BODY (Body rocking, Body swaying)	0	1	2	3
2	HEAD (Rolls head, Nods head, Turns head)	0	1	2	3
3	HAND/FINGER (Flaps hands, Wiggles or flicks fingers, Claps hands, Waves or shakes hand or arm)	0	1	2	3
4	LOCOMOTION (Turns in circles, Whirls, Jumps, Bounces)	0	1	2	3
5	OBJECT USAGE (Spins or twirls objects, Twiddles or slaps or throws objects, Lets objects fall out of hands)	0	1	2	3
6	SENSORY (Covers eyes, Looks closely or gazes at hands or objects, Covers ears, Smells or sniffs items, Rubs surfaces)	0	1	2	3

0 = behavior does not occur 1 = behavior occurs and is a mild problem 2 = behavior occurs and is a moderate problem 3 = behavior occurs and is a severe problem

II. Self-Injurious Behavior Subscale

(DEFINITION: movement or actions that have the potential to cause redness, bruising, or other injury to the body, and that are repeated in a similar manner)

7	HITS SELF WITH BODY PART (Hits or slaps head, face, or other body area)	0	1	2	3
8	HITS SELF AGAINST SURFACE OR OBJECT (Hits or bangs head or other body part on table, floor or other surface)	0	1	2	3
9	HITS SELF WITH OBJECT (Hits or bangs head or other body area with objects)	0	1	2	3
10	BITES SELF (Bites hand, wrist, arm, lips or tongue)	0	1	2	3
11	PULLS (Pulls hair or skin)	0	1	2	3
12	RUBS OR SCRATCHES SELF (Rubs or scratches marks on arms, leg, face or torso)	0	1	2	3
13	INSERTS FINGER OR OBJECT (Eye-poking, Ear-poking)	0	1	2	3
14	SKIN PICKING (Picks at skin on face, hands, arms, legs or torso)	0	1	2	3

III. Compulsive Behavior Subscale

(DEFINITION: behavior that is repeated and is performed according to a rule, or involves things being done "just so")

15	ARRANGING / ORDERING (Arranges certain objects in a particular pattern or place; Need for things to be even or symmetrical)	0	1	2	3
16	COMPLETENESS (Must have doors opened or closed; Takes all items out of a container or area)	0	1	2	3
17	WASHING / CLEANING (Excessively cleans certain body parts; Picks at lint or loose threads)	0	1	2	3
18	CHECKING (Repeatedly checks doors, windows, drawers, appliances, clocks, locks, etc.)	0	1	2	3
19	COUNTING (Counts items or objects; Counts to a certain number or in a certain way)	0	1	2	3
20	HOARDING/SAVING (Collects, hoards or hides specific items)	0	1	2	3
21	REPEATING (Need to repeat routine events; In / out door, up / down from chair, clothing on/off)	0	1	2	3
22	TOUCH / TAP (Need to touch, tap, or rub items, surfaces, or people)	0	1	2	3

0 = behavior does not occur
1 = behavior occurs and is a mild problem
2 = behavior occurs and is a moderate problem
3 = behavior occurs and is a severe problem

IV. Ritualistic Behavior Subscale

(DEFINITION: performing activities of daily living in a similar manner)

23	EATING / MEALTIME (Strongly prefers/insists on eating/drinking only certain things; Eats or drinks items in a set order; Insists that meal related items are arranged in a certain way)	0	1	2	3
24	SLEEPING / BEDTIME (Insists on certain pre-bedtime routines; Arranges items in room "just so" prior to bedtime; Insists that certain items be present with him/her during sleep; Insists that another person be present prior to or during sleep)	0	1	2	3
25	SELF-CARE – BATHROOM AND DRESSING (Insists on specific order of activities or tasks related to using the bathroom, to washing, showering, bathing or dressing; Arranges items in a certain way in the bathroom or insists that bathroom items not be moved; Insists on wearing certain clothing items)	0	1	2	3
26	TRAVEL / TRANSPORTATION (Insists on taking certain routes/paths; Must sit in specific location in vehicles; Insists that certain items be present during travel, e.g., toy or material; Insists on seeing or touching certain things or places during travel such as a sign or store)	0	1	2	3
27	PLAY / LEISURE (Insists on certain play activities; Follows a rigid routine during play / leisure; Insists that certain items be present/available during play/leisure; Insists that other persons do certain things during play)	0	1	2	3
28	COMMUNICATION / SOCIAL INTERACTIONS (Repeats same topic(s) during social interactions; Repetitive questioning; Insists on certain topics of conversation; Insists that others say certain things or respond in certain ways during interactions)	0	1	2	3

V. Sameness Behavior Subscale

(DEFINITION: (resistance to change, insisting that things stay the same)

29	Insists that things remain in the same place(s) (e.g. toys, supplies, furniture, pictures, etc.)	0	1	2	3
30	Objects to visiting new places	0	1	2	3
31	Becomes upset if interrupted in what he/she is doing	0	1	2	3
32	Insists on walking in a particular pattern (e.g., straight line)	0	1	2	3
33	Insists on sitting at the same place	0	1	2	3
34	Dislikes changes in appearance or behavior of the people around him/her	0	1	2	3
35	Insists on using a particular door	0	1	2	3
36	Likes the same CD, tape, record or piece of music played continually; Likes same movie / video or part of movie / video	0	1	2	3
37	Resists changing activities; Difficulty with transitions	0	1	2	3
38	Insists on same routine, household, school or work schedule everyday	0	1	2	3
39	Insists that specific things take place at specific times	0	1	2	3

0 = behavior does not occur 1 = behavior occurs and is a mild problem 2 = behavior occurs and is a moderate problem 3 = behavior occurs and is a severe problem

VI. Restricted Behavior Subscale

(DEFINITION: Limited range of focus, interest or activity)

40	Fascination, preoccupation with one subject or activity (e.g., trains, computers, weather, dinosaurs)	0	1	2	3
41	Strongly attached to one specific object	0	1	2	3
42	Preoccupation with part(s) of object rather than the whole object (e.g., buttons on clothes, wheels on toy cars)	0	1	2	3
43	Fascination, preoccupation with movement / things that move (e.g., fans, clocks)	0	1	2	3

Appendix D

Parent Rated Anxiety Scale-ASD

Date: _ _ /_ _/ _ _ _ _ Name (or ID): _____ Sex: [ ] Male [ ] Female Grade: _____

Ethnicity: [ ] African-American [ ] Asian [ ] Caucasian [ ] Hispanic [ ] Other (Specify_____)

Completed by: [ ] Mother [ ] Father [ ] Other (Specify _____)

Instructions: Circle the number that describes your child's worries and anxiety-related behaviors over the past two weeks. **None**= not present; **Mild**= Present sometimes, not a real problem; **Moderate** = Often present and a problem; **Severe** = Very frequent and a major problem.

		None	Mild	Moderate	Severe
1	Has difficulty sleeping due to fears or worries	0	1	2	3
2	Uneasy in new situations	0	1	2	3
3	Overly fearful of weather events (e.g., storms, hurricanes or tornados)	0	1	2	3
4	Uncomfortable in social situations	0	1	2	3
5	Gets stuck on what might go wrong	0	1	2	3
6	Consistently avoids certain situations due to anxiety	0	1	2	3
7	On the look-out for any change in routine	0	1	2	3
8	Needs a lot of reassurance that things will work out	0	1	2	3
9	Anxious about upcoming events	0	1	2	3
10	Is fearful when separated from parents	0	1	2	3
11	Is extremely tense or unable to relax	0	1	2	3
12	Complains about heart pounding	0	1	2	3
13	Worries about sticking out or being noticed by others	0	1	2	3
14	Nervous about being late or getting off schedule	0	1	2	3
15	Shuts down when anxious	0	1	2	3
16	Gets upset by loud noises (e.g., public address systems, trains, vacuum cleaners, fire alarms, sirens, loud toilets)	0	1	2	3
17	Gets upset when things are not perfect	0	1	2	3
18	Hyperventilates when anxious or afraid	0	1	2	3
19	Asks the same questions over and over for reassurance	0	1	2	3
20	Is overly self-critical	0	1	2	3
21	Paces or does other repetitive behaviors when tense or worried	0	1	2	3
22	Has difficulty controlling worries	0	1	2	3
23	Complains about physical problems	0	1	2	3
24	Over-reacts when things do not go as planned	0	1	2	3
25	Fears being alone	0	1	2	3

Total: [ ]

Appendix E

C SHARP
VERSION 2.0

Child Name: _____
Child Gender: □ Female □ Male
Child Birthdate ___/___/___
Your Name: _____
Your Relationship to Child: _____
Today's Date: ___/___/___

Instructions

Problem Scale
Circle the number that describes your child's behavior.

0 = Does not happen
1 = Mild or infrequent problem
2 = Moderately serious and/or frequent problem
3 = Severe and/or very frequent problem

If this answer is "0," do not select a "Who starts it?" rating, and move on.

If this answer is a "1," "2," or "3," circle one "Who starts it?" rating for the item.

Who starts it? Scale
Rate this only if you rated the item with 1, 2, or 3 on the Problem Scale.

Provocation refers to any action leading to the aggression, no matter how mild or severe, which seems to anger or upset your child and trigger the behavior.

-2 = *Only* when provoked and/or unplanned
-1 = *Usually* provoked and/or unplanned
0 = Equally likely to be provoked or to start it
1 = *Usually* "starts it," without provocation
2 = *Always* "starts it," without provocation

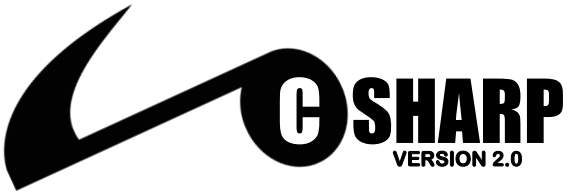
In the past month, how well does each item describe your child?

Remember to choose a "Who Starts It?" rating if you select a "Problem Scale" rating of 1, 2, or 3.

	Problem Scale (Doesn't Happen → Severe/Frequent)				Who Starts It? (Provoked → Not Provoked)				
1. Sneers, "makes faces" at others	0	1	2	3	-2	-1	0	1	2
2. Is "sneaky;" does things "on the sly"	0	1	2	3	-2	-1	0	1	2
3. Pinches others	0	1	2	3	-2	-1	0	1	2
4. Is resentful over seemingly minor issues	0	1	2	3	-2	-1	0	1	2
5. Breaks others' things	0	1	2	3	-2	-1	0	1	2
6. Is quick to anger ("hot-headed")	0	1	2	3	-2	-1	0	1	2
7. Takes others' things by force	0	1	2	3	-2	-1	0	1	2
8. Broods, pouts, or is sullen	0	1	2	3	-2	-1	0	1	2
9. Calls others insulting names in their absence	0	1	2	3	-2	-1	0	1	2
10. Shoves or pushes others	0	1	2	3	-2	-1	0	1	2
11. Crowds others (invades their personal space)	0	1	2	3	-2	-1	0	1	2
12. Says, "I hate you" or makes other hurtful statements	0	1	2	3	-2	-1	0	1	2
13. Bites others	0	1	2	3	-2	-1	0	1	2
14. Insults others to their faces	0	1	2	3	-2	-1	0	1	2
15. Throws objects at others	0	1	2	3	-2	-1	0	1	2
16. Reacts suddenly or impulsively to minor provocations	0	1	2	3	-2	-1	0	1	2
17. Shouts at others in anger	0	1	2	3	-2	-1	0	1	2
18. Gets mad when caught behaving badly	0	1	2	3	-2	-1	0	1	2
19. Is overly argumentative	0	1	2	3	-2	-1	0	1	2
20. Uses profanity to shock or offend others	0	1	2	3	-2	-1	0	1	2

OVER ➡

In the past month, how well does each item describe your child? Remember to choose a "Who Starts It?" rating if you select a "Problem Scale" rating of 1, 2, or 3.	Problem Scale				Who Starts It?				
	Doesn't Happen			Severe/Frequent	Provoked				Not Provoked
21. Tickles or physically teases others, even after being asked to stop	0	1	2	3	-2	-1	0	1	2
22. Steals from others when they aren't looking	0	1	2	3	-2	-1	0	1	2
23. Reacts to insults or teasing by lashing out physically	0	1	2	3	-2	-1	0	1	2
24. Calls others insulting names to their faces	0	1	2	3	-2	-1	0	1	2
25. Trips others	0	1	2	3	-2	-1	0	1	2
26. Head-butts others	0	1	2	3	-2	-1	0	1	2
27. Makes insulting comments about others behind their backs	0	1	2	3	-2	-1	0	1	2
28. Breaks own belongings	0	1	2	3	-2	-1	0	1	2
29. Charges at others	0	1	2	3	-2	-1	0	1	2
30. Verbally teases others, even after being asked to stop	0	1	2	3	-2	-1	0	1	2
31. If caught, denies having behaved badly	0	1	2	3	-2	-1	0	1	2
32. Pulls others' hair	0	1	2	3	-2	-1	0	1	2
33. When angry, is slow to cool off	0	1	2	3	-2	-1	0	1	2
34. Spits at others	0	1	2	3	-2	-1	0	1	2
35. Says "I hate [someone]" or other hurtful things when the person isn't there	0	1	2	3	-2	-1	0	1	2
36. Lashes out at people who are in his/her space	0	1	2	3	-2	-1	0	1	2
37. Starts trouble by baiting others	0	1	2	3	-2	-1	0	1	2
38. If caught, makes excuses for bad behavior	0	1	2	3	-2	-1	0	1	2
39. Scratches others with fingernails	0	1	2	3	-2	-1	0	1	2
40. Glares at others	0	1	2	3	-2	-1	0	1	2
41. Encourages others to gang up on someone (physically OR verbally)	0	1	2	3	-2	-1	0	1	2
42. Hits others with objects	0	1	2	3	-2	-1	0	1	2
43. Is often grouchy	0	1	2	3	-2	-1	0	1	2
44. Verbally threatens others with physical harm	0	1	2	3	-2	-1	0	1	2
45. Hits or shoves others forcefully	0	1	2	3	-2	-1	0	1	2
46. Makes unwanted sexual comments to others	0	1	2	3	-2	-1	0	1	2
47. Gets revenge after time has passed and the other person is not on guard	0	1	2	3	-2	-1	0	1	2
48. Tries not to get caught while doing harmful things to others	0	1	2	3	-2	-1	0	1	2



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