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Cognitive Functioning as a Moderator in the Relation between Externalizing Behavior Problems in Children with Autism Spectrum Disorder and Stress among Their Parents

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Running Head: PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

The University of Southern Mississippi

Cognitive Functioning as a Moderator in the Relation between Externalizing Behavior Problems in Children with Autism Spectrum Disorder and Stress among Their Parents

by

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PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

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PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Abstract

It is known that externalizing behavior problems among children with autism spectrum disorder (ASD) are related to parental stress among parents. This study examined how cognitive functioning levels of children with ASD may moderate this relation in a group of 27 children (ages 7 to 16 years) with a diagnosis of ASD. Children were tested on a brief measure of intelligence to estimate their cognitive functioning. Parents completed measures of the children's ASD symptom severity and externalizing behaviors as well as a measure of their own levels of parental stress. Hierarchical regression analyses indicated that ASD symptoms and cognitive functioning significantly predicted parental stress, with both ASD symptoms and cognitive functioning emerging as significant unique predictors. However, externalizing behaviors did not contribute significant unique variance in parental stress above and beyond these other child variables. Furthermore, IQ did not moderate the relation between externalizing behaviors and parental stress. These findings underscore the importance of considering ASD symptom severity and cognitive functioning as potential markers of risk for stress among parents with a child with ASD.

Key Terms: autism spectrum disorder, parental stress, cognitive functioning, externalizing behaviors

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Introduction

Previous research has found that parents of children with ASD often experience increased levels of stress when compared to parents of typically-developing children (Rao & Biedel, 2009). The primary factors contributing to that stress, however, do not appear to be ASD symptoms in themselves or even adaptive behavior deficits that may be related to ASD (Lecavalier, Leone, & Wiltz, 2006). Rather, it appears as if high levels of associated behavior problems—particularly externalizing behavior problems (such as hyperactivity, disruptive behaviors, self-regulation difficulties, and general externalizing behaviors) that could be found in children with or without ASD—are the key factors contributing to parental stress (e.g., Davis & Carter, 2008; Hall & Graff, 2012; Lecavalier et al., 2006; McStay, Dissanayake, Sheeren, Koot, & Begeer, 2014).

However, important questions remain. For example, given that children with ASD present with varying levels of cognitive functioning from significant intellectual deficiencies to very high levels of intelligence (American Psychiatric Association, 2013), does cognitive functioning (IQ) of children with ASD also relate to parental stress? Much previous research has focused on adaptive behaviors, sometimes as a proxy for IQ. However, few studies have examined IQ directly. Studies examining adaptive behaviors and other more cognitive related variables (e.g., verbal ability in children) among children with ASD have not found a direct relation (i.e., no main effect) with parental stress (e.g., McStay et al., 2014). Still, more research is needed to examine how child IQ, specifically, relates to stress among parents of a child with ASD. Likewise, there may be an interaction between cognitive and behavioral functioning. Perhaps the relation between externalizing behaviors and parental stress is stronger when children have lower

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IQs—with the lower cognitive functioning exacerbating not only the child's adjustment but also parental stress. Given the high level of stress among parents of children with ASD (Rao & Biedel, 2009), the answer to this question is of significant importance.

This study aims to answer the overarching question: Does the relation between behavioral problems among children with ASD and their parents' stress levels depend on the children's cognitive functioning level? One way in which this study is distinctive is that it examines parental stress in a way that is very relevant to children with ASD. The parental stress measure that this study used, the Questionnaire on Resources and Stress-Short Form (Friedrich, Greenberg, & Crnic, 1983), was constructed for families who have a child with a disability and was used to assess parental stress in three different areas relevant to parents of a child with ASD: parent and family problems, child characteristics, and pessimism. This project examined the impact of IQ and externalizing behaviors among children with ASD on a total parenting stress score including each of these three areas. Likewise, general stress from another stress measure was used as a second way to operationalize parent stress. This study aided in understanding the specific impact that IQ and externalizing behaviors have independently, as well as in combination, on parenting stress and general stress.

Literature Review

Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a developmental disorder that is associated with intellectual disabilities, difficulties in motor coordination, deficits in attention, and physical health issues (American Psychiatric Association, 2013). Individuals with ASD have communication and social skill deficits which may include inappropriate responding in conversations, misreading nonverbal interactions, or difficulties in building appropriate friendships (American Psychiatric Association, 2013). Communication problems include a difficulty using or understanding language; there are some children with ASD who focus their attentions on only a few subject areas, some recurrently repeat phrases, and some have limited speech (American Psychiatric Association, 2013). Children with ASD process social information in a less socially competent way than typically developing children; this finding is evident in encoding, interpretation, response construction, and response decision (Ziv, Hadad, & Khateeb, 2014). According to the American Psychiatric Association (2013), individuals with ASD have a difficulty relating to other people, events, and things such as problems making friends, difficulties interacting with other people, an issue reading facial expressions, as well as possibly not being able to make eye contact. Hand flapping and repeating sounds or phrases are also characteristics of ASD (American Psychiatric Association, 2013). Furthermore, it is common for individuals with ASD to be overly dependent on routines, hypersensitive to changes in their environment, or extremely focused on inappropriate things (American Psychiatric Association, 2013). Individuals with ASD fall along a continuum, with some showing

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mild symptoms whereas others present more severe symptoms (American Psychiatric Association, 2013).

Cognitive Functioning

As described by Metcalfe, Harvey, and Laws (2013), cognitive functioning skills show a person's ability to think and apply experiences and include skills such as working memory, abstract thinking, visual processing, and processing speed. It has been found that there is an uneven pattern of cognitive abilities in individuals with ASD (Kuschner, Bennetto, & Yost, 2007; Speirs, Rinehart, Robinson, Tonge, & Yelland, 2014); the pattern that does emerge is one of higher Performance (nonverbal) IQ scores in comparison to Verbal IQ (Kuschner et al., 2007). Cognitive functioning has been characterized by functions of visual-spatial processing, sensory perception, attention, elementary memory skills that assess short-term associative memory, and elementary language skills (Kuschner et al., 2007; Minshew, Goldstein, & Siegal, 1995, 1997; Williams, Goldstein, & Minshew, 2006).

According to the Information Processing Theory, there are higher demands put onto the cognitive processing system when the information that is to be processed is fundamentally complex or it becomes complex through constraints (Minshew et al., 1997; Speirs et al. 2014). Research has also shown that cognitive functioning is compromised due to the demands of excessive processing that prevents the cognitive processes from operating efficiently (Eysenck, Derakshan, Santos, & Calvo, 2007; Speirs et al., 2014; Williams et al., 2006).

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In a study conducted by Peters-Scheffer, Didden, and Korzilius, it was shown that there is no relation between parental stress and a child's cognitive functioning, or IQ level (2012). This finding makes a contrasting point to one of my study's primary hypotheses (i.e., that a child's cognitive functioning level does relate to parental stress when the child has ASD symptoms). A study by Weiss, Sullivan, and Diamond (2003) examined the adaptive functioning of individuals with a developmental disability to determine which child characteristics are predictors of parental stress. The results of this study showed that there was a relation between parental stress and adaptive behavior of the child. Adaptive behavior is related to IQ; therefore, it is possible that, given adaptive behavior relates to stress, low IQ may also relate to stress.

Externalizing Behavior Problems

Externalizing behavior problems are characterized by disruptive behaviors that include hyperactivity, impulsivity, aggression, attention problems, and noncompliance (Metcalf et al., 2013). Studies show that children with ASD present many more behavior problems than children without ASD (Maljaars, Boonen, Lambrechts, Van Leeuwen, & Noens, 2014). There is a wide variety of externalizing behavior problems represented in children with ASD ranging from defiance and escape behaviors to aggression and property destruction (Sikora et al., 2013).

Difficulties in pragmatic language are a significant predictor in internalizing and externalizing behaviors problems in children with ASD; these language problems possibly develop due to the child's cognitive functioning levels (Boonen et al., 2014).

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Parental Stress

Parental stress is often related to a child's behavior problems. Lecavalier and colleagues (2006) found that children's behavior problems were most associated with stress. Children with externalizing behavior problems tend to need more care to contain their disruptive behaviors which could cause a higher level of stress in their parents (Sikora et al., 2013).

Several studies have documented that parental stress is higher among parents of children with ASD than parents of typically developing children (Baker-Ericzn, Brookman-Fraze, & Stahmer, 2005; Estes et al., 2013; Rao & Beidel, 2009; Rivard, Terroux, Parent-Boursier, & Mercier, 2014). Even a child with high-functioning ASD creates more parental stress than a typically developing child (Rao & Beidel, 2009). Parental stress is dependent upon different aspects of children's behaviors (Davis & Carter, 2008).

Current Study and Hypotheses

It is known that externalizing behavior problems among children with ASD are related to parental stress among parents. This study focused on examining how cognitive functioning levels of children with ASD influence this relation. This study tested three hypotheses. Hypothesis 1 was that ASD symptoms and child externalizing behaviors would be positively related to parenting stress (i.e., parent and family problems, child characteristics, and pessimism) and general stress among parents, whereas child cognitive functioning would be negatively related to stress among parents. Hypothesis 2 was that externalizing behaviors among children with ASD would predict parental stress and general stress levels above and beyond the symptoms of ASD and cognitive functioning

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level. Specifically, the relations between externalizing behavior problems in children with ASD and parental stress and general stress were expected to be positive (e.g., higher levels of externalizing behaviors associated with higher levels of parental stress).

Hypothesis 3 was that IQ would moderate the relation between externalizing behaviors and parental stress and general stress after controlling for symptoms of ASD.

Specifically, a significant interaction between cognitive and behavioral functioning would be found such that parental stress and general stress levels would be the highest for children who have high externalizing behavior problems and lower IQ.

Method

Participants

Participants for this study were 27 children with ASD between the ages of 7 and 16 years ($M = 9.74$, $SD = 2.43$) as well as one of their parents. There were 20 male and 7 female children in this study; every parent was female. This age group was chosen because it not only provides a broad age range and, thus, more generalizability to the findings, but also it is appropriate for the behavioral and cognitive measures selected for the study. This sample was made up of 20 Caucasians, 6 African Americans, and 1 “other” race. To qualify as having ASD, participants must have received a previous diagnosis of Autistic Disorder, Asperger’s Disorder, or a Pervasive Developmental Disorder (as assessed by parental report of such a diagnosis being made by a professional). In this sample, 12 were diagnosed with ASD, 4 with Asperger’s, 9 with PDD-NOS, and 2 were classified as “other.” Participants were recruited through community flyers, schools, and clinics serving children with ASD in the Hattiesburg, Mississippi, and Mobile, Alabama, areas, as well as snowball sampling (where

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participating parents were asked to refer other parents). Table 1 presents additional demographic descriptive statistics.

Procedure

All procedures were approved by The University of Southern Mississippi Institutional Review Board and/or the University of South Alabama Institutional Review Board. Data for this study were collected in the context of a larger project (the two IRB approvals for the larger project are attached in Appendix A). Prior to any data collection, informed consent was gathered from the parents (Appendix B). Following parental consent, children provided their assent (Appendix C) and were individually tested in a quiet room where they completed the Kaufman Brief Intelligence Test, Second Edition to measure IQ. While the participants were being tested, their parents completed the demographic and diagnostic form along with the other questionnaires described in detail below (i.e., Children's Social Behavior Questionnaire, Strengths and Difficulties Questionnaire, and Questionnaire on Resources and Stress, short form). All surveys were collected online through a secure, web-based program called Qualtrics. Depending on where the study was being conducted, the parents either completed the questionnaires at the testing site on a tablet that was provided or completed them from their home. Parents who completed their questionnaires from home consented to participate in the research study before completing the measures a few days or weeks before their child was tested or a few days or weeks after their child was tested. Information gathered was de-identified and stored with a unique participant identification number. Following completion of these procedures, as well as some additional testing as part of a larger

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study, the parents were provided with a \$10 gift card to a local store or to Amazon (their preference).

Measures

Kaufman Brief Intelligence Test, Second Edition (KBIT-2). The KBIT-2 (Kaufman & Kaufman, 2004) was used to assess the IQ of each participant. The KBIT-2 provides an overall measure of intellectual functioning. This test consists of three subtests: verbal knowledge (receptive vocabulary and range of general knowledge), riddles (verbal comprehension, verbal reasoning, and vocabulary knowledge), and matrices (understanding of relationships, nonverbal reasoning, and problem-solving ability)—together yielding a Full Scale IQ (i.e., overall intellectual level).

The K-BIT-2 was standardized with individuals from a nationally-represented sample, ranging in age from 4 to 90 years. Internal reliability (.93) and test-retest reliability (.90) are both high for the IQ composite. The K-BIT-2 also exhibits a high level of validity, with IQ composite scores correlating significantly with other IQ measures [K-BIT = .84, Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV) = .77, Wechsler Adult Intelligence Scale, Third Edition (WAIS-III) = .89].

Children's Social Behavior Questionnaire (CBSQ). The CSBQ (Hartman, Luteijn, Serra, & Minderaa, 2006; Luteijn, Luteijn, Jackson, Volkmar, Minderaa, 2000) was used to assess the child's behavioral functioning and ASD symptoms in five areas: acting out behaviors, social contact problems, social insight problems, anxious/rigid behaviors, and stereotypical behaviors. A total of 66 items load on these five subscales. For each item, parents indicate how often a behavior occurs by checking *0-it does not describe the child*, *1-infrequently describes the child*, or *2-clearly applies to the child*.

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Test-retest reliability for four of the five scales is satisfactorily high (ICC ranging from .62 to .90), but the stereotypical scale exhibits a lower level of test-retest reliability (ICC = .32; Luteijn et al., 2000). Likewise, internal consistency is good, ranging from .76 to .92 (Luteijn et al., 2000). These subscales also exhibit evidence of validity in that they correlate with subscales of other measures investigating similar constructs (e.g., on the Child Behavior Checklist; Luteijn et al., 2000). The internal consistency for this measure was excellent (Chronbach's $\alpha = .96$) for the current sample.

Strength and Difficulties Questionnaire (SDQ). The Strengths and Difficulties Questionnaire (SDQ) was used to assess the child's emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behaviors. The parent-report form is appropriate for children and adolescents ages 3 to 17 (Goodman, 1997; Goodman, Meltzer, & Bailey, 1998). Respondents rate each item as *Not True*, *Somewhat True*, or *Certainly True*. Additionally, the SDQ provides an impact supplement by eliciting the respondent's views about whether they feel their child has a problem along with chronicity, distress, social impairment, and burden to others.

The SDQ has been shown to display sufficient internal consistency, with coefficient alphas ranging from .57 to .77 for the subscales. According to Goodman (1997), the SDQ has also shown evidence of concurrent validity with the well-established Rutter questionnaires, which measure broad child psychopathology. For the current sample, the internal consistency for conduct problems was poor (Chronbach's $\alpha = .30$), whereas the internal consistency for hyperactivity was fair (Chronbach's $\alpha = .67$). When these two subscales were combined to create an externalizing composite, the internal consistency was good (Chronbach's $\alpha = .72$).

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Questionnaire on Resources and Stress (short form). The Questionnaire on Resources and Stress-Short Form (QRS-SF; Friedrich et al., 1983) is a 53-item, abbreviated instrument measuring parental adaptation and coping while raising a child with a disability with three subscales (i.e., parent and family problems, child characteristics, and pessimism). There is also a physical incapacitation scale that was not used in the current study. It is adapted from the longer Questionnaire on Resources and Stress (Holroyd, 1974). Sample items include: “I get upset with the way my life is going,” “I have given things up that I have really wanted to do in order to care for _____,” “_____ does not do as much as he/she should be able to do,” “I worry about what will happen to _____ when I can no longer take care of him or her.” Respondents indicated their agreement with items by responding *True* or *False*. Thus, the measure of parental stress for the current study is focused specifically on stress related to caring for a child with special needs. For the current sample, the internal consistency for the parent and family problem section was good (Cronbach’s $\alpha = .84$). The internal consistency was lower for pessimism (Cronbach’s $\alpha = .69$), whereas the internal consistency for child characteristics was good (Cronbach’s $\alpha = .72$).

Depression Anxiety Stress Scales. The Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995) is a self-report measure of anxiety, depression, and stress consisting of 42 items. This scale was developed for the purpose of measuring distinct symptoms of anxiety and depression, while keeping in mind the two constructs are dimensional, rather than categorical, clinical states. Items are presented in a scale format that ranges from 0-*did not apply to me at all* to 3-*applied to me very much, or most of the time*.

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Excellent internal consistency for the DASS depression scale (Chronbach's $\alpha = .97$), anxiety scale (Chronbach's $\alpha = .92$), and stress scale (Chronbach's $\alpha = .95$) has been reported in previous research (Antony, Bieling, Cox, Enns, & Swinson, 1998). The DASS has strong convergent and discriminant validity with both the Beck Depression Inventory and the Beck Anxiety Inventory (Antony et al., 1998; Lovibond & Lovibond, 1995). The internal consistency for the stress scale in the current study was excellent (Chronbach's $\alpha = .87$).

Demographic and Diagnostic Form. The parents filled out a demographic and diagnostic form (Appendix D) detailing information about their child's diagnosis, medical history, age, family background, race, socioeconomic status, etc. This form includes extensive diagnostic information that includes a confirmation of a diagnosis of ASD by asking parents about diagnostic classification, age of diagnosis, and professional and affiliated facility that made the diagnosis (i.e., to rule-out parents merely self-reporting that they think the child has the diagnosis). This form also evaluated medication history, current medication type/dosage, family history of ASD diagnosis, and history and details of diagnosis of other psychological/behavioral disorders for the child (if applicable).

Results

Descriptive statistics for the variable statistics in the current study are presented in Table 2. An inspection of the skewness and kurtosis of cognitive functioning, ASD symptom severity, externalizing behavior, and stress among parents indicated no substantial skewness or kurtosis. Thus, all data were used without performing any data transformations.

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Tables 3 and 4 provide the intercorrelations among all variables of interest (with Table 3 indicating variables at both the scale and composite level, and Table 4 indicating variables at the composite level only). As indicated in Table 4, ASD symptom severity was significantly positively correlated with externalizing behaviors, $r = .70, p < .001$, parenting stress, $r = .64, p < .001$, and general stress, $r = .53, p = .01$. Composite IQ was significantly negatively correlated with parenting stress, $r = -.45, p = .02$, and externalizing behaviors were significantly positively correlated with general stress, $r = .43, p = .03$. Although results of the bivariate correlations indicated that externalizing behaviors among children with ASD symptoms predict general stress, the relation is not above and beyond the symptoms of ASD and cognitive functioning level (Table 5). Likewise, the hypothesized interaction between externalizing behaviors and composite IQ in predicting stress was not supported (Table 5). Results indicated that both ASD symptom severity and composite IQ added unique variance in the prediction of stress among parents, even when accounting for the other.

Discussion

The current study examined predictors of stress among parents of children with ASD, particularly how cognitive functioning may moderate the relation between externalizing behavior problems and symptoms of ASD with stress among parents. Hypothesis 1 was that ASD symptoms and child externalizing behaviors would be positively related to parenting stress and general stress among parents, whereas child cognitive functioning would be negatively related to stress among parents. The current study found that cognitive functioning, ASD symptom severity, and externalizing behaviors among children with ASD were all three related to some type of stress among

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their parents. ASD symptom severity and composite IQ were particularly robust predictors, with both adding unique variance in the prediction of stress among parents. This pattern of results is concurrent with the finding by Rao and Beidel (2009) that ASD symptoms increase stress among parents. Peters-Scheffer and colleagues (2012) found that cognitive functioning and stress among parents were not related. However, this study found that when there was evidence of lower cognitive functioning levels, stress among parents was higher.

Hypothesis 2 was that externalizing behaviors among children with ASD would predict parental stress and general stress levels above and beyond the symptoms of ASD and cognitive functioning level. Specifically, the relation between externalizing behavior problems in children with ASD was expected to be positive. However, this study did not find any significance in externalizing behavior problems predicting stress among parents above and beyond the symptoms of ASD. Lecavalier and colleagues (2006) found that children's behavior problems were most associated with stress. However, in this study, it was found that although externalizing behaviors among children with ASD related to general stress in their parents, these behaviors appeared to share much variance with ASD symptoms themselves. Externalizing behaviors did not contribute to the prediction of stress above and beyond symptoms of ASD, and this relation was not moderated by cognitive functioning.

Hypothesis 3 was that IQ would moderate the relation between externalizing behaviors and parental stress and general stress levels after controlling for symptoms of ASD. Specifically, a significant interaction between cognitive and behavioral functioning was expected such that parental stress and general stress levels would be the highest for

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children who have high externalizing behavior problems and lower IQ. However, there were no significant interactions even after controlling for symptoms of ASD. Whereas IQ and externalizing behaviors were each individually related to stress among parents, IQ was not a moderator in the relation between externalizing behaviors and stress among parents.

The correlations found in this study further add to the literature concerning children with ASD and stress among their parents. It shows which specific aspects of ASD contribute to the parent's stress. This could lead to the development of interventions to decrease some of the stress experienced by parents who have children with ASD, so that they can then give more support to their child. Knowing the correlates—and potential causes—of stress among parents of children with ASD can aid researchers in determining the best ways to improve the lives of these families.

Limitations

The greatest limitation of the current study was the relatively low number of participants. To adequately test for correlations and moderations, a larger sample size would be preferable. It is possible that the low sample size decreased the power of the current study to detect true interactions among variables, which may have been detected if there was an increased sample size. Because of recruitment difficulties, it was only possible to test 27 participants at the time that the analyses for the current study were conducted. Therefore, recruitment should continue to gain more participants and further test for significant effects. Clinics, schools, and camps should be contacted to help in recruitment. The study design requires the researcher to meet with the child participant

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for testing. This study cannot be completed fully online due to the need for an IQ test with the children with ASD, which can create a barrier in data collection.

Another limitation of this study was the measurement of cognitive functioning. We determined cognitive functioning levels from a brief intelligence test, and it is possible that cognitive functioning was not measured comprehensively enough to fully assess the impact that cognitive functioning levels have on the stress among parents. If a full intelligence test battery were to be used or other measures were added to determine the participant's cognitive functioning levels, it may provide a more comprehensive picture of the child's functioning and, as such, it may potentially lead to the detection of relations among variables not captured in the current study.

A final limitation of this study was the use of reports from only one parent. An examination of the child's externalizing behaviors from others' perspectives could gain further insight into the relation between externalizing behaviors in children and stress among parents. Obtaining teacher reports and other family members' reports could provide a more comprehensive picture of the child's behaviors. With increased data about the child's externalizing behavior problems, it may be revealed that such behaviors are a significant predictor of stress among parents above and beyond that of ASD symptom severity.

Directions for Future Research

Future research should expand this study with a larger sample size to increase the power to detect true relations and interactions among the variables if such relations and interactions indeed exist. Future studies may want to examine different moderators of the relations among externalizing behavior problems, ASD symptom severity, cognitive

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functioning levels, and stress among parents. Understanding the interactions between these predictors of stress would lead to a greater knowledge of how to work with children with ASD and their families.

Future research on this subject should be done to gather information on how each predictor impacts different types of stress. Researchers should look into different types of stress that parents experience, whether it be generalized family stress, outside stress, or stress due to their child's diagnosis. One could also look at how predictors of stress among parents impact the parent at different stages of the diagnosis. A longitudinal study could be used to determine whether stress levels increase throughout the diagnosis and continued living patterns.

Conclusions

Although not all of the hypotheses for this study were supported, it was determined that cognitive functioning, externalizing behaviors, and ASD symptom severity all relate to some amount of stress among parents. Due to the small sample size, power was limited to detect significant interactions (i.e., moderations). The findings of this study underscore the importance of considering ASD symptom severity and cognitive functioning, in particular, as potential markers of risk for stress among parents with a child with ASD and emphasizes the need to assess externalizing behaviors among this population within a larger context.

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PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Table 1

Sample Characteristics

Child Characteristics	N (%)	Mean (SD)	Child Characteristics	N (%)	Mean (SD)
Age	-	9.74 (2.43)	Composite IQ	-	81.56 (24.47)
7	7 (24.1)	-	Verbal IQ	-	77.14 (21.13)
8	3 (10.3)	-	Nonverbal IQ	-	88.11 (26.94)
9	6 (20.7)	-			
10	4 (13.8)	-	Diagnosis		
11	2 (6.9)	-	Autism/ASD	12 (44.4)	-
12	3 (10.3)	-	Asperger's	4 (14.8)	-
13	2 (6.9)	-	PDD-NOS	9 (33.3)	-
14	1 (3.4)	-	Other	2 (7.4)	-
16	1 (3.4)	-			
Gender					-
Male	20 (74.1)	-	ASD Diagnosis		
Female	7 (25.9)	-	Autistic Disorder	1 (3.7)	
Race			ASD	8 (29.6)	
White	20 (74.1)	-	Not Sure	3 (11.1)	
Black	6 (22.2)	-			
Other	1 (3.7)	-			
Services			ABA	8 (29.6)	
Occ. Th.	20 (74.1)		Early Intervention	19 (70.4)	
Psych. Th.	9 (33.3)		Physical Therapy	7 (29.6)	
Speech	24 (88.9)		Other	5 (18.5)	

PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Table 1 (continued)

Rater Characteristics	<i>N</i> (%)	Rater Characteristics	<i>N</i> (%)
Gender		Rater Education	
Male	0 (0.0)	Junior high school	1 (3.7)
Female	22 (88.0)	High school graduate	1 (3.7)
Race		Some college or specialized training	8 (29.6)
White	20 (74.1)	College/university graduate	13 (48.1)
Black	6 (22.2)	Graduate professional degree	4 (14.8)
Other	1 (3.7)		
Marital Status			
Married	17 (63.0)		
Separated	1 (3.7)		
Divorced	6 (22.2)		
Widowed	1 (3.7)		
Never married/living alone	2 (7.4)		

Note. Psych th. = psychological therapy; occ th. = occupational therapy.

PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Table 2

Descriptive Statistics for Variables of Interest

Variable of Interest	Min	Max	Mean	SD	Skewness	Kurtosis
Composite IQ	40.00	122.00	81.56	24.47	-.51	-.94
ASD Symptom Severity	16.00	109.00	61.44	24.56	-.09	-.25
Conduct Problems	1.00	5.00	2.44	1.12	.24	-.56
Hyperactivity	4.00	12.00	8.85	2.23	-.24	-.62
Externalizing Problems	5.00	16.00	11.30	3.00	-.33	-.71
Family Problems	.00	13.00	4.74	3.96	.26	-1.05
Pessimism	.00	9.00	4.93	2.27	-.58	.50
Child Characteristics	.00	11.00	4.93	3.02	-.23	-.66
Parenting Stress	-1.56	1.19	.00	.86	-.55	-.96
General Stress	.00	34.00	11.60	9.31	.73	-.10

Note. Composite IQ from the Kaufman Brief Intelligence Test, Second Edition (Kaufman & Kaufman, 2004). ASD Symptom Severity from the Children’s Social Behavior Questionnaire (Luteijn, Luteijn, Jackson, Volkmar, & Minderaa, 2000). Conduct Problems, Hyperactivity, and Externalizing Problems are from the Strength and Difficulties Questionnaire (Goodman, 1997). Family Problems, Pessimism, Child Characteristics, and Parenting Stress are from the Parent and Family Problems portion from the Questionnaire on Resources and Stress (short form; Friedrich, Greenberg, & Crnic, 1983). General Stress is from the Depression Anxiety Stress Scales (Lovibond, & Lovibond, 1995).

PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Table 3

Correlations Among Variables of Interest

	1	2	3	4	5	6	7	8
1 Composite IQ	-	-.03	-.09	.06	-.29	-.42*	-.45*	-.26
2 ASD Symptom Severity		-	.54**	.67**	.63**	.46*	.55**	.53**
3 Conduct Problem			-	.55**	.30	.27	.19	.33
4 Hyperactivity				-	.44*	-.03	.24	.41*
5 Family Problems					-	.48*	.70**	.58**
6 Pessimism						-	.64**	.25
7 Child Characteristics							-	.37
8 General Stress								-

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

PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Table 4

Correlations Among Variables of Interest at the Composite Level

	1	2	3	4	5
1 Composite IQ	-	-.3	.01	-.45*	-.26
2 ASD Symptom Severity		-	.70**	.64**	.53**
3 Externalizing Problems			-	.30	.43*
4 Parenting Stress				-	.48*
5 General Stress					-

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

PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

Table 5

Results of Regression Analyses

	Parenting Stress	General Stress
Model 1 (R²)	.59***	.38**
ASD Symptom Severity	.03 (.01)***	.23 (.07)**
Composite IQ	-.02 (.01)**	-.12 (.06) ^a
Model 2 (R²Δ)	.03	.01
ASD Symptom Severity	.03 (.01)***	.23 (.07)**
Composite IQ	-.02 (.01)**	-.12 (.06) ^a
Externalizing Behaviors	-.08 (.05)	.43 (.74)
Model 3 (R²Δ)	.0007	.02
ASD Symptom Severity	.03 (.01)***	.23 (.07)**
Composite IQ	-.02 (.01)**	-.12 (.06) ^a
Externalizing Behaviors	-.08 (.05)	.43 (.74)
IQ x Externalizing Behaviors	-.0003 (.002)	-.02 (.02)

Note. Moderated multiple regression analyses conducted using the PROCESS tool (Hayes, 2013) in SPSS, with all main effect variables centered prior to the creation of the interaction terms.

^atrend, $p < .10$. ** $p < .01$. *** $p < .001$.

Appendix A



INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional.review.board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: R-CH13062703

PROJECT TITLE: Age and IQ as Potential Moderators in the Relation among Endophenotypes and Expressed Behaviors in Children with an Autism Spectrum Disorder

PROJECT TYPE: Renewal of a Previously Approved Project

RESEARCHER(S): Elizabeth Fair

COLLEGE/DIVISION: College of Education and Psychology

DEPARTMENT: Psychology

FUNDING AGENCY/SPONSOR: N/A

IRB COMMITTEE ACTION: Expedited Review Approval

PERIOD OF APPROVAL: 01/08/2015 to 01/07/2016

Lawrence A. Hosman, Ph.D.

Institutional Review Board

PREDICTORS OF PARENTAL STRESS AMONG CHILDREN WITH ASD

UNIVERSITY OF SOUTH ALABAMA

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INSTITUTIONAL REVIEW BOARD
October 23, 2014

Principal Investigator: Hanes Swingle
IRB # and Title: IRB PROTOCOL: 14-191
[831449-1] Age and IQ as Potential Moderators in the Relation among
Endophenotypes and Expressed Behaviors in Children with an Autism Spectrum
Disorder

Status: APPROVED Review Type: Expedited Review
Approval Date: October 10, 2014 Submission Type: New Project
Initial Approval: October 10, 2014 Expiration Date: October 9, 2015
Review Category: Category: 45 CFR 46.110 (7):
Research on individual or group characteristics or behavior
DHHS/FDA Subpart D: 45 CFR 46.404: FDA 50.51 - Research not involving greater than MINIMAL RISK
to children

This panel, operating under the authority of the DHHS Office for Human Research and Protection, assurance number FWA 00001602, has reviewed the submitted materials for the following:

- 1. Protection of the rights and the welfare of human subjects involved.*
- 2. The methods used to secure and the appropriateness of informed consent.*
- 3. The risk and potential benefits to the subject.*

The regulations require that the investigator not initiate any changes in the research without prior IRB approval, except where necessary to eliminate immediate hazards to the human subjects, and that **all problems involving risks and adverse events be reported to the IRB immediately!**

Subsequent supporting documents that have been approved will be stamped with an IRB approval and expiration date (if applicable) on every page. Copies of the supporting documents must be utilized with the current IRB approval stamp unless consent has been waived.

Notes:

Appendix B

Parent Consent Form



AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT

Consent is hereby given to participate in the study titled: Age and IQ as Potential Moderators in the Relation among Endophenotypes and Expressed Behaviors in Children with an Autism Spectrum Disorder

Purpose: The primary goal of this study is to determine how specific endophenotypes are related to specific expressed behaviors that are commonly found in children with an ASD. Determining which particular endophenotypes are associated with these behaviors could lead to a better understanding of the origin of these behaviors in children with an ASD.

Description of Study: Children and adolescents will be asked to complete three brief neuropsychological tasks administered via a computer program, one paper-and-pencil neuropsychological task, and one facial identification computer task. Children will also be administered a brief test of intelligence. Testing with each child should take approximately 90 to 120 minutes. During this time, a parent or guardian will be asked to complete several questionnaires including a demographic and diagnostic form, some measures assessing their children's behaviors and emotions, and some self-report measures. These questionnaires should take no more than 60 minutes to complete.

Benefits: There are no direct benefits for participating in this study. However, the results of this research may contribute to a better understanding of neuropsychological constructs associated with various expressed behaviors in children with an ASD. Knowing this information may then aid in planning treatments that can be better tailored to particular children with an ASD.

Risks: There is little risk for participants completing the study, although some parents may find it mildly distressing to report some behavior problems of their children. It is also possible that despite offering breaks throughout the testing session, children or parents may become fatigued or frustrated during the testing session. If participants do in fact become too fatigued or frustrated to complete the testing session or wish to stop testing for any reason, they will be free to do so with no penalty or can choose to come back at a later date to complete testing.

Confidentiality: All efforts will be made to protect participants' privacy and to maintain the confidentiality of the information acquired through this project. All data will be coded with a non-identifying number. Once the participants have completed the measures,

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consent forms will be separated from the responses, and questionnaire responses will be stored in a locked filing cabinet in the research lab separate from identifying information.

Subject's Assurance: Whereas no assurance can be made concerning results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and subjects may withdraw from this study at any time without penalty, prejudice, or loss of benefits. Questions concerning the research should be directed to Elizabeth Fair (elizabeth.c.fair@eagles.usm.edu) working under the supervision of Dr. Tammy Barry (601-266-5514). This project and consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A hard copy of this form will be given to the participant in the lab setting.

Please sign if you consent to participate in the study:

Printed name date

Signature

Witness printed name date

Witness name

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The lab would like to keep a record of contact information to inquire about participation in future studies. If you would like to be included in the database of research participants and to be contacted to receive information about future studies, please provide your contact information below. This information will NOT be stored with your responses to the questions for the current study.

I would like to be contacted about future studies in the lab for which I or my child may qualify.

Yes _____ No _____

If yes:

E-mail Address: _____

Telephone Number: _____

Mailing address: _____

Street address: _____

City, State, Zip code: _____

Appendix C
Child and Adolescent Assent



THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

AGREEMENT TO PARTICIPATE IN RESEARCH PROJECT

We are doing a project to learn about how thinking and processing styles in children and adolescents with an Autism Spectrum Disorder may relate to day-to-day behaviors.

If you would like to help us with this project, you will be asked to complete some computer tasks that look at the ways you think about and pay attention to problems as well as ways you identify emotions. You will also be asked to answer some questions about words and pictures and solve certain problems. Finally, you will be asked to find some hidden shapes in a paper-and-pencil task. Helping out should take about an hour and a half to two hours. When we are finished, you can ask your parents to contact us at any time if you have questions about this study.

There are two important things to remember. First, you are a **volunteer**, which means you are helping us, but you do not have to unless you want to help. If you decide at any time not to finish, you can tell your parents and stop completing the problems, questions, or computer games. Second, the information that you give will be **private**. All of the information that we get will be used in research, but your name and other information that would let people know it is about you will not be used. Being in the study is up to you, and no one will be upset if you don't start the study or if you change your mind later.

If you agree to participate, please write your name on this line:

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Appendix D
Demographic and Diagnostic Form

Child or Adolescent Participant Information:

Child's Age: _____ Child's Date of Birth: (Month/Day/Year) ____/____/____

Child's Gender: Female ___ Male ___ Child's First and Last Initials: _____

Child's Race: White ___ Black ___ Hispanic ___ Asian ___ Other _____

What diagnosis was given to your child? Autism/Autism Spectrum Disorder _____ (if checked, please specify whether your child received a specific diagnosis of Autistic Disorder or whether your child received a diagnosis of an Autism Spectrum Disorder)

Asperger's _____ PDD-NOS _____ Other (Please specify) _____

What age was your child when you first noticed symptoms? _____

How old was your child when he/she was diagnosed? _____

Who diagnosed your child? Psychologist ___ Pediatrician ___ Neurologist ___

Psychiatrist ___ Other (Please specify) _____

Has your child received any other diagnoses? (Please select all diagnoses received)
___ ADHD ___ Anxiety Disorder ___ Conduct Disorder ___ Depression ___ Learning Disability

___ Mental Retardation/Intellectual Disability ___ Oppositional Defiant Disorder

___ Other _____

Please rate your child's overall cognitive functioning level:

___ Well Below Average ___ Below Average ___ Average ___ Above Average

___ Well Above Average

What is your child's current school placement? (Please specify at least the type of classroom, type of school and if your child has an individual aide.)

What services has your child received? (Please check all that apply)

___ Applied Behavioral Analysis (ABA) ___ Early Intervention Services ___ Physical Therapy

___ Occupational Therapy ___ Psychological Treatment ___ Speech Therapy

___ Other (Please Specify) _____

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Is your child currently on any medications? (If so, please list each medication and dosage received)

Does your child have any siblings? ____ yes ____ no
If yes, please record their age, and under relation, please indicate whether they are a full-sibling, a half-sibling, or a step-sibling. Also, please indicate whether or not the sibling lives in the same household as the child.

Age household?	Relation	Lives in same

Adult Participant Information

Your Gender: Female ____ Male ____ Your Age: ____ years

Your relation to the child participant: _____

Location: (City, State) _____, _____

Your Race: White ____ Black ____ Hispanic ____ Asian ____ Other ____

Marital Status: Married ____ Separated ____ Divorced ____ Widowed ____
Never Married/Living Alone ____ Never Married/Living with Someone ____

Education: What is the highest level of education completed by:

Yourself ____ 6th grade or less ____ Junior high school (7th, 8th, 9th grade) ____ Some high school (10th, 11th grade)	Your Spouse/Significant Other ____ 6th grade or less ____ Junior high school (7th, 8th, 9th grade) ____ Some high school (10th,11th grade)
---	---

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- | | |
|---|---|
| <input type="checkbox"/> High school graduate | <input type="checkbox"/> High school graduate |
| <input type="checkbox"/> Some college (at least 1 year) or specialized training | <input type="checkbox"/> Some college (at least 1 year) or specialized training |
| <input type="checkbox"/> College/university graduate (4-year degree) | <input type="checkbox"/> College/university graduate (4-year degree) |
| <input type="checkbox"/> Graduate professional degree (Master's, Doctorate) | <input type="checkbox"/> Graduate professional degree (Master's, Doctorate) |

Occupation: Please provide your job title or position, NOT the just name of your employer. For example, if you are a teacher at Lee High School, please state "high school teacher". If you are retired, please state your prior occupation and note that you are currently retired. If you do not work outside the home, state "unemployed."

What is your occupation? _____

(Please be specific)

What is your spouse's occupation? _____

(Please be specific)

Income: What is the total annual income of your household? (Combine the income of all people living in your house.)

- \$ 0 -- \$ 4,999 \$15,000 -- \$24,999 \$50,000 -- \$74,999
 \$ 5,000 -- \$ 9,999 \$25,000 -- \$34,999 \$75,000 -- \$99,999
 \$10,000 -- \$14,999 \$35,000 -- \$49,999 \$100,000 and above

How many total people live in your household?

- 1 2 3 4 5 6 7 8 9 10 >10

Please list who lives in the household:

Age Gender Relation to Child** Any Diagnoses (If so, please specify)

** Please be specific in describing the relation to child; self, brother, mother, father, step-father, stepbrother, half-brother, adopted sister, grandmother, aunt, cousin, etc.