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The Use of Appraisal by Parents of Children with Autism Spectrum Disorder

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This is to certify that the doctoral dissertation by

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Abstract

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MS, NOVA Southeastern University, 2009

BS, SUNY Stony Brook University, 1995

Dissertation Submitted in Partial Fulfillment

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Abstract

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects 1% of the world population and places caregivers at an increased risk of stress. Researchers have begun to explore coping mechanisms such as appraisal to understand how parents and caregivers of people with ASD cope with parental stress, but their results have been inconsistent. There was a gap in existing literature regarding the influence of ASD symptoms on the relationship between use of appraisal (reframing negative concepts into a more favorable light), and parental stress. The ABCX model of family adaptation was used to understand how coping skills might protect against parental stress and to determine whether symptoms of ASD mediate the relationship between stress and coping. Parents of children with a diagnosis of ASD aged 3–12 years (N = 90) were recruited via social media, forums, and flyers handed out at treatment facilities in the United States. Parental stress, coping mechanisms, and symptoms of ASD were measured using valid and reliable quantitative measures via anonymous online surveys. Multiple linear regression analysis indicated significant moderation by the ASD symptom of stereotypies and overall symptom severity: Use of appraisal by parents was associated with increased parental stress as each of those variables increased. The results were inconsistent with some existing findings and supported others, demonstrating that the relationship between stress and coping in these parents is complicated. The findings have the potential to create positive social change through development of education or treatment that reduces treatment costs and improves of the quality of life of parents caring for children with ASD.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that affects one in 68 people, or 1% of the world's population (Autism Society, 2016). The prevalence of ASD grew by 119.4 % between 2004 and 2010 (Autism Society, 2016), and has continued to increase (Damiano et al., 2014; Leigh & Du, 2015). ASD is a spectrum disorder typically diagnosed in early childhood that continues throughout a person's life. ASD affects how a person interacts with others, communicates, and learns. The nature of the disorder, the cost of care, and the lifelong burden of care mean that a diagnosis of ASD in a child is associated with higher levels of parental stress than any other neurodevelopmental disorder (Costa et al., 2017; Krakovich et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014; Rayan & Ahmad, 2017).

ASD is a social communication disorder (Lim & Chong, 2017; Øien & Eisemann, 2016) marked by deficits in language, social interaction, and stereotypic repetitive behavior (American Psychiatric Association [APA], 2013; Leigh & Du, 2015). The diagnosis of ASD applies to a wide range of individuals with a variety of degrees of impairment (Leigh & Du, 2015). An ASD diagnosis reflects this range of disability through a severity rating, which ranges from 1 to 3 (APA, 2013). Features associated with a diagnosis of ASD correspond to impairment of functional life skills. This impairment can limit independence (Leigh & Du, 2015; C. Lim, 2015; McStay, Dissanayake, et al., 2014), impede development of social relationships (Mayes et al., 2014), and place substantial emotional, physical, and economic burdens on the parents or guardians who provide care (Elder et al., 2017; Krakovich et al., 2016).

Researchers have consistently identified a relationship between having a child with an ASD diagnosis and parental stress (Costa et al., 2017; Craig et al., 2016; Krakovich et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014). Attempts to investigate how the symptoms of a child's ASD link to stress in the child's parents (e.g., Agazzi et al., 2017; Costa et al., 2017; Craig et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014) have resulted in largely negative or inconsistent findings. Continued research is needed to develop programs and treatments to help parents of children with ASD cope with and care for their children.

Researchers have not isolated variables that link a diagnosis of ASD directly to parental stress but have turned their attention to identifying factors that protect against stress, including coping skills (e.g., Agazzi et al., 2017; Costa et al., 2017; Craig et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014). Although stress in parents of children with ASD is a significant problem, it is not a universal problem; some parents have reported relatively low levels of stress, and others have reported higher levels of stress (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). There may, therefore, be variables that protect some parents against stressors. The use of appraisal as a coping tool is one strategy that has shown some promise as a way to prevent stress among parents of children with ASD (Rayan & Ahmad, 2017). A person applying appraisal as a coping method cognitively restructures an adverse event and reframes it in a positive light (Lim & Chong, 2017).

Rayan and Ahmad (2017) studied the association between appraisal and parental stress in the parents of children with ASD and found a significant relationship, although Lim and Chong (2017) and Costa et al. (2017) found no relationship between these

variables. Lim and Chong (2017) pointed out that their sample of children, whose parents were the focus of study, had low variability in symptom presentation and level of impairment. They suggested that efficacy of appraisal use is linked to symptom presentation, but they could not examine this relationship due to the heterogeneity of their sample. Symptoms associated with ASD are unique and may moderate the relationship between parental stress and use of appraisal to cope (Lim & Chong, 2017). There is a need for research focusing on the possible influence of ASD symptom severity on the relationship between appraisal use and parental stress (Lim & Chong, 2017), rather than on a direct link between ASD symptoms and parental stress.

Costa et al. (2017) examined the influence of ASD symptoms on the use of appraisal and parental stress and found no relationship among these variables. However, their study had methodological limitations that directly impacted their findings. For example, the authors found that parental well-being was related to the use of appraisal; however, the measure for parental well-being they used correlated significantly with the measure they used for appraisal, which suggests that the constructs measured by these tools overlapped. The authors also measured stress using heart rate, which is inconsistent with measures of stress used in other studies. And the authors assessed ASD symptoms using the Autism Spectrum Quotient Questionnaire for Children (AQ-Child; Auyeung et al., 2008), which does not measure features of ASD as outlined within the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; APA, 2013). Given the inconsistent findings reviewed above, it is important that further work is based on reliable and consistent measures of ASD symptoms and parental coping and stress.

More information is needed to understand the relationship between the use of appraisal by parents of children with ASD and parental stress (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). The nature of the relationship is likely complex and may depend on other factors that have yet to be identified.

In this study, I aimed to extend the research of Lim and Chong (2017) by examining ASD diagnostic traits as potential moderators that may strengthen or impede the relationship between appraisal and stress in parents. I extended the research of Costa et al. (2017) by measuring subjective reports of parental stress rather than physiological symptoms of stress and by using a measure of ASD symptoms aligned with the *DSM-5* diagnostic criteria (APA, 2013). The findings of this study may lead to interventions to help reduce parental stress, improve the quality of life for families caring for individuals with ASD, and reduce treatment costs and the financial burden shared by society as a result of ASD treatment.

In this chapter, I present an overview of ASD, including its symptoms, diagnostic features, and relationship to parental stress. I begin by presenting background information from previous studies of how to reduce stress in parents of children with ASD, and I outline gaps that remain in the literature. I introduce the problem statement, the purpose of the study, and the research questions addressed. I then explain the theoretical framework underpinning the research, define key terms, and outline the assumptions, scope, delimitations, and limitations of the study. I conclude the chapter by discussing the social significance of the research and its implications for change.

Background to the Study

Parental Stress Research

Researchers have thoroughly documented the significant relationship between having a child with an ASD diagnosis and parental stress (Costa et al., 2017; Craig et al., 2016; Krakovich et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014). Researchers investigating the nature of this relationship have produced a variety of sometimes conflicting findings, including identification of a possible relationship between the symptoms of ASD and severity of parental stress. McStay, Dissanayake, et al. (2014) failed to find a significant link between ASD symptom severity and parental stress, but Agazzi et al. (2017) and Brei et al. (2015) found symptom severity to be a key predictor of parental stress. Other researchers have investigated variables such as child behavior and IQ (Craig et al., 2016) or socioeconomic status and free time (Krakovich et al., 2016; Lim & Chong, 2017) as possible predictors of stress in parents with children with ASD. This suggests there may be a link between parental stress and a variable inherent in having a child with ASD, yet researchers have not yet identified specific predictors for this relationship (Craig et al., 2016; McStay, Dissanayake, et al., 2014).

Appraisal Research

The use of appraisal may be effective at protecting some parents of children with ASD from stress (Costa et al., 2017; Lim & Chong, 2017; Manning et al., 2011; Paynter et al., 2013; Rayan & Ahmad, 2017). Manning et al. (2011) found that use of appraisal was significantly related to lower parental distress in the parents of children with ASD. Rayan and Ahmad (2017) also reported a negative correlation between appraisal use and

parental stress. Other researchers, however, have failed to identify a relationship between these variables (e.g., Costa et al., 2017; Lim & Chong, 2017).

Manning et al. (2011) suggested that the link between appraisal and stress is indirect and based on interaction among several variables. Costa et al. (2017), Lim and Chong (2017), and Rayan and Ahmad (2017) have all examined the conditions under which appraisal is effective when used by parents of children with ASD; their results are inconsistent. Researchers have also examined the impact of child-based characteristics on the efficacy of appraisal at reducing parental stress (Costa et al., 2017; Craig et al., 2016; Lim & Chong, 2017; Minjarez et al., 2013), again with inconclusive findings. ASD features present unique challenges to parents that may impact coping, because the ability to communicate or self-regulate emotions and behavior varies significantly among children with this diagnosis. Lim and Chong suggested that future research should include participant diagnostic variables, such as symptoms or severity of disability, to reduce some of the ambiguity.

Problem Statement

Although some researchers have linked use of appraisal to reduced stress in parents of children with ASD (Costa et al., 2017; Lim & Chong, 2017), findings regarding this link have been largely inconclusive. Symptoms associated with ASD are unique and may influence the relationship between parental stress and use of appraisal to cope (Lim & Chong, 2017). To date, researchers have conducted only three studies of the relationship between ASD features, use of appraisal, and parental stress, with inconsistent findings. Lim and Chong (2017) suggested that further research with this focus was needed.

The problem I investigated in this study was lack of knowledge about whether (and to what extent) features of ASD impact the use of parental appraisal as a way to cope with parental stress. This study differed from previous studies because it involved assessment of features of ASD aligned with current diagnostic criteria as outlined with the current DSM-5 (APA, 2013) and use of a reliable and valid self-report measure for parental stress, rather than measurement of physiological symptoms of stress, which addressed methodological limitations of previous studies.

Purpose of the Study

The purpose of this quantitative survey study was to examine whether symptoms of ASD moderate the relationship between appraisal use and parental stress in parents of children aged 3–12 years diagnosed with ASD. The dependent variable was the level of stress as reported on the Parent Distress (PD) subscale of the Parent Stress Inventory-Short Form (PSI-4-SF; Abidin, 2012). The independent variable was parental use of appraisal as a coping mechanism, measured through administration of the Reappraisal subscale of the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Features of ASD were potential moderating variables, assessed using the Checklist for Autism Spectrum Disorder-Short Form (CASD-SF; Mayes, 2018). The features of ASD measured by the CASD-SF (Mayes, 2018) include limited reciprocal interaction, narrow and unusual interests, resistance to change, stereotypical behavior, sensory concerns, and atypical vocalizations. Parents completed the questionnaires anonymously through an online survey site.

Research Questions and Hypotheses

The following seven research questions, and their associated alternative and null hypotheses, guided the study.

Research Question 1 (RQ1): Do problems with reciprocal interaction in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$1): Problems with reciprocal interaction (as assessed by a positive score on Item 1 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD have no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis ($H_1$1): Problems with reciprocal interaction (as assessed by a positive score on Item 1 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderate the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Research Question 2 (RQ2): Does a narrow or unusual range of interests and play behaviors in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis (H_0 2): A narrow or unusual range of interests and play behaviors (as assessed by the score on Item 2 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as

assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis ($H_1$2): A narrow or unusual range of interests and play behaviors (as assessed by the score on Item 2 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderates the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Research Question 3 (RQ3): Does distress with change in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$3): Distress with change (as assessed by the score on Item 3 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis ($H_1$3): Distress with change (as assessed by the score on Item 3 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderates the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 4 (*RQ4): Do stereotypies in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$4): Stereotypies (as assessed by the score on Item 4 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD have no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 4($H_1$4): Stereotypies (as assessed by the score on Item 4 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderate the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 5 (*RQ5): Do sensory disturbances in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis 5 ($H_0$5): Sensory disturbances (as assessed by the score on Item 5 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD have no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 5 ($H_1$5): Sensory disturbances (as assessed by the score on Item 5 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD

significantly moderate the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 6 (*RQ6): Does the severity of atypical, repetitive vocalization or speech in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis 6 ($H_0$6): Atypical vocalization or speech (as assessed by the score on Item 6 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 6 ($H_1$6): Atypical, repetitive vocalization or speech (as assessed by the score on Item 6 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderates the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 7 (*RQ7): Does the severity of overall symptoms of children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis 7 ($H_0$7): Overall symptom severity (as assessed by total score on the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale

of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 7 ($H_1$7): Overall symptom severity (as assessed by the total score on the CASD-SF; Mayes, 2018) in children aged 3–12 years has a significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Theoretical Foundation

I used Lazarus and Folkman's (1984) model of stress and coping based on cognitive appraisal and attribution of stressful events to guide my understanding of the relationship between coping and parental stress. According to this model, an individual experiences stress when they believe that a situation exceeds their coping resources (Folkman, 1984). Another theoretical model I used to clarify the role of appraisal in reduction of stress of parents of children with ASD was Hill's ABCX family crisis framework (Costa et al., 2017). The ABCX model (Krakovich et al., 2016) and the double ABCX model (a modified version of the ABCX model; Paynter et al., 2013) are theoretical frameworks for examining the interplay of stressors, external variables, internal variables, and outcomes as perceived by an individual (Costa et al., 2017; Krakovich et al., 2016; McStay, Trembath, & Dissanayake, 2014; Paynter et al., 2013). These models help researchers understand how individuals interpret environmental events and how such events can lead to stress (Costa et al., 2017; Krakovich et al., 2016; McStay, Dissanayake, et al., 2014; Paynter et al., 2013).

The ABCX model includes an event, personal characteristics, environmental aspects, and coping methods employed by an individual and supports an interpretation. These models guided my understanding of which variables may protect against stress, increase resilience, or exacerbate stress in parents raising children with ASD (Costa et al., 2017; Manning et al., 2011; McStay, Dissanayake, et al., 2014; Paynter et al., 2013). In this study, the ABCX model guided examination of the interplay between a stressor (diagnosis, or A), child traits (ASD symptoms, or B), parent variables (coping and reappraisal, or C), and the reported level of stress or adaptation (X).

I assumed that parents' perceptions of their children's ASD symptoms may deplete their resources, which would explain how a parent's use of appraisal could mitigate their stress. Hill's ABCX model guided stepwise hierarchical multiple regression analysis. Understanding the variables involved in a stressful event and the unique contribution of each relevant variable creates a formula for the understanding and reduction of that stressful event.

Nature of the Study

This quantitative survey study involved exploration of the impact of symptoms of children aged 3–12 years with ASD on the relationship between their parents' use of appraisal as a coping skill and parental stress. Parents of children with ASD were recruited through websites associated with ASD, including websites of parent support groups, community resources, and applied behavior analysis (ABA) treatment providers in various locations throughout the United States. Three measures were administered to participants anonymously through an online survey platform. The CASD-SF (Mayes, 2018) measured intensity of diagnostic symptoms of participating parents' children with

ASD. The Reappraisal subscale of the ERQ (Gross & John, 2003) measured participating parents' use of appraisal. The PD subscale of the PSI-4-SF (Abidin, 1995) measured participating parents' parental stress.

After collecting the data, I applied hierarchical multiple regression to determine whether there was a significant relationship between appraisal use and stress in parents of children with ASD. Because I found a significant relationship, I completed stepwise multiple regression analysis to determine the variance explained by the ASD diagnostic criteria, as measured by the CASD-SF (Mayes, 2018).

Definitions

Appraisal: A coping method that requires a person to cognitively restructure an adverse event and reframe it in a positive light (Lim & Chong, 2017).

Atypical, repetitive vocalization or speech: A pattern of speech uncommon in typically developing children, examples of which include repeating dialogue from shows, excessive repetition of unusual sounds, and sporadic language production (Mayes, 2018).

Autism Spectrum Disorder: A range of neuropsychological disorders linked to deficits in social, emotional, behavioral, and communication behavior. Diagnosis is established by criteria delineated in the *DSM-5* (APA, 2013).

Distress with change: Difficulties with transitions and changes in routine and the need for sameness (Mayes, 2018).

Limited reciprocal interactions: Irregular social interactions, such as poor eye contact, lack of sharing or awareness, and absorption with personal interests (Mayes, 2018).

Narrow or unusual range of interests and play behaviors: Preoccupation with, and fixation on, particular items and topics of interest.

Parental stress: A parent or full-time caregiver's identification with positive or negative statements related to parenting and stress (Abidin, 1995).

Sensory disturbance: Atypical sensory behavior, such as an increase in desire for specific types of motion; hypersensitivity to sound, smell, or sensation; avoidance of crowds; atypical sensory exploration, including mouthing and smelling objects; high tolerance for pain; problems with sleep or eating; and tactile defensiveness (Mayes, 2018).

Severity of overall symptoms: A score on the Checklist for Autism Spectrum Disorder (CASD; Mayes, 2012); a high score reflects a high degree of ASD symptomology.

Stereotypies: Repetitive and unusual movements, such as hand flapping, rocking, or spinning (Mayes, 2018).

Assumptions

This study relied on several important assumptions. I assumed that only parents or full-time caregivers of children diagnosed with ASD would participate. I also assumed that participants would understand the questionnaire items and respond truthfully to the best of their ability and that their children's ASD diagnoses were accurate. The measures used in this research have good reliability and validity (Abidin, 1995; Gross & John, 2003; Mayes, 2018).

Scope and Delimitations

The scope of this study consisted of parents of children aged 3–12 years diagnosed with ASD. Parents within the scope of the study could understand written English, were computer literate, and engaged with social media. The study was also likely to reach parents interested in connecting with other parents raising children with ASD. Recruitment had the potential to include parents within the United States and Canada but was unlikely to include participants outside these countries.

The findings are therefore generalizable to this group in this location, but generalizability is more limited to parents who are not computer literate, who are not affiliated with support or resource groups, or who do not seek online support or connections. Because the surveys were provided in English only, generalizability of the findings is also limited to individuals who read and understand English.

Limitations

This study had several limitations. The results of the study are specific to parents or full-time caregivers of children aged 3–12 years diagnosed of ASD and are not generalizable to other populations. The study did not include formal diagnostic testing; therefore, the findings are generalizable only to other people who score similarly on the surveys. It was impractical to screen participants to verify their children's ASD diagnoses. Participants provided data through self-report prescriptive questionnaires, which reduced the breadth and depth of information gathered. The study's quantitative design prevented the collection of detailed narrative information, which a qualitative design would have made possible.

Significance of the Study

A parent's affect impacts their child's behavior, and child vice versa (Al-Khalaf et al., 2014; Craig et al., 2016; Dababnah & Parish, 2016; Schertz et al., 2016). Changing one therefore changes the other in turn. Improvements in knowledge about parental stress and how it relates to coping and ASD symptoms may result in treatments that improve the functioning of children (Dardas & Ahmad, 2014). Thus, the findings of this study have the potential to impact both children with ASD diagnoses and their families. The results of this study may also benefit practitioners working with families affected by ASD by guiding their service provision (Dardas & Ahmad, 2014; Schertz et al., 2016). Practitioners may be able to use information from the findings to understand how to help parents of children with ASD use appraisal in situations where it can effectively reduce stress (Lim & Chong, 2017; Rayan & Ahmad, 2017). Understanding whether diagnostic features of a child with ASD are associated with appraisal efficacy can also guide practitioner teaching models (Lim & Chong, 2017; Rayan & Ahmad, 2017).

Treatment recommendations derived from the study findings for parents of children with ASD could also have social implications. Treatment of ASD has been placing an extraordinary financial burden on society. In 2014 Damiano et al., 2014 report the cost per individual in the United States as $2,400,000, and researchers have estimated the total annual financial burden at between $241,000,000,000 (Damiano et al., 2014) and $268,000,000,000 (Leigh & Du, 2015). Leigh and Du (2015) projected the cost in the United States to increase to $461,000,000,000 by 2025, in tandem with prevalence. Research leading to improved mental health of the parents of children with ASD can benefit society by increasing the productivity of the parents and the ability of the children

to function. Identifying ways to develop parents' coping strategies may improve parents' well-being, improve outcomes for children, provide treatment options to health care professionals, and reduce the cost of ASD to society (Schertz et al., 2016).

Summary

ASD affects many people worldwide, including not just individuals diagnosed with the disorder but also their families and caregivers. Leigh and Du (2015) predicted the prevalence of ASD and the financial burden associated with it to increase through at least 2025. Diagnosis of ASD in children is associated with stress in the parents of those children, and it seems prudent to identify traits protective against stress in these parents, such as coping skills (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017).

My goal for this quantitative survey study was to identify features of children's ASD linked to use of appraisal by their parents to reduce parental stress. Professionals can use symptom-specific information from the findings to design interventions that reduce parental stress. Reduction of parental stress through effective interventions may improve the quality of life for the 1% of children diagnosed with ASD and their families, and such interventions may also and reduce the financial burden on society through health care and education.

Chapter 2: Literature Review

Appraisal is a coping skill linked to reduced stress in parents of children with ASD and may therefore help parents cope with stressors related to parenting a child with ASD (Pozo et al., 2014). To date, researchers have conducted only three studies on this topic (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). This chapter includes an in-depth review of these studies. The researchers responsible for these studies have recommended further investigation of the relationship between use of appraisal and parental stress because their findings have been inconsistent (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). These findings may be related to traits unique to a diagnosis of ASD (Costa et al., 2017; Lim & Chong, 2017). Lim and Chong (2017) recommended further research to identify the conditions under which appraisal use lowers stress in parents of children with ASD. The purpose of this study was to examine whether symptoms of ASD moderate the relationship between the use of appraisal and parental stress in parents of children aged 3–12 years diagnosed with ASD.

Parenting stress is a greater concern for parents of children with ASD than for most other parents. Something about a diagnosis of ASD leads to greater parental stress than that reported by parents of neurotypical children and parents of children with other diagnoses (Costa et al., 2017; Krakovich et al., 2016; McStay, Dissanayake, et al., 2014; Rayan & Ahmad, 2017). Researchers have established a link between appraisal use and reduction of parental stress but have not consistently demonstrated this link for parents of children with ASD (e.g., Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). The contradictory findings of these authors need further investigation.

Researchers have examined variables associated with a diagnosis of ASD that may moderate the efficacy of appraisal when used by parents to cope; those researchers found that demographics such as the age or gender of the parents or children do not moderate the effects of appraisal on parental stress (Costa et al., 2017; Lim & Chong, 2017). Further study is needed to investigate which factors moderate this relationship, and Lim and Chong (2017) indicated which variables to investigate. Through this study, I sought to build on their work by focusing on the symptoms of ASD as potential moderators between appraisal use and coping in the parents of children with ASD.

Researchers have been increasingly focusing on understanding the link between ASD and parents' reports of stress to guide the design of effective interventions for these parents (Brei et al., 2015; Rayan & Ahmad, 2017). Researchers have explored the possible roles of symptom severity (McStay, Dissanayake, et al., 2014), IQ (Craig et al., 2016), maladaptive behavior (Pozo et al., 2014), and age of the parent or child (Lim & Chong, 2017), but their results have been inconsistent. Costa et al. (2017), Manning et al. (2011), and Pozo et al. (2014) suggested that the link between ASD and parental stress may be based on an interaction effect across multiple variables common to parents of children with ASD. The link between parental stress and ASD symptoms may not be reducible to the effects of a single variable but may instead derive from the interaction of multiple variables.

Researchers have relied on a variety of definitions of appraisal, assessments of ASD symptoms, and measures of parental stress, which possibly accounts for some of the inconsistencies among their findings. As part of reviewing existing literature, I aimed to clarify the definitions of the variables and align the measures with those definitions. To

date, no published researchers have explored the potential role of specific ASD symptoms with a measure closely aligned with the *DSM-5* variables.

In this chapter, I outline the search terms used to conduct the literature review. I review the cognitive appraisal theories and the ABCX family crisis framework and describe how these theories guide understanding of stress and mitigation of stress through the interaction between a child with ASH, the features of the child's ASD, and use of appraisal by the child's parent. In addition, I summarize research that has contributed to understanding of the variables used in this study and highlight gaps in existing literature.

Literature Search Strategy

The literature search included relevant databases, such as PsycINFO, PsycARTICLES, Walden Dissertations, the Centers for Disease Control and Prevention (CDC), Education Source, and Medline with Full Text. The searches targeted seminal work on stress and coping, such as that by Lazarus and Folkman (1984), as well studies published between 2010 and 2021. The primary sources reviewed included peer-reviewed articles selected from scholarly sources and published between 2011 and 2021. A few older articles were included to establish the context of past research on some topics.

The terms used to search the databases included *appraisal, reappraisal, autism, autism spectrum disorder, ASD, parent stress, coping," parent coping, ABCX model, double ABCX model,* and *quality of life.* I also accessed scholarly websites addressing ASD, such as those of the CDC and the Autism Society, and relevant books, such as the *DSM-5*.

Lazarus and Folman's and Hills's Theoretical Frameworks

Researchers investigating parental stress related to caring for a child with ASD have focused on establishing a link between stress variables and the parent–child relationship (N. O. Davis & Carter, 2008; Øien & Eisemann, 2016; Pozo et al., 2014). These researchers have used Lazarus and Folkman's (1984) model of stress and coping to understand the relationship between coping and parental stress. According to this model, an individual feels stress when they believe the demands of a situation exceed their resources for coping (Lazarus & Folkman, 1984).

Hill, considered the father of family stress models, studied stress reactions in people affected by war in 1949 and identified four variables involved in a family's response to an event as either stressed or nonstressed (free from stress; Weber, 2011). The four variables were a crisis or event (A), family resources available to deal with the event (B), an interpretation of the event (C), and a stressed or nonstressed response to the event (X; Hill, 1958). According to Hill (1958), a crisis occurs when a family experiences a novel and unexpected event for which they are unprepared. Resources reflect the skills the family has to navigate the crisis (Hill, 1958). The family's interpretation of the event reflects their appraisal of it, which can be positive or negative (Hill, 1958). The response to the event, as either stress or nonstress, reflects individual family members' identification with stress indicators (Hill, 1958). The main assumption of the ABCX model is that the best way to understand stress is to consider the interplay among multiple variables, including events and personal characteristics associated with a stressor (Weber, 2011). Hill's early research served as a model with which practitioners could understand

why some people experience stress in a given situation while others in similar situations do not.

Researchers have used McCubbin and Patterson's double ABCX model of family adaptation to examine potential interaction effects among ASD diagnostic features, parental coping styles, and parental reports of stress. McCubbin and Patterson (1983) presented the double ABCX model, which expanded Hill's original ABCX model. The double ABCX model reflects compounded crisis experienced through the passage of time (Weber, 2011). Initially, the ABCX and double ABCX models guided understanding of the differences experienced by families affected by wartime events (Weber, 2011). However, these models are applicable to other family crises as well. For example, researchers have begun to use the model to understand the stress related experiences of families caring for children diagnosed with ASD (Manning et al., 2011; McStay, Dissanayake, et al., 2014; Paynter et al., 2013). I used the ABCX model in this study to explain how aspects of an ASD diagnosis can contribute to parental stress through an analysis of interplay between the crisis (ASD diagnosis), parental resources (coping skills), perceptions of the diagnosis (appraisals), and experience of stress. Understanding how ASD diagnostic traits and parental coping styles interact to produce stress could inform on treatments designed to improve family outcomes (Costa et al., 2017; Manning et al., 2011; McStay, Dissanayake, et al., 2014; Paynter et al., 2013).

The ABCX model supports the notion that stress is often the result of an interplay among multiple variables rather than the results of any one variable. The theory presented by Hill (1958) supports the supposition that the interplay between specific ASD diagnostic criteria and appraisal use influences parental stress. In contrast, the coping

model of Lazarus and Folkman (1984) emphasizes the importance of having effective coping skills in the first place. Researchers have begun to examine the phenomenon of parental stress and ASD through the multifaceted lens offered by the ABCX model (Manning et al., 2011; McStay, Dissanayake, et al., 2014; Paynter et al., 2013).

ASD Presentation and Parental Stress

ASD is considered a spectrum disorder because its presentation varies from person to person with respect to expression of features and intensity of symptoms (APA, 2013). One person may present with mild social differences, another may display restricted interests, and yet another may exhibit both those symptoms in addition to extensive repetitive behavior. The presentation of ASD features varies from person to person (C. Lim, 2015), as does the impact on the families of those with ASD. Regardless of the diversity of symptom presentation, parents of children diagnosed with ASD routinely report higher stress levels than those reported by parents of children without ASD (Costa et al., 2017; Krakovich et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014; Rayan & Ahmad, 2017). The heightened stress observed in parents of children with ASD suggests there is a link between parental stress and variables inherently affected by having a child with ASD, yet the nature of this connection has remained unclear (Craig et al., 2016; McStay, Dissanayake, et al., 2014).

Therapy for children with ASD, such as ABA, can involve many hours of costly and time-consuming service that also potentially increases parental stress (Krakovich et al., 2016; C. Lim, 2015). ABA focuses on the child with ASD and both teaches adaptive behavior and introduces effective environmental modifications (Johnson et al., 2011; C. Lim, 2015) with the goal of reducing behavior disturbance (Agazzi et al., 2017).

Therapists encourage parental involvement in ABA, but the role of parents is often to work on improving parenting skills using child-focused strategies (Agazzi et al., 2017; Minjarez et al., 2013; Schertz et al., 2016). Although ABA is an effective resource for treatment of children diagnosed with ASD, it is not designed to reduce parental stress.

Diagnostic Criteria for ASD

ASD is a chronic disorder with a lifelong prognosis (Elder et al., 2017; Maenner et al., 2020). The features associated with a diagnosis of ASD include deficits in social interactions, such as nonverbal communication; difficulty responding to social reciprocity; and difficulty forming relationships (APA, 2013). A diagnosis of ASD requires at least two concerns related to restricted, repetitive, and rigid behavior; narrow interests; difficulty coping with change; engagement in repetitive or stereotypic behaviors; or hypersensitivity to sensory stimuli (APA, 2013). Symptoms emerge at an early age, pose a significant disruption to functioning, and are not better explained by intellectual impairment. A diagnosis of ASD also includes a severity rating ranging from 1, *requiring support*, to 3, *requiring very significant support* (APA, 2013, p. X). This covers a wide range of impairment from mild effects to severe functional impairment (Leigh & Du, 2015). The *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*) included two additional diagnostic categories with similar criteria: pervasive developmental disorder and Asperger's syndrome. The APA (2013) eliminated these categories in the *DSM-5*. Pervasive developmental disorder and Asperger's syndrome conveyed subtypes of ASD that did not fully meet the ASD diagnostic criterion. The severity rating system replaced these terms (Mehling & Tassé, 2016).

Increasing Prevalence of ASD

ASD is one of the most common childhood neurobiological disorders (Boyle et al., 2011) and one of the most severe childhood disorders (Dardas & Ahmad, 2014). It has a profound impact because of its lifetime prognosis (Damiano et al., 2014; Elder et al., 2017; Whiteley et al., 2019). Population statistics indicate an increase in the prevalence of ASD over time (Baio et al., 2018; Fombonne, 2003). The median rate of ASD was 4.4/10,000 from 1966 to 1991, and this increased to 12.7/10,000 from 1992 to 2001 (Fombonne, 2003). The most recent prevalence of ASD reported by the CDC is one in 59 among 8-year-old children, which reflects an increase over prior estimates (Baio et al., 2018). According to Baio et al. (2018), the prevalence of ASD has been rising. From 2000 to 2002, the prevalence was one in 150. The prevalence more than doubled between 2010 and 2012 to one in 68.

Leigh and Du (2015) projected that the escalating prevalence of ASD would lead to ASD having a greater impact on society than either attention-deficit/hyperactivity disorder or diabetes by the year 2025. It is not clear why the rates have escalated, although Fombonne (2003) and Mayes et al. (2014) presented some possible explanations. Fombonne explained that changes in the rate of diagnosis reflect increasing awareness about what ASD is and the change to a more inclusive definition. Mayes et al. (2014) disagreed with Fombonne's assessment regarding the scope of the revised ASD criteria in the *DSM-5* and suggested that the *DSM-5* is not specific enough, perhaps missing 12%–16% of children identified using common assessment measures.

The Childhood Autism Rating Scale 2-Standard Versions (CARS-2; Schopler et al., 1986, 2010) and the CASD (Mayes, 2012) identify, with 94% agreement, many

children with ASD who previously received diagnoses of pervasive developmental disorder or Asperger's syndrome (Mayes et al., 2014). Worley and Matson (2012) agreed with Mayes et al. (2014) and reported that the change in diagnostic criteria has reduced the rate of diagnosis. Worley and Matson assessed a group of 208 toddlers using both the *DSM-5* and *DSM-IV-TR* and found that using the *DSM-5* failed to diagnose 32% of the children diagnosed with ASD using the *DSM-IV-TR.*

Another concern regarding the new *DSM-5* criteria relates to their specificity and sensitivity (Barton et al., 2013). Sensitivity is the degree to which criteria for a disorder identify the presence of the disorder, and specificity is the degree to which the criteria discriminate between those with or without the disorder. Barton et al. (2013) reported that the *DSM-5* criteria are not sensitive enough to identify the disorder in all individuals, and they noted that sensitivity should be the greater focus. Barton et al. supported the conclusions of Mayes et al. (2014) and Worley and Matson (2012) that the changes from the *DSM-IV-TR* to the *DSM-5* have not resulted in an increased rate of diagnosis. Although the basis for the increasing prevalence of ASD has remained unclear, the rate of ASD has been increasing, which is concerning (Baio et al., 2018; Damiano et al., 2014; Leigh & Du, 2015). Leigh and Du (2015) cautioned that the problem had reached alarming proportions, necessitating prevention and cost-effective treatments.

Impact of Parental Stress

Effective clinical treatment should improve outcomes by addressing both child ASD behavior and parental affect (Agazzi et al., 2017; Brei et al., 2015; Minjarez et al., 2013; Schertz et al., 2016). Parental stress can impact the physical health of parents

(Johnson et al., 2011; Krakovich et al., 2016). Nelson et al. (2015) analyzed telomere length in families with and without children diagnosed with ASD and compared the lengths in the two groups. Telomeres are stretches of DNA at the ends of chromosomes: They protect DNA when cells divide. Each time a cell divides, the telomeres get shorter, until they are too short to support further division (Nelson et al., 2015). This process is associated with aging as well as chronic stress and illness. Individuals of similar ages have different telomere lengths depending on their life experiences, including emotional and physical stressors (Nelson et al., 2015). Nelson et al. grouped families according to either high or low risk and compared telomere length across each family. The authors found that families with children diagnosed with ASD had shorter telomeres than those without. They suggested that these findings indicate how having a child with ASD relates to parental stress, which in turn impacts parental health and longevity.

Transactional Nature of the Parent–Child Relationship

Features associated with a diagnosis of ASD can have a negative impact on the parent–child relationship (Agazzi et al., 2017; Dardas & Ahmad, 2014; Krakovich et al., 2016; Pozo et al., 2014; Schertz et al., 2016). The parent–child relationship is transactional, with both parent and child contributing to the quality of this bidirectional bond (Krakovich et al., 2016; Schertz et al., 2016). Stress can negatively influence parental attention, causing a parent to focus on their child's negative behaviors (Agazzi et al., 2017). Stress can also reduce parental tolerance and lead to reactive parenting, which in turn may exacerbate negative child behaviors (Agazzi et al., 2017). Parental stress can impede implementation of interventions that might otherwise help reduce problem behaviors (Brei et al., 2015).

Quality of parenting for a child with ASD may have a profound impact on the child's development, parental well-being, and parental life satisfaction (Krakovich et al., 2016). Parental stress can also be cyclical, exacerbating child problems, which in turn exacerbate parental stress (Craig et al., 2016; A. L. Davis & Neece, 2017; McStay, Dissanayake, et al., 2014). For example, parents may feel responsible for things they believe they can control, such as their children's behavior or quality of life (McStay, Dissanayake, et al., 2014). When parents perceive their children's behavior as problematic or their children as having poor quality of life, they may feel responsible, which can increase stress (McStay, Dissanayake, et al., 2014). Because of the bidirectional impact of stress on both parents and children, it is essential that researchers focus on both parents and children when considering best practice for ASD treatment (Agazzi et al., 2017).

Influences on Parental Stress

Researchers have struggled to identify links between characteristics of ASD and parental stress (Brei et al., 2015; Costa et al., 2017; Craig et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014), and no conclusive results have emerged to guide treatment for parental stress. McStay, Dissanayake, et al. (2014) studied symptom severity, Brei et al. (2015) focused on ASD diagnostic criteria, and Craig et al. (2016) suggested that parental IQ may be relevant. Time and financial resources may also influence parental stress and coping (Krakovich et al., 2016; Lim & Chong, 2017). Identification of specific ASD characteristics that link to parental stress has been difficult because of the variation in symptom intensity inherent to the disorder.

Researchers have identified an apparent relationship between parental stress and problem behavior in children with ASD (Agazzi et al., 2017; Brei et al., 2015; Craig et al., 2016). Agazzi et al. (2017) suggested that stressed parents of children with ASD may lack the patience to implement interventions and may inadvertently attend to and reinforce their children's maladaptive behavior (Agazzi et al., 2017). Furthermore, the behavior problems and emotional issues of children with ASD may exacerbate their problems with completing functional routines, which can increase their reliance on their caregivers (Craig et al., 2016). Craig et al. (2016) explained that children with ASD may have impaired intellectual functioning that hinders their ability to complete functional routines. When a child with ASD has diminished capacity, their parent experiences an increased burden that can add to parental stress (Craig et al., 2016; Krakovich et al., 2016).

In summary, researchers have focused on multiple variables as potential sources of parental stress (Agazzi et al., 2017; Brei et al., 2015; Craig et al., 2016; Krakovich et al., 2016; McStay, Dissanayake, et al., 2014). These researchers seem to agree that parental stress may be linked to specific variables associated with a diagnosis of ASD, but they differ regarding which variables are most significant. Further research on this topic is needed to address this gap in the literature.

Importance of Addressing Parental Affect

Parental affect, including perceived stress, plays a critical role in every family unit and is of paramount concern for families of a child with ASD. N. O. Davis and Carter (2008) noted that parental stress can deplete coping resources and increase maternal reactivity, which can then perpetuate problem behavior in children. Parental stress may

impede effective parenting skills (Agazzi et al., 2017; Brei et al., 2015), reduce quality of life (Costa et al., 2017; N. O. Davis & Carter, 2008; Lim & Chong, 2017; Rayan & Ahmad, 2017), and negatively influence parental health (Brei et al., 2015; McStay, Dissanayake, et al., 2014). Parents of children with ASD must provide a high level of long-term care when their parenting resources may be depleted.

C. Lim (2015) suggested that, rather than trying to cure ASD, those providing treatment should focus on habilitation and accommodation. Working to help people function despite ASD characteristics may be the best option when considering outcomes in this population. However, many strategies require parental support. Providing the necessary support for a child with ASD requires more parental resources than raising other children, and stress depletes these resources (Agazzi et al., 2017; Krakovich et al., 2016; McStay, Dissanayake, et al., 2014). Caring for a child with ASD can require lifelong support, and it is essential to consider the health and longevity of the parents of children with ASD. The nature of ASD requires a dual focus of treatment targeting both children with ASD and their parents or caregivers.

Coping Skills

Regardless of why parents of children with ASD experience greater stress than other parents, the phenomenon is concerning, especially in the context of the increasing prevalence of ASD. It is important to identify ways to minimize parental stress to help improve quality of life for children with ASD and their parents (Costa et al., 2017; N. O. Davis & Carter, 2008; Lim & Chong, 2017; Rayan & Ahmad, 2017). One way to address these concerns is to study parental coping skills to learn more about when and how parents can protect themselves from stress. Positive appraisal is one promising coping

skill (Costa et al., 2017; Krakovich et al., 2016; Lim & Chong, 2017; Lyons et al., 2010; McStay, Dissanayake, et al., 2014; Rayan & Ahmad, 2017). Pozo et al. (2014) reported that parents who use coping strategies such as positive appraisal report less stress than other parents. Because of the transactional nature of the parent–child relationship and the relationship between adaptive parents' behavior and children's outcomes, a primary focus of ASD treatment needs to be helping parents cope (Craig et al., 2016; Rayan & Ahmad, 2017; Schertz et al., 2016).

Appraisal Research

Researchers have found that use of appraisal distinguishes stressed parents from nonstressed parents (McStay, Dissanayake, et al., 2014; Pozo et al., 2014; Rayan & Ahmad, 2017). McStay, Dissanayake, et al. (2014) used multiple regression analysis and the ABCX model to examine the impact of appraisal on parental stress in 196 Australian parents of children with ASD aged 3–16 years. The authors found that appraisal and coping accounted for 9% of the variance in maternal stress and 7% of the variance in paternal stress. Pozo et al. (2014) surveyed 161 parents of children diagnosed with ASD and confirmed that appraisal, or perception of the situation, is a significant predictor of parental stress in the parents of children diagnosed with ASD. Rayan and Ahmad (2017) found that the use of appraisal significantly distinguished stressed parents from nonstressed parents in their study of 104 parents of children with ASD. Lim and Chong (2017) found a significant negative correlation between appraisal and parental stress in 184 parents of children diagnosed with ASD; they concluded that use of positive appraisal is one of the most salient differences between stressed and nonstressed parents.

Rayan and Ahmad also concluded that positive appraisal is the most significant protective factor against stress.

Parents' use of positive appraisal appears to be a buffer against parental stress. However, those who have studied the relationship between positive appraisal and stress in parents of children with ASD have reported inconsistent findings (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). Lim and Chong (2017) conducted a correlational study and examined the potential effect of benefit finding on well-being of parents of children with ASD. Benefit finding involves the adaptive coping strategy of reframing an adverse event in a more favorable light. Lim and Chong described benefit finding as the process of finding positive meaning from a troubling event; Garland et al. (2009) described positive appraisal as an adaptive coping process by which individuals restructure stressful events as benign, favorable, or beneficial in some manner. Garland et al. described finding benefits of adversity as one type of positive reappraisal used in active coping models.

Lim and Chong (2017) hypothesized that there would be a positive association between benefit finding and positive affect, that this association would be moderated by a diagnosis of ASD, and that the moderation would vary according to the age of the child (either older or younger than 7 years). The study participants included 302 parents of children aged 7–18 years with special needs from Singapore Early Intervention programs or special education programs (60% of the participants' children had diagnoses of ASD; Lim & Chong, 2017). The authors divided the participants into two groups: parents of children aged 7 years or older and parents of children aged under 7 years. Lim and Chong reported that benefit finding was positively correlated with positive affect and negatively

correlated with negative affect. However, there was no association between benefit finding and stress among the parents of children aged 8 years or older with ASD. Lim and Chong noted that their findings were inconsistent with general findings related to benefit finding and stress. The authors reflected that these unexpected results may have been due to the use of a homogeneous participant pool, because the children with ASD symptoms in their study exhibited little variation in symptom intensity (Lim & Chong, 2017). They also suggested that future research take into consideration variation in ASD symptoms across the participants as a potential explanation for why benefit finding works for some parents but not others (Lim & Chong, 2017).

Rayan and Ahmad (2017) studied the relationship between positive reappraisal and psychological distress in 104 Jordanian parents raising children diagnosed with ASD. The authors measured parental stress using the Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995) and measured use of appraisal to cope through the Positive Reappraisal Coping subscale of the Cognitive Emotion Regulation Questionnaire (Jermann et al., 2006). Rayan and Ahmad reported that parent age and gender together predicted 5% of the variance in parental stress, but neither predicted stress independently. When the authors added use of appraisal to their model, they found it accounted for an additional 8% of variance; only the Positive Reappraisal Coping subscale had a unique contribution to the model. They concluded that increasing use of appraisal decreases stress in parents of children with ASD regardless of parental age and gender.

Costa et al. (2017) conducted a study to predict parental well-being and stress in 37 parents of children diagnosed with ASD and 41 parents of typically developing children. Costa et al. used Lazarus and Folkman's (1984) transactional model of stress

and coping and examined the interactions among environmental antecedents (diagnosis of ASD), personal antecedents (parents' perceptions of children), mediating processes (appraisal and coping), and the stress experienced by parents. The authors found that parents of children with ASD reported more stress and less well-being than parents of children without disabilities (Costa et al., 2017). The parents of children with ASD also showed greater levels of physical stress compared to the parents of typically developing children (Costa et al., 2017). Children with ASD were rated as having more negativity than typically developing children, and parents who rated their children with ASD as having severe ASD traits perceived them as having greater negativity/lability than parents of typically developing children perceived their own children as having (Costa et al., 2017). The parents of children with ASD also reported less use of reappraisal as a coping method than did parents of typically developing children (Costa et al., 2017). Negative emotions were associated with having a child with ASD, but the results were not statistically significant. Appraisal use by parents significantly predicted well-being above group differences (Costa et al., 2017).

Costa et al. (2017) reported that when they added parental use of appraisal to their model it was not a significant predictor of parental stress, and the overall model was not significant. However, parental perception of a child's lability/negativity is an example of an appraisal; a problem with the Costa et al. analysis was that ratings of children's lability/negativity were entered into the regression equation before use of appraisal, and these two variables may overlap substantially.

The findings of the three studies reviewed above—by Lim and Chong (2017), Rayan and Ahmad (2017), and Costa et al. (2017)—are inconsistent with respect to the

efficacy of appraisal as a way to reduce stress in parents of children with ASD. Lim and Chong found that appraisal was only effective when used by parents of younger children. Costa et al. reported that use of appraisal was not linked to stress in the parents of children with ASD, but Rayan and Ahmad found that parental use of appraisal was linked to reduction of stress in parents of children with ASD.

Lim and Chong (2017) reported that appraisal served as a protective factor for some parents of younger children with ASD, but it was not an effective buffer for all parents. The authors noted that this lack of effect may have been due to flaws in the study design. They did not investigate variation of severity of ASD symptoms as a possible moderator of the relationship between appraisal and stress; however, they noted that the lack of observed effect may have been due to the homogeneity of their sample with respect to symptom severity. Lim and Chong recommended investigation of variation in ASD symptoms as a possible contributor to the effectiveness of using appraisal to mitigate stress in the parents of children with ASD.

Differences in study design may have contributed to the inconsistency of results regarding the efficacy of appraisal as a way to reduce the stress of parents of children with ASD. Costa et al. (2017) concluded that use of appraisal does not contribute to parental stress. However, they measured parental stress using heart rate variability, which they assessed via changes in R-wave to R-wave intervals on electrocardiograms (Costa et al., 2017). The researchers noted that heart rate variability is linked to emotional regulation, and parents with high heart rate variability might be less stressed than parents with low heart rate variability (Costa et al., 2017). In contrast, the researchers who found that appraisal helped with stress used self-report stress inventories to measure stress (Lim

& Chong, 2017; Rayan & Ahmad, 2017). The inconsistencies in the findings may therefore be partly attributable to inconsistencies of the measures used rather inconsistencies in the effect.

Costa et al. (2017) also used two variables, parents' perceptions of children's lability/negativity and parental use of appraisal, that were significantly correlated. Rayan and Ahmad (2017) found that use of appraisal was negatively correlated with parental stress. Lim and Chong (2017) found no link between use of appraisal and reduction of stress among parents of children with ASD. Neither study involved exploration of the variability and similarity of ASD symptoms. It is possible that variation in symptoms of ASD accounts for the differences in the findings of Lim and Chong and Rayan and Ahmad.

At the time I conducted this study, there remained a gap in the literature regarding how and when the symptoms of ASD impact the relationship between appraisal use and stress in the parents of children with ASD. There was a clear need both for the use of valid and reliable methods and for research based on a sample of parents of children who exhibit diverse symptom intensity. Because of the apparent protective effect of positive appraisal, it seemed beneficial to learn which variables impact the efficacy of appraisal to reduce stress among parents of children with ASD.

Summary

I identified a gap in existing literature regarding the relationship between use of appraisal and stress in parents of children with ASD. In particular, researchers have not discovered how ASD traits and their severity impact this relationship. Examining the effects of different ASD symptoms and their severity on parental stress using the ABCX

model could provide useful information about the moderating effect of ASD symptoms and their severity on the relationship between use of appraisal and stress in parents of children with ASD. Results from such an examination would add to the body of research identifying methods for improving parental coping skills (N. O. Davis & Carter, 2008; McStay, Dissanayake, et al., 2014). A long-standing pattern has emerged in which researchers have highlighted the need to reduce parental stress through improved coping skills that consider the impact of ASD characteristics.

Chapter 3: Research Methodology

The few researchers who have explored the use of appraisal as a coping method for reducing stress in parents raising children with ASD have yielded inconsistent results (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). The purpose of this quantitative survey study was to add clarity to existing literature by investigating the potential moderating effect of ASD symptoms on the relationship between appraisal use and parental stress in parents of children with ASD aged 3–12 years. The dependent variable was parental stress, measured by the PSI-4-SF (Abidin, 1995). The independent variable was parental use of appraisal to cope, measured using the Reappraisal subscale of the ERQ (Gross & John, 2003). The Reappraisal subscale is a self-reporting tool on use of appraisal to cope with stress. The potential moderating variables, ASD symptoms, were measured using items from the CASD-SF and included variables corresponding to problems with social interaction, perseveration, somatosensory disturbance, and atypical communication and development (Mayes, 2017).

In this chapter, I first describe the research design and the rationale for the methods used. I then discuss the population, sampling procedures, and effect size. I review the recruitment procedures, the methods and instruments used for data collection, the research questions, and the methods of analysis. I conclude the chapter by discussing threats to validity and ethical concerns and how I addressed them.

Research Design and Rationale

The use of a quantitative survey was an appropriate choice because researchers such as Creswell (2009) indicate that surveys provide a quick, economical, versatile, and valid method of gathering a large amount of data from specific a population. Ponto

(2015) explained that survey designs are an effective way to access sensitive and subjective information and that people are likely to provide valid responses when surveys are anonymous. Researchers use surveys to assess variables with reliable and valid measures that correspond quantitatively to constructs of interest. Researchers can use a survey design to gain information about a group of people and generalize that information to similar cohorts (Creswell, 2009).

The use of a survey design allowed researchers to generalize the results to other members of the population. Survey designs allow researchers to access tools with established validity and reliability, and this adds to the weight of their results (Jones et al., 2013). A survey was thus the most appropriate way to address the research questions, which I used to explore associations between quantified variables.

The inclusion of a group of parents whose children displayed a range of symptoms was important to answering the research questions. Lim and Chong (2017) recommended further research drawing on a heterogeneous group of participants, because the range of symptom severity in their study sample was narrow. They suggested that expanding the scope could improve future study outcomes (Lim & Chong, 2017). I conducted this study using anonymous online surveys, which was an appropriate way to address the research questions.

Sample

Population

The population of interest for this study consisted of U.S. parents or guardians raising children diagnosed with ASD aged 3–12 years. Zablotsky et al. (2015) reported that 2.4% of the population had ASD between 2011 and 2014 based on CDC and

Prevention National Health Interview survey data considered representative of the noninstitutionalized population in the United States.

Sampling Recruitment, Participation, and Data Collection

This study included a convenience sample of the population of interest. To be included in the study, an individual had to be aged 21 years or older and be the parent or legal guardian of a child aged 3–12 years diagnosed with ASD. The use of a convenience sample was appropriate because it supported a focus on a specific cohort (Jones et al., 2013). Convenience samples are appropriate when looking for information about a large number of people with specific characteristics (Creswell & Guetterman, 2019).

I provided a brief summary of the study, and a link to the survey (see Appendix E), to the moderators of websites, Facebook pages, Instagram accounts, and Twitter accounts that focused on parents of children diagnosed with ASD. I asked the moderators to make the link available on these social media platforms. Social media recruitment may have reached participants in any English-speaking country. In addition, a variety of potential recruitment sources across the United States—such as schools, mental health service agencies, providers of ABA and parental ASD resource, and advocacy groups—were sent the recruitment information. The directors or administrators of these entities were invited to distribute the information to families they worked with. The flyers and email clarified that participation in the study was voluntary and anonymous, and explained that participants could receive information about the results of the study if they provided an email address for this purpose. This information was also provided on the website where participants accessed the survey.

When a potential participant used the electronic link, they were required to read and acknowledge details of the inclusion criteria and provide their informed consent before progressing to the survey questions. The informed consent form clarified that they would not be coerced to participate, that their participation would be kept private, that they would remain anonymous, that they were free to stop answering the survey questions at any time, that they would not be compensated for participating, and that clicking on the survey link indicated they understood the nature of the study and agreed to participate. Potential participants were asked to acknowledge they met the inclusion criteria.

I obtained institutional review board (IRB) approval before initiating this research. I collected data using anonymous self-report survey questionnaires accessed through SurveyMonkey (https://www.surveymonkey.com/). The use of self-report surveys and computer platforms such as SurveyMonkey is a sound technique for conducting survey-based research (Ponto, 2015). I downloaded and analyzed the data from this using IBM SPSS Statistics (Version 27).

Perceived risks of participating in the study were low because the materials consisted of self-report questionnaires requiring participants to consider their use of coping skills, rate their stress related to parenting, and briefly review ASD symptoms. There was no exposure to adverse stimuli, there was no experimentation, and the questionnaire was not long or intrusive. I provided the participants with a list of resources offering support for managing stress, developing coping skills, or seeking education or training related to parenting a child diagnosed with ASD (see Appendix F).

Power Analysis

A priori power analysis ensures the statistical validity of study results. Power analysis provides an estimate of the minimum number of participants required for statistical validity. The power analysis estimates the needed sample size based on the effect size, Type I error rate (α), and, in a regression analysis, the number of predictor variables to be examined in the linear equation. I completed the power analysis for this study using G*Power (Version X; Faul & Erdfelder, 1992) with an α of .05, a power level of .80, and an estimated effect size of .15, corresponding to a medium effect. The effect size reflected that reported by researchers conducting similar studies (i.e., Costa et al., 2017). I employed a linear regression with seven additional regressions to check for an interaction across each predictor variable, which yielded a recommended sample size of 103 to avoid erroneously rejecting null hypotheses. To provide a margin against attrition and invalid responses, I recruited 110 participants.

Instrumentation

Demographic Assessment

This study included a brief demographic survey (see Appendix G). The survey requested the age of the participant, the age of their child, the gender of the participant, the gender of their child, the participant's level of education, and the participant's ethnicity. I used demographic information to describe the sample and compare their characteristics to those of participants in previous studies. Completing the demographic form took approximately 2 min.

CASD-SF

The CASD-SF (Mayes, 2018) is a brief assessment designed to identify individuals diagnosed with ASD using the smallest subset of variables possible from the full CASD without sacrificing accuracy (Mayes, 2018). Mayes (2018) identified the critical items from the CASD that reliably and accurately identify and discriminate between children with and without ASD diagnoses. Researchers and clinicians use the CASD (Mayes, 2012), which is a self-report survey, to support the diagnostic process for individuals with ASD. The CASD was normed and standardized using a group of 2,469 children aged 1–17 years, each of whom was diagnosed with ASD, diagnosed with another developmental disorder, or typically developing (Mayes, 2012). The CASD was able to discriminate children with ASD from other children in the normed sample with 99.5% accuracy (Mayes et al., 2001).

The CASD (Mayes, 2012) consists of a 30-item semistructured interview covering six domains: problems with social interaction, perseveration, somatosensory disturbances, atypical communication and development, mood and disturbance, and problems with attention (Mayes, 2012). The six domains of the CASD (Mayes, 2012) are closely aligned with the criteria used to identify features of ASD as specified within the *DSM-5* (APA, 2013). The assessment is completed in approximately 15 minutes using a parent interview and records symptoms as either present or absent either now or at any time in the past. The CASD has high reliability and validity; congruence with the CARS-2 is 98%, and congruence with the Autism Diagnostic Interview-Revised is 93% (Mayes et al., 2001).

Mayes (2018) developed the CASD-SF by identifying the smallest number of items on the CASD that distinguish between children diagnosed with ASD and children without such a diagnosis (Mayes, 2018). He examined the scores on the full scale CASD for 607 children aged 3–17 years to identify the smallest number of items that distinguished children with ASD from children with attention-deficit/hyperactivity disorder and oppositional defiant disorder (Mayes, 2017, 2018). The study was repeated with the same results using a separate independent referral group of 397 children with a makeup similar to that of the original sample of 607 children. Six items on the CASD discriminated the two groups with 100% accuracy. A score of 3 or greater on the CASD-SF distinguished children with ASD with 100% accuracy and ruled out ASD with 90.2% accuracy (Mayes, 2018). Table 1 presents the six critical items, which were cross-validated with 98.5% agreement using 307 children referred for diagnosis (Mayes, 2018). The method was repeated to distinguish ASD from non-ASD using data from the 1,417 children used in the standardization sample for the CASD; agreement was 97.6% (Mayes, 2018). The method was validated a third time using the data from the 1,052 children used for the normative CASD sample; agreement was 99.8% (Mayes, 2018). In addition, Mayes (2018) established diagnostic agreements of 96% and 98%, respectively, between the CASD-SF and each of the Autism Diagnostic Interview—Revised (Rutter et al., 2008) and the CARS-2 (Schopler et al., 2010).

I used the CASD-SF in this study after I received permission from the test developer (Appendix B) because it appeared best suited for the chosen design. The questionnaire assesses the six critical items most critical for distinguishing ASD from other diagnoses (Mayes, 2018). Therefore, it was most effective to limit scoring for this

study to these critical items. In addition, the use of the short form limited the burden on participants without risking the validity of the results. The six-item assessment required less than 5 min for each participant to complete.

Table 1

Critical Items Identified for Use in the CASD-SF

Item	Description
1	Limited reciprocal interaction (e.g., poor eye contact; does not show a toy to an adult, seek recognition, or share an experience; dictates play with others according to his/her peculiar and repetitive interests and rule)
2	Narrow or unusual range of interests and play behaviors (e.g., obsessive preoccupations or extreme fixation on things such as certain movies, trains, dinosaurs; unusual attachment to and holding or hoarding objects)
3	Distress with change (e.g., in schedule, parent takes a different car route home, objects moved), difficulty transitioning from one activity to another, insists that things be a certain way (e.g., closing doors, wearing same clothes)
4	Stereotypies (unusual repetitive movements such as hand flapping, toe walking, spinning, rocking, head shaking)
5	Sensory disturbance (one or more of the following): • unusual hypersensitivity to sounds, smell, or light (e.g., covering ears or crying when hearing a vacuum cleaner, toilet flushing, hand dryer, people singing) • extreme fascination with spinning or repetitive movements (e.g., fans, TV credits), lights, shiny surfaces, patterns • abnormal sensory inspection (e.g., excessively mouths, licks, smells, or rubs objects or surfaces; repetitively scrutinizes objects or finger movements close to eyes) • high pain tolerance (e.g., does not cry when hurt or respond normally to painful stimuli)
6	Atypical, repetitive vocalizations or speech (e.g., unusual repetitive sounds, sporadic speech saying a word once and never or rarely saying it again, echolalia, excessively reciting from movies)

Note. Descriptions of autism spectrum disorder symptoms are those used in the CASD-SF. CASD-SF = Checklist for Autism Spectrum Disorder—Short Form. Adapted from "Brief Report: Checklist for Autism Spectrum: Most Discriminating Items for

Diagnosing," by S. D. Mayes, 2018, *Journal of Development Disorders*, *48*(3), p. 93? (https://doi.org/10.1007/s10803-017-3401-0). Copyright 2017 by Springer Nature. Adapted with permission.

Mayes (2018) suggested that the CASD and CASD-SF be presented in the form of a clinical interview paired with observation. I presented the CASD-SF as a self-report questionnaire online and that created another study limitation

Reappraisal Subscale of the ERQ

The Reappraisal subscale is one of two subscales included in the ERQ (Gross & John, 2003). The ERQ measures two methods of coping: reappraisal and suppression (Gross & John, 2003; Melka et al., 2011). Reappraisal is the process of reframing a situation in a more favorable light than initially considered as a means of coping with an event. The Reappraisal subscale measures the use of positive reappraisal using responses to six questions provided via self-report Likert scales that range from 1 (*strongly disagree*) to 7 (*strongly agree*; Gross & John, 2003). Gross and John (2003) reported internal consistency of the Reappraisal subscale of the ERQ to be .79, with −.01 convergence across items. The researchers also reported high test-retest reliability (69%).

Melka et al. (2011) conducted research to further support the reliability and validity reported by Gross and John (2003). Melka et al. administered the ERQ to a diverse group of 1,188 college students with a mean age of 19.2 years. They conducted a factor analysis across groups and found no significant differences by group. The Reappraisal subscale of the ERQ (Gross & John, 2003) is a valid and reliable measure of use of reappraisal as a coping method (Gross & John, 2003; Melka et al., 2011). This was

used to measure reappraisal in this study after receiving permission (Appendix C). It took each participant no more than 3–5 min to complete the Reappraisal subscale of the ERQ.

PD Subscale of the PSI-4-SF

The PSI-4-SF (Abidin, 1995) is one of the most commonly used measures of stress in parents of children diagnosed with ASD (Dardas & Ahmad, 2014). The PSI-4-SF (Abidin, 1995) is a 36-item self-report measure with three subscales: PD, Parent–Child Dysfunctional Interaction, and Difficult Child. The survey includes five response choices: *strongly agree*, *agree*, *not sure*, *disagree*, and *strongly disagree*.

The PSI-4-SF (Abidin, 1995) is a shortened version of the Parent Stress Inventory (PSI) designed by Abidin (1983) to identify parental stress. The PSI (Abidin, 1983) was normed using 534 mothers and 522 fathers, and the results showed a high level of internal consistency. Test–retest reliability coefficients across the child domain ranged from .55 to .82 and the parent domain ranged from .69 to .91. The score for reliability coefficient for the whole test ranged from .65 to.96 (Abidin, 1983). The PSI-4-SF (Abidin, 1995) has strong external validity when compared with the PSI (Abidin, 1983). The correlation between the PSI and the PSI-4-SF is .87 (Abidin, 1995). To minimize the burden on participants, I used only the 12-item PD subscale of the PSI-4-SF (Abidin, 1995) to assess parental stress after receiving permission (Appendix A). It took less than 5 min for each participant to complete the PD subscale of the PSI-4-SF.

As noted above, the PSI-4-SF (Abidin, 1995) includes three subscales: PD, Parent–Child Dysfunctional Interaction, and Difficult Child. However, Dardas and Ahmad (2014) and Zaidman-Zait et al. (2010) studied the PSI-4-SF's (Abidin, 1995) psychometric properties specifically in relation to parents of children with ASD and

reported that the three subgroups were not equally reliable and valid for these parents. Dardas and Ahmad and Zaidman-Zait et al. reported that when the PSI-4-SF is used to measure stress in parents of children with ASD, the PD subscale has the highest validity, but the other two subscales exhibit some flaws. Therefore, I included only the PD subscale in this study.

Research Questions

The quantitative survey addressed the following seven research questions and their corresponding alternative and null hypotheses.

Research Question 1 (RQ1): Do problems with reciprocal interaction in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$1): Problems with reciprocal interaction (as assessed by a positive score on Item 1 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD have no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis ($H_1$1): Problems with reciprocal interaction (as assessed by a positive score on Item 1 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderate the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Research Question 2 (RQ2): Does a narrow or unusual range of interests and play behaviors in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$2): A narrow or unusual range of interests and play behaviors (as assessed by the score on Item 2 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis ($H_1$2): A narrow or unusual range of interests and play behaviors (as assessed by the score on Item 2 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderates the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Research Question 3 (RQ3): Does distress with change in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$3): Distress with change (as assessed by the score on Item 3 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis ($H_1$3): Distress with change (as assessed by the score on Item 3 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderates the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 4 (*RQ4): Do stereotypies in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis ($H_0$4): Stereotypies (as assessed by the score on Item 4 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD have no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 4($H_1$4): Stereotypies (as assessed by the score on Item 4 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderate the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 5 (*RQ5): Do sensory disturbances in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis 5 ($H_0$5): Sensory disturbances (as assessed by the score on Item 5 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD have no

significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 5 ($H_1$5): Sensory disturbances (as assessed by the score on Item 5 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderate the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 6 (*RQ6): Does the severity of atypical, repetitive vocalization or speech in children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis 6 ($H_0$6): Atypical vocalization or speech (as assessed by the score on Item 6 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 6 ($H_1$6): Atypical, repetitive vocalization or speech (as assessed by the score on Item 6 of the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD significantly moderates the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

*Research Question 7 (*RQ7): Does the severity of overall symptoms of children aged 3–12 years with ASD impact the relationship between using positive appraisal as a coping mechanism and parental stress?

Null Hypothesis 7 ($H_0$7): Overall symptom severity (as assessed by total score on the CASD-SF; Mayes, 2018) in children aged 3–12 years with ASD has no significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Alternative Hypothesis 7 ($H_1$7): Overall symptom severity (as assessed by the total score on the CASD-SF; Mayes, 2018) in children aged 3–12 years has a significant impact on the relationship between appraisal use (as assessed by the Reappraisal subscale of the ERQ; Gross & John, 2003) and parental stress (as assessed by the PD subscale of the PSI-4-SF; Abidin, 1995).

Data Analysis Plan

Before using linear multiple regression analysis to test the effect of potential moderating variables on the relationship between independent and dependent variables, eight assumptions must be met (Laerd Statistics, n.d.). The first two assumptions are the use of continuous variables as independent variables and the use of only one dependent variable. The third assumption is independence of observation, which was assessed using the Durbin-Watson statistic (Primavera, 1995). The fourth assumption posits a linear relationship between the independent and dependent variables. The fifth assumption is homoscedasticity, which requires that all combinations of independent variables/moderators are equally distributed (i.e., have the same variance of error).

Primavera (1995) recommended testing for linearity and homoscedasticity at the same time with a visual analysis of studentized residuals plotted against predictor values. The sixth assumption is that of multicollinearity. It is important to ensure that the variables in the study are not highly correlated. This assumption of normal probability was verified using a normal P-plot and visual analysis of a scatterplot of the residuals in IBM SPSS Statistics (Version 25; Primavera, 1995). The seventh assumption is that there are no unusual data (substantial outliers, high leverage points, or highly influential points), which can have a negative impact on a moderation test. Outliers were assessed using studentized deleted residuals, leverage points were identified using IBM SPSS Statistics, and influential points were identified using Cook's distance. Finally, I checked the validity of the assumption of residual errors and ensured that data were normally distributed using the Shapiro-Wilk test for normality.

Checking that no assumptions were violated ensured the results provided an accurate description of the demographic data and multiple regression analysis. When any assumptions were violated, variables were converted to eliminate the violation. Statistically significant interactions indicating evidence of moderation were then sought.

Threats to Validity

External Validity

Threats to external validity can lead to overgeneralization of study findings to people or groups not reflected within the study (Creswell, 2009). Findings from the study are only generalizable to parents who are computer literate, engaged with social media, and raising children diagnosed with ASD aged 3–12 years. The findings are less generalizable to parents who are not computer literate; who are not affiliated with

support, resource, or advocacy groups; and who do not seek support or online connections. The materials were provided in English only, which also limited generalizability. The use of an online, anonymous, convenience sample prohibited the establishment of causal inferences (Creswell, 2009).

Internal Validity

Internal validity reflects the degree of confidence that can be placed on the accuracy of the study results. A number of threats can affect internal validity, including selection bias, response bias, and methodology used (Creswell, 2009). Internal validity was threatened by the design because of the study's reliance on anonymous, online data collection. I could not confirm the diagnoses of participants' children. Further, participants may not have understood the questions asked. There was no opportunity to clarify confusion on the part of participants, which may have led to inaccurate responses. I aimed to consider the effects of different ASD symptoms on the relationship between appraisal and stress in parents of children with ASD; therefore, both threats to validity were noteworthy. The CASD-SF (Mayes, 2018) was not developed for use as a self-report survey, and use of the measure outside its intended purpose may have threatened internal validity.

Another concern related to response bias: Participants may have rated their children's symptoms in ways they believed acceptable rather than accurately. The use of a self-report questionnaire usually threatens to internal validity because participants can respond in what they perceive to be a more favorable light. However, I hoped that this threat was reduced by the anonymity of the data collection.

In addition, this study relied on a convenience sample in a specific population rather than recruitment of a random sample, which may have weakened the validity of the findings. Inherent aspects of the sample may explain the results better than the variables I was trying to measure.

Ethical Procedures

When conducting research, it is essential to ensure that participants are protected from harm. Ethical risks for this study were low and related to the potential for psychological distress induced by exposure to the questions in the study. Parents may have felt emotional activation as they responded to questions about their levels of stress or their children's symptoms. To reduce this risk, parents were informed in the consent information that they could quit the study at any time. They were provided with my contact information in case they had any questions or problems with the study. I also included a list of resources offering parents assistance with stress management and parenting children diagnosed with ASD (see Appendix F). The resource list also provided my contact information so that I could assist in parents with accessing further support, if needed. The list of resources I provided was comprehensive because the study had the potential to reach participants all over the United States. Because I was active in the field of ASD service delivery and could directly access support systems in many states and identify local resources, I could provide assistance with accessing support or services if needed. However, I received no requests for additional support.

The use of a self-report survey and anonymous data collection helped to offset other forms of psychological distress, such as feeling judged or perceiving any sense of coercion to participate in the study. Participants were reminded that they were free to

terminate the study at any point without consequences. No identifying information was requested, and no internet protocol addresses were collected.

After the IRB approved the study, data were collected through SurveyMonkey (https://www.surveymonkey.com/), which is protected through security systems, and participants were informed of this before starting their surveys. The data were stored and analyzed on my personal computer, which is password protected. The computer is stored in a locked office to which I am the only person with access. Data obtained from this study is being stored using a high security file share company (Egynte.com) for 7 years, at the end of which it will be destroyed. I provided participants with my Walden University email address so they could contact me to request a copy of the findings of the study.

Summary

This chapter provided rationale for this quantitative, nonexperimental study. I outlined the target population, sample procedures, and recruitment methods used. I outlined the data collection and analysis methods used and reviewed the measures used and their validity and reliability. I also provided information about threats to the internal and external validity of this study and efforts to reduce those threats. And I provided a comprehensive review of ethical concerns, how these were reduced, the safeguards provided to protect the participants, the storage of their personal data, and how participants can request a copy of the findings.

Chapter 4: Results

Introduction

The purpose of this quantitative survey study was to explore moderation by ASD symptoms of the relationship between use of appraisal and parental stress for parents of children diagnosed with ASD aged 3–12 years. The goal was to provide useful information that could inform potential treatment of psychological distress in parents raising children with ASD. I used quantitative analysis and administered reliable and valid measures to address the research questions. In this chapter, I describe the data collection methods (outlined in Chapter 3), describe the statistical analyses performed, and present the results of those analyses. In the last section of this chapter, I summarize the results.

Data Collection

I collected data anonymously using an online survey via SurveyMonkey (https://www.surveymonkey.com/). To recruit participants, I sent flyers to several counseling centers and ABA providers in New York and North Carolina. My contacts at the centers who agreed to assist the recruitment effort sent the flyer to families serviced by the centers who met the study criteria. Further, I amended my original recruitment plan, with IRB approval, to include several disability support groups and support groups for parents of children with ASD. I contacted the moderators of these groups, and several agreed to post the flyer on their websites. I also contacted a school psychologist who provided parent advocacy and other support services to families of children with disabilities; she agreed to post the flyer on her Facebook page and send it to some of her

clients. The survey was available on SurveyMonkey for 6 months from May 7, 2020, through August 22, 2020.

Discrepancies in the Original Data Collection Process

As discussed above, recruitment was initially slow. The Walden IRB approved my request to add additional partner sites in nine different locations, including ABA practice facilities, a general psychological practice, a school psychologist's online resource site, and five Facebook parent resource groups. On October 13, 2020, I had received 113 responses to the survey and closed access to the survey. The power analysis completed in Chapter 3 indicated that I should obtain at least 103 participants for the study. I recruited 113 participants to guard against loss of participants during data cleaning.

Data Cleaning

I exported the 113 responses from SurveyMonkey to a Microsoft Excel spreadsheet and reviewed the data for errors and omissions. I omitted data from 22 of the respondents because they had only completed the consent process and provided no answers to any of the questions. One additional participant was omitted because they completed the consent and the CASD-SF but did not complete the demographic survey, the Reappraisal scale of the ERQ, or the PD scale of the PSI-4-SF. The data cleaning process therefore resulted in omission of data from 23 respondents and retention of data from 90 participants.

Results

Descriptive Statistics

Demographic information is presented in Table 2. Of the 90 participants, 81 were women, six were men, one identified as other, and two did not disclose their gender. The mean age of the participants was 40.14 years (*SD* = 7.21), and the mean age of their children was 8.57 years (*SD* = 3.21). Over half had a level of education below that of a graduate degree (50.5%). I compare the demographics of this sample with those of similar studies below.

Gender Distribution

Most children in the study were male (70.0%); 26.7% were female, 1.1% were identified as other, and 2.2% had no specified gender. Maenner et al. (2020) reported that boys were 4.3 times more likely than girls to be diagnosed with ASD. There were 2.63 times as many boys as girls in my study. The gender distribution in this study was similar to that in other studies of parental stress and coping skills in connection with ASD (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017).

The gender distribution for parents and caregivers indicated that a majority of the participants were women, which was also similar to the distributions in previous studies (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). In this study, 90% of participants were women; the corresponding percentages reported by Costa et al. (2017), Lim and Chong (2017), and Rayan and Ahmad (2017) were 78.8%, 78.8%, and 70.19%, respectively.

Table 2

Frequencies of Demographic Characteristics for Sample

Characteristic	*F*	%
Participant gender		
Male	6	6.7
Female	81	90.0
Other/not specified	3	3.3
Child gender		
Male	63	70.0
Female	24	26.7
Other/not specified	3	3.3
Participant race		
White	76	84.4
Black or African American	3	3.3
Asian	2	2.2
Other/not specified	9	10.0
Participant education		
Less than high school diploma	1	1.1
High school graduate	9	10.5
Some college	35	38.9
Graduate degree	43	47.8
Not specified	2	2.2

Age Distribution

The age distribution of the parents and caregivers in this study was similar to the distributions in similar studies on the use of appraisal and parental stress in parents raising children with ASD (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). In this study, participant age ranged from 20 to 59 years (M = 40.14, SD = 7.21). Costa et al. (2017) reported that parent age in their sample ranged from 26 to 53 years.

The ages of the parents recruited by Lim and Chong (2017) ranged from 17 to 62 years (M = 38, SD = 5.82). Rayan and Ahmad (2017) reported the mean parent age in their sample as 36 years.

The ages of the children in this study ranged from 3 to 17 years (M = 8.57, SD = 3.2). Costa et al. (2017) reported that child age ranged from 3 to 13 years in their study. Lim and Chong (2017) reported a child age range of 1–16 years. Rayan and Ahmad (2017) did not report the age of the children in their study.

Ethnicity Distribution

The ethnicity distribution of participants in this study differed from those reported for similar studies (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017); the sample in this study was overwhelmingly White (84.4%). Lim and Chong (2017) reported that 68% of the children they studied were Chinese, 16.8% were Malay, 6.7% were Indian, 7% were Eurasian, and 6.6% were of other ethnicity. Rayan and Ahmad (2017) did not report ethnicity; however, the purpose of the study was to learn about ASD, parental distress, and coping skills in Arab parents, so a reasonable conclusion is that the sample was exclusively Arab. However, there was no separate category for Arab ethnicity in my study; people of this ethnicity have often been categorized as White in the United States. Costa et al. (2017) did not report the ethnicities of the participants in their study.

Maenner et al. (2020) reported that the prevalence of ASD in their study of 8-year-olds across 11 sites in the United States was similar across most ethnic groups but slightly lower in Hispanic individuals; prevalence was 18.5% in the non-Hispanic White group, 18.3% in the non-Hispanic Black group, 17.9% in the Asian Pacific group, and

15.4% in the Hispanic group. Maenner et al. noted that although they found a mostly uniform prevalence of ASD across ethnic groups, White children were diagnosed more often than Black or Hispanic children. The sample in this study was thus disproportionately White compared with the population of parents of children with ASD.

Socioeconomic Status

Durken et al. (2017) reported that diagnosis of ASD is positively correlated with socioeconomic status, but actual prevalence of ASD does not depend on socioeconomic status. Level of education obtained is a key measure of socioeconomic status used by the National Committee on Vital and Health Statistics (2021). Level of education was used as a proxy measure of socioeconomic status in this study. The sample included many highly educated individuals: 47.8% of participants had at least a graduate-level degree, 35% reported having some college, and 11.6% had no more than a high school degree. Lim and Chong (2017) reported that 40% of the participants in their study had obtained tertiary education, and 25% had high school degrees. Rayan and Ahmad (2017) only noted that the participants in their study could read and write, and Costa et al. (2017) did not report socioeconomic status. Costa et al. and Rayan and Ahmad did not report level of education. Overall, the sample recruited for this study was well educated and thus probably represented a relatively high average socioeconomic status.

Assumption Checking

The purpose of initial data screening was to check the assumptions of the multiple linear regression model to ensure that this was an appropriate statistical analysis to apply. Before using linear multiple regression analysis to test the effect of the potential moderating variables on the relationship between the independent and dependent

variables, I had to ensure that eight assumptions were met: existence of a continuous dependent variable, existence of two or more independent variables, independence of observations, linearity, homoscedasticity, multicollinearity, absence of outliers, and normality (Laerd Statistics, n.d.). I used IBM SPSS Statistics (Version 27) to complete an analysis of multicollinearity, normality, and independence. In addition, I assessed the assumptions of linearity, homoscedasticity, and absence of outliers. In this study I used continuous variables, a sufficient sample size for the analysis performed.

Assumption of Normality

I tested the assumption of normality using IBM SPSS Statistics (Version 27) to perform the Kolmogorov-Smirnov test of normality and by visually inspecting the histograms. The results of the Kolmogorov-Smirnov test indicated that the assumption of normality was violated for the ERQ (p = .025), and the distribution for the PSI-4-SF was normal (p = .20). See Figure 1 for a visual representation.

The ERQ scores were positively skewed (skewness 0.931, kurtosis 1.453), so I completed a square root transformation to restore normality. The Kolmogorov–Smirnov test of normality indicated that the assumption of normality was met for the ERQ scores after applying the square root transformation (p = .117). The histograms appear normal for both the square root of the ERQ score (skewness 0.24, kurtosis 0.21) and the PSI-4-SF score (skewness 0.02, kurtosis −0.71). Figure 2 shows the distribution of the transformed ERQ scores, and Figure 3 presents the distribution of the PSI-4-SF data.

Assumption of Absence of Outliers

It is important that the data set in a multiple regression does not include outliers (Laerd Statistics, n.d.). The assumption of absence of outliers was tested using visual analysis of box plots created using IBM SPSS Statistics (Version 27). Based on visual inspection, the box plots indicated no outliers for the square root of ERQ score or PSI-4-SF score. Thus, no cases were deleted (Laerd Statistics, n.d.).

Assumption of Linearity

Visual examination of a scatterplot of the dependent variable plotted against the independent variable did not suggest any violation of the assumption of linearity: There was no obvious nonlinear relationship between the variables. Based on visual inspection of the scatterplot (Figure 4), the assumption of linearity was met (Laerd Statistics, n.d.).

Assumption of Multicollinearity

The assumption of multicollinearity requires that potential moderating variables are not highly correlated (Laerd Statistics, n.d.). Multicollinearity was tested by examining Pearson correlations among the moderator variables (Table 3; see Laerd Statistics, n.d.). The correlation values ranged from −.28 to .09. All correlations were of small to moderate strength, so the assumption of multicollinearity was not violated (Laerd Statistics, n.d.).

Table 3

Pearson Correlations Between Square Root of ERQ Score and Moderators

Moderator	Pearson correlation with square root of ERQ score
Reciprocal interactions	.03
Narrow range of interests	−.04
Distress with change	.09
Stereotypy	.09
Sensory	−.28*
Atypical vocalization	−.05
Severity	−.05

Note. ERQ = Emotion Regulation Questionnaire.

*$p < .01$.

Assumption of Homoscedasticity

Homoscedasticity indicates that there is no predictive relationship within the error or residual data (Laerd Statistics, n.d.). I assessed the assumption of homoscedasticity using a plot of standardized residuals. The plot of standardized residuals (Figure 5) did not reveal patterns and I used this information to conclude that this met the assumption. Figure 5 also indicates that the variance of error was similar across all variables because there is no pattern to the plot (Laerd Statistics, n.d.).

Reliability of Measures

I used Cronbach's alpha to assess the reliability of the Reappraisal subscale of the ERQ (Gross & John, 2003) and the PD subscale of the PSI-4-SF (Abidin, 1995). Cronbach's alpha measures reliability, or the extent to which all items measure the same construct. Reliability was not assessed for the CASD-SF because this is a checklist on

which parents record whether symptoms apply to their children, and there are no other items to compare these responses to. Assessment of internal reliability was thus not possible for this instrument (Gliem & Gliem, 2003). Reliability scores fall in the range 0–1, with higher values indicating greater reliability. Reliability scores of at least .7 indicate acceptable reliability, and scores above .9 indicate high reliability (Tavakol & Dennick, 2011). Cronbach's alpha for the PD subscale of the PSI-4-SF (Abidin, 1995) was .82, indicating reliability, and Cronbach's alpha for the Reappraisal subscale of the ERQ (Gross & John, 2003) was .93, indicating high reliability.

Hypothesis Testing Using Multiple Linear Regression

I conducted a multiple linear regression using IBM SPSS Statistics (Version 27) to test whether symptoms of ASD, as assessed by items on the CASD-SF (Mayes, 2018), moderated the relationship between appraisal use, as assessed by the Reappraisal subscale of the ERQ (Gross & John, 2003), and parenting stress, as assessed by PD subscale of the PSI-4-SF (Abidin, 1995). The relationship between the Reappraisal subscale of the ERQ (Gross & John, 2003) and the PD subscale of the PSI-4-SF (Abidin, 1995) was examined first to establish a basis for determining whether ASD symptoms moderated that relationship during testing of the specific hypotheses. The correlation between these measures was not significant ($r = .07$, $p = .50$).

RQ1–RQ6 addressed the interaction of six individual symptoms of ASD with the relationship between the use of appraisal and parental reports of stress; the six symptoms were reciprocal interaction, narrow or unusual range of interests and play behaviors, distress with change, stereotypies, sensory disturbances, and atypical vocalization. RQ7

addressed the impact of the severity of all symptoms together on the relationship between use of appraisal and parental reports of stress.

RQ1—Reciprocal Interaction

RQ1 asked whether problems with reciprocal interaction in children with ASD aged 3–12 years moderate the relationship between the use of positive appraisal as a coping mechanism and parental stress. The overall regression model was not significant, $\chi^2(3) = 1.16$, $p = .76$. Reciprocal interaction did not moderate the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = .102$, $SE = .20$, $p = .60$). The null hypothesis was retained. The results indicated that reciprocal interaction does not influence the relationship between appraisal and parental stress. See Table 4.

Table 4

Linear Model of Reappraisal Use, Reciprocal Interaction, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−.097	.5164	0.036	.850
Reciprocal interaction	−.223	.3478	0.459	.522
Reappraisal use (square root) × reciprocal interaction	.102	.1961	0.486	.604

RQ2—Narrow Interests

RQ2 asked whether a narrow or unusual range of interests and play behaviors in children with ASD aged 3–12 years moderates the relationship between the use of positive appraisal as a coping mechanism and parental stress. The overall regression model was not significant, $\chi^2(3) = 0.727$, $p = .867$. Narrow range of interests did not

moderate the relationship between the square root of ERQ score and PSI-4-SF score (β = .219, *SE* = .46, *p* = .64). The null hypothesis for RQ2 was retained. See Table 5.

Table 5

Linear Model of Reappraisal Use, Narrow Interests, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−.016	.3939	0.002	.967
Narrow interests	−.406	.8164	0.247	.619
Reappraisal use (square root) × narrow interests	.219	.4632	0.223	.637

RQ3—Distress with Change

RQ3 asked whether distress with change in children with ASD aged 3–12 years moderates the relationship between the use of positive appraisal as a coping mechanism and parental stress. The overall regression model was not significant, $\chi^2(3) = 2.086$, $p = .555$. Distress with change did not moderate the relationship between the square root of ERQ score and PSI-4-SF score (β = .129, *SE* = .12, *p* = .286). The null hypothesis was retained. See Table 6.

Table 6

Linear Model of Reappraisal Use, Distress With Change, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−.286	.4624	0.382	.536
Distress with change	−.247	.2060	1.436	.231
Reappraisal use (square root) × distress with change	.129	.1211	1.141	.286

RQ4—Stereotypies

RQ4 asked whether stereotypies in children with ASD aged 3–12 years moderate the relationship between the use of positive appraisal as a coping mechanism and parental stress. The overall regression model was significant, $\chi^2(3) = 11.37$, $p < .010$. Stereotypies moderated the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = 1.324$, $SE = 0.48$, $p = .006$). The null hypothesis was rejected. See Table 7.

Table 7

Linear Model of Reappraisal Use, Stereotypy, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−0.869	0.4291	4.104	.043
Stereotypy	−2.558	0.8202	9.730	.002
Reappraisal use (square root) × stereotypy	1.324	0.4823	7.536	.006

A graph of the interaction (Figure 6) reveals the nature of the relationships among the variables. The relationship between use of appraisal and parental stress depended on level of stereotypy. For low-stereotypy children, there was no relationship between reappraisal use and parental stress (the line is flat). For high-stereotypy children, there was a positive relationship between reappraisal use and parental stress: As the use of reappraisal increased, so did parental stress (the line slopes upward to the right).

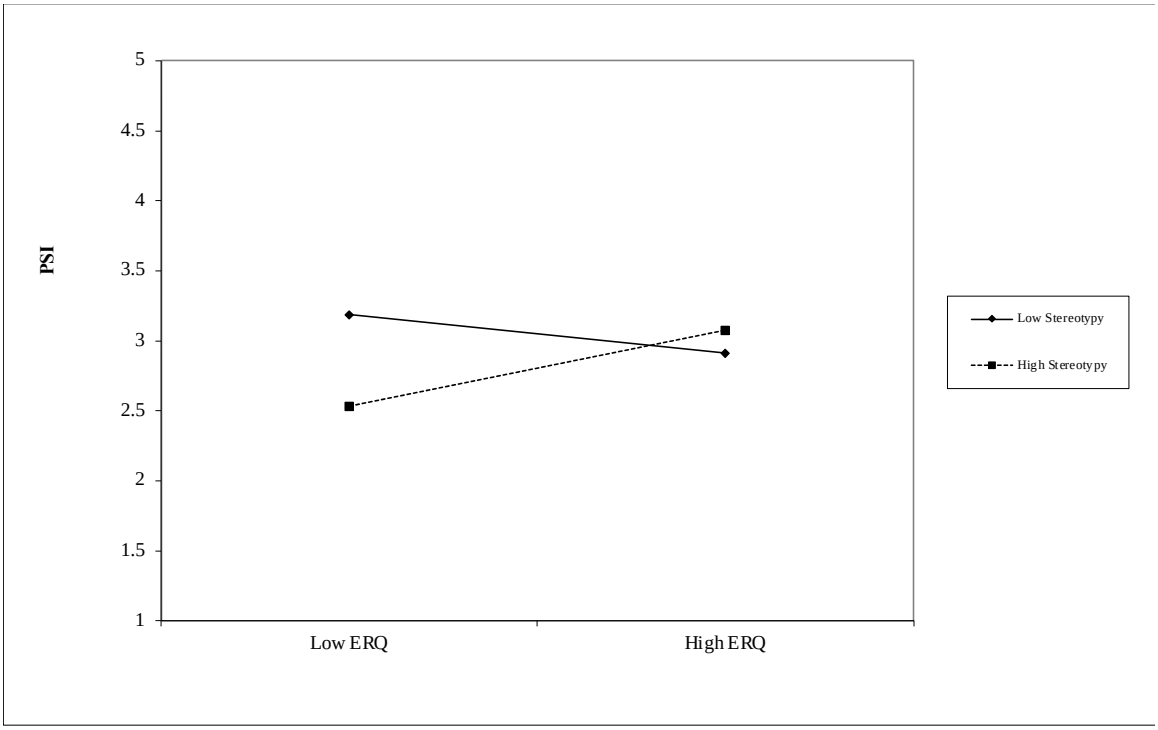
RQ5—Sensory Disturbance

RQ5 asked whether sensory disturbance in children with ASD aged 3–12 years moderates the relationship between the use of positive appraisal as a coping mechanism

and parental stress. The overall regression model was not significant, $\chi^2(3) = 6.159$, $p = .104$. Sensory disturbance did not moderate the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = .143$, $SE = .19$, $p = .451$). The null hypothesis was retained. See Table 8.

Figure 1

Interaction of Stereotypies and the Relationship Between Appraisal Use and Parental Stress



Note. PSI = Parent Stress Inventory—Short Form; ERQ = Emotion Regulation Questionnaire.

Table 8

Linear Model of Reappraisal Use, Sensory Disturbance, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−.232	.3848	0.365	.546
Sensory disturbance	−.387	.3207	1.453	.228
Reappraisal use (square root) × sensory disturbance	.143	.1902	0.568	.451

RQ6—Atypical Vocalization

RQ6 asked whether the severity of atypical, repetitive vocalization or speech in children with ASD aged 3–12 years moderates the relationship between the use of positive appraisal as a coping mechanism and parental stress. The overall regression model was not significant, $\chi^2(3) = 4.977$, $p = .173$. Atypical vocalization did not moderate the relationship between the square root of ERQ score and PSI-4-SF score (β = .136, *SE* = .07, $p = .055$), but its impact was notable. For RQ6, the null hypothesis was retained. See Table 9.

Table 9

Linear Model of Reappraisal Use, Atypical Vocalization, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−.350	.3233	1.172	.279
Atypical vocalization	−.253	.1201	4.419	.036
Reappraisal use (square root) × atypical vocalization	.136	.0708	3.695	.055

RQ7—Symptom Severity

RQ7, the final research question, asked whether the severity of overall symptoms of children with ASD aged 3–12 years impacts the relationship between the use of positive appraisal as a coping mechanism and parental stress. The overall regression model was not significant but was notable, $\chi^2(3) = 7.232$, $p = .065$. Symptom severity significantly moderated the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = .086$, $SE = .04$, $p = .034$). The null hypothesis was rejected. See Table 10.

Figure 7 indicates the nature of the interaction with symptom severity. The relationship between appraisal use and parental stress depended on the level of overall symptom severity. For high-severity children, there was a positive relationship between reappraisal use and parental stress: As reappraisal use increased. so did parental stress (the line slopes upward to the right). For low-severity children, there was no relationship between reappraisal use and parental stress (the line is flat). There was little difference in parental stress for low-severity children, regardless of the level of appraisal used by parents.

Table 10

Linear Model of Reappraisal Use, Symptom Severity, and Their Interaction Predicting Parental Stress

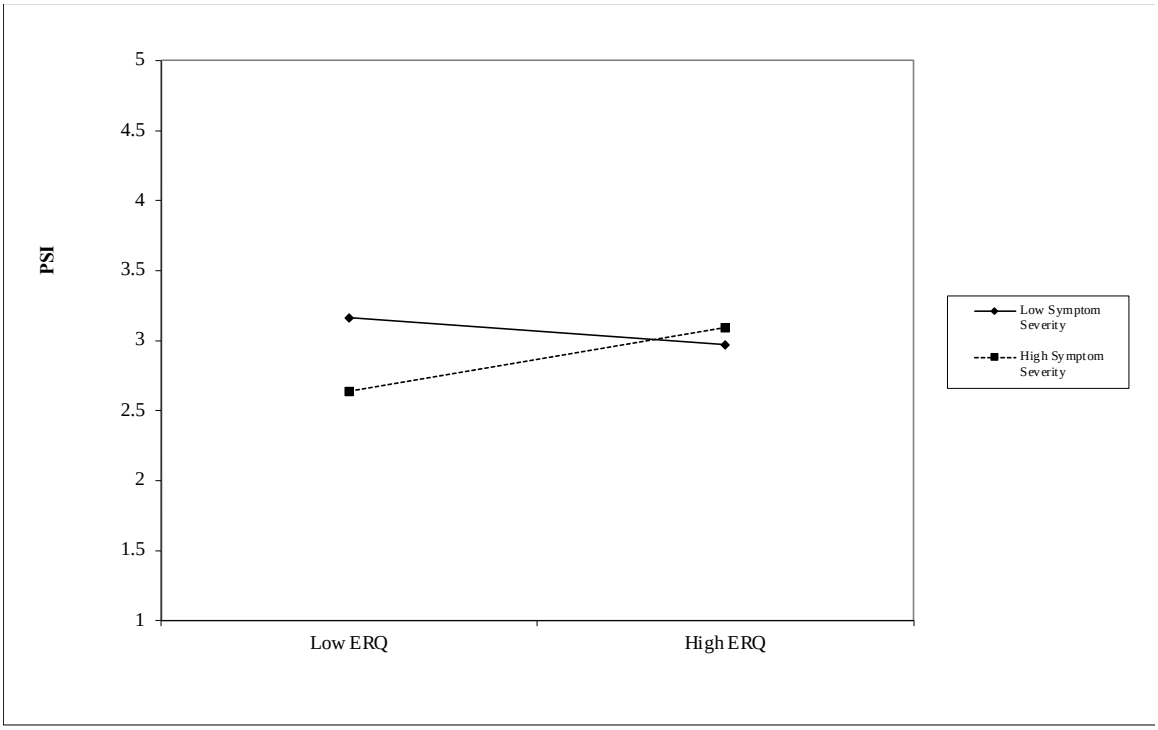
Parameter	β	*SE*	Wald $\chi^2(1)$	*p*
Reappraisal use (square root)	−.953	.5481	3.024	.082
Symptom severity	−.167	.0694	5.826	.016
Reappraisal use (square root) × symptom severity	.086	.0404	4.486	.034

Exploratory Analysis

Lim and Chong (2017) found that for children older than 7 years, use of appraisal correlated with parental stress, but there was no relationship between use of appraisal and parental stress for children younger than 7 years. I conducted a multiple regression on the age of the children in this study and parental stress to determine whether my data supported this finding of Lim and Chong. There were 22 children (24.4%) younger than 7 years and 59 children (65.6%) 7 years of age or older in my sample. To determine whether age affected the relationship between appraisal and parental stress, I examined the interaction between age and appraisal in predicting parental stress. The regression revealed no significant interaction between age and appraisal, $\beta = .46$, $SE = .45$, $\chi^2(1) = 1.05$, $p = .31$. The lack of significance indicated that the relationship between appraisal and stress was the same for both age groups (see Table 11).

Figure 2

Interaction of Symptom Severity and the Relationship Between Appraisal Use and Parental Stress



Note. PSI = Parent Stress Inventory—Short Form; ERQ = Emotion Regulation Questionnaire.

Table 11

Linear Model of Reappraisal Use, Age, and Their Interaction Predicting Parental Stress

Parameter	β	*SE*	$\chi^2(1)$	*p*
Reappraisal use (square root)	−.323	.3676	0.772	.380
Age	−.756	.7652	0.975	.323
Reappraisal use (square root) × age	.464	.4545	1.045	.307

Summary

The purpose of this quantitative survey study was to explore moderation by ASD symptoms of the relationship between use of appraisal and parental stress for parents of children diagnosed with ASD aged 3–12 years. Before completing the statistical analysis, I checked for assumption violations and transformed one of the variables. I performed a multiple linear regression to determine whether individual ASD symptoms or overall symptom severity moderated the relationship between use of appraisal and parental stress. The six specific symptoms assessed were reciprocal interactions, narrow interests, distress with change, stereotypies, sensory disturbance, and atypical vocalization. The results revealed significant interactions of each of stereotypies and overall symptom severity with the relationship between use of appraisal and parental stress. There was also a notable but nonsignificant interaction of atypical vocalization with the relationship between use of appraisal and parental stress.

Stereotypies significantly moderated the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = 1.324$, $SE = 0.48$, $p = .006$). For ASD symptom severity, the overall regression model was notable but not significant, $\chi^2(3) = 7.232$, $p = .065$. Symptom severity significantly moderated the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = .086$, $SE = .04$, $p = .034$). For atypical vocalization, the overall regression model was not significant, $\chi^2(3) = 4.977$, $p = .173$. Atypical vocalization did not significantly moderate the relationship between the square root of ERQ score and PSI-4-SF score ($\beta = .136$, $SE = .07$, $p = .055$); however, $p = .055$, which indicated a notable result.

Stereotypies, symptom severity and atypical vocalization all interacted similarly with the relationship between use of appraisal and parental stress. As ERQ score and each of stereotypies, atypical vocalization, and symptom severity went up, parental stress also went up. For low ERQ scores, there were no significant interactions. Appraisal is a coping skill that parents of children with ASD use to help reduce stress. However, my findings indicated that use of appraisal by parents of children with ASD either has no significant connection to parental stress or (in the presence of stereotypies, atypical vocalization, or severe symptoms) is linked to elevation of parental stress.

I conducted an additional exploratory analysis to attempt to replicate findings of Lim and Chong (2017) regarding child age; unlike those authors, I did not find that use of appraisal was linked to higher stress among parents of children aged 7 years or older than among parents of children younger than 7 years. In Chapter 5, I discuss the implications of my findings.

Chapter 5: Discussion, Conclusions, Recommendations

Introduction

The purpose of this study was to explore moderation by ASD symptoms of the relationship between use of appraisal and parental stress for parents of children diagnosed with ASD aged 3–12 years. I used a quantitative survey design to gather a large amount of anonymous information directly from participants. The use of a quantitative survey was appropriate because researchers such as Creswell (2009) report that that surveys are a quick, economical, versatile, and valid method of gathering a large quantity of data on specific populations. After cleaning the collected data, 90 participants remained in the sample.

There was no significant main effect between use of appraisal and parental stress. Results of the multiple linear regression indicated that stereotypies and overall symptom severity significantly moderated the relationship between use of appraisal and parental stress. The results indicated that reciprocal interaction, narrow or unusual interests, distress with change, and sensory disturbance did not moderate the relationship between use of appraisal and parental stress. Atypical vocalization did not significantly moderate the relationship between use of appraisal and parental stress; however, there was a notable interaction for this variable, which may have been significant if the sample had not been smaller than expected. In this chapter, I discuss and interpret the findings. I also note the limitations of the study, provide recommendations for future research, and present implications of the study for positive social change.

Interpretation of the Findings

The dependent variable was parental stress level, as reported on the PD subscale of the PSI-4-SF (Abidin, 2012). The independent variable was parental use of appraisal as a coping mechanism, measured using the Reappraisal subscale of the ERQ (Gross & John, 2003). Symptoms of ASD were potential moderating variables, assessed using the CASD-SF (Mayes, 2018). The symptoms of ASD measured by the CASD-SF (Mayes, 2018) include limited reciprocal interaction, narrow and unusual interests, distress with change, stereotypies, sensory disturbance, and atypical vocalization. The overall scale assesses overall ASD symptom severity.

Some researchers have linked use of appraisal to reduction of stress in parents of children with ASD; however, their findings have been largely inconclusive (Costa et al., 2017; Lim & Chong, 2017). Lim and Chong (2017) suggested that symptoms associated with ASD are unique, may influence the relationship between parental stress and use of appraisal to cope, and deserve consideration with respect to that relationship. With this study, I aimed to explore potential moderation by ASD symptoms of the relationship between parental stress and use of appraisal. Something about the nature of ASD appears to cause ASD to have a unique impact on parental stress. My findings indicated that a connection between parental stress and use of appraisal exists in some circumstances. Future researchers should aim to identify interventions that can help and the conditions under which they do so.

For children with high levels of stereotypies and overall symptoms, there was a significant positive relationship between appraisal use and parental stress: As the use of appraisal increases, so does parental stress. There was a notable but nonsignificant

interaction of atypical vocalization with the relationship between appraisal and parental stress. The power analysis indicated that I needed 103 participants to avoid a Type I error (Faul & Erdfelder, 1992). I recruited 113 people but had to omit data from 33 respondents because they did not complete their surveys. With sufficient power, the results for atypical vocalization may have been statistically significant.

The results indicated that children's stereotypies and overall symptom severity were associated positively, not negatively, with parental stress. For children with other symptoms, and for low-stereotypy children, atypical vocalization and symptom severity did little to moderate the relationship between appraisal and parental stress. My findings are similar to those of Lim and Chong (2017) and McStay, Dissanayake, et al. (2014), in that they suggest that appraisal is effective at reducing stress for some but not all parents of children with ASD and not to a substantial extent. My findings were inconsistent with those of Rayan and Ahmad (2017), who found use of reappraisal effective for reducing stress of parents of children with ASD.

Interpretation of the Findings in the Context of Previous Literature

Several researchers have investigated stress in parents raising children with ASD (e.g., Costa et al., 2017; Craig et al., 2016; Krakovich et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014). Many researchers have documented appraisal as a coping method that provides an effective buffer against stress (Finkelstein-Fox et al., 2019; Folkman, 1997; Moskowitz et al., 2009). Three groups of researchers explored the relationship between parental stress and use of appraisal in parents of children diagnosed with ASD, but their results were inconclusive (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). Lim and Chong (2017) found that appraisal was only effective

when used by parents of children with ASD younger than 7 years. Costa et al. (2017) reported no link between appraisal and stress in parents of children with ASD, but Rayan and Ahmad (2017) linked parental use of appraisal to reduction of stress in parents of children with ASD. Rayan and Ahmad provided no information on the age or symptom severity of the children with ASD who participated in their study. Lim and Chong posited that symptoms associated with ASD are unique and may influence the relationship between parental stress and use of appraisal to cope. It is possible that Rayan and Ahmad's sample represented a distribution of symptoms different from those of other samples.

In this study, I attempted to address the identified gap in existing literature by investigating whether the effectiveness of appraisal as a coping strategy depends on ASD symptoms. I found evidence that symptoms of ASD moderate the relationship between use of appraisal and parental stress, but the moderation was not in the expected direction.

I followed a suggestion of Lim and Chong (2017) and treated symptoms of ASD as potential moderators of the relationship between use of appraisal and stress in parents of children with ASD. Lim and Chong suggested that the lack of symptom variation in their sample may have accounted for their failure to find an effect. I recruited participants whose children exhibited a wide range of symptoms to address this limitation.

The findings of Rayan and Ahmad (2017) were unlike my findings and the findings of Lim and Chong (2017) and Costa et al. (2017). Rayan and Ahmad found a link between use of appraisal by parents of children with ASD and reduction of parental stress. Rayan and Ahmad have been the only researchers to demonstrate this effect so far. Unlike Rayan and Ahmad, I found no significant association between appraisal and

parental stress. My findings, like those of Lim and Chong and Costa et al. indicate that use of appraisal is not directly linked to reduction of stress in parents of children with ASD. Rayan and Ahmad did not provide information on the symptoms of ASD, or children's ages represented in their sample, and their sample may have included younger children and children with lower levels of stereotypies and overall symptom severity than those in my sample. Lim and Chong et al. (2017) linked use of appraisal by parents of children older than 7 years to elevation of parental stress. I conducted an exploratory analysis to attempt to replicate this finding, but I found no difference in the relationship between these variables based on whether children were younger or older than 7 years.

Despite the lack of a significant main effect between use of appraisal and parental stress, I did obtain some interesting findings regarding symptoms as moderators. Stereotypies and atypical vocalization were the only symptoms that moderated the relationship between appraisal use and stress in parents of children with ASD, and the only individual symptom variable that was a statistically significant moderator was the stereotypies variable. Overall symptom severity was also a significant moderator. Stereotypies and symptom severity accentuated a positive association between use of appraisal and parental stress. I did not explore the directionality of the moderation of atypical vocalization on the relationship between use of appraisal and parental stress, because atypical vocalization was not a statistically significant moderator.

The use of appraisal seems sometimes ineffective at reducing stress of parents of children with ASD, and in some cases use of appraisal seems to increase parental stress. Higher levels of stereotypies, atypical vocalization, and overall symptom severity may impact the ability of appraisal to reduce parent stress, or they may increase parental

stress, which appraisal then does not effectively manage. My findings indicate that the connections between the symptoms of ASD and use of appraisal to reduce stress are complicated. Researchers should examine the symptoms of ASD in greater detail to learn more about their impact on the use of appraisal to reduce parental stress.

In most situations, aside from when used by parents of children with ASD, appraisal appears to buffer or reduce stress (Finkelstein-Fox et al., 2019). Many researchers have shown that use of appraisal to reduce stress by parents of children with ASD works differently than its use by parents of other children: This coping strategy may be ineffective in some circumstances for parents of children with ASD (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). ASD symptoms appear to moderate the ability of appraisal to reduce parent stress; however, I focused on identifying associations, and the methods I used cannot determine the existence of cause–effect relationships.

Costa et al. (2017) found that ASD symptoms assessed using the AQ-Child (Auyeung et al., 2008) were not significant predictors of parental stress. The AQ-Child (Auyeung et al., 2008) is not closely aligned with the ASD criteria from the *DSM-5* (APA, 2013). I addressed this problem by using the CASD-SF (Mayes, 2018) to assess symptoms of ASD, because the CASD-SF is highly correlated with the *DSM-5* criteria (APA, 2013). This choice may explain some of the discrepancies between my findings and the findings of other researchers.

Interpretation of the Findings in the Context of the Theoretical Framework

I used McCubbin and Patterson's (1983) double ABCX model of family adaptation to examine potential interaction effects among ASD symptoms, parental

coping styles, and parental reports of stress. I also used Lazarus and Folkman's (1984) model of stress and coping based on cognitive appraisal and attribution of stressful events to understand the relationship between coping and parental stress in parents of children with ASD.

I applied Lazarus and Folkman's (1984) model of stress and coping to consideration of the relationship between parents' stress and use of appraisal and how different symptoms of ASD might impact that relationship. Researchers have begun to use the ABCX model of family adaptation to understand the stress-related experiences of family members caring for children diagnosed with ASD (Manning et al., 2011; McStay, Dissanayake, et al., 2014; Paynter et al., 2013). The ABCX model can explain how aspects of an ASD diagnosis contribute to parental stress through analysis of the interplay between the crisis (ASD diagnosis), parental resources (coping skills), perceptions about the diagnosis (appraisals), and parents' experience of stress.

McCubbin and Patterson's (1983) double ABCX model of family adaptation posits that when members of a family experience a crisis, they have resources and appraisals that interact to either lead them to experience stress or buffer them against such an experience (Manning et al., 2011; McStay, Dissanayake, et al., 2014; Paynter et al., 2013). Lazarus and Folkman (1984) argued that the way people view or appraise a situation impacts their level of stress. I used the ABCX model to explore the interplay among a children's ASD symptoms, appraisal, and parental stress for parents raising children with ASD aged 3–12 years. Lazarus and Folkman's theory of stress and coping aided understanding of how the use of appraisal impacts parents' stress given their children's symptoms of ASD.

I found no significant relationship between parental stress and use of appraisal. In addition, for parents of high-stereotypy children, there was a positive association between appraisal use and parenting stress: As use of appraisal increased, so did parental stress. My findings contrast with those expected based on Lazarus and Folkman's (1984) theory of stress and coping and the ABCX model (McCubbin & Patterson, 1983), which had led me to predict that parents who used appraisal to cope would experience lower levels of stress than other parents. I also expected that the buffering effect would differ based on ASD symptoms. However, I found use of appraisal was not associated with stress reduction. For children with high stereotypy and severe symptoms overall, there was a positive association between use of appraisal and parental stress.

Limitations of the Study

One limitation in this study is that the results may not generalize to all parents of children with ASD, because the study relied on convenience sampling, and the sample may therefore not have fully represented the population of parents of children with ASD. The sample did appear demographically similar to the samples used by other researchers in a number of ways, but there were some differences: For example, the participants in my study were overwhelmingly White, but ASD is equally prevalent across all racial groups (Maenner et al., 2020). The participants also tended to be well educated, indicating that their socioeconomic status was higher than average. This may have been an outcome of the recruiting methods, because potential participants were recruited from ABA treatment facilities, and individuals treated in these facilities may have characteristics different from those of the overall population of parents of children with ASD. My findings may not generalize to other populations that were not fully represented

in the sample. Participants were anonymous and self-selected to participate in the study. I did not screen participants; participants themselves indicated that they qualified for participation, which may have impacted the validity of the data.

The study design limited the information gathered to subjective self-reported data, which is also a limitation. Symptoms of ASD were potential moderating variables, and parents' self-reports of symptoms may have been unreliable. A more effective approach may have been to use direct behavioral observation by trained clinicians in conjunction with parental ratings. Future researchers should also focus on measures of appraisal and other types of coping, because parents of children with ASD may use other coping strategies not assessed in this study.

Another limitation of the study design was that I could not get information on the types of appraisal and other parental coping skills that parents used, which a qualitative or mixed methods design may have delivered. This information would have been valuable, especially given that the direction of the relationship between the variables was the opposite of that predicted by the theoretical model. Interviews of parents could have placed associations among the variables in context.

A final limitation is that the sample was too small to satisfy the power analysis, which limits the validity of the findings. The study needed data from 103 participants to have sufficient power, and after cleaning the data only 90 participants remained. There were more invalid responses than I anticipated when setting the recruitment goal. The reduced power may have impacted the findings; other symptom variables may have moderated the relationship between appraisal use and stress, but the size of the sample may have prevented me from detecting them.

Recommendations

Future researchers should capture a more representative and larger sample that represents a wider variety of ethnic groups. A more representative sample would increase the ability to generalize any results to individuals outside the study. I also recommend that future researchers integrate behavioral observations rather than relying solely on self-reported data to identify and rate symptoms of ASD. My findings suggest that the relationship between use of appraisal and parental stress among parents of children with ASD is complicated and linked to some of the symptoms of children. Given this complexity, it would be prudent to gain objective information about children's symptoms.

I also recommend that future researchers continue to explore the connections among use of appraisal, parental stress, and ASD symptoms, given my complex and contradictory findings. A qualitative or mixed methods study could be beneficial for detailed investigation of the types of coping strategies parents of children with ASD use and the circumstances in which parents find such strategies useful. My findings, combined with those of Costa et al. (2017) and Lim and Chong (2017), provide further support for the claim that ASD is unique and impacts people in a unique manner.

Implications

The findings indicate that use of appraisal by parents of children with ASD aged 3–12 years does not have an overall beneficial impact on parental stress. Many researchers have documented the use of appraisal as a way to reduce stress in parents of children experiencing other disorders or life events (Finkelstein-Fox et al., 2019; Folkman, 1997; Moskowitz et al., 2009). My findings strengthen the claim that ASD

symptoms have a unique impact on parental stress; indicate that the connections among ASD symptoms, stress, and coping are complicated; and suggest that research related to children without ASD does not generalize to this population (Lim & Chong, 2017).

Parents of children with ASD report more stress than other parents, and it is possible that something specific to the symptoms of ASD is responsible for that increased stress (Lim & Chong, 2017). My findings add support to the notion that symptoms of ASD have a unique impact on parental stress; however, the nature of the connection remains unknown and is apparently complex. This study adds to the literature on the use of appraisal to reduce parental stress (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017) and the literature on ASD symptoms and parental stress in general. Strategies typically used to reduce stress in other situations may not work for parents of children with ASD, which clinicians should consider in work with this population.

It is possible that appraisal works differently when used by parents of children with ASD from the way it works for parents of other children. The type of appraisal used, the nature of crises, and other contextual variables may be relevant to assessing the efficacy of appraisal for reducing stress (Finkelstein-Fox et al., 2019). Different types of appraisal may be useful in different contexts (Finkelstein-Fox et al., 2019). And appraisal that makes one feel better in the moment may lead to choices that exacerbate problems later and eventually increase stress. An alternative interpretation of the findings is that they reflect increased stress leading to increased use of ineffective appraisal: The analyses employed in this study cannot determine cause and effect. Rather than assessing the use of appraisal generally, it may be beneficial to explore the use of specific types of appraisal in a variety of contexts.

The implications for positive social change of the findings include the addition of knowledge to the growing body of research on ASD and parental stress. The findings enhance understanding of the use of appraisal to reduce parental stress and can help professionals in the field who work with the parents and other family members of children with ASD. The findings suggest that use of appraisal is related to increases rather than decreases in stress or, alternatively, that use of appraisal does not decrease or impact parental stress, and clinicians and future researchers should take this into account. It is important to learn more about the unique nature of ASD as it relates to parental stress. Increasing knowledge regarding this topic will eventually lead to sound guidance for practitioners working with families affected by ASD and stress. Improving knowledge about when use of appraisal is effective for parents of children with ASD will help guide practitioners to design interventions and preventative measures. Future researchers can aid understanding of the conditions under which use of appraisal helps parents of children with ASD reduce parental stress.

Clinicians can also realize social change by changing clinical approaches to helping parents and other family members of children with ASD. Clinicians can assess traits or symptoms found to moderate the use of appraisal and guide their treatment of parental stress based on their assessments. Clinicians can also advise parents of children with ASD to use appraisal if such use is associated with reduced stress; however, my findings indicate that appraisal is not always effective for stress reduction, and clinicians should focus on helping parents develop a variety of coping tools. My findings indicate that use of appraisal and parental stress are positively associated in parents of children

with ASD who have high levels of stereotypies and overall symptoms, and clinicians who work with families of these children should consider this association.

Clinicians can help parents of children with ASD address parental stress after they gain information about the children's symptoms and need to tailor their approach accordingly. For parents of children with higher levels of stereotypies and overall symptoms, my findings indicate that clinicians should not focus on the use of appraisal for stress reduction. It is important to learn what works, what does not work, and what works only in certain contexts. At this point, researchers have not conclusively delineated the conditions in which appraisal is clearly effective. More research is needed before practitioners can feel equipped to advise parents raising children with ASD to use specific strategies to reduce stress. Such research and corresponding changes in clinical approach could improve the quality of life of parents of children with ASD and thus the lives of their children.

Conclusion

Diagnosis of ASD in a child is associated with higher levels of parental stress than those associated with any other neurodevelopmental disorder (Costa et al., 2017; Krakovich et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014; Rayan & Ahmad, 2017). Although stress in parents of children with ASD is a significant problem, it is not a universal problem (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). There may be variables that protect some parents against stressors that affect other parents in similar situations. To date, researchers have not conclusively isolated variables that link diagnosis of ASD to parental stress, and they have turned their attention to identifying factors protective against stress, including coping skills (Agazzi et al., 2017;

Costa et al., 2017; Craig et al., 2016; Lim & Chong, 2017; McStay, Dissanayake, et al., 2014).

Researchers have found that although use of appraisal is linked to reduction of stress in some parents of children with ASD, this link is not always present (Costa et al., 2017; Lim & Chong, 2017; Rayan & Ahmad, 2017). Attempts to identify variables that determine when use of appraisal can reduce parental stress have yielded inconsistent findings, and my findings add to the body of literature indicating that the relation between stress and coping among caretakers of children with ASD is complicated and multifaceted. My findings indicate that there is a relationship between use of appraisal and parental stress in parents of children with ASD, and the relation is moderated by some but not all symptoms of ASD.

The results of this study can impact social change by guiding practitioners who work with parents experiencing parental stress and whose children have ASD. Future researchers should aim to replicate my findings before making recommendations to practitioners. Future researchers should also explore the connection between atypical vocalization and use of appraisal by parents of children with ASD to reduce stress. Multiple regression analysis indicated a notable result related to this connection that was not statistically significant but warrants further examination.

The findings of this study add to the body of knowledge regarding the use of appraisal to reduce stress in parents of children with ASD. Through this addition, the findings can contribute to social change. Practitioners can use the findings on stress in parents of children with ASD to provide a greater level of care to this population.

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Appendix A: Approval to Use PSI-4-SF

LICENSE AGREEMENT

THIS AGREEMENT, made this June 21, 2019, by and between Psychological Assessment Resources, Inc., a Florida Corporation, with its principal offices located at 16204 North Florida Avenue, Lutz, Florida 33549, hereinafter referred to as PAR, and Denise V. Wright, MS., BCBS, LBA, with her principal offices located at Walden University, 100 S. Washington Ave # 900, Minneapolis, MN 55401, hereinafter referred to as Licensee.

1) RECITALS

PAR has developed and holds all copyrights and distribution rights to certain psychological tests and related materials as listed in Schedule A, hereinafter called "Test". The Test consists of PAR's items, scoring keys, scales, profiles, standard-score conversion tables, norms tables, interpretive information, and related materials created, prepared, devised, and combined by PAR for the administration, scoring, reporting, and analysis of the Test, and includes the words, symbols, numbers, and letters used to represent the Test. Licensee desires to develop automated procedures for the secure and encrypted administration of the Test through Licensee's secure internet assessment website utilizing Survey Monkey. The access to Licensee's website will be by invitation only in connection with Licensee's research titled, *The Use of Appraisal by Parents of Children with Autism Spectrum Disorder* and to subjects for this research purpose only (the "Limited Purpose(s)"). Unless permitted to do so by a separate license agreement, Licensee only has the right to use the Test for the Limited Purpose described above.

In consideration of the mutual covenants and promises expressed herein and other good and valuable considerations, it is agreed as follows:

2) LICENSE

PAR hereby grants to Licensee, subject to the terms of this Agreement, a non-transferable, non-refundable, non-exclusive license to place the Test on Licensee's Website for the Limited Purpose described in Section 1 above. Licensee agrees to hold secure and treat as proprietary all information transferred to it from PAR. Licensee shall carefully control the use of the Test for the Limited Purpose described in this Agreement. Licensee's use of the Test will be under the supervision or in consultation with a qualified psychologist or other qualified individual and consistent with the then current edition of the Standards for

3) TERMS AND TERMINATION

The initial term of this Agreement shall extend from August 16, 2019 through January 16, 2020, and may be extended only by mutual agreement of the parties. Notwithstanding any other provision of this Agreement, this Agreement may be terminated if any of the following events occur:

(a) Termination is mutually agreed to by the parties.

(b) Licensee defaults in the performance of any of its duties hereunder.

On the effective date of expiration or termination of this Agreement pursuant to subsections (a) and (b) above, all rights in this Agreement revert to PAR. Computer software programs written by or for Licensee remain the property of Licensee. Licensee warrants that upon expiration or termination of this Agreement under subsections (a) and (b) above, and except as set forth in any separate license agreement relating thereto, all portions of the Test licensed hereunder shall be removed from Licensee's Website. Failure to cease all uses of the Test shall constitute copyright infringement.

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The computer programs developed by Licensee and used in any phase of administration and scoring of the Test shall be fully tested by Licensee and shall be encrypted and reasonably protected from access, intrusion and changes by persons who are not authorized agents of Licensee. In addition to the foregoing, Licensee shall exert all reasonable commercial efforts to prevent the Programs, and any accompanying code for the administration of the Test from being accessed, viewed or copied by others. Licensee warrants the accuracy of such scoring and reporting.

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PAR is the owner of all right, title and interest in the Test. Licensee shall acquire no right or interest in the Test, by virtue of this Agreement or by virtue of the use of the Test, except the right to use the Test in accordance with the provisions of this Agreement. Licensee shall not modify or revise the Test in any manner without written approval by PAR. All uses of the Test by Licensee shall inure to the benefit of PAR. Licensee agrees not to challenge or otherwise interfere with the validity of the Test or PAR's ownership of them.

7) ROYALTIES

Licensee agrees to pay PAR a royalty fee for 316 administrations of the Test and copyrighted materials contained therein. Licensee will also provide PAR with an itemized accounting of all administrations of each Test administered by Licensee during the term of this agreement. Licensee shall pay to PAR Two Hundred and Fifty US Dollars ($250.00) as an initial license fee which is due and payable upon the signing of this License Agreement. Licensee shall also pay PAR $0.79 per each test administered for any tests administered above 316 by January 30, 2020. This fee includes a 40% student discount.

For the purposes of this Agreement, an administration of the Test includes any instance where the Test is completed wholly or in part by a subject.

8) ACCOUNTING

Licensee shall develop secure computerized accounting methods acceptable to PAR. Such accounting methods must include an electronic counting mechanism which will accurately record the number of administrations of each Test used. Licensee will keep accurate financial records of all transactions relating to the use of the Test, and PAR shall have the right to examine the software and records of Licensee pertaining to the use of the Test. Licensee will make such software and records accessible to PAR or its nominee during normal working hours upon not less than five (5) business days' prior written notice. Licensee shall retain such software and records for at least one year from the date this Agreement expires or the effective termination date.

The Website shall contain the following copyright notice:

> "Adapted and reproduced by special permission of the Publisher, Psychological Assessment Resources, Inc. (PAR), 16204 North Florida Avenue, Lutz, Florida 33549, from the Parenting Stress Index Fourth Edition Short Form by Richard R. Abidin, EdD. Copyright 1990, 1995, 2012 by PAR. Further reproduction is prohibited without permission of PAR."

9) INDEMNITY

Licensee agrees to indemnify PAR and hold PAR harmless against any claim or demand or against any recovery in any suit (including taxes of any kind, reasonable attorney's fees, litigation costs, and other related expenses) that may be:

(a) brought by or against PAR, arising or alleged to have arisen out of the use of the Test by Licensee;

(b) sustained or incurred by PAR, arising or alleged to have arisen in any way from the breach of any of Licensee's obligations hereunder; or

(c) incurred by PAR in any litigation to enforce this Agreement, including litigation against Licensee.

10) ASSIGNMENT

Licensee shall not assign this Agreement or any license, power, privilege, right, or immunity, or delegate any duty, responsibility, or obligation hereunder, without the prior written consent of PAR. Any assignment by PAR of its rights in the Test shall be made subject to this Agreement.

11) GOVERNING LAW

This Agreement shall be construed according to the laws of the State of Florida of the United States of America. Venue for any legal action relative to this Agreement shall be in the appropriate state court in Hillsborough County, Florida, or in the United States District Court for the Middle District of Florida, Tampa division. Licensee agrees that, in any action relating to this Agreement, the Circuit Court in Hillsborough County, Florida or the United States District Court for the Middle District of Florida, Tampa Division, has personal jurisdiction over Licensee, and that Licensee waives any argument it may otherwise have against the exercise of these courts' personal jurisdiction over Licensee.

12) SEVERABILITY

If any provision of this Agreement shall, to any extent, be invalid and unenforceable such provision shall be deemed not to be part of this Agreement, and the parties agree to remain bound by all remaining provisions.

13) EQUITABLE RELIEF

Licensee acknowledges that irreparable damage would result from unauthorized use of the Test and further agrees that PAR would have no adequate remedy at law to redress such a breach. Therefore, Licensee agrees that, in the event of such

a breach, specific performance and/or injunctive relief, without the necessity of a bond, shall be awarded by a Court of competent jurisdiction.

14) ENTIRE AGREEMENT OF THE PARTIES

This instrument embodies the whole Agreement of the parties. There are no promises, terms, conditions, or obligations for the Test licensed hereunder other than those contained herein; and this Agreement shall supersede all previous communications, representations, or agreements, either written or verbal, between the parties hereto, with the exception of any prior agreements that have not previously been terminated by written consent of both parties or by one party if the terms of the agreement allow. This Agreement may be changed only by an agreement in writing signed by both parties.

15) NOTICES AND MODIFICATIONS

Any notice required or permitted to be given under this Agreement shall be sufficient if in writing and if sent by certified or registered mail postage prepaid to the addresses first herein above written or to such addresses as either party may from time to time amend in writing. No letter, telegram, or communication passing between the parties hereto covering any matter during this contract, or periods thereafter, shall be deemed a part of this Agreement unless it is distinctly stated in such letter, telegram, or communication that it is to constitute a part of this Agreement and is to be attached as a right to this Agreement and is signed by both parties hereto.

16) SUCCESSORS AND ASSIGNS

Subject to the limitations on assignments as provided in Section 10, this Agreement shall be binding on the successors and assigns of the parties hereto.

17) PARAGRAPH HEADINGS

The paragraph headings contained in this Agreement are inserted only for convenience and they are not to be construed as part of this Agreement.

18) AUTHORIZATION AND REPRESENTATION

Each party represents to the others that it has been authorized to execute and deliver this Agreement through the persons signing on its behalf.

IN WITNESS WHEREOF, the parties have executed this Agreement in duplicate on the date first herein above written.

ACCEPTED AND AGREED: [redacted]

Title: STUDENT

ACCEPTED AND AGREED: [redacted]

Title: CEO

SIGNATURE OF PROFESSOR REQUIRED: [redacted]

I hereby agree to supervise this student's use of these materials. I also certify that I am qualified to use and interpret the results of these tests as recommended in the *Standards for Educational and Psychological Testing*, and I assume full responsibility for the proper use of all materials used per this Agreement.

SCHEDULE A

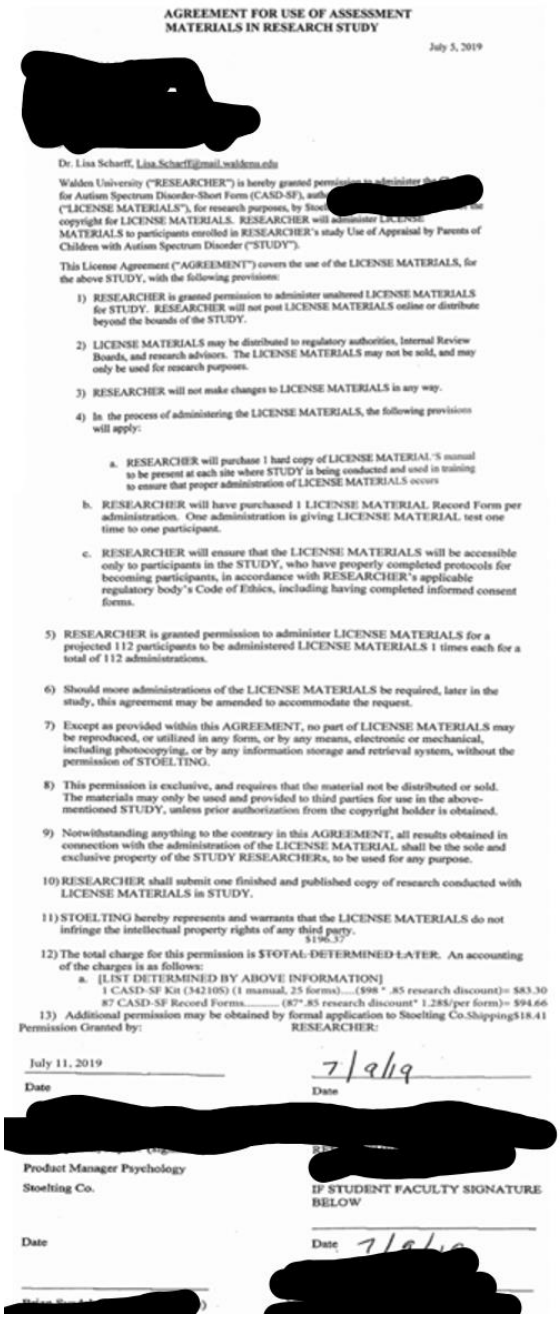
The Test licensed to Licensee pursuant to the above license consist of PAR's items, scoring keys, scales, profiles, standard-score conversion tables, norms tables, and related materials created, prepared, devised, and combined by PAR for the administration, scoring, reporting, and analysis of the Test, and include the words, symbols, numbers, and letters used to represent the Test. However, PAR and Licensee acknowledge and agree that Licensee may use only the PAR items and scoring information for the Test as appropriate for the Limited Purpose. The Test referred to in the body of this Agreement is defined as follows:

1) Parenting Stress Index, Fourth Edition Short Form (PSI-4-SF)
   Record Form
   Score Report

   12 items in the Parental Distress (PD) Scale only

Permission is also granted for you to include up to a total of three (3) sample items from the PSI-4-SF in your dissertation, any further publication in a Journal (or otherwise) will require additional permission.

Appendix B: Approval to Use CASD-SF



AGREEMENT FOR USE OF ASSESSMENT MATERIALS IN RESEARCH STUDY

July 5, 2019

[redacted]

Dr. Lisa Scharff, Lisa.Scharff@mail.waldenu.edu

Walden University ("RESEARCHER") is hereby granted permission to administer the [redacted] for Autism Spectrum Disorder-Short Form (CASD-SF), auth[redacted] ("LICENSE MATERIALS"), for research purposes, by Sto[redacted] the copyright for LICENSE MATERIALS. RESEARCHER will administer LICENSE MATERIALS to participants enrolled in RESEARCHER's study Use of Appraisal by Parents of Children with Autism Spectrum Disorder ("STUDY").

This License Agreement ("AGREEMENT") covers the use of the LICENSE MATERIALS, for the above STUDY, with the following provisions:

1) RESEARCHER is granted permission to administer unaltered LICENSE MATERIALS for STUDY. RESEARCHER will not post LICENSE MATERIALS online or distribute beyond the bounds of the STUDY.

2) LICENSE MATERIALS may be distributed to regulatory authorities, Internal Review Boards, and research advisors. The LICENSE MATERIALS may not be sold, and may only be used for research purposes.

3) RESEARCHER will not make changes to LICENSE MATERIALS in any way.

4) In the process of administering the LICENSE MATERIALS, the following provisions will apply:

   a. RESEARCHER will purchase 1 hard copy of LICENSE MATERIAL'S manual to be present at each site where STUDY is being conducted and used in training to ensure that proper administration of LICENSE MATERIALS occurs

   b. RESEARCHER will have purchased 1 LICENSE MATERIAL Record Form per administration. One administration is giving LICENSE MATERIAL test one time to one participant.

   c. RESEARCHER will ensure that the LICENSE MATERIALS will be accessible only to participants in the STUDY, who have properly completed protocols for becoming participants, in accordance with RESEARCHER's applicable regulatory body's Code of Ethics, including having completed informed consent forms.

5) RESEARCHER is granted permission to administer LICENSE MATERIALS for a projected 112 participants to be administered LICENSE MATERIALS 1 times each for a total of 112 administrations.

6) Should more administrations of the LICENSE MATERIALS be required, later in the study, this agreement may be amended to accommodate the request.

7) Except as provided within this AGREEMENT, no part of LICENSE MATERIALS may be reproduced, or utilized in any form, or by any means, electronic or mechanical, including photocopying, or by any information storage and retrieval system, without the permission of STOELTING.

8) This permission is exclusive, and requires that the material not be distributed or sold. The materials may only be used and provided to third parties for use in the above-mentioned STUDY, unless prior authorization from the copyright holder is obtained.

9) Notwithstanding anything to the contrary in this AGREEMENT, all results obtained in connection with the administration of the LICENSE MATERIAL shall be the sole and exclusive property of the STUDY RESEARCHERs, to be used for any purpose.

10) RESEARCHER shall submit one finished and published copy of research conducted with LICENSE MATERIALS in STUDY.

11) STOELTING hereby represents and warrants that the LICENSE MATERIALS do not infringe the intellectual property rights of any third party.

12) The total charge for this permission is ~~$TOTAL DETERMINED LATER~~ $196.57. An accounting of the charges is as follows:
   a. [LIST DETERMINED BY ABOVE INFORMATION]
      1 CASD-SF Kit (342105) (1 manual, 25 forms).....($98 * .85 research discount)= $83.30
      87 CASD-SF Record Forms..... (87*.85 research discount* 1.28$/per form)= $94.66

13) Additional permission may be obtained by formal application to Stoelting Co.Shipping$18.41

Permission Granted by:

July 11, 2019
Date

[redacted]
Product Manager Psychology
Stoelting Co.

Date

RESEARCHER:

7/9/19
Date

[redacted]

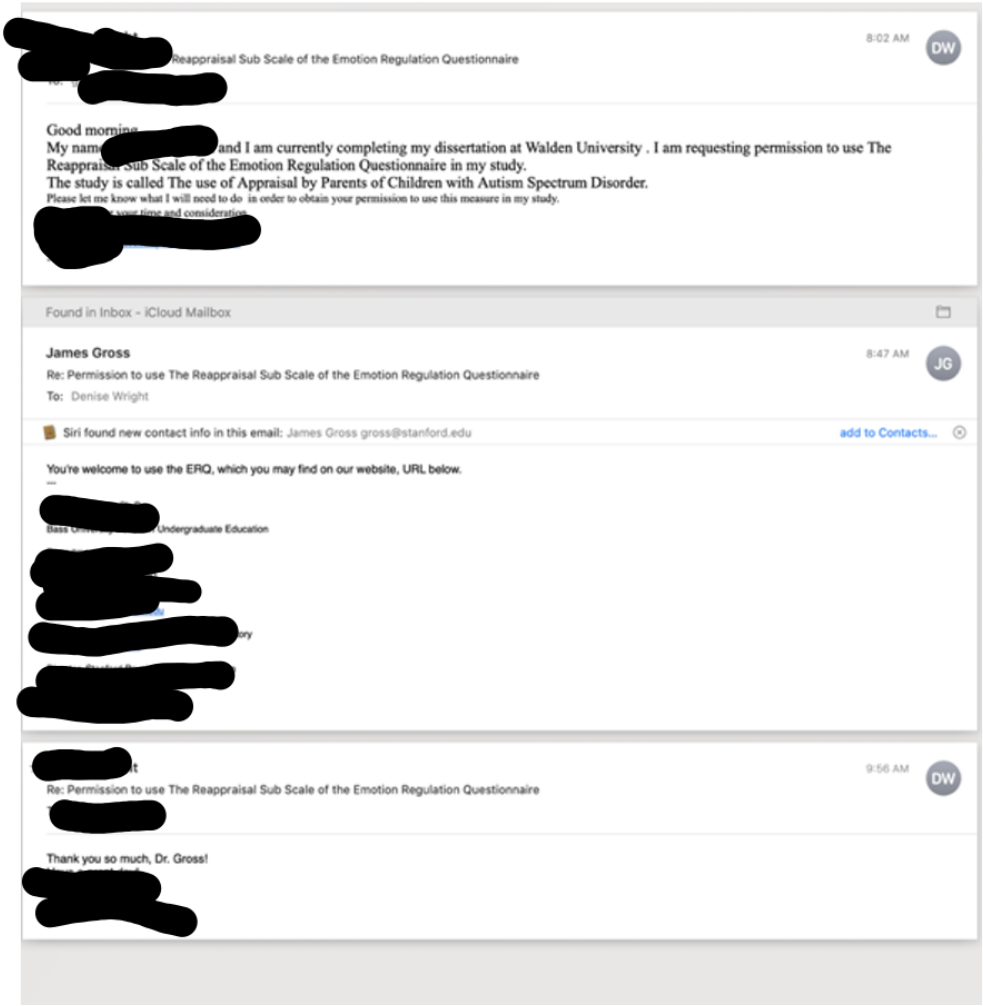
IF STUDENT FACULTY SIGNATURE BELOW

Date

Date 7/9/19

[redacted]

Appendix C: Approval to use ERQ



[redacted] Reappraisal Sub Scale of the Emotion Regulation Questionnaire

8:02 AM DW

Good morning
My nam[redacted] and I am currently completing my dissertation at Walden University . I am requesting permission to use The Reappraisal Sub Scale of the Emotion Regulation Questionnaire in my study.
The study is called The use of Appraisal by Parents of Children with Autism Spectrum Disorder.
Please let me know what I will need to do in order to obtain your permission to use this measure in my study.
[redacted]

Found in Inbox - iCloud Mailbox

James Gross
8:47 AM JG
Re: Permission to use The Reappraisal Sub Scale of the Emotion Regulation Questionnaire
To: Denise Wright

Siri found new contact info in this email: James Gross gross@stanford.edu add to Contacts...

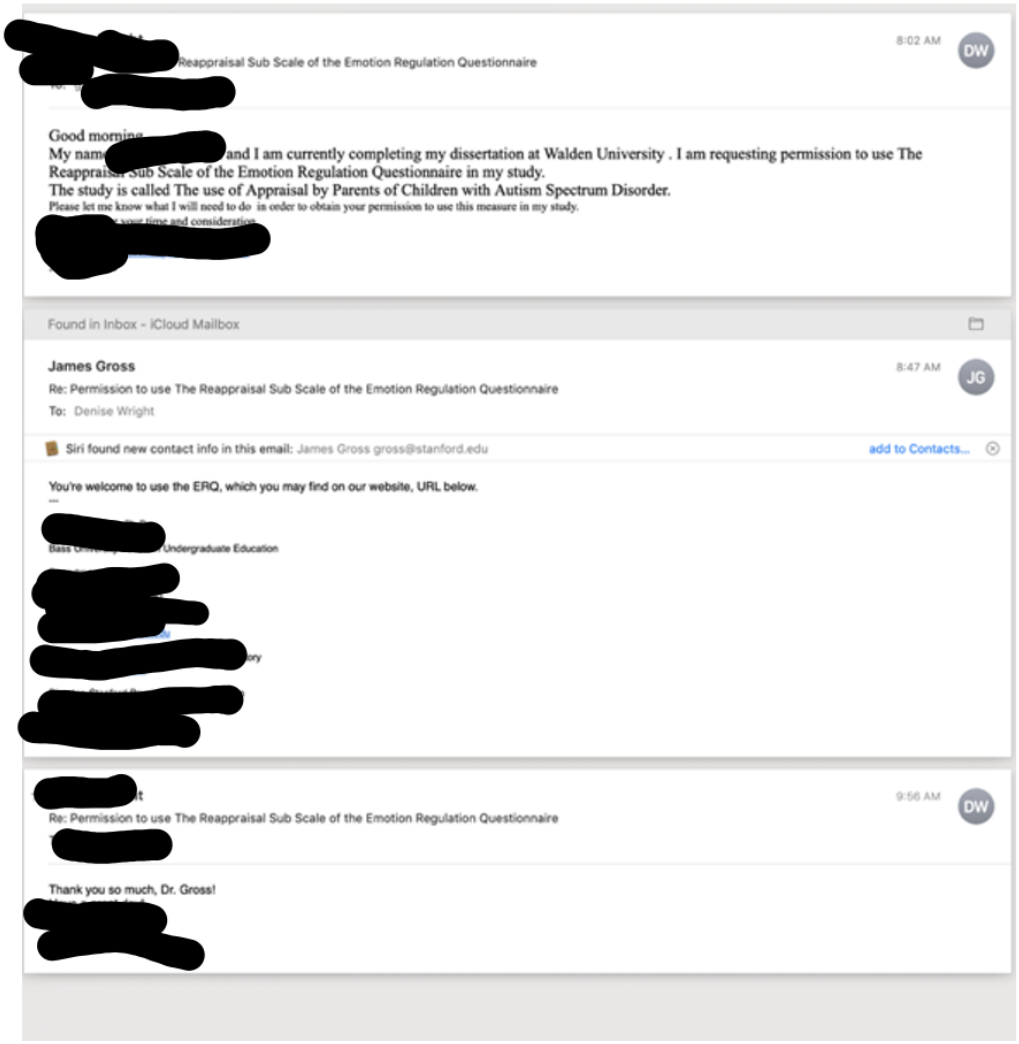
You're welcome to use the ERQ, which you may find on our website, URL below.

[redacted] Undergraduate Education
[redacted]

[redacted]
9:56 AM DW
Re: Permission to use The Reappraisal Sub Scale of the Emotion Regulation Questionnaire
[redacted]

Thank you so much, Dr. Gross!
[redacted]

Appendix D: Permission to Use Adapted Table



[redacted] Reappraisal Sub Scale of the Emotion Regulation Questionnaire

8:02 AM DW

Good morning
My nam[redacted] and I am currently completing my dissertation at Walden University . I am requesting permission to use The Reappraisal Sub Scale of the Emotion Regulation Questionnaire in my study.
The study is called The use of Appraisal by Parents of Children with Autism Spectrum Disorder.
Please let me know what I will need to do in order to obtain your permission to use this measure in my study.
[redacted]

Found in Inbox - iCloud Mailbox

James Gross
8:47 AM JG
Re: Permission to use The Reappraisal Sub Scale of the Emotion Regulation Questionnaire
To: Denise Wright

Siri found new contact info in this email: James Gross gross@stanford.edu add to Contacts...

You're welcome to use the ERQ, which you may find on our website, URL below.
[redacted]
Undergraduate Education
[redacted]

[redacted]
9:56 AM DW
Re: Permission to use The Reappraisal Sub Scale of the Emotion Regulation Questionnaire
[redacted]

Thank you so much, Dr. Gross!
[redacted]

Appendix E: Social Media Post and Flyer and Brief Summary of the Study

The purpose of the study is to gain more knowledge about the use of appraisal as a coping skill when used by parents of children with ASD. It is possible that symptoms of ASD may impact on the efficacy of appraisal when used by parents of children with ASD to cope with feelings of stress. It may be helpful for researcher to learn if symptoms of ASD have an impact on the use of appraisal to reduce stress in parents of children with ASD. Parents who are at least 21 years of age and have a child aged 3 to 12 with ASD are invited to complete this study. The study can be completed online by following the links provided below. The study requires 8 to 10 minutes and includes three self-report assessments which total 22 responses and a four-item open-ended demographic questionnaire. The three assessments include the Checklist for Autism Spectrum Disorder- Short Form (CASD-SF: Mayes, 2018), the Parent Distress (PD) subscale of the Parenting Stress Index-Short Form (PSI-4-SF: Abidin, 1995) and the Reappraisal subscale of the Emotional Regulation Questionnaire (ERQ: Gross & John, 2003). The CASD-SF is used to identity symptoms of ASD. The PD subscale of the PSI-4-SF (Abidin, 1995) is the subscale of the full parent stress inventory designed by Abidin (1995) to identify the degree in which parents self-report symptoms of parent distress, and the ERQ (Gross & John; 2003) is a measure of the use of appraisal as a coping skill. I hope you have time to participate in this short survey study as it has the potential to help individuals as well as society. This study has the potential to benefit parents who experience stress, children who are raised by parents under stress and also society who bear the responsibility of treating these families. Gaining knowledge that can help improve the quality of life for families caring for individuals with ASD across their

lifespan may reduce parental stress. This may, in turn, improve the quality of life for families with children with ASD, and may reduce the clinical, educational, and financial burden shared by society.

My name is Denise Wright, and I am a student at Walden University. I am conducting a research study for my dissertation as a part of a PhD program in Clinical Psychology. I am inviting parents (who are at least 21 years of age) of children aged 3 to 12 with a diagnosis of ASD to participate in a study to explore the use of parental coping skills to determine if features of autism might interact with those skills.

If you choose to participate in this study, it should take you approximately 20 minutes. You will be asked to complete questions about yourself (including your age, gender, and education level) and about your experience of parental stress, coping, and your child's symptoms. There is no perceived risk and no incentive offered for participation in this study.

Resources will be provided to anyone who may want more information on parental stress, coping, and parenting a child with ASD. Please contact me at Appraisal@Behaviorchangesuccessaba.com if you have any questions, would like to be provided with the results of this study, or want to request the list of resources.

In order to complete the study, you must:

- Be a parent of a child aged 3 to 12 who is diagnosed with ASD
- Be at least 21 years of age

Clicking on the link below indicates that you meet the requirements above.

- I am aware this is an anonymous study and that the researcher will not be aware of my name or any identifying information
- I am completing this survey without coercion
- I am aware that I may stop answering questions at any time. I am not obligated to finish the questions.

Please follow the link:
Thank you for taking the time to complete this study!

Appendix F: Resources

Parenting Resources

1. **American Psychological Association Psychology Help Center**. Family and Relationshipshttps://www.apa.org/helpcenter/family/index
2. **Coping Strategies for Our Mental Health**. Network. Educate. Empower. NWR of New Albany Inc.https://www.nwralbany.org/getyourlifeblog/2017/12/28/coping-strategies-for-our-mental-health
3. **HealthyChildren.org** www.healthychildren.org AAP parenting website backed by pediatricians. Site includes everything from general child health guidance to information on specific issues and conditions.
4. **Center for Parent Information and Resources** (CPIR)/OSEP. www.parentcenterhub.org/find-your-center/ Families with a child who has a disability often need information about the disability of their child, about early intervention (for babies and toddlers), school services (for school-aged children), therapy, local policies, transportation, and much more. Every State has at least one Parent Training and Information Center (PTI). Many states also have a Community Parent Resource Center (CPRC), which offers the same type of support and training to parents of children with disabilities.
5. **Early Childhood Technical Assistance Center** (ECTA Center). http://ectacenter.org/families.asp. To help families understand their rights under the Individuals with Disabilities Education Act (IDEA), connect with other families, and find high-quality resources related to caring for infants, toddlers, and young children with disabilities.

Coping Skills and Stress Management

1. **Positive Psychology Program** which provides 10 work sheets and links to various articles on developing coping skills and resilience. https://positivepsychologyprogram.com/coping-skills-worksheets/
2. **Managing Stress**
3. **Positive Psychology Strategies for Managing Stress** https://positivepsychologyprogram.com/stress-management-techniques-tips-burn-out/
4. **Stress Management Help Guide** which provides some self-help stress management techniques https://www.helpguide.org/articles/stress/stress-management.htm/
5. **Stress Management and Coping Skills Apps** which can be accessed on a phone. The apps provide mindfulness training, breathing and relaxation training and heart rate coherence training: calm, cardiac coherence, heart rate plus coherence, breathe 2 relax.

Autism Spectrum Disorder

1. **AAP Autism Initiatives** www.aap.org/autism The AAP Council on Children with Disabilities (COCWD) is dedicated to optimal care and development of children with disabilities and to the support of their families within a medical home. The COCWD Autism Subcommittee is the main point of contact for the AAP on issues related to autism.
2. **Understanding Autism Spectrum Disorder**. This 36-page booklet provides answers to questions parents have about autism including: symptoms, diagnosis,

treatment strategies, and transitioning to adulthood. This resource helps identify symptoms so that an intervention program can be started as soon as possible.

3 **American Academy of Child & Adolescent Psychiatry**: Autism Resource Center. **www.aacap.org**/aacap/families_and_youth/resource_centers/Autism_Resource_Center/Home.aspx Resource Centers provide consumer-friendly information, definitions, FAQs, clinical resources, expert videos, and literature relevant to autism.

4 **Association of Maternal and Child Health Program** (AMCHP) State Public Health Autism Resource Center (SPHARC). http://www.amchp.org/programsandtopics/CYSHCN/projects/spharc. Web-based resource center intended to provide ongoing technical assistance and facilitate cross-state learning to increase the capacity of states, particularly Title V programs, in developing and implementing systems of care for children and youths with ASD and other developmental disabilities through resource development, technical assistance, and peer learning.

5 **Autism NOW**: The National Autism Resource and Information Center (www.autismnow.org) is a central point of resources and information for individuals with ASD and other developmental disabilities, their families, and other key stakeholders (The Arc).

Appendix G: Demographic Questionnaire

Your Age: _____
Your Gender: _____
Child's Age _____
Child's Gender _____
Which Race do you identify with?

- White
- Black or African American
- Asian
- American Indian or Alaska Native
- Native Hawaiian or Another Pacific Islander?

Highest level of education?

- Less than High School degree
- High School graduate
- Some college/trade school
- Graduate degree