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Examining Depression Symptoms, Parental Stress, and Dispositional Mindfulness in Mothers of Children with Autism Spectrum Disorder

Tracey Ward
Seattle Pacific University

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Tracey Ward, M.S.

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Approved by:

Beverly Wilson, Ph.D.
Associate Professor of Clinical Psychology
Dissertation Chair

Thane Erickson, Ph.D.
Associate Professor of Psychology
Director of Clinical Training
Committee Member

Felice Orlich Ph.D.
Seattle Children's Hospital
Seattle Children's Autism Clinic

Reviewed by:

Amy Mezulis, Ph.D.
Chair, Department of Clinical

Kathleen Tangenberg, Ph.D.
Dean, School of Psychology, Family & Community

Dedication

I dedicate this manuscript to the many loving and supportive people who supported me throughout this process. To my husband Edouard, you were my enduring coach and partner who cared for our family while I spent many long days and nights writing and growing, always encouraging me to be the best version of myself. To my son, Jules, who is my inspiration to be a better human, psychologist, and mother. I hope that one day you will find a profession that brings you joy and speaks to your passion as I have in the field of psychology. To my friends, thank you for supporting me on this graduate school journey, encouraging me and understanding that the road to success included many missed social engagements. To my clinical and professional mentor, Dr. Jennifer Gerdts, thank you for recognizing my interest and passion nearly 10 years ago, continuing to encourage and recognize my strengths at every stage of development. Lastly to my family. To my mother, your wisdom and passion for children inspired me to dedicate my life to understanding and improving the lives of children and parents. To my father, you pushed me intellectually and thoughtfully, welcoming paper edits and debates. To my sister, you were my steadfast supporter, always understanding my dedication and commitment to this field. I simply could not have done this without you.

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Abstract

The current study explored depression symptoms, parental stress and dispositional mindfulness in mothers of children with and without autism spectrum disorder (ASD). This study sought to clarify whether parental stress was a risk factor for maternal depression symptomology and if dispositional mindfulness explained the variation in parental stress and depressive symptoms in this population. Participants included 32 mothers of children with typical development (n=21; TD) and ASD (n=11) between the ages of 3:0 and 6:11. Groups differed significantly by child sex (ASD = 81.1% male; TD = 42.9% male). No additional group differences were present for children or mothers in terms of age, verbal abilities, ethnicity, income, relationship status, and education. Self-report measures of maternal depressive symptoms, parental stress, and dispositional mindfulness were collected from both groups. Results indicated that diagnostic status significantly predicted parent reported depression symptoms and stress, such that there was a significant, positive association between mothers of children with ASD, depression; $F(1,30) = 8.63$ $p = .006$, $R^2 = .22$) and maternal stress $b = 14.15$, $t(30) = 6.37$, $p < .001$, $R^2 = .58$. Parental stress fully mediated the relation between status and depression symptoms, significantly explaining the variance between status and depression and indicating the presence of a full mediation, $B = 4.20$, $CI_{95} = 1.27$ to 7.08. The conditional indirect effect of mindfulness moderating indirect effects of diagnostic status via stress on depression was not significant. Post hoc analyses revealed 73% mothers of children with ASD reported clinically significant depression symptoms, compared to 23% of mothers within the TD group. Correlations displayed lower mindfulness abilities in mothers with higher depression and stress when both groups were combined. The results of this study underscore the significant mental health burden that mothers of children with ASD experience. In particular, mothers of children with ASD are considerably more affected by depression symptoms and have greater stress than mothers of children without ASD. While the results in this study did not support mindfulness as a protective trait for mothers, post hoc analyses imply the possibility that mindfulness may continue to be an important area of intervention.

Keywords: ASD; autism; depression; parental stress; mindfulness; maternal mental health

Chapter I

Introduction and Literature Review

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impairments in two domains including restricted and repetitive behaviors and interests and social communication (American Psychiatric Association, 2013). ASD affects nearly 1 in 59 children in the United States, which represents a 120% increase in diagnoses since 2002 (Baio et al., 2018; Christensen et al., 2016). As the mental health system attempts to respond to the myriad of needs for families affected by ASD, it is clear that ASD is a growing public health challenge. Typically, the emphasis of treatments for ASD directly focuses on the developmental goals of the child, while support for the mental health of parents is often unaddressed (Estes et al., 2013; Singer, Ethridge, & Aldana, 2007). However, caregivers are often under considerable distress due to child variables such as problem behaviors (Estes et al., 2013). Further, parents of newly diagnosed children are faced with challenges related to understanding their child's new diagnosis, navigating a complicated mental health system, while balancing parental responsibilities at same time (McGrew & Keyes, 2014). As such, many parents of children with ASD exhibit increased mental health symptoms including stress, anxiety and depression symptoms.

Parents of children with ASD report higher levels of mental health challenges than parents of children with other developmental disabilities and children with typical development (Dykens, Fisher, Taylor, Lambert, & Miodrag et al., 2014; Seltzer et al., 2010). Specifically, parents of children with ASD often report increased anxiety, depression, and have greater incidences of physical illness (Hayes & Watson, 2013; Singer, 2008). Stress associated with parenting children with ASD may provide a possible explanation for the elevated depressive symptoms in these parents (Benson & Karlof, 2009). Although parental mental health

is often not a focal point of treatment for families of children with ASD, several interventions have been proposed to reduce mental health symptoms commonly reported by parents of children with ASD, including stress, anxiety and depression (Singer et al., 2007). Treatment strategies utilizing mindfulness approaches may be especially beneficial as the aforementioned symptoms are targeted by skills which can be seamlessly implemented in ones' daily routines, providing longer lasting benefits (Conner & White, 2014; Dykens et al., 2014).

Programs teaching mindfulness techniques, such as Mindfulness-Based Stress Reduction (MBSR), have displayed promising results such as decreased parenting stress, decreased anxiety and depression, and increased sleep, well-being and life satisfaction (Conner & White, 2014; Dykens et al., 2014). Theoretical proposals of mindfulness suggest that mindfulness may be superior to other cognitively oriented parental interventions due to the seemingly simple intervention strategies targeting physiology and cognitions (e.g., awareness on body signals in body scan and noticing thoughts; Baer, 2009; Brown & Ryan, 2003; Dykens et al., 2014). Due to these findings, it is plausible that differential parent stress and mental health profiles exist in parents with varying tendencies toward being mindful, known as dispositional mindfulness (Beer, Ward, & Moar, 2013; Bränström, Duncan, & Moskowitz, 2011a; Conner & White, 2014; Garland, Gaylord, & Fredrickson, 2011). As such, investigating the affective and behavioral mechanisms through which stress and mental health symptoms manifest in parents of children with ASD is fundamental to providing optimal support to families affected by ASD.

Therefore, this study aims to investigate if dispositional mindfulness buffers the mediation of parental stress on mental health outcomes in parents of children with ASD. The primary motive of this study is to investigate the relationship between stress, depression and parenting a child with ASD, and whether tendency toward a mindfulness disposition buffers the

symptoms of maternal stress, subsequently reducing the likelihood of depressive symptoms in mothers of children with ASD. The following sections provide an overview of ASD, definitions and empirical reviews of parenting stress, depression symptoms in parents, and dispositional mindfulness, and provide evidence for investigating how these variables relate to affect depressive symptoms in parents of children with ASD.

Autism Spectrum Disorders

Overview

ASD is a neurodevelopmental disorder characterized by impairment across two domains: reciprocal social communication and restricted and repetitive patterns of behavior, interests or activities (American Psychiatric Association, 2013). Symptoms associated with ASD are typically evident within the first two years of life as evidenced by developmental delays, loss of previously acquired skills or developmental plateaus in the areas of social and/or language skills. Within the first year of life, children with ASD typically present with lack of interest in social interaction or unusual social interactions, odd play patterns, and unusual communication patterns. During the second year of life, children with ASD tend to exhibit odd and repetitive behaviors and play patterns that are atypical, including lining up toys for extending periods of time and becoming upset if the toys were moved (American Psychiatric Association, 2013). ASD is a lifelong disorder and represents a public health challenges due to its early onset, persistence across the lifetime, and variability of impairment (Simonoff et al., 2008). It is estimated that lifetime costs for caring for an individual with ASD based on costs of services and support and economic/productivity loses are $2.4 million for an individual with ASD with intellectual disability and $1.4 million for those without intellectual disability (Buescher, Cidav, Knapp, & Mandell, 2014). Further, approximately 70% of individuals with ASD also have at least one

comorbid psychiatric condition including anxiety disorders, depression, attention deficit hyperactivity disorder, obsessive compulsive disorder, and oppositional defiant disorder, contributing to the increased burden on children with autism and their families (Leyfer et al., 2006; Simonoff et al., 2008).

Diagnostic Specifiers

Individuals with ASD present with substantial variability in symptom severity and functional impairment, within various contexts and over the course of their lives To capture this variability, the Diagnostic and Statistical Manuel of Mental Disorders, Fifth Edition (DSM-5; American Psychiatric Association, 2013) includes three specifiers to succinctly describe current symptomatology. Specifiers include: *with or without accompanying intellectual disability, with or without accompanying language impairment*, and *severity level* used to describe impairment and level of recommended support in each diagnostic domain (e.g., reciprocal social communication and restricted and repetitive patterns of behavior, interests or activities). Severity level ranges include Level 3: requiring very substantial support, Level 2: requiring substantial support, and Level 1: requiring support (APA, 2013). Clinicians differentially specify level of impairment for an individual in each domain, thus more accurately representing the diagnostic heterogeneity of symptoms of individuals with ASD. These diagnostic specifiers lend to a more accurate understanding of individuals' strengths and challenges between service providers and across settings.

Epidemiology

Approximately 1 in 6 children in the United States have a developmental disability ranging from mild impairment in speech and language or attention deficit hyperactivity disorder to more severely impairing intellectual disabilities, cerebral palsy and ASD (Boyle et al., 2011).

The rates of autism have risen steadily since the 1990s along with rates of ADHD and other developmental delays (Boyle et al., 2011; Christensen et al., 2016). In a recent article released by the Centers for Disease Control (CDC), prevalence rates of ASD is currently estimated to affect nearly 1 in 59 individuals (Baio et al., 2018). ASD is reported across all racial, ethnic and socioeconomic groups; however, ASD disproportionally affects boys (26.6 in 1,000) compared to girls (6.6 per 1,000), with a total prevalence of 16.8 in 1,000), and significantly higher for non-Hispanic white children (17.2 per 1,000) than for non-Hispanic black children (16 per 1,000 (Baio et al., 2018). Children with ASD also present with variability in intellectual ability. Comorbid intellectual disability is classified in 31% of children with ASD and it is higher in girls than boys (36% vs. 29%, respectively), while 25% of children with ASD are in the borderline range of intellectual disability, and 44% are in the average range (Christensen et al., 2016). In regard to early developmental concerns, 89% of children have documentation of early concerns before 36 months of age and when intellectual disability was present, early documentation rates rose to 95%. The American Academy of Pediatrics recommends providers administer two ASD screenings at 18 and 24 months and when screening results are concerning, a comprehensive diagnostic evaluation should be initiated (Christensen et al., 2016). As a result, on average children exhibiting symptoms consistent with ASD receive a comprehensive diagnosis between 36 and 40 months. The rise in ASD prevalence may be related to several factors including greater awareness of ASD of symptoms and lifelong consequences of ASD, the expansion of the diagnostic criteria in the DSM-5, and greater focus on earlier screening and diagnosis (Kirby, 2015).

Etiology

The etiology of ASD includes a combination of genetic, prenatal, perinatal and postnatal factors (Hertz-Picciotto et al., 2006; Newschaffer et al., 2007; Ornoy, Weinstein-Fudim, & Ergaz, 2015). Genetic factors were initially highlighted through early twin studies that report heritability of ASD is estimated to be as high as 90%, suggesting that genetics contribute significantly to ASD biology (Bailey et al., 1995). Supporting these data, siblings of those with ASD have a 20% increased risk of having ASD compared to the risk in the general population (Ozonoff et al., 2011). Further, roughly 80% of siblings who do not go on to receive a diagnosis of ASD share autism-like characteristics called the broader autism phenotype (e.g., some social skills deficits or restricted interests but not meeting full clinical impairment), suggesting strong genetic lability for autism traits in families (Gerdts & Bernier, 2011).

Underlying genetic etiology is significantly varied with several hundred mutations identified with estimates suggesting up to 1,000 ASD risk genes, while only in rare cases can ASD be attributed to single gene events (O'Roak et al., 2012; Sanders et al., 2012). The application of a genetics-first approach (e.g., characterizing individuals by common genotypes rather than grouping patients on outward phenotype characteristics; Jeste & Geschwind, 2014; Stessman, Bernier, & Eichler, 2014) has uncovered distinct genetic subtypes of ASD, such as mutations of *DYRK1A* (van Bon et al., 2016), *ADNP* (Helsmoortel et al., 2014; O'Roak et al., 2012), and *CHD8* (Bernier et al., 2014) as well as demonstrated highly variable psychiatric phenotypes, such as with 16p11.2 CNV (Girirajan et al., 2010; Hanson et al, 2014).

While there is not a clear consensus on the casual mechanisms of ASD, preliminary evidence suggests that additional factors contribute to the etiology of ASD, including parental characteristics and prenatal exposures. A review article conducted by Ornoy, Weinstein-Fudim

and Ergaz (2015) highlighted several etiological factors including maternal infection, exposure to teratogens, and parental and child characteristics such as mental health and medical history. The documented maternal infection factors include maternal infection and disease during pregnancy such as influenza, diabetes, toxoplasmosis and fever, Cytomegalovirus infection, antenatal inflammation and immune activation, and gestational diabetes (Ornoy et al., 2001). Exposure to environmental teratogens, which are agents that can negative affect the development of a fetus in utero, and chemicals pesticides include insecticides, misoprostol, thalidomide SSRIs, low and high folic acid and B12, heightened air pollution exposure, cocaine, and high levels of ethanol (Ornoy et al., 2001; Raghavan, Fallin, & Wang, 2016; Raz et al., 2014; Schmidt et al., 2012). In terms of parental and child characteristics, advanced maternal and paternal age, use of assisted reproductive technology, premature birth, high maternal body mass index and gestational weight have all been associated with ASD risk (Fountain et al., 2015; Gardner et al., 2015; King, Fountain, Dakhlallah, & Bearman, 2009). Recent research has examined the use of antidepressants, specifically selective serotonin reuptake inhibitors (SSRIs) during the second and third trimester and found an 87% increased risk of having a child with ASD, even after controlling for maternal history of depression; however evidence is preliminary and should be interpreted with caution (Boukhris, Sheehy, Mottron, & Bérard, 2016). More research is needed to unravel the environmental and genetic factors associated with ASD however, the given the complex and still largely unknown etiology of ASD, the mental health and wellbeing of families affected by ASD deserves special attention. One such factor necessitating significant attention to understand parental well-being and mental health is the experience of stress among caregivers.

Parenting Stress

Parenting stress is understood as the experience of distress or discomfort resulting from the role-specific demands of parenting that are qualitatively different than stressors from other life domains (Deater-Deckard, 1998). Even though additional stressors (i.e., work related stress, interpersonal stress, etc.) may influence parenting stress, generally parenting stress is strongly related to differences between parent characteristics (i.e., temperament, psychopathology, etc.) and child characteristics (i.e. ASD diagnosis, temperament/difficult child, etc.; Abidin, 1990a). According to Deater-Deckard, parenting stress occurs when one's perceived resources or ability to parent is low compared to one's perceived demands of parenting, often resulting in negative psychological reactions to parenting (1998). As such, the sources of parenting stress occur through a transactional, dynamic interplay of multiple parent, child and situational characteristics that vary by parent-child dyad (Abidin, 1990a).

Researchers investigating parenting stress have examined the task demands of parenting, the parents' psychological well-being and behaviors, the quality of the parent-child relationship, and the child's psychological adjustment when conceptualizing parental stress reaction (Deater-Deckard, 1998). Early on, seminal researchers (e.g., Abidin, 1990a; Mash & Johnson, 1983; Webster-Stratton, 1990) proposed models elucidating parent psychosocial factors that play a strong role in the impact of stress on parent-child outcomes. For example, Deater-Deckard, (2005) found that mothers' perceptions between sibling children's behavioral problems were tied to warmth and hostility toward their children. It was suggested that parental cognitions are a "key facet of parenting stress" and subsequent parental behaviors and must be understood through assessment of parents' attitudes, attributions, and expectations (Deater-Deckard, 2005). Models implicating parental cognitions as a mediator in relation to parenting behavior and subsequent

parenting stress outcomes were proposed as a call to action among parenting stress researchers as a necessary next step for future research. Nearly 30 years since the seminal work of Webster-Stratton, Mash, Johnson, and Abidin, the need for complex parenting stress models continues to exist for special populations such as parents of children with ASD. The current study seeks to explore the interplay of complex parental psychosocial factors affecting parents of children with ASD. The following sections provides a brief overview of general theory related to parenting stress, a broad understanding of parenting stress in ASD, and possible mechanisms associated with parenting stress.

General Theory

Parenting stress can primarily be understood utilizing the fundamental theory of stress proposed by Lazarus and Folkman's Transactional Model of Stress and Coping (1979). Deater-Deckard (1998) expanded on Lazarus and Folkman's Model by suggesting that parenting stress occurs in the context of four interacting factors: 1) an external causal event; 2) parental cognitive appraisal of the event which evaluates if the event is harmful; 3) one's coping mechanisms available to reduce the harm of the event; and 4) the resulting effects of the body (i.e., the stress reaction). These two theories explain the process of parenting stress as a dynamic interaction between external stressors, the parental response to those stressors, and parental ability to cope or respond. These factors intertwine to result in a physiological and psychological stress reaction.

Lazarus and Folkman's Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping (Lazarus, 1966; Folkman & Lazarus, 1979) helps frame the experience of stress in parents of children with ASD. The emphasis of this model is on the transactional relationship between a parent and their environment leading to individual perceptions/cognitive appraisals of stress. Cognitive appraisals reflect a distinctive

and continually changing processes of interpreting and evaluating the world through two lenses--individual traits, such as values, and environmental characteristics, such as situational components. Research has documented that appraisal of an experience or situation is central to the emotional response that follows (Gross, 2002). The concept of appraisal is necessary because there are individual differences in the degree of sensitivities, vulnerabilities, interpretations, and reactions of an event that a parent might possess. For example, a parent whose child receives a diagnosis of ASD may react with sadness, while another person may react with relief. The second key component suggests that distinguishing between benign and dangerous situations determines ones' survival and well-being. Therefore, individuals instinctually and continually evaluate the meaning and significance of events throughout their life (Lazarus, 1984).

In the context of parenting, Deater-Deckard (1998) highlights that parents may appraise stressors related to their child differently when determining the severity of harm. This variance in appraisal differentially impacts their stress response. For example, one parent may evaluate a child's tantrum as harmful while another parent may evaluate the tantrum as common and harmless subsequently leading to differential stress responses. Understanding individual differences in parental cognitive appraisals is crucial to understanding the parental stress response because a stress response is directly linked to the parental coping response (Deater-Deckard, 1998). These components (e.g., external stimuli, appraisals, and coping) interrelate to influence parenting perceptions, relational qualities and parent-child psychological health.

Extant research highlights that parents under high stress conditions is associated with increased depression and decreased psycho-social support (Bromley, 2004; Dabrowska & Pisula, 2010; Dykens et al., 2014; Hayes & Watson, 2013). As such, a dissection of the stress response may provide clinicians with possible avenues of intervention to support parents in high parental

stress cohorts, such as those with children with ASD. The following section provides a general overview of parenting stress in ASD and possible mechanisms associated with parenting stress.

Parental Stress and ASD

The following section will review the literature pertaining to parenting stress in ASD before addressing the possible mechanisms proposed in this study. It is clear that parents of children with ASD face complex challenges related to caregiving that affect their mental and physical health overtime. Parents of children with ASD display greater physical health related outcomes associated with stress such as biological changes including dysregulated cortisol profiles, reduced immune function, and insomnia due to sustained exposure to stress compared to parents without children with ASD (Dykens et al., 2014; Foody, James, & Leader, 2014; Seltzer et al., 2010). Overall, parents of children with ASD report higher levels of parenting stress and mental health symptoms than parents of children with typical development or other developmental disabilities, such as Down Syndrome (Dabrowska & Pisula, 2010; Dykens et al., 2014; Hayes & Watson, 2013; Seltzer et al., 2010). Evidence suggests that parents of children with ASD experience high parenting stress, high rates of depression and anxiety (Hayes and Watson, 2013; Kuhlthau et al., 2014; Singer, 2008), and lower quality of life (Kuhlthau et al., 2014) than parents of children with typical development. Sustained stress and mental health burden significantly affect the familial unit as evidenced by marriages among parents of children with ASD being nearly twice as likely to end in divorce compared parents of children with typical development (Hatley et al., 2010). It is well understood that parenting stress is a common experience among parents of all children (Deater-Deckard, 2004); however, this research further illustrates the severity of psychosocial challenges faced by parents of children with ASD.

Research suggests that several factors may be associated with increased parental stress in this population. Child impairments related to ASD symptoms and behaviors such as socialization deficits, adaptive functioning impairments, and oppositional behaviors have also been associated with higher parenting stress (Foody et al., 2014). Parents may be particularly at risk for increased parental stress when the primary caregiver perceives family support to be low accompanied by high levels of child challenging behavior problems (Bromley, 2004). Mothers of children with ASD were also less likely to cope by utilizing their social support system (Donavan, 1988). However, not surprisingly, social support has been found to buffer against stress in mothers of children with ASD (Weiss et al., 2013). More specifically, mothers who perceived social support as more accessible had fewer stress-related somatic and depressive symptoms (Gill & Harris, 1991). In addition, parents of children with ASD reported less parenting competence and less family adaptability than parents of children with Down's syndrome or typical development (Rodrigue, Morgan, & Geffken, 1990). Parents of ASD report feelings of incompetence related to parenting, self-blame and isolate themselves rather than endure the frustration and challenges of taking their child out in public (Rodrigue et al., 1990).

While higher rates of stress and depression in mothers of children with ASD has been well established, literature examining the mechanism through which this relation occurs is limited (Benson, 2014; Conner & White, 2014; Hastings, 2005; Weiss et al., 2013; Zablotsky, Bradshaw & Stuart, 2013). Such an exploration would provide insight into possible interventions or prevention of poor outcomes for mothers of children with ASD. The following section will discuss possible factors associated with parental cognitive appraisals and coping model highlighted through the work of Lazarus, Folkman (1984) and Deater-Deckard (1998; 2004) and possible propose additional mechanisms in this association.

Stress appraisals in parents of children with ASD. An important element of parenting stress research is the understanding that parents have varying appraisals of a stressor, emphasizing the person-environmental nature of appraisal theory (Deater-Deckard, 2004). Cognitive appraisals are important because appraisals help determine the saliency of a situation and the subsequent emotional response (i.e., whether a situation is experienced as stressful; Gross, 2002). Altering ones' appraisal can ultimately facilitate positive coping responses (Bränström, Duncan, & Moskowitz, 2011b; Lazarus & Folkman, 1984). Given the chronicity of ASD, longitudinal research suggested that parents with children with ASD may alter how they appraise and cope with stressors over time (McGrew & Keys, 2014). Findings suggest that parents had increased positive appraisal of stressors within the first year after an ASD diagnosis was made (i.e., "Having a child with ASD is a gift"). Interestingly this increase in positive appraisals did not decrease the amount of negative appraisals (i.e., "My child's behavior is a problem"). This suggested that while parents of children with ASD were able to discern positive aspects of having a child with ASD, they reported an equal number of positive and negative appraisals (McGrew & Keys, 2014). Within this research, the most consistent predictor of poor outcomes in parents, such as increased caregiver burden and poorer marital adjustment, was the high use of negative appraisals. These findings emphasize the key role of appraisal in defining a stressful event. However, while negative appraisals were consistently related to negative outcomes, they were not related to a decrease in positive appraisals, indicating that increasing positive appraisals may not necessarily lead to decreased negative appraisals and overall reduced stress outcomes (McGrew & Keys, 2014).

This research highlights that despite parents' use of proactive coping strategies, some parents continue to display poor outcomes related to stress. For example, Benson (2014) found

that prolonged engagement in proactive problem-focused coping was associated with increased stress, suggesting that while problem focused coping was helpful, when situations are perceived as out of ones' control and persistent (i.e., having a child with ASD) this coping style may not always be helpful (Folkman, 1984). Even when parents used other coping styles, such as cognitive reframing, they continued to report lower overall well-being compared to mothers of typically developing children (Obeid & Daou, 2015). Further research investigating the use appraisals among parents of children with ASD found that failure to use positive appraisal was related to feelings of isolation and spousal relationship difficulties (Dunn, Burbine, Bowers, & Tantleff-Dunn, 2001). On the other hand, when mothers of children with ASD were able to make cognitive reappraisals related to challenges associated with raising a child with ASD, the outcome of overall psychological adjustment was more favorable. A key element of this study suggested that parents showed the greatest life satisfaction when they were able to place less emphasis on others' opinions of their child's behaviors and more non-judgment on the nature of their child's behaviors (Tunali & Power, 2002). Such a non-judgmental stance is often emphasized in mindfulness practice which will be briefly discussed in this section, but expand on in later sections.

Mindfulness, Stress, Depression in Parenting Children with ASD

Many of the persistent and chronic factors influencing poor outcomes for parents of children with ASD are perhaps not completely addressed by simple appraisal and coping mechanisms commonly used in cognitive behavioral therapy (CBT). Further, research on the parental experience of having a child with ASD is marked by some variability in parental reporting of stress and self-reported mental health outcomes. While parents appear to be experiencing stress and mental health symptoms in greater frequency compared to parents of

unaffected children, some parents of children with ASD report low psychological distress and mental health symptomology (Benson, 2014; 2016). One possible explanation for this finding is that some parents may have cognitive or emotional qualities that may buffer the relation between child having a child with ASD, stress and parental mental health outcomes, such as depressive symptoms. However, little attention has focused on additional cognitive processes influencing stress and mental health in this population of parents. As such, investigating the mechanisms though which stress influences mental health outcomes in parents of children with ASD is fundamental to understanding how to optimally support parents of children with ASD.

Researchers investigating mindfulness in the parent-child relationship propose that mindfulness in parenting can disrupt negative cycles of appraisals that become automatic for many parents. Such strategies include having mindful attention and awareness to "exercise choice" when it comes to responding within the parent-child relationship and choosing to respond mindfully with increased awareness, compassion, and non judgement (Duncan, Coatsworth, & Greenberg, 2009). Mindfulness, therefore can be utilized as psychological resource within the stress and coping model (Lazarus & Folkman, 1984) to allow parents to use adaptive coping and appraisals when dealing with parenting stress (Duncan, Coatsworth, & Greenberg, 2009). It has been suggested that greater levels of dispositional mindfulness may be related to the process of appraisal of stress and strongly related to experiences of stress, symptoms of depression and anxiety, positive states of mind and perceived health (Bränström, Duncan, & Moskowitz, 2011). In addition, greater dispositional mindfulness is associated with lower parental stress and depressive symptoms separately (Beer et al., 2013; Conner & White, 2014). Further, researchers suggest that by holding a non-judgmental stance with greater awareness, one is less likely to engage in negative appraisals and subsequent negative stress

reactions (Raphiphatthana, Jose, & Kielpikowski, 2016). Researchers investigated associations between with specific facets of internalizing symptomology and mindfulness using path analysis to simultaneously examine model fit indices. Mindfulness (e.g., awareness and non-judgment) qualities were found to be inversely associated with anhedonia, negative affect, and depressive and anxious thoughts (Raphiphatthana et al., 2016), suggesting that appraisals, stress, depressive symptoms and mindfulness may be related. In addition, multiple mediation analysis further emphasized the association between mindfulness and depression symptoms. Research revealed that rumination, non-acceptance, worry, and reappraisal were all significant as mediators (Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013). These finding reveal that specific mindfulness internalizing symptom traits may be particularly responsive to mindfulness strategies, subsequently highlight a possible rationale for how appraisals may influence stress reactions and mental health symptoms.

Though parenting a child with ASD has a clear impact on parental stress, it is possible that the use of neutral cognitive appraisals of stressful stimuli, such as those adopted with dispositional mindfulness, may lead to more positive outcomes for mothers of children with ASD. Understanding the factors that impact parental stress appraisals, along with other parental factors that may exacerbate or alleviate stress, is an important direction for research as these may be crucial targets for intervention. The following section will examine maternal depressive symptoms as an outcome variable in the relation of having children with ASD on parental mental health outcomes.

Maternal Depression

Overview

Along with increased rates of parental stress in parenting children with ASD, there is also an increased risk of parental psychopathology, including depression (Zablotsky, Bradshaw, & Stuart, 2013). There are seven depressive disorder diagnoses in adulthood including major depressive disorder (MDD), persistent depressive disorder (PDD), premenstrual dysphonic disorder, substance/medication induced depressive disorder, depressive disorder due to another medical condition, and unspecified depressive disorder (American Psychiatric Association & American Psychiatric Association, 2013). Depressive disorder symptomatology includes the presence of sad, empty, or irritable mood, with somatic and cognitive changes that significantly impair functioning, however, characteristics of onset, duration and etiology differs between depressive disorder diagnoses (American Psychiatric Association, 2013). Nevertheless, this overview will primarily focus attention on subclinical depressive symptoms and clinical major depressive disorder (MDD).

Depression in Mothers

Major depressive disorder (MDD) is characterized by discrete changes in affect, behavior, neurovegetative, cognitive function lasting for at least two weeks, however most cases last longer and are often recurrent (American Psychiatric Association & American Psychiatric Association, 2013). Women experience a major depressive episode (MDE) at a rate one and a half to three times higher than men, affecting between 6% and 17% of women (Kessler, 2006). In addition, rates of subclinical depressive symptoms are higher than rates of MDE and continue to be higher in women than men Almeida & Kessler, 1998; Lennon, 1987). Compared to men, women are at greater risk of having recurrent, short depressive symptoms and episodes, with

approximately 80% of individuals experiencing multiple episodes in their lifetime (Belsher & Costello, 1988; Kessler, 2006). Evidence examining prenatal and perinatal anxiety and depression suggests that individual maternal anxiety and depression were reliability stable across pregnancy to 36 months postnatal. Specifically, anxiety in pregnancy was associated with stable postnatal anxiety and significant increases in the likelihood of postnatal depression (Heron et al., 2003).

The Etiology of Depression

The etiology of depression includes genetic and environmental characteristics. Genetic heritability accounts for 26% to 42% of the variance in ASD etiology (Sullivan et al. 2000). While no single gene has been definitively associated with depression, several candidate genes have been implicated in the risk associated with depression including CREB1 (Levinson et al., 2003) and the serotonin transporter gene (5HTTLPR; Ressler & Nemeroff, 2000). In addition to genetic vulnerabilities, the affective, cognitive, and interpersonal traits may also predispose one to the development of depression; factor such as emotional reactivity and associated lower vagal tone (Porges, 2001), neuroticism (Tellegen et al., 1998) and sociability (Plomin et al., 1993) include possible vulnerabilities. In addition, it is likely that depressed mothers themselves were exposed to a depressed parent and subsequently born with dysfunctional neuroregulatory mechanisms impacting emotional regulation, distress tolerance, and increasing risk of depression later in life (Goodman & Gotlib, 1999). Additional risk factors can vary based on both biological and environmental characteristics.

Several factors contributing to the course and subsequent long-term trajectories of depression have been associated with recurrent and chronic nature of depression (Luoma et al., 2001; 2017). Factors contributing to chronic depression include socio-demographic factors such

as low education attainment (Campbell et al., 2007; Cents et al., 2012; Skipstein et al., 2010), younger maternal age (Campbell et al., 2007; Skipstein et al., 2010), lower socio-economic status (Campbell et al. 2007; Cents et al., 2012; Gross et al., 2009), less participation in the workforce (Skipstein et al., 2010) and single or in unstable marriage status (Campbell et al., 2007; Skipstein et al., 2010). Several physical and mental health factors have been implicated as risk factors for chronic depression, including poor self-reported emotional health (Mora et al., 2009), a history of depression and anxiety (Cents et al., 2012; Sutter-Dallay et al., 2012), expressed ambivalence about pregnancy and unwanted or unplanned pregnancy (Mora et al., 2009), lower child behavioral compliance scores (Gross et al., 2009), and higher number of births per mother (Mora et al., 2009). Maternal stress and perceived lack of social support also contribute to chronic outcomes for mothers with depression. Elevations of self-reported stress (Mora et al., 2009) have been implicated as a main predictor of postpartum depression (Beck, 2001) as well as a tendency to perceive life events from a more negative perspective (Robertson et al., 2004). Several family of origin factors have also been implicated in the chronicity of maternal depression including low perceived social support from ones' own mother and the quality of marital or partnered relationship (Beck, 2001; Robertson et al., 2004).

Transactional Model of Maternal Depression on Child Outcomes

It is important to state that maternal depression significantly impacts the development of child emotional, behavioral and social development. In Goodman and Gotlib's integrative model for understanding the transmission of children's risk for developing depression (1999), the authors propose that maternal depression influences childhood outcomes through a pathway of mechanisms and vulnerabilities that interact with and affect one another. Specifically, authors argue there are four potential mechanisms (mediators) for which maternal depression adversely

affects child functioning and three factors that may moderate child function. Mediators include heritability of depression, innate dysfunctional neuroregulatory mechanisms, exposure to mother's negative and/or maladaptive cognitions, behaviors, affect, and exposure to a stressful environment. These mechanisms influence child vulnerabilities in unidirectional and transactional ways. Vulnerabilities include psychobiological dysfunction, and skill deficits/maladaptive cognitive, affective and behavioral tendencies of the child. Moderators for this model include father involvement, timing and course of maternal depression, and temperament, gender, intellectual and social cognitive skills of the child (Goodman & Gotlib, 1999). The dynamic relationship between child and factors and maternal factors leading to and resulting from maternal depression may act as possible targets for intervention, and therefore are crucial focal points of research.

Maternal depression on child outcomes. Research suggests that mothers with depression may use different parenting techniques that impose lasting effects on child emotional and behavioral outcomes. Evidence of disrupted mother-infant attachment by 6 months old is displayed through reduced mother-child synchrony (Lundy, 2002). Reduced left frontal brain activity at 14 months old was associated with higher levels of maternal insensitivity (Dawson et al., 2003). Depressed mothers also exhibited less maternal warmth children, associated with poorer child emotion regulation skills by second grade (Kam, 2001) and maternal speech characterized by non-child focused, high negative affect was associated with children with poor cognitive development at 18 months old (Murray et al., 1993).

Children of depressed mothers are also at an increased risk for internalizing childhood psychopathology including depression, separation anxiety disorder, and panic disorder (Weissman et al., 1984). There is strong consensus that parental depression confers significant

risk for child depression rates, with 20% and 41% of the variance in child depression attributed to genetic heritability in school aged children and adolescents (Goodman, 2007). For these children, there appears to be an earlier age of onset, longer duration, greater functional impairment, and higher instances of reoccurrence of depressive symptoms (Keller et al., 1986; Warner et al., 1992). Child outcomes are also associated with parent-child relational factors. Research suggests that daughters of depressed others who experience less maternal social support display poorer social competence by age 5 and 6 (Prinstein & LaGreca, 1999) and greater internalizing symptoms at age 11 and 12 (McCarty & McMahon, 2003). Children of depressed mothers tend to exhibit greater negative affect (Field, 1992) and increased dysregulation, including more aggression and emotionality (Zahn-Waxler et al., 1984). Possible mechanisms for these behaviors include evidence which suggests depressed mothers may use harsh, inconsistent or ineffective discipline including physical punishment, which is associated with greater conduct problems at 4 years old (Snyder, 1991) and increased child behavior problems throughout early childhood (Ghodsian et al., 1984). In addition to harsh parenting, evidence suggests that mothers with depression may display temperamental characteristics including being cold and hostile resulting in a difficult mother-child relationship and disruptive behavior problems in adolescents ages 11 to 12 (McCarty & McMahon, 2003). This was associated with greater dysfunctional communication styles leading to greater negative self-concept in children between ages 8 to16 years old (Hammen et al., 1990; Nelson, 2001) and higher parental criticism resulting in greater instances of depressive disorders and externalizing problems in teens between 12 to15 years old (Hilsman, 2001).

Depressive Symptoms and Stress in Mothers with Children with ASD

Raising a child with ASD has been associated with increased parental stress and maternal depression compared to parents of children without ASD (McStay, Trembath, & Dissanayake, 2015; Zablotsky et al., 2013). With persistent unmanaged stress, a parent may be at increased risk of developing depressive symptoms. Research suggest that mothers of children with ASD typically have greater parental strain associated with raising a child with ASD including both caregiving tasks and expectations about family functioning than fathers. These factors were related to poor mental and physical health outcomes for mothers compared to fathers (Johnson, Frenn, Feetham, & Simpson, 2011). The transactional theory of maternal depressive symptoms influencing child outcomes elucidates bidirectional relationship between child consequences associated with maternal depression in children with ASD. Research suggests these effects may be compounded in families of children with ASD given the increased risk of depression for children with ASD and parents of children with ASD more likely to have depressive symptoms (Ghaziuddin & Greden, 1998; Zablotsky et al., 2013). Factors associated with the increased incidence of depressive symptoms include child characteristics and parental psycho-social factors, along with factors associated with stressors around diagnosis and treatment.

Taylor and Warren (2012) suggest that the onset of depressive symptoms may occur shortly after the initial ASD diagnosis. Seventy-nine percent of mothers reported clinically significant depressive symptoms within one week of their child's ASD diagnosis and symptoms remained persistent for 37% of mothers one-year later (Taylor & Warren, 2012). Factors related to early onset of depressive symptoms that occur within one week following the ASD diagnoses include the amount of time that elapsed between initial diagnostic confirmation and subsequent follow-up appointments and the presence of child internalizing symptoms. Approximately 29%

of mothers reported a delayed onset of clinically significant depressive symptoms up to 16 months after the initial diagnosis. Delayed onset depressive symptoms were related to child internalizing and externalizing behaviors and financial barriers limiting access to services and service quality (Taylor & Warren, 2012). This study suggests that clinically significant depressive symptoms are extremely common in mothers of children with ASD and symptoms are likely to persist. The initial onset, persistence or delayed onset of depressive symptoms may be related to different symptom expression and social factors over time. Factors such as child problem behaviors, access to services, financial barriers, and family support may interact or pile up in an additive or multiplicative way for mothers with children with ASD (Taylor & Warren, 2012). Increased rates of maternal depression were also associated with the ADHD symptoms (Steijn et al., 2013), internalizing, externalizing, and behavior problems in children, as well as parental adjustment. Overall, each of these diagnoses increased parental stress and exacerbated depressive symptoms in parents of children with ASD (Steijn et al., 2013; Weitlauf et al., 2014).

In contrast, research suggests that psychosocial factors may also play an important role in reducing depressive symptoms. For example, increased relationship satisfaction may buffer the impact of parenting stress on maternal depression while a negative marital relationship may exacerbate this relation (Weitlauf et al., 2014). Additional social-emotional factors such as perceived social support and self-efficacy were associated depression in mothers of children with ASD across a seven-year period. Mothers of children with ASD involved unsupportive social networks where they perceived other caused them interpersonal strain were more likely to be depressed. However, mothers with stronger self-efficacy and instrumental support were protected from depressive symptoms (Benson, 2016). Taken together, it appears that various psychosocial factors contribute to early onset and later onset depressive profiles in mothers of children with

ASD. As such, psychosocial traits such as dispositional mindfulness may be an important construct to examine as it relates to the depression profiles in mothers of children with ASD. The following section provides a background of mindfulness and proposes that mindfulness may act as a moderator in the relation of increased maternal stress and depressive symptoms in mothers of children with ASD.

A number of questions still remain in relation to the stress experienced by parents of children with ASD. The growing mental health burden faced by parents of children with ASD is profound. More research is needed understanding if the beneficial of mechanisms of mindfulness within parenting that can buffer the chronicity of stress and mental health in parents of children with ASD. Parents of children with ASD are a special population that deserves attention in order to ameliorate the potential negative effects associated with having a child with ASD.

Mindfulness

General Theory

The roots of mindfulness are based in ancient eastern Buddhist teachings of the Theravada Buddhist branch dating to the 5th century B.C. (Schmidt, 2011). Over the last 20 to 30 years, the concept of mindfulness has transitioned into Western culture, permeating the fields of medicine, behavioral science, and neuroscience (Schmidt, 2011). This accelerated Western acculturation of mindfulness has challenged the scientific community to swiftly operationalize mindfulness (Sauer et al., 2013; Schmidt, 2011). One of the challenges measuring mindfulness in psychometrically sounds ways is the debate surrounding distilling a complex construct into an operational definition. Nonetheless, current consensus of the definition of mindfulness is three-fold: first, it implies a sense of being in the present moment; second, it focuses clear awareness

of sensory, affective, and cognitive experiences; and third, it requires one to voluntarily disrupt the appraisal of automatic thoughts and reappraise the thoughts as neutral in a nonjudgmental or accepting attitude (Sauer et al., 2013). A well-known definition of mindfulness is described as the act "paying attention in a particular way, on purpose, in the present moment and non-judgmentally" (Kabat-Zinn, 1994, p. 4).

Operationalizing Mindfulness

Researchers tend to agree overall on the important facets within the definition of mindfulness, however the scientific community remains divided a on the construct specificity when examining mindfulness. The first attempt to operationalize mindfulness in a multifactorial way suggested that mindfulness was a two factor model which includes the first factor as *presence,* focusing on the attentional present moment experience and the second factor as *acceptance* which is characterized by openness, curiosity, and a non-judgmental stance on the present moment (Bishop et al., 2004). This perspective posits that *presence* and *acceptance* are two separate but interrelated constructs in which one needs to systematically inhibit cognitive evaluations first (*presence*) in order to achieve *acceptance* (Sauer et al., 2013). Additional multifactor definitions of mindfulness have been proposed to consist of as many as five features, as proposed in the Five Factor Mindfulness Questionnaire (FFMQ), and include of *nonreactivity, observing, awareness, nonjudging, and describing* (Baer et al., 2006; Chiesa, 2013). Researchers more recently have characterized mindfulness as a unidimensional construct in which mindfulness cannot be separated by *presence* and *acceptance,* but is collapsed into a single *presence* factor (Brown & Ryan, 2003). This is derived from the simplistic definition that mindfulness is nothing more than being present in the moment where one must cease from

judgmental and evaluative thinking as a prerequisite to achieve present moment awareness (Bowen & Ryan, 2003; Sauer et al., 2013).

The second major division in mindfulness research is whether mindfulness is a *trait*, meaning mindfulness is an enduring quality engrained in ones' personality or a *state*, meaning that mindfulness is a mode in which one can be trained to transition into and out of with ease (Chiesa, 2013). Defining mindfulness as a *trait* may partially explain variability in individual response patterns to prolonged stress (i.e., psychological outcomes of parents with children with ASD; Branstrom et al., 2011; Chiesa, 2013). A shift toward understanding mindfulness as a trait or disposition includes conceptualizing being mindful a naturally occurring attribute that varies with and between individuals and includes possessing the discipline or inclination to be aware, consciously attentive and have a heightened state of clarity from one moment to the next (Brown & Ryan, 2003). The current study will focus on the basic human capacity toward mindfulness that occurs at various levels, called dispositional mindfulness (Bränström et al., 2011a).

Mental Health Benefits of Mindfulness

Researchers have found higher dispositional mindfulness to be associated with positive mood, well-being, and lower stress, depression and anxiety (Brown & Ryan, 2003; Carlson & Brown, 2005). High parental dispositional mindfulness is associated with positive child outcomes across development stages in young childhood, middle childhood, and adolescence (ages 3 to 17), as well as decreased child internalizing and externalizing problems (Parent, McKee, Rough, & Forehand, 2016).

Mechanisms for how individuals with high dispositional mindfulness have lower stress and mental health symptoms are not well understood, however researchers theorize that levels of mindfulness may moderate stress related outcomes of psychological functioning (Bränström et

al., 2011a). Researchers propose several pathways through which mindfulness influences psychosocial functioning. Being mindful may lead to viewing thoughts and experiences as transient, allowing cognitions to be appraised in a neutral way (i.e., label thoughts, as just thoughts), fostering less automatic and ruminative thought patterns, greater tolerance of negative affective states and more effective affective regulation (Bränström et al., 2011a; Brown, Ryan, & Creswell, 2007). This theory is consistent with Lazarus and Folkman's stress and coping model (Lazarus & Folkman, 1984) suggesting that the coping response is initiated when an appraisal of a stressful event is threatening. Lack of attentional awareness to stress cues may lead to an accumulation of stress and limited coping mechanisms to utilize, while increased awareness may lend access to greater awareness, cognitive, and emotional coping abilities, leading one to have more adaptive appraisals and coping responses (Bränström et al., 2011a; Brown et al., 2007). Baer (2009) suggests that greater ability to react mindfully to daily experiences, which includes observing, describing the present moment with awareness, non-judgmentally and non-reactively, may reduce fear, rumination and maladaptive responses and improve coping to stressful situations.

Mindfulness emphasizes processing stress in adaptive ways and that support emotion regulation. This process is conceptualized as utilizing non-threatening cognitive appraisals of stressful situations and implementing adaptive coping responses to stress (Gross & Muñoz, 1995; Lazarus & Folkman, 1984; Weinstein, Brown, & Ryan, 2009). Experimental designs suggested individuals with high mindfulness viewed demanding situations as less stressful and threatening, were more likely to cope with stress in adaptive ways, and used less avoidant strategies in stressful situations and overall related to higher emotional well-being (Weinstein et al., 2009). Research suggests that individuals with greater dispositional mindfulness reported less frequent

avoidant coping, higher approach coping, and subsequently, used more adaptive stress responses accounting for higher psychological well-being (Weinstein et al., 2009).

Furthermore, mindfulness approaches may be superior to other cognitively oriented parental interventions due to the immediacy of physiological relaxation responses that occur within mindfulness and less reliance cognitive strategies that require more time and reflection (Dykens et al., 2014). Mindfulness emphasizes a clear, calm mind that is focused on the present moment in a nonjudgmental way and encourages the individual to be fully open to perceiving and responding to events, non-judgmentally (Kabat-Zinn, 2003; Singh et al., 2007). These behavioral practices share commonalities with cognitively based approaches by encouraging individuals to remain aware of their automatic thoughts, negative internal perceptions, and implement behavioral activation strategies. Both cognitively oriented strategies, such as restructuring and mindfulness both result is distance from one's distressing cognitions, research suggests that mindfulness may alter appraisal and coping by using a mindfulness approach of "turning down" the focus on negative appraisals of events therefore alter the perceptions of situations to be less stressful (Weinstein, Brown, & Ryan, 2009). Other studies have suggested that mindfulness practice emphasizes less avoidant coping, rumination, thought suppression, and negative thinking styles that are related to poor mental health outcomes and therefore altering appraisal and coping responses to stressful situations (Gross & Thompson, 2007). By doing so, mindfulness approaches have been shown to increase adaptive coping, by implementing active coping, acceptance, and cognitive reinterpretation (Weinstein, Brown, & Ryan, 2009). Research suggests that cognitive behavioral approaches may be helpful in reducing negative appraisal and maladaptive coping (McGrew & Keyes, 2014); however, increases in positive appraisals do not necessarily decrease negative appraisals and prolonged problem focused coping tends to

increase, instead of decrease parenting stress (Benson, 2014). Therefore, differential mechanisms of appraisal and coping strategies should be examined. Research suggest that neutral mindfulness appraisals, rather than positive or negative appraisals, may be beneficial for reducing symptomology associated with stress in this population (Benson, 2014; Brown et al., 2007). Mindfulness describes the state of mind where an individual employs sensitive awareness and attention to what is occurring in the present moment without judgment, removes negative valance of the appraisal of an event, and appraises the event as neutral. Interpreting life events with mindful attention involves the practice of processing stimuli as they occur. This stands in stark contrast to processing thoughts, emotions, and events through automatic reactions. As such, mindful attention allows an individual to view situations from a neutral perspective with objective interpretation. Research has investigated individual differences dispositional mindfulness related to appraisals of a potentially stressful event. Results supported individuals with mindful attentional appraisals evaluated current and future stressful events more benignly. As a result employed less avoidant coping, leading to reduced stress (Garland et al., 2011).

Mindfulness, Stress, Depression in Parenting Children with ASD

Programs teaching mindfulness techniques have generated promising results for parents of children with ASD demonstrating decreased parenting stress, anxiety, depression, and increased sleep, well-being and life satisfaction (Conner & White 2014; Dykens et al., 2014). In parenting interventions, mindfulness includes targeting interpersonal and intrapersonal skills, parental attributions, attitudes, and altering coercive interactions between parents and children (Coatsworth, Duncan, Greenberg, & Nix, 2009; Dykens et al., 2014). The goal is to teach parents to have a clear, calm mind that is focused on the present moment in a nonjudgmental way and encourage the individual to be fully open to perceiving and responding with more options than

previously realized (Kabat-Zinn, 2003; Singh et al., 2007). Such programs are successful in teaching alternative approaches to parenting and increasing satisfaction in parenting and parent-child interactions (Singh et al., 2007). From this perspective, researchers concluded that parents who are naturally able to parent mindfully or are able to learn mindfulness practices will be more likely to develop quality relationships with their children and avoid maladaptive cycles in parenting (Duncan, Coatsworth, & Greenberg 2009). While evidence suggests some individuals naturally appraise experiences with mindful awareness and attention, others suggest that while mindfulness can be trained, it may also be a basic human capacity that sometimes occurs naturally without specific training. Overall, mindfulness techniques demonstrate positive outcomes for mental health. (Brown et al., 2007; Kabat-Zinn, 2003).

Research suggests that dispositional mindfulness is associated with lower anxiety, depression, more positive and less negative affect in parents of children with ASD (Bränström et al., 2011a). However, researchers have not directly examined if dispositional mindfulness buffers the relation between perceived stress and depression in parents of children with ASD. This is an important area of examination. In addition, research indicated that mothers of children with ASD with higher rates of depression and stress had lower levels of dispositional mindfulness, suggesting that increased maternal dispositional mindfulness is associated with lower stress and depression in this population. The researchers concluded that increasing dispositional mindfulness among mothers is likely to reduce stress, and act as a protective factor to adverse mental health in this population of parents (Conner & White, 2014). Research suggests that greater dispositional mindfulness alters the stress response by attenuating negative appraisals in demanding situations and implementing adaptive forms of coping (Weinstein, Brown, & Ryan, 2009).

Current Study

Stress and Depression in Mothers of Children with ASD: Mindfulness as a Possible Protective Factor

While parenting stress is a common experience among parents of all children (Deater-Deakard, 2004), parents of children with ASD report high levels of stress, depressive symptoms (Hayes & Watson, 2013; Kuhlthau et al., 2014, Singer, 2008), and lower quality of life and well-being (Kuhlthau et al., 2014) than parents of children with typical development or other developmental disabilities (Dabrowska & Pisula, 2010; Dykens et al., 2014; Hayes & Watson, 2013; Seltzer et al., 2010). Research suggests that several factors may be associated with increased parental stress in this population including child characteristics (Foody et al., 2014), lack of social support (Weiss et al., 2013) and feelings of incompetence related to parenting, self-blame and social isolation (Rodrigue et al., 1990). With persistent unmanaged stress, a parent may be at increased risk of developing depressive symptoms. Research suggests that mothers of children with ASD have experience greater parental strain related to caregiving and expectations than fathers resulting in poorer mental and physical health outcomes for mothers compared to fathers (Johnson et al., 2011). Seventy-nine percent of mothers reported clinically significant depressive symptoms within one week of their child's ASD diagnosis and symptoms remained persistent for 37% of mothers one-year later (Taylor & Warren, 2012). As such, mothers will be the primary focus of examination this study.

While higher rates of stress and depression in mothers of children with ASD has been well established, literature examining the mechanism through which the relation between parenting a child with ASD and depression occurs is limited (Benson, 2014; Conner & White, 2014; Hastings, 2005; Weiss et al., 2013; Zablotsky et al., 2013). One possible explanation for

this the high rates of stress and depression in this population is that some parents may have cognitive or emotional qualities that may buffer the relation between child having a child with ASD, stress and mental health outcomes. As such, within this study, mindfulness is proposed to buffer the relation between parenting a child with ASD and high stress, subsequently impacting depression symptoms. Support for this pathway is made through research that suggests greater dispositional mindfulness alters the stress response by attenuating negative appraisals in demanding situations and implementing adaptive forms of coping (Weinstein et al., 2009). Dispositional mindfulness may buffer the relation between perceived stress, altering depression in parents of children with ASD, as dispositional mindfulness is associated with lower anxiety, depression, more positive and less negative affect in parents of children with ASD (Bränström et al., 2011a). As such, greater dispositional mindfulness among mothers is likely to reduce stress, and act as a protective factor to adverse mental health in this population of parents (Conner & White, 2014). Therefore, this study aimed to investigate if dispositional mindfulness buffers the primary relation between parenting a child with ASD and elevated stress, leading to less depressive symptoms in mothers of children with ASD. The primary motive of this study was to investigate if a tendency toward a mindful disposition buffers the symptoms of maternal stress, subsequently reducing the likelihood of depressive symptoms in mothers of children with ASD. Only one study to my knowledge has examined maternal symptoms of stress and dispositional mindfulness in a cross sectional sample mothers of children with ASD compared to mothers without children with ASD (Conner & White, 2014). However, the aforementioned study was conducted using hierarchical regression and did not include depression within the regression model. Therefore, the current study offers a unique examination into the conditional indirect effects mindfulness on the relation between parenting a child with ASD, stress and depression

symptomology. This research will help clarify whether higher parental stress may be a risk factor for maternal depression symptomology and if dispositional mindfulness may explain the variability in stress response and depressive symptoms in this population. The results of this study may help mental health professionals identify parents who may be at risk for a more severe stress response and subsequent psychopathology.

Hypotheses

The current study aimed to explore the nature of the associations between mindfulness on the presence of depression and stress symptoms in mothers of children with ASD. Parents of children with typical development (TD) and ASD between the ages of 3:0 and 6:11 were assessed for parental depressive symptoms, parental stress, and dispositional mindfulness. As such, the following hypotheses were proposed:

Hypothesis 1. There will be a relation between diagnostic status (ASD =1 vs. TD=0) and maternal depressive symptoms, such that mothers of children with ASD will have greater maternal depressive symptoms compared to mothers of neurotypical children (Figure 1).

Hypothesis 2. Child diagnosis status for mothers of children with ASD will be positively associated with maternal stress, compared to mothers of children without ASD.

Hypothesis 3. There will be an indirect effect of diagnostic status on maternal depressive symptoms through parental stress, such that diagnostic status of ASD will be related to elevated maternal depressive symptoms through elevated parental stress.

Hypothesis 4. The indirect effect of status (ASD vs. TD) on depressive symptoms via parental stress will depend on level of dispositional mindfulness on the "A" Path. Consequently, I hypothesized that the indirect effect of status (ASD vs. TD) on

depression via parenting stress will be weaker for those with higher mindfulness (Figure 2).

Figure 1. The direct effect of diagnostic status and maternal depressive symptoms.

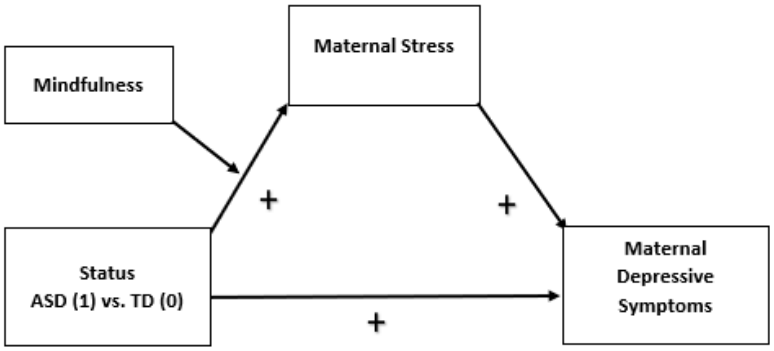

Figure 2. The hypothesized conditional indirect effect of diagnostic status on maternal depressive symptoms through maternal stress, moderated by maternal dispositional mindfulness.

Chapter II: Method

Participants

This study was conducted as a smaller subset of the larger ongoing project called Study of Autism and Self-Regulation which examines the self-regulation abilities in young children with ASD and with typical development. The current study was approved by the Institutional Review Board at Seattle Pacific University. Inclusion in the study was determined by the following eligibly criteria: 1) a confirmed diagnosis of ASD from a licensed provider, 2) children must be between the ages of 36 month to 85 months old, 3) children must have a verbal abilities score of 85 or above, and 4) children in the TD group must not have any developmental diagnosis.

Participants included mothers of children with ASD and typical development. Approximately 32 mothers were enrolled in the current study with children ages 3:0 to 6:11 years old. Participants included approximately 11 parents of children with ASD and 21 parents of children with typical development. Demographic information is presented in Table 1. The group differences were noted for child sex as expected; no other demographic variables were significant.

Table 1.
Demographic Characteristics by Group

Child Variables	ASD (n = 11)	TD (n = 21)	t/χ^2
Average Age in Months *(SD)*	54.10 (11.52)	51.95 (11.85)	-.489
Average Verbal Mental Age	56.91 (14.15)	67.86 (18.5)	1.74
Average Verbal Ability	108.09 (15.31)	119.52 (13.86)	2.14
Sex, N (% male)	9 (81.8 %)	9 (42.9%)	-2.37**
Child Ethnicity, N (%)			.416
Caucasian	**9 (81.8%)**	**16 (76.2%)**	
Minority	**2 (18.2%)**	**5 (23.8%)**	
African American	1 (9.1%)	0 (0%)	
Asian American/Pacific Islander	1 (9.1%)	3 (14.3 %)	
Biracial/Other	0 (0%)	2 (9.5%)	
Maternal Variables			
Maternal Ethnicity *(same as child)*			
Maternal Education Level			.396
Some College	**6 (54%)**	**9 (42.9%)**	
Some College	2 (18%)	1 (4.8%)	
Bachelor's Degree	4 (36 %)	8 (38.1%)	
Higher Education	**5 (45.55)**	**12 (57.1%)**	
Some Masters	0 (0%)	1 (4.8%)	
Masters	3 (27.3%)	7 (33.3%)	
Professional/Doctorate	2 (18.25)	4 (19%)	
Annual Income *(SD, Min-Max)*	$139,545 ($156,861; $43,000-$600,000)	$133, 571 (70,500; $50,000-$350,000)	-.150
Relationship Status, N (%)			.286
Legally Married	**8 (72.7%)**	**17 (81%)**	
Other	**3 (27.3%)**	**4 (19%)**	
Separated/Divorced	1 (9.1%)	2 (9.5%)	
Never Married/single	1 (9.1%)	0 (0%)	
Living with partner/unmarried	1 (9.1%)	2 (9.5%)	

Note. N = 32; ** p <.01

Procedures

Recruitment. Participants were recruited through a variety of sources including community outreach events, postings in schools, mental health centers, libraries, online listserves, community centers, and coffee shops in the greater Seattle area. Research team members also attended community events, staffed informational tables and provided general information regarding enrollment criteria, research study commitment and collected contact information from interested individuals. During these events, participants had the opportunity to sign-up for the current study. Research team members gathered email addresses and phone number and provided study details and commitment to potential participants. Once participants agreed take part in the study, research team members scheduled the participant for their enrollment visit if they meet initial enrollment criteria.

Enrollment visit. Children and their caregiver participated in the initial visit in the participants' home, our university research lab, or a nearby library if requested by the parent. The visit lasted approximately 60 to 90 minutes and was conducted by a graduate level clinician and an undergraduate level research assistant. During the initial visit, parent consent and child assent were obtained in accordance with the Seattle Pacific University Institutional Review Board guidelines. Parents also signed a medical release of information which contained diagnostic confirmation of ASD. Additionally, the child participated in tasks that measured his/her verbal cognition (Differential Abilities Scale – Version II; DAS-II; Elliot, 2007) to assess whether they met the verbal requirement of 85 or above to be included in the study. Children completed other tasks including emotional knowledge, attention and executive functioning tasks. Among the questionnaires, parents completed the Autism Behavior Checklist (ABC; Krug, Arick, & Almond, 1980) to corroborate ASD symptoms with clinical diagnosis and to screen for ASD

symptomatology in the typically developing children. All children who scored above 85 on the DAS-II and met criteria on the ABC were eligible to enroll in the study.

In addition to the questionnaires listed above the mother completed three additional questionnaires pertinent to the current study. First, the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) was completed to assess the mothers' level of dispositional mindfulness. Next, the Parenting Stress Index-Short Form (Abidin, 1990b) was completed to assess the magnitude of stress the parent experiences, and finally the Center for Epidemiologic Studies Short Depression Scale (CES-D-10; Andresen et al., 1994) was completed to assess maternal symptoms of depression.

University visit. In addition to the enrollment visit, children and their parents also participated in the 90 to 120-minute university visit at the developmental research lab at Seattle Pacific University. This second visit consisted of a battery of self-regulation, theory of mind, emotion knowledge, and parent-child interaction tasks that are relevant to the greater study and was unrelated to the current study. For completing the research procedures, parents received a $50 and a $5 coffee card and children received a small toy worth approximately $5 and behavioral rewards throughout the visit (i.e., stickers).

Measures

Demographic variables. Parents completed a demographic questionnaire assessing family and child characteristics including family income, profession, child age, gender, and education level. Potential covariates were identified from the demographic questionnaire items and were analyzed to determine if they needed to be controlled for in subsequent analyses. Previous research suggests that socioeconomic status may predict stress, depression

symptomatology and anxiety in parents of children with ASD (Zablotsky et al., 2013), therefore, family income was collected in the demographic questionnaire.

ASD symptomology. Parents completed the Autism Behavior Checklist (ABC; Krug, Arick, & Almond, 1980), a general screener of symptoms of ASD, during the home visit. This assessment contains 57 items that are divided into five subscales: a) Sensory Behavior, b) Social Relating, c) Body and Object Use, d) Language and Communication Skills, and e) Social and Adaptive Skills. Respondents rated each item according to whether the characteristic is present or absent in the individual. These scores were weighted according to the degree which the characteristic is a symptom of ASD. Finally, the scores were added, giving the child a total score. Scores below 0.5 standard deviations from the mean are considered to be at the "high probability cut-off point for the classification of autism" (Krug, Artick, & Almond, 1993, p. 27). The ABC was originally normed on a sample of 1,049 individuals and had an alpha coefficient of $\alpha = .87$ in that sample (Sturmey, Matson, & Sevin, 1992). Whereas the ABC is not an adequate measure for diagnosing ASD, it is considered to be a sufficient screener (Luteijn, Luteijn, Jackson, Volkmar, & Minderaa, 2000).

Verbal Abilities. Participants completed the DAS-II (Elliott, 2007) during the home visit. The DAS-II is a comprehensive assessment of cognitive abilities for children ages 2 years and 6-months through 17 years and 11-months. Specifically, this study used the naming vocabulary and verbal comprehension modules in the Early Years cognitive battery for children. Each child's ability score, T-score, percentile ranking, and age equivalent were used to assess his/her verbal ability to control as a covariate in the current study. An overall verbal ability of below 85 was exclusionary for the current study. Non-verbal ability/performance was not assessed for this study. The DAS-II was normed using 3,480 individuals who were between the

ages of two years and six months and 17 years and 11 months. The verbal ability alpha coefficient of the Early Years battery for the lower age range was $\alpha = .93$. The DAS-II was also tested against other measures of intelligence and achievement and received an average mean correlation of .80 (Elliot, 2007).

Assessment of mindfulness. The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) is a 15-item self-report questionnaire aimed at assessing a single factor structure, in day-to-day life using general statements and situational specific statements. The construct of mindfulness is conceptualized as a unidimensional construct. Therefore, the MAAS is based on the definition of mindfulness which focuses on *presence.* This assessment measures the frequency of mindful states over time, specifically the presence of attention to awareness throughout ones' daily activities (Brown & Ryan, 2003) using a 6-point Likert scale from 1 (*almost always*) to 6 (*almost never*) where higher scores indicate greater mindfulness and low scores indicate mindlessness (Sauer et al., 2013). Sample items include: "I tend not to notice sensations or feelings of tension of discomfort until they really grab my attention" and "I find it difficult to stay focused on what's happening in the present." For the current study, the mean score of each participant was used.

The MASS is a widely used measure of mindfulness (Sauer et al., 2013) and has been tested on nonclinical populations (student and adult local/national populations) comprising a total of 1,253 participants (Brown & Ryan, 2003). Exploratory factor analyses (EFA) performed on the adult sample displayed strong single-factor loadings. Results indicated satisfactory fit and all 15-items were significantly related to the latent factor, respectively (CFI = .92; RMSEA = .065; Brown & Ryan, 2003). This measure displays good internal consistencies (Cronbach's Alpha $\alpha = .80$ to .87) and strong test-retest reliability (.81; Brown & Ryan, 2003). Subsequent

studies have investigated psychometric properties of the MAAS with similar fit indices and revealed similar satisfactory fit with no significant gender differences and supported a single factor structure of mindfulness, respectively (CFI = .91; RMSEA = .071, *CI* = .065 - .079, α = .89, eigenvalue = 5.33 accounting for 33.55% of variance accounted for; MacKillop & Anderson, 2007). Internal consistency in the current study was good (α = .83).

Parental stress. Parenting stress was measured by the Parenting Stress Index-Short Form (Abidin, 1990a). The PSI-SF is the most widely used instrument for measuring parenting stress in parents of children with ASD to identify various forms of stress associated with parenting (Abidin, 1990a; Zaidman-Zait et al., 2011). The PSI-SF is a 36-item, self-report instrument that measures stress related to the role of parenting for children ages 1:0 to 12:0. It contains statements related to parenting such as, ‘‘I feel trapped by my responsibilities as a parent.’’ Parents rate their level of agreement with each statement on a 5-point Likert scale from 1 (*strongly agree*) to 5 (*strongly disagree*). The PSI yields an overall parenting stress score from three separate sub-scales consisting of 12 questions each: parental distress (PD), parent–child dysfunctional interaction (PCDI), and difficult child (DC). The PD subscale measures distress associated with personal factors such distress associated with conflict with a partner and life restrictions due to parenting. The PCDI subscale provides indications of parents’ dissatisfaction with their relationship with their child. The DC subscale measures parents’ perceptions of their child’s self-regulation abilities. Finally, the PSI-SF includes a Defensive Responding scale that indicates the degree to which the parent may be minimizing their problems. Subscale scores range from 12 to 60, while the total stress index ranges from 360 to 180. Higher scores indicate greater distress. The PSI-SF takes approximately 10 minutes to compete. Normative subscale ranges fall between the 15th and 80th percentile. Subscale scores (e.g., PD =33, PCDI=26,

DC=33) above the 85th percentile and total scores above the 90th percentile indicate clinical levels.

The PSI-SF was standardized and normed on 840 parents and has been shown to be valid for parents of children with typical development and ASD (Abidin, 1990b; Zaidman-Zait et al., 2011). Internal consistency in normative samples of the Total Stress (α = .91), parental distress (α = .87) and parent-child dysfunction (α = .80) and difficult child (α =.85) were strong. In a sample normed on children with ASD, internal consistency ranged from a Cronbach alpha of.80 to .88. The internal consistency for the current study was good (α = .84).

Maternal depressive symptoms. The Center for Epidemiologic Studies Short Depression Scale (CES-D-10; Andresen et al., 1994) is a 10-item self-report assessment the single factor structure of depressive symptoms for the general population. This open source short-from version consists of items from the original 20-item The Center for Epidemiologic Studies Depression Scale-Revised (CESD-R; (Radloff, 1977). The assessment measures depressive symptoms on a 4-point Likert scale of response options ranging in frequency of symptoms experienced. Responses include 0 *(rarely or none of the time [less than 1 day]),* 1 *(some or a little of the time [1–2 days*]), 2 *(Occasionally or moderate amount of time [3–4 day])*, or 3 (all *of the time [5–7 days]).* Self-reporters are presented with directions which read: "*Below is a list of some of the ways that you may have felt of behaved. Please indicate how often you have felt this way during the past week by checking the appropriate box for each question."* Sample questions include: "I was bothered by things that don't usually bother me," "I had trouble keeping my mind on what I was doing," "my sleep was restless," and I could not get going." All items are totaled given a score of 0 through 3, while items 5 (*I felt hopeful about the future)* and 8 (*I was happy)* are reverse scored. Scores range from 0 to 30 with high scores

indicating higher a degree of depression. Cutoff scores of 8 or greater indicates clinically significant depressive symptoms (Andresen et al., 1994).

The CESD-10 has demonstrated strong psychometric properties including good reliability and construct validity in adolescents (Bradley, McGrath, Brannen, & Bagnell, 2010), diverse populations (Cheng, Chan, & Fung, 2006), older adults (Irwin, Artin, & Oxman, 1999), community samples (Cheung, Liu, & Yip, 2007), and psychiatric samples (Bjorgvinsson, Kertz, Bigda-Peyton, McCoy, & Aderka, 2013). Internal consistently ($\alpha = .86$), reliability (ICC = .85) and convergent (.91) and divergent (.89) validity was strong (Miller, Anton, & Townson, 2008). Internal consistency for the current study was good ($\alpha = .80$).

CHAPTER III

Results

Power Analysis

To determine the sample size for this study, an a priori power analysis was conducted using the statistical software G*Power (Faul, Erdfelder, Buchner, & Lang, 2009). The power analysis was conducted using a multiple regression design with four predictor variables: child status, parental mindfulness, parental stress, status x mindfulness. The following demographic variables were controlled for in analyses: child age, socioeconomic status and verbal mental age. All 4 variables were accounted for and entered in power analysis. A conventional, large Cohen's f^2 effect size of 0.35 was chosen consistent with previous studies examining parental stress, mindfulness and depression in parent of children with ASD (e.g., Conner & White, 2014; Dykens et al., 2014; Hayes & Watson, 2013). The alpha level was set at .05 and the power level was set at .95 to increase expected sample size and reduce probability of Type I error. Based on these criteria, a minimum of 59 participants were necessary in order for the analyses to be adequately powered. Due to the sample size of the current study ($N = 32$) and a particularly small subsample of mothers of children with ASD due to recruitment challenges ($n = 11$), analyses were underpowered.

Data Entry and Preparation

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) Version 25.0 and the PROCESS macro add-on (Hayes, 2008). Preliminary correlational analyses were used to highlight possible covariates to be assessed and controlled for in subsequent analyses. The following variables were entered: family income, child chronological age, and child verbal mental age, were entered as continuous variables. The variables of interest were

entered as follows: diagnostic status was dummy coded and entered as dichotomous variables (ASD =1 and TD = 0), parenting stress as continuous variables with four levels included T scores and percentiles ranging from 35 to 81 and the 6th percentile to 99th percentile, respectively (parental distress, parent–child dysfunctional interaction, difficult child, and total stress), the proposed outcome of maternal depressive symptoms as a continuous variable with raw scores ranged from 0 to 17, and the proposed moderator of mindfulness utilizing the mean of the 15 items ranged from 3.0 to 5.4. Family income, child chronological age, and verbal mental age were not significantly correlated with variables of interest and were not controlled for in subsequent analyses (see Table 2).

Prior to data analysis, data were screened for possible missingness, outliers and normality. All participant completed demographic variables, the PSI-SF-4, the MAAS, and the CESD-10. No missingness was detected. Data were examined for outliers using histograms, and box-and-whisker plots. Two cases with significant outliers were detected within the ASD group on the CES-10 (Total score = 1) and the PSI (total score = 73) the utilizing Cooks Distance score of >1 (CESD-10 total score of 1, $D_i = 2.31$ and PSI total score of 73, $D_i = 2.26$) and box and whisker plots within the CESD-10. The outliers identified were examined, and given no clear reason for exclusion, were retained and interpreted as representing variability within the clinical population sampled. As recommended, the method of bootstrapping was used as it is robust to outliers (Hayes, 2012, 2013; Preacher, Rucker, & Hayes, 2007). The data also were examined for the following violations of the assumptions of multiple regression: linearity, homoscedasticity, independence, normality, and multicollinearity. According to Preacher, Rucker, and Hayes, if bootstrapping is used, the only assumptions required when testing conditional indirect effects are

linearity and independence (2007). However, the following will review assumptions for regression.

Linearity. The assumption of linearity states that the relation between the independent variable (IV) and the dependent variable (DV) must be linear. To assess this assumption, the data were examined graphically using a scatter-plot with a best fitting line. This process assures that the data does not follow a quadratic or cubic trajectory. In addition, residuals and the predicted values were plotted to assess the linearity of the relations between the variables. Given that status is a categorical variable, data were analyzed by group (ASD=1 and TD=0). Data were visually examined utilizing scatter plots by group between predictor variables (i.e., parental stress and mindfulness) and the outcome variable (maternal depression). All relationships appeared linear within both groups. Data were examined visually using a probability-probability plot (P-P plot) and scatterplots of residuals. Data appeared linear and not to fall out of bounds. Data points were randomly and evenly dispersed around estimates. As such, this the assumption was met.

Homoscedasticity. The assumption of homoscedasticity refers to the variance of the residuals being constant across all values of the IV (Field, 2009). This assumption was tested by creating graphical partial plots for each IV in relation to the DV by group. Data appeared evenly dispersed at all levels of the best fitting line.

Independence. The assumption states that the errors of estimation are statistically independent such that a given residual from one observation is not related to the residual of another observation. To test this, the Durbin-Watson test (Field, 2009) was conducted. Values less than 1 or greater than 3 are indicative of residual dependence. Results indicated values were independent. Therefore, this assumption was not violated (Cohen et al., 2003).

Normality. The assumption of normality states that the errors in estimation of the outcome variable are normally distributed. As such, the distribution of residuals within the data should follow a normal distribution (Field, 2009). Field (2009) recommends that a categorical predictor (i.e., ASD and TD group) should be examined separately. Normality was assessed using the Kolmogorov-Smirnov test (K-S test) with maternal depression as the main dependent variable. The K-S test indicated data was normally distributed in both groups. Data were visually inspected graphically with a histogram and a P-P plot for each group. The histogram of the residuals appeared to be normally distributed in a bell-shaped curve and the P-P plot displayed the z-scores plotted closely along the diagonal line. As such, the assumption of normality was not violated.

Multicollinearity. Multicollinearity occurs when there is high covariance between two predictor variables (Field, 2009). Multicollinearity was assessed through correlational analyses (see Table 2). No predictor values were highly correlated with one another ($r > .80$), as such, the assumption of multicollinearity was not violated (Field, 2009).

Data Analytic Plan

Test of direct effects. A linear regression was conducted regressing maternal depression, stress, and mindfulness on developmental status utilizing SPSS 25 (Statistical Package for the Social Sciences) Process Macro Model 4 examining the total effect. Conceptual representation is displayed in Figure 1.

Test of indirect effects. The test of the indirect effect of status on depression through parental stress was conducted utilizing SPSS 25 (Statistical Package for the Social Sciences) PROCESS Macro (Hayes, 2013). Mediation is recommended when examining any casual theory where at least one antecedent variable (development status) is proposed to influence an outcome

variable (depression) through a single intervening variable (stress; Preacher et al., 2007). Process Model 4 was utilized to examine this relation, as model 7 does not provide total effects of the simple mediation.

Test of conditional indirect effects. Data analysis was conducted utilizing SPSS 25 (Statistical Package for the Social Sciences) PROCESS Macro, Model 7 (Hayes, 2013). Moderated mediation is recommended when examining the magnitude of the indirect effect at particular values of a moderator (Preacher et al., 2007). Thus, a moderated mediation model analyzing conditional indirect effects was utilized to examine the proposed model. Bootstrapping, a nonparametric resampling procedure, is recommended for assessing the conditional indirect effects, particularly when the total sample size is not large and the sampling distribution of conditional indirect effects tend to be irregularly shaped (Hayes, 2012; Preacher et al., 2007). Bootstrapping resampling was set at 5,000, the default setting. Variables were mean centered, as recommended as recommended by Hayes (2013) to ensure tests of significance are interpretable when testing interactions.

The overall conceptual model examined used Model 7 of PROCESS. This model produces 95% confidence intervals for the conditional indirect effect. The conditional indirect effect was assessed utilizing PROCESS model 7. The model was examined using the piecemeal approach examining the total, total, indirect effect, using model 4, then the conditional indirect effect in model 7, as recommended by Hayes (2013). A statistical diagram of Model 7 ($Y= i_y + c'_1X+ c'_2W + c'_3XW + b_1M + e_y$) is represented in Figure 3. This model allows for the direct effects of the categorical predictor variable, diagnostic status (ASD vs. TD; *X*) on the continuous outcome variable, maternal depression (*Y*) to be examined while controlling for variables within the model. Additionally, Model 7 analyzed the indirect effect of diagnostic status on maternal

depression through the mediator, parental stress (*M*), while controlling for the moderator. Finally, this model analyzed the conditional effect of the moderator, mindfulness (*W*) on the indirect effect. PROCESS examined conditional indirect effects in a single command resulting in a PROCESS output containing conditional, unconditional, direct and indirect effects allowing for interpretation of regression coefficients, and their standard errors, *p*-values, R^2, and confidence intervals. Conditional indirect effects at standard deviation values (-1 *SD*, 0, and, +1 *SD*) of the moderator, Mindfulness, were examined. Within the model, I expected to see that at low levels of mindfulness, there would be a stronger indirect relation between status and depressive symptoms via parenting stress. However, at high levels of mindfulness the indirect effect of status on depressive symptoms would be weaker. The null hypothesis of no conditional indirect effect can be rejected if the CI does not contain 0.

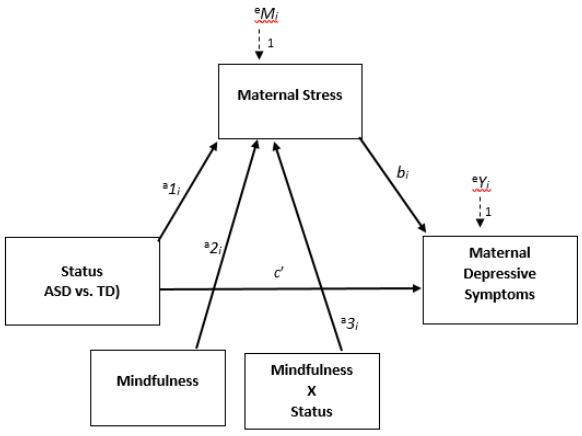

Figure 3. Statistical diagram of the conditional indirect effect of diagnostic status (*X*) on maternal depressive symptoms through maternal stress ($M = a_{1i} + a_{3i}W)b_i$. Direct effect of *X* on *Y* = *c'*.

Table 2.

Bivariate Correlations among Study Variables

Variable	1	2	3	4	5	6	7	8
1. Verbal Mental Age								
2. Chronological Age	.218							
3. Child's Sex	.016	.108						
4. Maternal Ethnicity	-.016	-.054	.218					
5. Annual Salary	.268	-.032	.166	.124				
6. Mother's Education	.136	.007	-.197	.069	.223			
7. MAAS	-.231	-.165	.038	.783	-.044	-.069		
8. PSI-Total T Score	-.138	.299	.254	-.253	-.054	-.125	-.307	
9. CESD Total Score	.146	.112	.112	-.142	-.008	-.045	-.509**	.629**

Note. $N = 32$; MAAS = Mindful Attentional Awareness Scale Average; PSI-Total T Score = Parenting Stress Inventory T Score; CESD Total Score = Center for the Epidemiological Studies of Depression Short Form total score.
** $p < .01$.

Statistical Analyses

Descriptive Analyses. Descriptive statistics including means, standard deviations, *t*-tests and effect sizes are included for the study variables and presented in Table 3. Significant group differences were found for the following study variables. Mothers in the ASD group displayed significantly higher maternal stress ($d = 2.24$) and maternal depression symptoms ($d = 1.10$) than mothers of children in the TD group, displaying large effect sizes. There were no significant differences between groups for trait mindfulness.

Preliminary analyses. Preliminary correlational analyses were conducted to identify bivariate relationships between study variables and to isolate potential covariates relating to the outcome variable: maternal depressive symptoms. Significant bivariate relationships are noted between depression and mindfulness (negative correlation) and depression and parental stress (positive correlation; see Table 2). No proposed demographic variables were significantly correlated with study variables and therefore none were controlled for in subsequent analyses (see Table 2).[1]

Table 3.
Descriptive Statistics for Variables: Means, Standard Deviations, T-tests, Effect Sizes by Group and Reliability

Variable	Means (SD) [Range]		*t*	*d*	*α*
	ASD (*n* = 11)	TD (*n* = 21)			
MAAS Average	4.05 *(.52)* [3.40, 5.13]	4.18 *(.644)* [3.01, 5.40]	.557	.22	.83
PSI-Total T Score	59.91 *(7.29)* [48, 73]	45.76 *(5.18)* [36, 54]	-6.37**	2.24	.84
CESD Total Score	9.27 *(4.19)* [1, 17]	5.10 *(3.61)* [0,14]	-2.94**	1.10	.80

Note. N = 32; MAAS = Mindful Attentional Awareness Scale Average; PSI-Total T Score = Parenting Stress Inventory T Score; CESD Total Score = Center for the Epidemiological Studies of Depression Short Form total score.
** $p < .01$.

Test of Hypotheses

A moderated mediation (Hayes, 2013, PROCESS Model 7) was conducted using the piecemeal approach recommended by Hayes to examine the following hypotheses:

Hypothesis 1. **There will be a relation between diagnostic status (ASD =1 vs. TD=0) and maternal depressive symptoms.** A linear regression was used to examine the prediction of maternal depression symptoms on diagnostic status. Consistent with the hypothesis, diagnostic status significantly predicted maternal depressive symptoms, $F(1,30) = 8.63$ $p = .006$, $R^2 = .22$, indicating that mothers of children with ASD experienced more depression symptoms than mothers of children with typical development.

Hypothesis 2. Child diagnosis status (ASD) will be positively associated with maternal stress. In the second model, regression was used to examine maternal stress regressed on child diagnostic status, controlling for depression, mindfulness, and ASD X Mindfulness**.**

Consistent with this hypothesis, there was a significant positive relationship between diagnostic status and maternal stress on the 'a path', $b = 14.15$, $t(30) = 6.37$, $p < .001$, $R^2 = .58$ $f^2 = 1.38$, large; (see Table 4).

Hypothesis 3. There will be an indirect effect of diagnostic status on maternal depressive symptoms through parental stress, such that diagnostic status of ASD will be related to elevated maternal depressive symptoms through elevated parental stress. In the third model, the indirect effect of maternal depressive symptoms on diagnostic status through the mediator of parental stress was analyzed. Consistent with this hypothesis, parental stress mediated the relation between status and depression symptoms, significantly explaining the variance between status and depression and indicating the presence of a full mediation within the model, $B = 4.20$, $CI_{95} = 1.27$ to 7.08, $f^2 = .64$, large; see Table 4). This model showed evidence for the presence of a total effect of the categorical predictor variable (ASD vs. TD; *X*) on the continuous outcome variable (maternal depression; *Y*) such that mothers of children with ASD had significantly more depression symptoms than mothers of children without ASD (c path) as tested with the Process Macro 4 (as Macro 7 does not give the total effect). Additionally, this model provided support for the indirect effect of diagnostic status on maternal depression through the mediator (parental stress; *M*) while controlling for variables within the model (c' path). Initially, the relationship between status and depression was statistically significant and positive (c path). There was a positive relationship between diagnostic status and parental stress (a path), a positive relationship between parental stress and depression (b path) as tested through the PROCESS macro model 7. The inclusion of parental stress as the mediator in the model completely explained the relationship between status and depression, such that status and depression dropped from significance when the mediator was included in the model (c' path).

Table 4.
Regressions of Maternal Stress, Depression, and Developmental Status

Outcome	Predictor	*B*	*SE*	*t*	*p*	LLCI	ULCI
Total Stress	Status (a path)	14.15	*2.22*	*6.37*	< .001	*9.61**	*18.68**
Depression	Stress (b path)	.302	.105	2.87	.008	.087*	.516*
Depression	Status (c path)	4.20	1.42	2.94	.006	*1.27**	*7.08**
Depression	Status (c' path)	-.09	1.96	-.06	.964	-4.10	3.92

Indirect effects of Maternal Depression on Developmental Status via Depression

Mediator	Effect	Boot SE	BootLLCI	BootULCI
Depression	4.27	2.09	.40*	8.50*

Note. N = 32; Status = Child with ASD vs. Child with TD; Mindfulness = Mindful Attentional Awareness Scale Average; Parenting Stress = PSI-Total T Score; Depression = Center for the Epidemiological Studies of Depression Short Form, Total Score.
**indicates significant confidence intervals*

Hypothesis 4. The indirect effect of status (ASD vs. TD) on depressive symptoms via parental stress will depend on level of dispositional mindfulness on the "A" Path. Consequently, I hypothesized that the indirect effect of status (ASD vs. TD) on depression via parenting stress will be weaker for those with higher mindfulness. In the fourth model, the conditional indirect effect was not significant as indicated by bootstrapped intervals crossing zero within the interaction model, the index of moderated mediation, indicating that the simple slopes of mindfulness were not significantly different enough from each other to detect an effect *B* = 1.25, *SE* = 2.43, CI_{95} = -2.20 to 7.45; see Table 5). Despite the non-significant conditional indirect effect, there was a trend toward a significant effect in the expected direction when stress was regressed on mindfulness (*B* = - 3.05, *SE* = 1.76, *p* = .094; see Table 5) suggesting a trending relationship between higher mindfulness and lower stress.

Table 5.
Conditional Indirect Effects of Diagnostic Status on Maternal Depression through Maternal Stress, by Mindfulness

Outcome	Predictor	*B*	*SE*	*t*	*p*	LLCI	ULCI
Stress	Status	13.91	2.13	6.53	< .001	9.55*	18.29*
Stress	Mindfulness	-3.05	1.76	-1.74	.094	-6.64	.55
Stress	Status X Mindfulness	4.15	3.97	1.04	.31	-3.10	12.29
Depression	Status	-.090	1.96	-.046	.964	-4.10	3.96
Depression	Stress	.30	.11	2.87	.007	.08*	.51*

Conditional indirect effects of Mindfulness on the Relationship of Status (X) to Depression (Y)

	Mindfulness	Effect	Boot SE	Index	BootLLCI	BootULCI
Stress	-.60	3.45	2.17		.065	8.23
Stress	-.00	4.20	2.17		.27	8.75
Stress	.60	4.95	2.98		.28	11.89
Index of Moderated Mediation						
			2.43	1.25	-2.20	7.45

Note. N = 32; Status = Child with ASD vs. Child with TD; Mindfulness = Mindful Attentional Awareness Scale Average; Parenting Stress = PSI-Total T Score; Depression = Center for the Epidemiological Studies of Depression Short Form, Total Score.
**indicates significant confidence intervals*

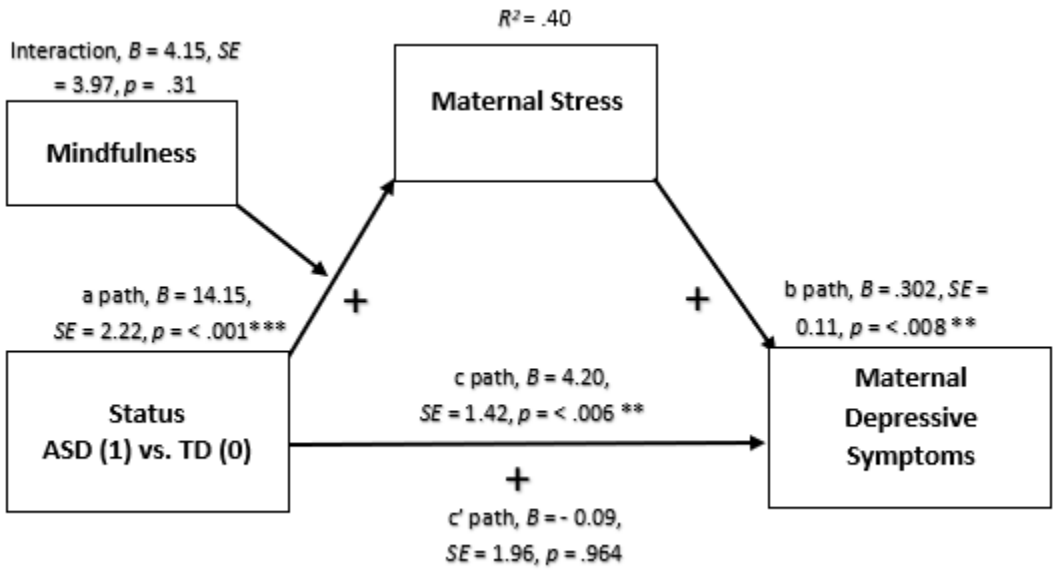

Figure 4. Statistical diagram of the indirect effect of diagnostic status (*X*) on maternal stress through maternal depressive symptoms. Note. The conditional indirect effect of mindfulness also included in depiction above.

Post-hoc Analyses

Due to the lack of significant findings of the conditional indirect effect within the overall proposed model, exploratory analyses were conducted to examine incidence of clinically significant depression among the study population. A depression total score of 8 or above was considered clinically significant (Andresen, Malmgren, Carter, & Patrick, 1994). Percentage of participants with a clinically significant total score of 8 or above was calculated for both groups separately and compared as follows: 1) ASD = 73% and TD = 23%. Additional visual examination of the possible effects of mindfulness was conducted by combining both groups of mothers to examine trends within the data. This rationale was based on several factors including the null group effect of mindfulness for mothers of children with ASD, the significant bivariate correlations between study variables (e.g., depression and mindfulness (r = -.509, N = 32, p < .001) and stress and depression (r =.629, N = 32, p < .001; see Table 2 and Table 3), and the

small sample size of the ASD group. Bivariate correlations were conducted, significant correlations were placed in a scatter plot and are displayed in Figures 6a and 6b. These data suggest that despite the evidence that mindfulness did not have a moderating effect within the model, several trends emerged. There was evidence of a trend toward inverse relationships between mindfulness and both depression scores and parental distress scores, indicating that higher mindfulness was associated with lower parental distress and depression symptoms when examining parental stress and mindfulness and maternal depression and mindfulness visually. While the proposed moderated mediation model was not statistically significant, the visual representation within the post hoc scatter plots (e.g. Figure 6a and 6b) suggest that mindfulness may still be an important construct to examine as greater mindfulness appears to be related to lower depression and stress at they display a negative trend between depression and mindfulness and stress and mindfulness.

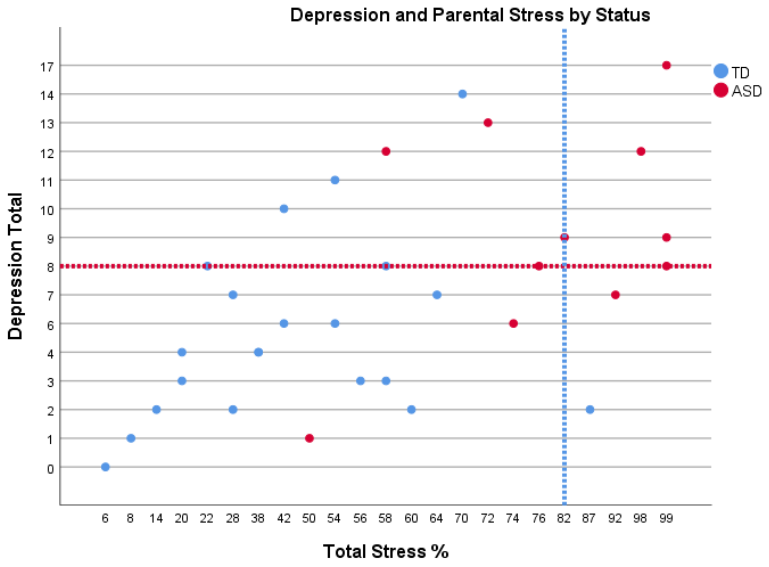

Figure 5. Total depression and parental stress percentile by developmental status. Note: CESD of 8 or more as indicated by red line and stress percentile of 80 or above as demarcated by blue line indicates clinically significant levels.

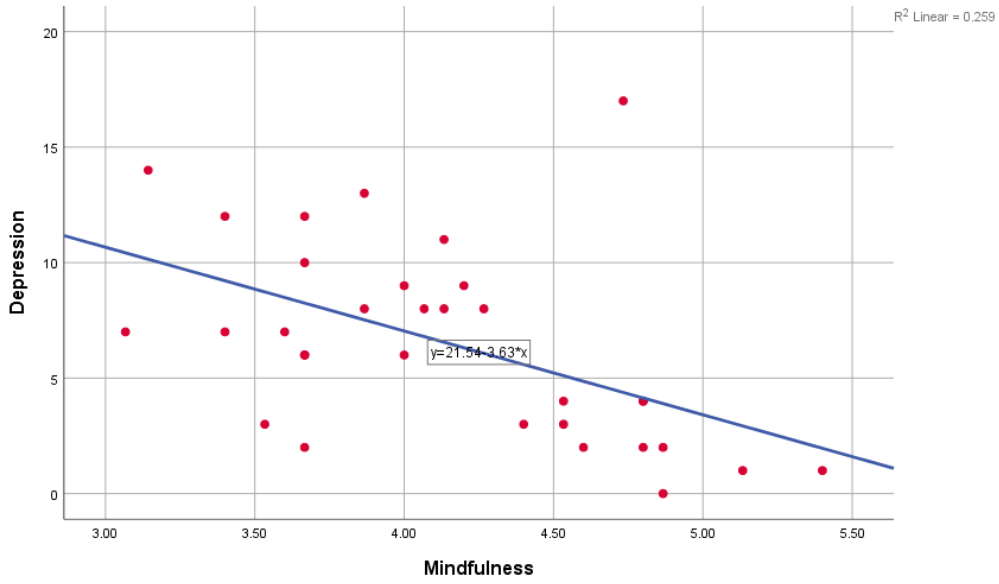

Figure 6a. Scatterplot of the total sample displaying negative trend between depression and mindfulness indicating mothers with higher depression scores, displayed lower mindfulness scores.

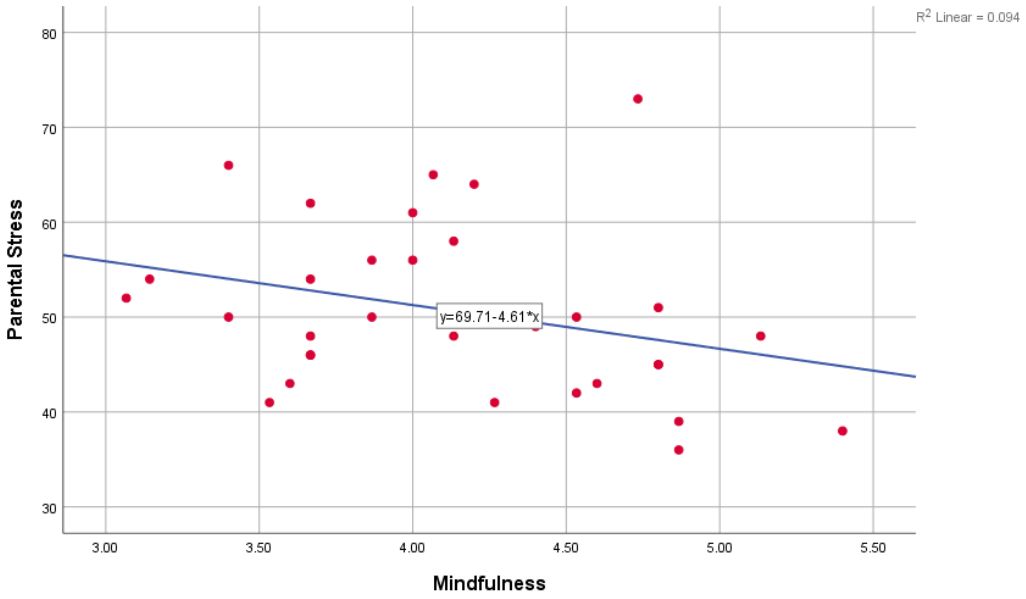

Figure 6b. Scatterplot of the total sample displaying negative trend between parental stress and mindfulness indicating mothers with higher stress scores, displayed lower mindfulness scores.

Chapter IV: Discussion

Purpose of the Study

The current study investigated the relations between parental stress, depression symptoms and dispositional mindfulness among mothers of children with and without ASD. The primary motive of this study was to investigate if a tendency toward a mindful disposition buffered the effects of being a mother of a child with ASD on symptoms of maternal stress, and indirectly on depressive symptoms. While study results did not support mindfulness as a significant moderating factor in this process, there was a significant indirect effect of depression on diagnostic status, through parental stress. Additionally, significant bivariate correlation between depression and mindfulness and a negative sloping trend between mindfulness and stress were found. In the following sections, I will review results of analyses involving study hypotheses, interpret and summarize findings, explore clinical implications and limitations and propose directions for future research.

Interpretation of Results

Autism and maternal depressive symptoms. The hypothesis that mothers of children with ASD would exhibit higher depression symptoms was supported. This significant finding is consistent with previous research demonstrating that mothers of children with ASD experience more symptoms of depression compared to mothers of children with typical development (McStay et al., 2015; Zablotsky et al., 2013). Within the current sample, 73% of mothers of children with ASD scored an 8 or higher on the CESD-10, suggestive of clinically elevated depressive symptoms (Andresen, Malmgren, Carter, & Patrick, 1994). Comparatively, only 23% of mothers of children without ASD scored in the clinical range within this study (Andresen et al., 1994). While the mothers with TD children were still higher than the national average for

women with clinically significant depression symptoms according to the recent CDC report (10.1 %-11.5% of women aged 20-59 reported depression; Brody, Pratt, & Hughes, 2018), mothers who had children with ASD in the current sample reported depression at a 6.3 fold increase compared to the general population). Recent research demonstrates prevalence rates of clinically significant depressive symptoms as high as 76% among mothers of children with ASD (Jose, Gupta, Gulati, & Sapra, 2017) which is consistent with the finding in the current study of 73%. Understanding factors contributing to this increased risk of elevated depression is important.

Jose and colleagues (2016) found a significant positive association between greater autism severity and maternal depression symptoms based on maternal report. Another recent study found that the odds of mothers of children with ASD developing depression were 2.9 times greater than for mothers who did not have a child with ASD, and their risk increased as children aged (Cohrs & Leslie, 2017). This is contrary to the findings of Taylor and Warren (2012) who found depression symptomology to decrease over time, although still remaining quite high at 37%. While the current study was cross-sectional, it is important to highlight that various time points of depression onset and persistence for this population have been noted in the literature. Importantly, the current study indicated that elevated depression symptoms were present among mothers of preschool aged children (3-6 years old), underscoring the importance of attention toward maternal mental health in the preschool years.

The results of the current study are unique in that within the study population, even mothers of children with ASD who were well-resourced socioeconomically (M = $139,545), had children with average to above average verbal intelligence (VIQ = 108.09), and an average age of 4.5 years old, displayed greater depression symptomology than mothers of children with typical development and commensurate demographic variables. The current study did not find

SES, child cognitive functioning, and child age to be protective in regard to reduced symptomology of maternal depression, despite the fact that low SES, cognitive functioning, and young age have been associated with higher maternal burden in previous literature (Steijn et al., 2013; Warren & Taylor, 2015; Weitlauf et al., 2014). Given the finding that these factors did not serve as protective variables in the current study, it is important to explore what factors (e.g., social expectations, stigma, grief, etc.) influence depression symptomatology within the population.

Autism and maternal stress. The hypothesis that mothers of children with ASD would exhibit greater stress was supported, such that there was a significant and positive relation between diagnostic status and maternal stress. This finding is consistent with established literature of high stress among parents of children with ASD (Dykens et al., 2014; Foody et al., 2014; Seltzer et al., 2010). This stress profile is particularly unique to parents of children with ASD compared to parents of children with typical development or other developmental disabilities, such as Down Syndrome (Dabrowska & Pisula, 2010; Dykens et al., 2014; Hayes & Watson, 2013; Seltzer et al., 2010) and is highly correlated with negative mental health outcomes (Hayes & Watson, 2013; Kuhlthau et al., 2014; Singer, 2008), lower quality of life and parental divorce (Hatley et al., 2010; Kuhlthau et al., 2014).

These results add to the plethora of research showing that mothers of children with ASD are disproportionally affected by stress. In particular, longitudinal indicators of stress in this population are beginning to emerge in the literature which highlight several moderating and mediating factors including social support, child behaviors, family dysfunction, maternal baseline stress, and coping strategies (Zaidman-Zait et al., 2017). Findings in the current study are consistent with established literature of greater maternal stress in mothers of children with

ASD. This sample is particularly unique in that it examined stress in a subset of mothers with children with ASD which was restricted in terms of age (3-6:11), intelligence level, relatively high SES, and intact families. These factors have previously been established as protective factors within this population (e.g., Zaidman-Zait et al., 2017), yet within the current sample, mothers continued to show elevated stress.

Autism, parental stress, and maternal depressive symptoms. When combining the aforementioned study variables, support was found for a full mediation demonstrating a statistically significant relation between having a child with ASD and elevated depressive symptoms through elevated parental stress. Parental stress mediated the relation between status and depression symptoms. This model accounted for 40% of the variance in the total model of depression symptoms among mothers with a child with ASD. This indirect effect provides the strongest evidence for a presence of a mediation proposed by Baron and Kenny (1986), as there was no direct effect between diagnostic status and depression after including stress within the model (indirect effect), suggesting evidence of a full mediation.

These results suggest that elevated parental stress is a crucial mechanism contributing to depression among mothers of children with ASD. Current literature continues to display the increased incidence of elevated stress and depression within this population, however, research has yet to highlight the directionality of maternal stress and depression within the population. It is important to emphasize that these results assume a model in which stress statistically precedes depression within the sample, but ultimately the present cross-sectional study can neither establish temporal precedence nor permit experimental manipulation. While longitudinal study design is imperative to incorporate temporal precedence, the present study is the first to this

writer's knowledge to highlight elevated stress as a mediator of depression outcomes within mothers of children with ASD.

Consistent with current literature, these findings add to our working understanding that raising a child with ASD is associated with increased parental stress and maternal depression compared to parents of children without ASD (e.g., McStay et al., 2015; Zablotsky et al., 2013) and expand our understanding that parental stress contributes up to 40% of the variance in depression symptoms among mothers with a child with ASD within the full model. Greater parental strain associated with raising a child with ASD in regards to caregiving tasks and expectations about family functioning (e.g., child problem behaviors, access to services, financial barriers, family support) may be an important factor contributing to the disproportionate effect of poor mental and physical health outcomes for mothers compared to fathers (Johnson et al., 2011). While the current study did not examine these individual factors associated with stress, the results highlight that stress within the milieu of raising a child with ASD may place mothers at increased risk of developing depressive symptoms.

Testing mindfulness as a moderator of the mediation of autism on depressive symptoms through parenting stress. In the fourth model, the conditional indirect effect of mindfulness moderating the indirect effect of developmental status on depression via stress was not significant. This hypothesis proposed that the statistically significant relation between having a child with ASD, elevated depressive symptoms, and elevated parental stress would vary depending on the level of mindfulness. Results did not indicate a significant relation within the current sample, despite previous research suggesting that dispositional mindfulness may buffer the effects of stress and depression in mothers of children with ASD (Bränström et al., 2011a; Conner & White, 2014; Weinstein, Brown, & Ryan, 2009).

There may be several reasons for these non-significant findings related to mindfulness. First, the current study was a cross-sectional design with self-report measures. Such design limited the conclusions significantly, compared to an experimental study design where mindfulness skills could be taught using MBSR manualized treatment or mindfulness, and stress and depression could be monitored longitudinally (e.g., before children as a baseline and at various developmental time points). While previous studies examining dispositional mindfulness found group differences associated with mental health variables using a cross-sectional design (i.e., Ryan & Brown, 2009), substantially more research supports the notion that mindfulness can be taught using a manualized treatment (e.g., MBSR) within intervention/experimental studies resulting in a reduction of mental health symptoms. The current study population may have shown statistically significant differences in mindfulness and mental health outcomes if the study design included MBSR and used pre/post measures of mindfulness. In addition, while the measure used to assess mindfulness (MASS) displayed strong psychometric properties within the current sample, the range of total scores was quite limited (range = 2.3 for TD and 1.7 for ASD) and the means between groups differed by only .13, and sample size was quite low likely limiting the ability to detect a statistically significant moderator effect. As such, power within the current study was a significant barrier given the small sample size and type of analysis conducted. It is possible that a significant effect may have been detected with a larger sample size, given that there was a trend toward lower depression when mindfulness was greater and when the groups were combined. However, it is worth noting the statistical significance of the indirect effect (simple mediation) despite low sample size. It is also likely that the study population as a whole exhibited a higher “baseline” of mindfulness compared to previous studies

(e.g., Conner & White, 2014) as evidenced by the higher mean and limited variability in mindfulness scores between groups (ASD, $M = 4.05$, $SD = .52$; TD, $M = 4.18$, $SD = .64$).

Relatedly, another possible explanation for the null effects in this model is the content and ecological validity of the MAAS. Although the validity is quite high for the MAAS as a measure of mindfulness ($\alpha = .80$ to $.87$), the MAAS utilizes a unidimensional factor structure of *presence*, while other mindfulness assessments (e.g., FFMQ; Baer et al., 2006) consist of multiple factors including *observe*, *describe*, *act with awareness*, *nonjudging*, and *nonreactive stance*. Perhaps measuring mindfulness by a single factor of presence/awareness, reduced the ability to find an effect within this unique population due to the demographic, life/situational experiences and in terms of exposure to intervention services, individual therapy, or other supports. For example, perhaps the mindfulness construct of *nonjudgment* and *nonreactive stance* would be significantly more protective than, *presence*, as *nonjudgment* may be more easily utilized in the context of hectic or challenging moments that often arise spontaneously with children with ASD. Additionally, as the popularity of mindfulness has grown, so has the colloquial use of the term and understanding of mindfulness. Perhaps given the popularity or social desirability of being "mindful," the participants were influenced by social desirability as they answered the questionnaire, as subject were not blind to the title of the measure.

The current study proposed that mindfulness was a dispositional trait that may be protective against negative adverse mental health outcomes. The role of mindfulness to predispose or protect mothers of children with ASD from negative mental health outcomes was not supported within this study. Perhaps additional internal or external factors within the familial unit interact and either moderate or mediate the stress experienced by mothers, subsequently influencing depression symptoms. This is an important distinction for mothers of children with

ASD, as it suggests that perhaps mindfulness is a skill one must learn, practice and continue to hone throughout life to positively influence mental health outcomes, rather than a dispositional trait. It is also important to consider parenting a child with ASD is a complex, life-long experience and that perhaps mindfulness is not necessarily protective for this population. A multitude of other factors may be protective/risk factors for this special population. For example, a recent study highlighted that mothers who were able to tell an integrated narrative of their parenting experiences related prospectively to their biological and stress resilience, as this ability predicted lower parenting stress and less telomere shortening over time (Mason et al., 2018). Telomere dysfunction and shortening have been associated with physical disease states in which prolonged and aging stress are present (Ridout et al., 2018). These findings suggest that perhaps understanding additional complex individual factors (i.e., resilience or effective reflection), as they relate to psychological functioning in mothers of children with ASD, is crucially important.

Strengths and Limitations

There were many strengths of this study including the mediation design model, which is the first study to this writer's knowledge to highlight elevated stress as a significant mediator of poor mental health outcomes for mothers of children with ASD. Another strength of this study is the relatively average to above average IQ among children with ASD, as previous research suggests that having a child with lower IQ is one of the risk factors for maternal stress and depression. This is an important finding because it suggests the previously held belief that having a child with ASD with average to above average cognitive functioning would be protective regarding maternal stress and depression symptoms. In addition, this study occurred in the context of a larger study examining child outcomes on several self-regulation tasks, which by design, required that children be generally compliant and able to initiate and demonstrate task

persistence. These are child characteristics that one may postulate to play a protective role in maternal mental health outcomes. Yet, the data suggest that mothers of children with ASD in the current sample continued to show elevated stress and depression symptoms. The sample, while homogenous in terms of race, ethnic, cognitive, and SES diversity, offers substantive evidence that these aforementioned traits were not protective regarding the development of high maternal stress and depression symptomatology. Additionally, this sample of families had preschool and kindergarten aged children who were relatively young compared to children in past studies, highlighting the incidence of stress and depression within this sample of mothers with younger children. Finally, despite the small sample size of 32 mothers, the results still displayed a strong effect within the simple mediation model, such that stress accounted for 40% of the variance explained by the predicter (ASD vs. TD) and mediator (stress) and both variables combined.

There were several limitations within the current study. The strongest limitations related to the current sample size, particularly in ASD-mother group (n =11). The limited sample size impacted results in two ways: 1) power and 2) homogeneity. Low sample size influences several factors statistically including power, and risk for type one error and type two error. Low power may be responsible for the null result, particularly in the final model including mindfulness (e.g., total of four variables included in the model) and the low sample size (N = 32), given that a sample size of 94 was recommended. However, when post hoc power analyses with GPower were conducted with the data (R^2 = .40 and N = 32), the sample was adequately powered at .94, likely due to the large effect size. Additionally, while the data revealed the relation between status and depression was fully mediated by stress, the moderator (mindfulness) within the sample may have been too homogenous. As such, homogeneity of the sample is certainly a limitation. The maternal-ASD group was overly homogenous in terms of demographics such as

SES and education, particularly in regards to exposure to the concept of mindfulness. But, also in terms of the clinically impairing depressive symptomology in the sample (73%), which was quite high. These factors likely contributed to a reduced ability to detect variations within the data.

This study did not examine child predictors of maternal outcomes as demonstrated in previous studies which included factors such as child problem behaviors, access to services, financial barriers, and family support which may interact or pile up in an additive or multiplicative way to impact maternal mental health (Taylor & Warren, 2012). Additionally, this study was limited by the lack of important data that were not collected as this study was a part of a larger study examining child characteristics. Important data that were not collected include maternal age, maternal history of depression, and maternal history of psychiatric and therapeutic intervention.

Finally, due to the cross-sectional design of this study, causation cannot be inferred from the study findings. It would be a misspecification of the study variables to conclude that stress symptomology temporally preceded depression among mothers with children with ASD without determining this relation longitudinally. Given the strong empirical and theoretical support for the temporal precedence of the variables, it appears that current casual direction is likely accurate, however longitudinal data is needed to support this postulation.

Clinical Implications

The results of this study underscore the significant mental health burden that mothers of children with ASD experience. In particular, these results highlight that mothers of children with ASD are considerably more impacted by depression symptoms and greater stress than mothers of children without ASD. Importantly, mothers of children with ASD are at a particular risk for depression, especially when parental stress is high. In fact, these results provide evidence that

higher stress is associated with depression among this population. These data elucidate several areas of clinical intervention, including preventative or proactive treatment approaches to support this unique population of mothers. While the results in this study did not support mindfulness as a protective trait for mothers, post-hoc analysis did suggest that mindfulness may still be worthy of investigating as there was a negative association between depression and mindfulness, suggesting mindfulness may continue to be an important area of intervention as research continues to be done with this population. These results suggest a model such as preventative mental health care for caregivers of children with ASD given the extremely high rate of depression symptoms found in this sample (73%). Optimally, clinical implications of how children and maternal mental health are interrelated is important to consider when providing assessment and treatment to children with ASD. Understanding that mothers have likely been under prolonged stress by the time their child receives a diagnosis of ASD is important clinical data to guide empirical recommendations of therapeutic intervention as a standard of care for working with this population.

Conclusions and Future Directions

The study's primary goal was to examine the associations among the following variables: diagnostic status, maternal stress, maternal depression, and mindfulness in mothers of young children with and without ASD. These findings add to the literature pertaining to the maternal experience and well-being related to having a child with ASD by addressing parental stress and presence of psychopathology among mothers of children with ASD. The findings of the current study are consistent with the idea that maternal stress associated with parenting a child with ASD (age 3 to 6) represents a risk factor for depression symptoms. While the aims of this study also sought to identify dispositional mindfulness as a possible moderator to the relation between

stress and having a child with ASD, the current study did not establish mindfulness as a significant moderator. However, there appeared to be a trend among all mothers within this sample that indicated greater mindfulness was associated with lower stress and depression. Overall, these results highlight the mental health burden that mothers of children with ASD experience and the need for intervention for not only children with ASD, but their mothers as well. These results also highlight the presence of clinically significant symptoms of depression among mothers who are well resourced, predominantly Caucasian, and have young children with ASD with average to above average verbal intelligence, underscoring that despite these protective factors, this population is also in need of mental health services.

Future research should address important questions pertaining to stress and depression including the age of onset, predisposing and precipitating factors, and confirmation of the causal links between these variables. Additionally, future studies should examine other variables that may impact maternal mental health outcomes such as involvement in early developmental intervention, maternal participation in psychotherapy, presence of familial relationships, social support/proximity to support system, coping styles, social expectations, stigma, and grief; as these may influence depression symptomatology within the population (e.g., Benson, 2014, 2016; Rodrigue et al., 1990; Weiss et al., 2013). The role of dispositional mindfulness and interventions on stress and depression should be examined both using a cross-sectional and longitudinal design with larger cohorts and using experimental designs utilizing MBSR or other evidence-based treatment (i.e., ACT). These data will be important as the mental health needs of families continue to become increasingly complex as more children are diagnosed and/or recognized as having ASD. Importantly, it would be valuable to examine these variables within a more racially, economically, and cognitively diverse sample of families and children to improve

overall generalizability of the findings to support underserved populations. Such data are crucial to the mental health of all families of children with ASD to optimally support children, families and communities throughout the developmental lifespan.

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