Toddler Attachment Security and Parenting Stress in Families with Autism Spectrum Disorder

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Dedication

The author wishes to dedicate this dissertation to Jacqueline Whitlock and children living with mental illness.

Mom, you knew I could do this before I did. I hold you in my heart and mind every day. I know that you are proud of my journey as I take it “one day at a time”.

To all of the children and adolescents I have worked with and will work with in the future, thank you for giving me a place in your life. To all of the parents, thank you for your trust. Within all of us is a strength that cannot be measured, and your strength is an inspiration.

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When I moved from California to Washington, DC to begin this journey, I was so nervous about the lack of support I would experience. I found a second home at GW's

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Abstract of Dissertation

Toddler Attachment Security and Parenting Stress in Families with Autism Spectrum Disorder

The current study investigates the relationships between mother-toddler attachment security, autism spectrum disorder (ASD), sociodemographic risk, and parenting stress utilizing the Fragile Families and Child Well-Being Study (FFCW) longitudinal data set, a nationally representative sample of 4,898 unmarried births. The FFCW oversampled non-marital births from urban, low-income, minority individuals, and the current study utilizes self-report data from mothers during Waves 1, 3, and 6. Sociodemographic risk (Gedaly & Leerkes, 2016) is defined as the potential for increased negative impacts of maternal age at birth, maternal education level, maternal household income, and maternal race on child development due to genetic and/or societal impacts. Data on these variables are collected at Wave 1 per mother report. Mother-toddler attachment security was assessed at Wave 3 using the Toddler Attachment Sort-39 (TAS-39; Bimler & Kirkland, 2002) and parenting stress was evaluated during the same wave. Autism diagnosis in children was evaluated at Wave 6 per parent report. Children in the sample were more likely to be diagnosed with ASD if their mother earned greater than a high school education and identified as White. Results indicated that maternal race influenced both mother-toddler attachment security and the diagnosis of ASD in the sample. White mothers reported higher mother-toddler attachment security when compared to both Black and Hispanic mothers, and children of Black mothers were less likely to have a diagnosis of ASD when compared to children of White mothers. Additionally, toddlers with ASD were less secure at age 3 years when compared to their neurotypical peers. ASD, Black maternal race, and Hispanic maternal race predicted a

decrease in mother-toddler attachment security, and both higher maternal education and maternal household income predicted an increase in mother-toddler attachment security. Although mothers of children with ASD reported higher levels of stress when compared to mothers of neurotypical children, parenting stress was not found to moderate the relationship between ASD and mother-toddler attachment security. Parenting stress did, however, negatively impact attachment security. The results of this study provide insight into the unique challenges faced by families with ASD during critical periods of child development and how race may correlate with both the diagnosis of ASD and mother-toddler attachment security. Multicultural considerations at diagnosis and neurodiversity as well as recommendations for family-centered interventions are discussed.

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Chapter 1: Introduction

Overview

Attachment theory provides a framework to understand the longitudinal impact of early childhood experiences on development. Attachment security may predict socioemotional and cognitive outcomes across time, with special attention paid to the intersection of adverse caregiver behavior and child development. This study explored the relationship between attachment security measured in toddlerhood and the diagnosis of autism spectrum disorder (ASD) recorded in adolescence. While ASD has long been associated with limitations in socioemotional skills, there is variability in attachment security in the ASD population (Capps, Sigman, & Mundy, 1994; Rutgers, Bakermans-Kranenburg, van IJzendoorn, & Berckalaer-Onnes, 2004; Rutgers et al., 2007; Willemsen-Swinkels, Bakermans-Kranenburg, Buitelaar, van IJzendoorn, & van Engeland, 2000). This variation may be impacted by factors found to be associated with both attachment security and autism: sociodemographic risk variables including maternal age, maternal education, household income, and maternal race (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010; Gedaly & Leerkes, 2016; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). The association between these risk factors, attachment, and autism was explored. Parenting stress was also assessed, as it was hypothesized that this stress would be greater among both mothers of children with lower attachment security and mothers of children with ASD compared to parents of secure and neurotypical children due to the burdens associated with care (Hayes & Watson, 2013; Koegel et al., 1992). The threshold model (Bernier & Meins, 2008) and family stress model (Conger et al., 1992, 1993) were utilized to frame the impact of these factors on

attachment security and the diagnosis of ASD. It was hypothesized that parenting stress would moderate the relationship between attachment security in early childhood and ASD diagnosis in adolescence. Specifically, low attachment security would be more strongly related to ASD diagnosis when parenting stress is high (Rutgers et al., 2004; Rutgers et al., 2007; van IJzendoorn et al., 2007). The purpose of this research is to understand how attachment security and autism are associated and whether parenting stress moderates the relationship. Results have the potential to inform interventions aimed at improving the attachment relationships between neurotypical and neuroatypical children and their caregivers, as well as identifying risk factors for poor attachment security in general, due to both genetic and societal factors. Additionally, the results add to the limited, existing research on the connections between ASD and attachment security utilizing a longitudinal, birth-cohort sample and the understanding of the social and emotional challenges experienced by individuals with ASD.

Statement of the Problem

Attachment security. Insecure attachment in infancy is a significant predictor of maladjustment in later development. While infants who form secure attachments are more likely to develop emotionally healthy relationships as they age (Thompson, 2008), and display greater self-confidence and higher self-esteem (Cassidy, Ziv, Mehta, & Feeney, 2003; Coleman, 2003; Doyle, Markiewicz, Brendgen, Lieberman, & Voss, 2000; Kerns, Klepac, & Cole, 1996; Yunger, Corby, & Perry, 2005), children who are insecurely attached are more likely to face specific challenges in socioemotional and cognitive development (Lyons-Ruth, 2003; Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997). Children who develop insecure, avoidant attachments may engage in

aggressive and antisocial behaviors and have a greater likelihood of developing externalizing disorders (Aguilar, Srouefe, Egeland, & Carlson, 2000; Belsky & Fearon 2002b; Berlin, Cassidy, & Appleyard, 2008; Cassidy & Berlin, 1994; DeKlyen & Greenberg, 2008; McElwain, Cox, Burchinal, & Macfie, 2003; Sroufe, Egeland, Carlson, & Collins, 2005). Children displaying an insecure, ambivalent (or resistant, anxious) attachment style are more likely to have short attention spans and limited frustration tolerance and may be described as needy in their relationships (DeKlyen & Greenberg, 2008). Over time, insecure, ambivalent children are more likely to develop internalizing disorders, including anxiety and depression (Salzman, 1997; Symons & Szielasko, 2011). Infants who develop an insecure, disorganized (or disoriented) attachment style are likely to have the poorest outcomes longitudinally and are more likely to have experienced maltreatment early in development (Barnett, Ganiban, & Cicchetti, 1999; Benoit, 2004; van IJzendoorn et al., 1999). These infants are also more likely to be diagnosed with neurological disorders such as ASD, cerebral palsy, and Down syndrome at or shortly after birth (van IJzendoorn et al., 1999). Over time, children with an insecure, disorganized attachment style are more likely to engage in externalizing behaviors and develop dissociative and personality disorders (Benoit, 2004; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; Shemmings & Shemmings, 2011; van IJzendoorn et al., 1999). Given the deleterious outcomes associated with insecure attachment, the increased focus on the essential attachment bond that begins at birth is unsurprising as is the effort to improve parenting practices to foster secure attachments. However, there continue to be gaps in understanding this complex

process, specifically within families who do not fit into the framework in which attachment theory was developed.

Attachment theory can be considered ethnocentric, anti-feminist, heteronormative, and ableist as Bowlby and Ainsworth assessed caregiver behaviors and child outcomes in predominantly neurotypical, White families in individualistic cultures (Quinn & Mageo, 2013; Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). While current attachment theorists and interventionists recognize the deficits in multicultural competencies inherent in attachment theory, the secure/insecure framework developed by Ainsworth and associated child behaviors are based on these stereotypies and assumes a nuclear family with traditional gender roles. The focus on the mother-child dyad presupposes that mothers will be the primary caregivers and provide the most direct support during the critical years of attachment formation. Mothers were often unfairly blamed for poor child outcomes thought to be related to attachment insecurity, with Freud's impact continuing to be felt in the discussion of "refrigerator mothers" and autism (Bettelheim, 1967; Cohmer, 2014; Dolnick, 2007; Kanner, 1943). Mothers may also be shamed and marginalized if they do not prioritize child-rearing above working, a fact that feminist and progressive theorists assert keeps women from social equality (Duschinsky, Greco, & Solomon, 2015). Additionally, families from collectivistic backgrounds often practice group caregiving; this is not an expectation of classic attachment theory which focuses on the mother-child dyad. Individuals in these families often identify as a racial minority further compounding the challenges in understanding secure attachment behavior outside of White, Western expectations. In the current study, race and household income were investigated as variables potentially impacting attachment security. Mothers who identify

as a minority are disproportionately impacted by institutional barriers to economic security, education, safety, child care, and healthcare (Duschinsky et al., 2015). Mothers experience stress managing the accompanying hardships and may need to spend more time away from their children in order to provide for the family, possibly influencing the consistency and sensitivity central to parent-child attachment security (Bakermans-Kranenburg, van IJzendoorn, & Kroonenberg, 2004; Cyr et al., 2010; Dexter, Wong, Stacks, Beeghly, & Barnett, 2013; Gedaly & Leerkes. 2016).

Autism Spectrum Disorder. As the visibility surrounding ASD grows, so does the value of discussing how neurodevelopmental disorders interact with the environment to create an array of outcomes. While the majority of existing research has shown a relationship between ASD and lower attachment security (Barnett, Hunt, et al., 1999; Belsky, 1997; Capps et al., 1994; Ganiban, Barnett, & Cicchetti, 2000; Rutgers et al., 2004; Rutgers et al., 2007; Willemsen-Swinkels et al., 2000), results are mixed, and a smaller percentage of higher-functioning children on the spectrum are capable of forming secure attachments (Rutgers et al., 2004; Rutgers et al., 2007). Aside from the increased cognitive capabilities of these children little else is understood about the mechanisms by which they form secure attachments when their peers with lower cognitive abilities do not. Caregiver variables associated with risk, stress, and responsiveness have been shown to influence attachment security in neurotypical populations. Sociodemographic risk (Bakermans-Kranenburg et al., 2004; Cyr et al., 2010; Gedaly and Leerkes, 2016; van IJzendoorn et al., 1999) and parenting stress (Bernier & Meins, 2008) typically decrease attachment security, whereas consistency and responsiveness are more likely to increase it (Barnett, Kidwell, & Leung, 1998; De Wolff & van IJzendoorn, 1997; Fonagy &

Target, 1997; van der Voort, Juffer, & Bakermans-Kranenburg, 2014). However, the relationship between these environmental factors, attachment, and autism needs more research, and sociodemographic risk and caregiver sensitivity are inconsistently correlated with the existence of ASD. The bidirectional nature of attachment is complicated by the existence of autism due to the genetic, generational nature of the disorder; the difficulty for children on the spectrum to display joint attention, physical proximity, and age-appropriate socioemotional behaviors with their caregivers; and the increased levels of stress experienced by parents of children with ASD. It is important to note that caretaker behavior does not "cause" ASD. Despite significant advances in neuroscience, genetics, and the study of environmental factors, the cause or, likely, multiple causes of ASD remain unknown. What is known is that genetic causes and/or chromosomal rearrangements have been identified in approximately 50% of individuals with ASD, and this genetic heterogeneity continues to be researched to determine causative and susceptibility genes (Centers for Disease Control and Prevention [CDC], 2019; Huguet, Ey, & Bourgeron, 2013) as well as the effects of specific drugs, asthma, and allergies during pregnancy (Gidaya et al., 2016).

The current study sought to address these gaps in the literature and inform individuals and groups working with families impacted by attachment insecurity, ASD, sociodemographic risk, and parenting stress. Specifically, the relationship between attachment security and the prevalence of ASD was investigated in a high-risk sample. Sociodemographic risk variables known to indirectly or directly affect attachment security and/or ASD were controlled for to better evaluate this proposed connection, and levels of parenting stress were examined as a moderating variable between attachment

and autism. An understanding of the associations between these factors can inform intervention and prevention efforts, as well as focus attention on specific ages where these efforts will be most useful developmentally. By gaining a greater understanding of the relationship between attachment and autism, the current study builds on emerging research that suggests a connection affected by parental and environmental stressors.

Purpose and Research Questions

The purpose of the current study was to expand the understanding of the relationship between attachment, ASD, and parenting stress. First, the researcher sought to understand possible associations between maternal sociodemographic variables of household income and race and mother-child attachment security. Second, the researcher sought to understand possible associations between maternal sociodemographic variables and a diagnosis of ASD recorded in adolescence per parent report. These sociodemographic variables include maternal age, maternal education, maternal household income, and maternal race. Third, the researcher investigated the possible relationship between attachment security measured at age 3 and the diagnosis of ASD recorded in adolescence. The association between attachment and ASD is valuable in that the presence of ASD may provide insight into attachment security, informing a multi-faceted intervention approach in developing children. Fourth, the researcher investigated whether the variable of parenting stress has a moderating effect on attachment security and the occurrence of ASD.

The following four research questions are posed in the current study:

Research question one. What is the association between maternal sociodemographic risk variables and mother-child attachment security in toddlerhood?

Research hypothesis one predicted that maternal sociodemographic risk variables would be associated with decreased levels of mother-child attachment in toddlerhood. Sociodemographic risk variables included maternal household income and maternal race. It was hypothesized that mothers with low household income and who identify as a racial minority would be more likely to have children with lower attachment security in toddlerhood.

Research question two. What is the association between maternal sociodemographic risk variables and a diagnosis of ASD in adolescence? Research hypothesis two predicted that maternal sociodemographic risk variables would be largely associated with increased prevalence of ASD recorded in adolescence, though not all variables would have the same effect. Sociodemographic risk variables included maternal age at birth, maternal education, maternal household income, and maternal race. It was hypothesized that mothers with low household income, older than 29 years at childbirth, and those identifying as a racial minority would be more likely to have children diagnosed with ASD as recorded in adolescence. Due to mixed results in current studies, it was hypothesized that women with both below average education and above average education would be more likely to have children diagnosed with ASD.

Research question three. What is the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood? Research hypothesis three predicted that the presence of ASD as recorded in adolescence would be significantly related to lower mother-child attachment security in toddlerhood when maternal sociodemographic risk variables found to be statistically reliable in question two were controlled for.

Research question four: Does parenting stress moderate the relationship between the diagnosis of ASD and mother-child attachment in toddlerhood? Research hypothesis four predicted that the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood would be moderated by the level of parenting stress. Participants with children with ASD who are experiencing high levels of parenting stress would report lower levels of mother-child attachment security when maternal sociodemographic risk variables were controlled for. The direct relationship between mother-child attachment security and ASD would be assessed when analyzing research question three. Sociodemographic risk variables would be determined when addressing question two based on statistical reliability.

Summary of Methodology

The current study utilized data from the Fragile Families and Child Well-Being Study (FFCW), a longitudinal birth cohort survey of approximately 5,000 families comprised primarily of unwed couples (Reichman, Teitler, Garfinkel, & McLanahan, 2001). The FFCW data set is one of the few that uses the Attachment Q-Sort (AQS) to examine the styles of attachment among children in high-risk, or fragile, families (Brooks-Gunn, Garfinkel, McLanahan, & Paxson, 2001). The Toddler AQS was conducted as a part of the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) during Wave 3, when children were 3 years of age, during an optional in-home interview. During Waves 5 (child age 9) and 6 (child age 15) parents were asked if a doctor or health professional ever told them that their child has autism or Asperger's syndrome at any time during his/her life. Per mother self-report, sociodemographic risk variables were

assessed at baseline and parenting stress was recorded at Wave 3. The research questions listed above were analyzed using regression models.

Statement of Potential Significance

The current study has several potential benefits. First, a primary goal of this study was to build on the current evidence that demonstrates a relationship between ASD and attachment security, providing some additional clarity to a topic with mixed outcomes (Capps et al., 1994; Chandler & Dissanayake, 2013; Doussard-Roosevelt, Joe, Bazhenova, & Porges, 2003; Grzadzinski, Luyster, Spencer, & Lord, 2014; Haltigan, Ekas, Seifer, & Messinger, 2011; Kahane & El-Tahir, 2015; Rutgers et al., 2004; Rutgers et al., 2007; Teague, Newman, Tonge, & Gray, 2018; van IJzendoorn et al., 2007; Willemsen-Swinkels et al., 2000). Similarly, the current study builds on the evidence that demonstrates the value of Fragile Families data in the understanding of attachment behavior in high-risk families. A number of studies have utilized Fragile Families items to evaluate relationships between attachment security and a myriad of other variables including parenting stress (Keyser, Ahn, & Unick, 2017; Martin, Brazil, & Brooks-Gunn, 2012; Nomaguchi, Brown, & Leyman, 2017) and sociodemographic risk (Huang & Lee, 2008; Waldfogel, Craigie, & Brooks-Gunn, 2010). However, the current study may be the first to utilize the Fragile Families data when examining the association between attachment, ASD, and maternal factors. Additionally, the current study adds support to the Fragile Families items used to assess parenting stress. As defined below, parenting stress is a constructed variable utilizing several questions within the maternal interview at Wave 3 which are used in several other studies examining parenting burden (Fomby,

2018; Halpern-Meekin & Turney, 2016; Keyser et al., 2017; Martin et al., 2012; Nomaguchi, et al., 2017; Petts, 2018).

A second benefit of the study is the possible intervention strategies that can be informed as a result of the findings. The negative longitudinal effects of insecure attachment in infancy and ASD, especially without early intervention, are clear. While empirically based individual and family treatment approaches have been established for insecure attachment and ASD, an intervention designed to address both concurrently may be beneficial to help parents, children, and the family system with a focus on social emotional skills. Additionally, interventions and policy reforms with the aim of decreasing the number of children raised in fragile families can be aided by the results. This includes promoting healthy parental relationships among unwed couples, increasing access to resources in single-parent homes, decreasing levels of parenting stress and burden through community services and outreach, and promoting high-quality universal child care as a means of providing early intervention to at-risk children.

Third, the study may increase the understanding of the unique issues that individuals on the autism spectrum and their families face by creating a dialogue about sociodemographic, socioemotional, and genetic factors. While ASD is garnering more attention, individuals on the spectrum and their families continue to be misunderstood. The autism spectrum is just that – a spectrum. While hundreds of thousands of individuals share the same label, each person with autism is unique and the autism community acknowledges that if you have met one child with autism, you have met one child with autism. Sicile-Kira (2014) suggests that this is the reason for the neurodiversity movement and current discussions about whether or not autism is a "disease that needs to

be cured or a brain difference that should be celebrated as a gift" (p. 40). The neurodiversity movement embraces the range of skills, aptitudes, and impairments in individuals with ASD, dyslexia, and ADHD. The goal of this movement, in part, is shifting the perception of differences in behaviors, cognitions, and abilities from a deficit model to one that celebrates diversity (Silberman, 2015). The current study seeks to increase the knowledge around ASD and the accompanying challenges, as well as provide suggestions to manage these challenges from a strengths-based perspective.

Theoretical Foundation

Attachment Theory. Attachment theory suggests that individuals develop patterns of attachment behavior in infancy that influence relationships with the self and others throughout the lifespan (Cassidy & Shaver, 2016). Attachment behaviors are organized within an attachment behavioral system that is rooted in survival, with infants motivated to use caregivers to remain safe and regulated within the environment (Cassidy & Shaver, 2016). Infants are predisposed to develop attachment bonds with their caregivers, and these behavioral patterns reflect the "mental representations" that are internalized about how others behave in intimate relationships and about how the infant receives this behavior (Barnett & Vondra, 1999, p. 2). These mental representations create the infant's internal working model of attachment, which influences their emotional and social wellbeing within and beyond the primary caregiver relationship and will continue to guide them throughout the lifespan (Barnett & Vondra, 1999, p. 2). Ainsworth categorized individual differences in relationships with attachment figures based on the behavioral patterns observed. Three attachment patterns were originally proposed by Ainsworth: secure attachment (Type B); insecure, avoidant attachment

(Type A); and insecure, ambivalent (or resistant, anxious) attachment (Type C) (Ainsworth, Blehar, Waters, & Wall, 1978; Benoit, 2004;). Later, Main and Solomon (1986, 1990) proposed insecure, disorganized (or disoriented) attachment (Type D) as the fourth pattern. Individuals possessing a secure attachment style are more likely to develop and maintain emotionally healthy relationships across the lifespan when compared to the three insecure styles of attachment, according to a large volume of research (Thompson, 2008).

The threshold model. The threshold model (Bernier & Meins, 2008) explains the variability in environmental and individual characteristics in children with insecure, disorganized attachment styles. Bernier and Meins (2008) posit that insecure, disorganized attachment is managed by a threshold set by child characteristics that make the child either more vulnerable or more resilient to forming such an attachment (pp. 972-973). The threshold serves as a distinction between secure and insecure attachment; a higher threshold acts as a protective mechanism against forming an insecure, disorganized attachment style and a lower level increases this vulnerability. Caregiver behaviors perceived as threatening or frightening can breach this threshold. Because the relationship between the child and caregiver is bidirectional, parental characteristics are impacted by the behaviors and temperament of the child. Caregiver factors like sensitivity and responsiveness are closely tied to the development of a secure attachment in the child and are considered in the model. Additionally, environmental factors also influence the caregiver and, therefore, the child's threshold. Sociodemographic risk factors such as the caregiver's age, education, household income, and race can have specific negative effects on this relationship. In the current study, parental and

environmental factors hypothesized to negatively influence attachment security were investigated. Additionally, the impact of ASD on a child's ability to develop a secure attachment and the parent's ability to support this emotional and social growth was researched, and the threshold model provides a lens in which to interpret the findings.

The family process model. The family process model (Conger et al., 1992, 1993) theorizes that economic stress negatively impacts parents emotionally, behaviorally, and cognitively, affecting their ability to provide effective parenting. The three dimensions of parental behavior suggested to have direct effects on child wellbeing are supportive parent behavior, including providing expectations for child behavior; low levels of parent hostility; and consistent and reasonable disciplinary practices that are not considered to be "overly harsh" (Conger et al., 1992, p. 529). Without these factors being present, negative familial relationships may occur. In the current study, the impact of sociodemographic risk, including low household income, on attachment security and ASD were investigated. Additionally, the impact of parenting stress on the relationships between attachment security and ASD were researched. The family process model provides a framework to understand the relationship between sociodemographic risk, parenting stress, attachment security, ASD, and parental efficacy.

Limitations and Delimitations

Limitations to this study include those associated with the use of secondary data analysis. The author of this study was not directly involved with data collection and did not have control when addressing attrition rates, as shown in the presence of missing data. Relatedly, another limitation to this research is that the measures utilized largely require self- or parent-report; the maternal sociodemographic risk variables, the parenting

stress variable, and the autism variable use this data collection method, and attachment is assessed using a modified version of the Toddler AQS that requires mothers reporting on toddler behaviors. When self-report data are utilized in behavioral research, response bias is a concern due to participant social desirability, or "faking good" in a study. However, Chan (2009) argues that this social bias happens less often than some may expect, and it is unlikely that respondents would lie about demographic characteristics, specifically. Additionally, as a practical measure in the context of this dissertation four maternal factors were chosen as control variables. While it is impossible to control for all possible factors that may impact parent-toddler attachment security, the diagnosis of ASD, and parenting stress, a number of studies and models support the variables included in the current study: maternal age, maternal education, maternal household income, and maternal race. Therefore, the potential impact of variables outside of the scope of this study remains unanswered. Finally, the variable used to indicate ASD is a dichotomous variable assessed at Waves 5 and 6, child ages 9 and 15, respectively. As previously mentioned, caregivers were asked, "Has a doctor or health professional ever told you that [CHILD] has any of the following health conditions?" A number of mental and physical health concerns were listed, including "Autism" at Wave 5 and "Autism or Asperger's syndrome" at Wave 6. More specific information, including child age at diagnosis, is not provided and would have been valuable for the purposes of the current study. Finally, due to the significant comorbidity of ASD and ID, cognitive measures suitable for individuals with ASD would benefit the current study and offer additional insight into how cognitive ability can impact attachment security in individuals with ASD.

Definition of Key Terms

This section provides definitions of key terms in this study.

Attachment security. Attachment security is defined as a set of behavioral patterns that develop within the first years of life as a response to both genetic and environmental cues, with the effect of keeping the child within close proximity to his primary caregiver(s) (Bowlby, 1988). These patterns become more organized over time and are activated when the child experiences stress in the form of pain, fear, fatigue, and the like. At these times, the secure child seeks comfort and reassurance from the caregiver whereas the insecure child does not. The FFCW assessed attachment security using the Toddler Attachment Sort-39 (TAS-39) (Bimler & Kirkland, 2002), an adaption of the AQS. The AQS is a method of assessing attachment security in infants and toddlers; each card describes a specific behavioral characteristic of children between the ages of 12 and 48 months and are sorted by an observer after several hours of parent-child observation into piles ranging from "most descriptive of the subject" to "least descriptive of the subject" (van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004; Waters, 1987, 1995). A score of attachment security is derived by comparing these descriptions with behavioral profiles of prototypical children identified as secure by experts in the field of attachment theory. The AQS security score is the correlation between the specific child's Q-sort and the expert sort of the prototypically secure child. In the Fragile Families study, the TAS consisted of 39 items derived from the Everett Waters 90-item AQS. This was administered during in-home assessments of mothers during Wave 3, child age 3 follow-up. Participants volunteered to be a part of this sub-study in 18 of the 20 cities surveyed. The security variable is derived

from multidimensional scaling and attachment security is represented by a score within the range of -1.00-1.00, with higher values indicating more security and lower values indicating less security.

Autism Spectrum Disorder (ASD). ASD is defined as a lifelong neurodevelopmental disorder with symptoms typically presenting in toddlerhood or early childhood (Joseph, Soorya, & Thurm, 2015). Individuals with ASD live with a range of symptoms which include "persisting and impairing social communication deficits and the presence of restricted and repetitive behavior and interests" (Joseph et al., 2015, p. 8). The FFCW assessed for the presence of ASD per parent report during Wave 5, child age 9 and Wave 6, child age 15 follow-up. Parents were asked if their child was ever diagnosed (informally or formally) with autism or Asperger's syndrome by a doctor or health professional and responded "yes" or "no". Data from Wave 6 were ultimately used to create a new dichotomous variable.

Maternal age. At baseline (Wave 1) mothers were asked, "How old are you?" and mothers provided an age in years. A constructed variable was created to account for unavailable or missing data, and mother's report was used whenever possible.

Maternal education. Maternal education is defined as the highest grade completed by the mother at Wave 1 in the FFCW. Mothers were asked, "What is the highest grade or year of regular school that you have completed?" and responded with one of the following options: no formal schooling; eighth grade or less; some high school (grades 9, 10, 11, and 12); high school diploma (completed twelfth grade); G.E.D.; some college or two-year degree; technical or trade school; bachelor's degree; and graduate or professional school. Researchers created a constructed variable to account for unavailable

or missing data, and mother's report was used whenever possible. Responses were coded into the following categories: less than a high school diploma, high school diploma or equivalent, some college or technical school, or college degree or higher. In the current study, maternal responses were dichotomously coded into below and above average education (high school diploma or equivalent).

Maternal household income. Maternal household income is defined as the total household income reported at Wave 1 in the FFCW. Mothers were asked, "Thinking about your income and the income of everyone else who lives with you, what was your total household income before taxes in the past 12 months?" Researchers created a constructed variable to decrease missing values and mother's report was used whenever possible. When mothers provided an approximate income, the mean value of the given range was entered. If neither mother or father reported on income, the variable was entered using Stata's regression-based impute command and included the following mother and father covariates: city, age, years of education, race/ethnicity, earnings, received welfare, and marital status.

Maternal race. Maternal race is defined as a mother's self-reported racial identity reported at Wave 1 in the FFCW. Mothers were asked, "Which of these categories best describes your race?" Mothers were provided with the following options: White; Black, African American; Asian or Pacific Islander; American Indian, Eskimo, Aleut; other, not specified; Hispanic; and don't know. Based on the answer to this question, mothers were asked "Are you of Hispanic or Latino descent?" and "Are you Mexican, Puerto Rican, Cuban, or other Hispanic?". Researchers constructed a maternal race variable to eliminate any missing responses.

Parenting stress. Parenting stress is defined as the mother's interpretation of the emotional and physical burden she experiences parenting her children. Mothers in the FFCW were asked about the burden associated with child rearing. A number of researchers (Fomby, 2018; Halpern-Meekin & Turney, 2016; Keyser et al., 2017; Martin et al., 2012; Nomaguchi et al., 2017; Petts, 2018) have defined parenting stress utilizing the following statements from the FFCW:

1. "Being a parent is harder than I thought it would be."
2. "I feel trapped by my responsibilities as a parent."
3. "Taking care of my children is much more work than pleasure."
4. "I often feel tired, worn out, or exhausted from raising a family."

Mothers indicated their level of agreement with these statements on a Likert scale, with 1 indicating "strongly agree" and 4 indicating "strongly disagree". For the current study, the same questions were utilized to form the constructed parenting stress variable, with maternal responses collected at Wave 3. Likert responses were reverse-coded so that a higher score indicated greater agreement with the experience of stress, and the variable was constructed by averaging item responses.

Sociodemographic risk. Sociodemographic risk is defined as the potential for increased negative impacts of maternal age at birth, maternal education level, maternal household income, and maternal race on child development (Gedaly & Leerkes, 2016). Partly as a result of societal inequities and/or genetic risk, high sociodemographic risk includes factors such as maternal age during adolescence or over 29 years (Bhasin & Schendel, 2007; Idring et al., 2014; Lung, Chiang, Lin, Lee, & Shu, 2018), a maternal education level less than a high school diploma or equivalent, low household income

(Bakermans-Kranenburg et al., 2004; van IJzendoorn et al., 1999), and minority racial identity.

Chapter 2: Literature Review

Introduction

This literature review will discuss ASD, attachment theory, and the proposed connection between the two. Maternal variables including age, education, income, race, and stress that potentially affect this relationship are also discussed. There is a paucity of research regarding the possible relationship between ASD and attachment security. Research regarding ASD was collected from peer-reviewed journal articles and books found online via Washington Research Library Consortium via GWU. The Autism and Developmental Disabilities Monitoring (ADDM) Network was utilized for current statistics and prevalence rates. Diagnostic criteria for ASD was found in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013). A brief summary of the changes in diagnostic criteria for ASD is presented, as the literature includes various terminology for autism and related disorders. Additionally, due to the fact that ASD often co-occurs with other disorders, a brief overview of comorbidity is presented. The following key words/terms were searched utilizing the Washington Research Library Consortium via GWU: autism spectrum disorder, prevalence rates of ASD, ASD and co-occurring disorders, sex differences in ASD, changes in autism diagnostic specificity as a result of criterion changes in the *DSM-5*, and ASD and attachment security. Due to the changes in diagnostic criteria and the magnitude of research on ASD in recent decades, searches were limited to sources published in the last 20 years; this was not the case with research that pertained to autism and attachment, due to the lack of available studies. Research on the possible associations between autism and related disorders and attachment security was selected to provide a

summary of the various outcomes: individuals with ASD are less secure than neurotypical individuals, individuals with ASD and comorbid disorders are less secure than individuals with ASD only and neurotypical individuals, and individuals with ASD have the same likelihood of establishing a secure attachment as neurotypical individuals.

This literature review will also discuss the theory of attachment, including theoretical underpinnings, history, seminal research in establishing theoretical foundations, current research, criticisms, and application to developmental outcomes. Research regarding attachment theory was gathered from books and journal articles written by the theory's founders, Bowlby and Ainsworth, as well as information about the history and application of the theory over time. Searches for peer-reviewed journal articles and books were completed online via the Washington Research Library Consortium via GWU with the following key words/terms: Psychoanalysis and attachment, ethology and attachment, attachment and developmental psychology, attachment and Bowlby, Bowlby and Harlow, the internal working model of attachment, attachment and Ainsworth, attachment styles, secure attachment, insecure attachment, the Strange Situation Procedure, outcomes of attachment styles, caregivers and attachment security, and criticisms of attachment theory. Due to the nature of attachment theory and its development over nearly a century, there was not a limitation set within the search regarding year of publication; however, studies from the past 20 years were utilized in the critique of scholarly literature section. Special attention was provided to references that detailed the theoretical underpinnings of attachment while highlighting the eclectic nature of the theory, variables influencing the formation of the four different attachment styles,

outcomes associated with the different attachment styles, and attachment in individuals with neurological disorders and developmental delays, specifically ASD.

The threshold and family process models provide a framework from which to understand the associations between sociodemographic risk, parenting stress, ASD, and attachment security. Sociodemographic risk variables include maternal age, maternal education, maternal household income, and maternal race; research investigating possible relationships between these variables, ASD, and attachment is provided. Finally, parenting stress related to both ASD and attachment security is discussed.

Classification and Symptomatology of Autism Spectrum Disorders

ASD is a complex, neuropsychiatric disorder with an onset in the early developmental period. Currently, the cause or causes of the disorder remain unknown; however, there is a strong genetic element to ASD susceptibility with approximately 50% of individuals assessed exhibiting genetic causes including chromosomal abnormalities and mutations in specifics genes (Huguet et al., 2013). It is hypothesized that epigenetic and environmental factors also contribute to the disorder, including prescription drugs taken during pregnancy and chronic asthma in mothers (CDC, 2019). The heterogeneity of ASD presents difficulties in understanding the contributing factors, but it is important to emphasize that parents are not responsible for the diagnosis. Diagnoses of autistic disorder, Asperger' syndrome, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS) as defined by the *DSM-IV* (4th ed.; APA, 1994) are now considered to be part of ASD. As indicated by the inclusion of the word "spectrum", presentation of symptoms varies significantly based on the severity, developmental level, and chronological age of the individual with ASD. ASD

can affect an individual's social-emotional abilities and communication; expressive and receptive speech; motor skills; and flexibility in behaviors, routines, and expectations (i.e., executive functioning skills). While a range of symptoms and severity exist, the central features of ASD are deficits in social communication and interaction, and restricted, repetitive behaviors (also known as RRB) and interests. Children diagnosed with ASD meet the following criteria as defined by the *DSM-5* (APA, 2013):

A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by all of the following, currently or by history:
    1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.
    2. Deficits in nonverbal communication behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.
    3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.
B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history:

1. Stereotyped or repetitive motor movements, use of objects or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases).
2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).
3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).
4. Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

C. Symptoms must be present in the early developmental period (but may not become fully manifest until social demands exceed limited capacities or may be masked by learned strategies in later life).

D. Symptoms cause clinically significant impairment in social, occupational, or other important areas of current functioning.

E. These disturbances are not better explained by intellectual disability (intellectual disability disorder) or global developmental delay. Intellectual disability and autism spectrum disorder frequently co-occur; to make comorbid diagnoses of

autism spectrum disorder and intellectual disability, social communication should be below that expected for general developmental level. (p. 50)

Over the course of the last several decades, the visibility of ASD has increased dramatically, leading to discussions regarding increasing prevalence rates, possible genetic and environmental risk factors, treatment, and prevention efforts. The CDC (2009, 2016) reported a prevalence of 1 in 110 in the US in 2009 and 1 in 68 in 2014. The current prevalence of ASD is 1 in 59 in children aged 8 years in the US (Baio et al., 2018), and between 1.5% and 2.24% in developed countries (Elsabbagh et al., 2012; Lyall et al., 2017; Zablotsky, Black, Maenner, Schieve, & Blumberg, 2015). According to the ADDM Network, males are 4 times more likely than females to be diagnosed with autism, with a higher prevalence in non-Hispanic White children compared with non-Hispanic Black children and Hispanic children, and non-Hispanic Black children having higher rates than Hispanic children (ADDM, 2014; Baio et al., 2018). Due to the genetic liability associated with ASD, twin studies have revealed a 60%-94% concordance rate in monozygotic twins and 18%-34% in dizygotic twins (Frazier et al., 2014; Rutter, 2005; Tick, Bolton, Happé, Rutter, & Rijsdijk, 2015). In children with a sibling with ASD, the rate of autism is between 2%-18% compared to .5% in the general population (Ozonoff et al., 2011; Rutter, 2005). The shift in prevalence has received additional consideration since 2013 when the *DSM-5* presented ASD as an umbrella diagnosis, integrating the aforementioned related diagnoses into one in an attempt to improve diagnostic specificity. From the years 2000 to 2014 the ADDM Network noted a significant increase in cases of ASD, from 1 in 150 to 1 in 45. Nearly all of these children would have been

diagnosed under the *DSM-IV-TR* (4th ed., text rev., APA, 2000) definition of autistic disorder (Baio et al., 2018).

Changes in classification. The *DSM-5* presents a significant change to the diagnostic criteria and terminology (Carpenter, 2013). In an effort to make the diagnosis of autism a more straightforward process, there is a single diagnosis termed autism spectrum disorder (ASD) which represents a range of severity in two domains: social communication and restrictive, repetitive behaviors (Lord, Elsabbagh, Baird, & Veenstra-Vanderweele, 2018). The consolidation of the diagnoses autistic disorder, Asperger's syndrome, and PDD-NOS was meant to reduce the unreliable diagnosis of individuals on the spectrum, and individuals with an established *DSM-IV* diagnosis of these disorders were given an ASD diagnosis following the *DSM-5*'s release. Levels of severity of ASD are included in the *DSM-5* diagnostic criteria: (a) level one is defined as individuals requiring support, (b) level two is defined as individuals requiring substantial support, and (c) level three is defined as individuals requiring very substantial support. These levels of support are relatively fluid and can change over time as individuals gain skills or face new challenges. The validity of these levels of severity is not yet determined (Lord et al., 2018).

Co-occurring disorders. Initial concerns for co-occurring disorders with ASD include intellectual disability (ID), developmental delay, language delays and disorders, and motor difficulties. Studies on ASD and co-occurring ID provide widely varying statistics, with a range of 11%-65% of school-aged children having both disorders (ADDM, 2012, 2014; Lord et al., 2018; van IJzendoorn et al., 2007). Regardless of this variability, ID is the most common developmental diagnosis to accompany autism. As

children age, concerns for other co-occurring disorders increase. For individuals with ASD, the most common comorbid mental health condition is attention-deficit/hyperactivity disorder (ADHD). Rates vary but comorbidity between these two disorders ranges from 28.2%-50%, with rates highest in preschool- and elementary school-aged children (Leitner, 2014; Lord et al., 2018; Romero et al., 2016). The co-occurrence of ASD and ADHD is associated with poorer overall health and physical functioning, and greater impairments in adaptive and daily living skills, executive functioning, and verbal working memory when compared to children with ASD only (Sikora, Vora, Coury, & Rosenberg, 2012). Adolescents with ASD are more prone to depression and anxiety disorders than their neurotypical peers (*DSM*-5, APA, 2013; Kerns & Kendall, 2014; Lord et al., 2018); approximately 48% of children and adolescents with ASD manage an anxiety disorder.

Neurodiversity. The neurodiversity movement has gained attention in recent years partly because of the marginalization of individuals on the spectrum. Neurodiversity acknowledges the failings of the medical model in the interpretation of ASD from a deficit-based perspective assuming that there must be prevention efforts, a reduction of symptoms, a cure, and a goal of "normalization" (Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013; Orsini, 2012). Many self-advocates in the autism community see ASD as an important part of their identity and utilize a social model of disability to distinguish between the biological characteristics of the condition and the social and political barriers to equity (Baker, 2011). The movement empowers individuals on the spectrum to utilize their unique lived experiences to advocate for their minority group identity by challenging negative stereotypes and improving access to needed

opportunities and services (Baker, 2011; Orsini, 2012). Rather than focusing on typical functioning, the neurodiversity movement advocates adaptive functioning, self-determination, and subjective well-being; interventions intended to normalize behaviors and ameliorate ASD deficits are opposed (Kapp et al., 2013; Silberman, 2015). This is contradictory to goals of many individuals in the community, specifically parents of children with ASD who are seeking to improve skills and quality of life as well as those who advocate for individuals who are not considered "high-functioning" (Jaarsma & Welin, 2012). While the current study seeks to understand some of the challenges that families with ASD face, it does not seek to discount the strengths and experiences that are unique to the community. Additionally, results of the study have the possibility to bring attention to abilities in social-emotional reciprocity that are often assumed to be absent in children with ASD potentially informing strengths-based attachment interventions.

Autism Spectrum Disorder and Sociodemographic Risk

While ASD is a neurodevelopmental disorder present at birth there is a relationship between sociodemographic risk factors and ASD, although the effects are not uniform. For the purposes of the current study, sociodemographic risk variables include maternal age at childbirth, maternal education level, maternal household income, and maternal race (Gedaly & Leerkes, 2016). High sociodemographic risk includes factors such as maternal age during adolescence or 29 years and older at childbirth (Bhasin & Schendel, 2007; Idring et al., 2014; Lung et al., 2018; Sandin et al., 2016), a maternal education level less than a college degree or equivalent (Lung et al., 2018), low household income (Delobel-Ayoub et al., 2015; He et al., 2018; Rai et al., 2012; Sandin et al., 2016), and minority racial identity (Becerra et al., 2014; Bhasin & Schendel, 2007;

CDC, 2016). For the purpose of the current study, a maternal education level less than a high school diploma or equivalent is considered to be a risk factor.

Maternal age and autism spectrum disorder. An association between maternal and paternal age at birth and autism has been investigated frequently over the past few decades, with varying results. Adults in Western countries are waiting longer to have children; a hypothesized connection between this trend and the increase in autism prevalence has largely driven this research (Bray, Gunnell, & Davey Smith, 2006; Hultman, Sandin, Levine, Lichtenstein, & Reichenberg, 2011). In a nationally representative Swedish sample, Idring et al. (2014) found that 1.1% of children had a diagnosis of ASD; 42% of the children diagnosed with ASD were also diagnosed with ID. The prevalence of ASD was not affected by mothers younger than 29 years but increased with each additional year (Idring et al., 2014); a maternal age of 30 or older was associated with a greater risk of ASD with accompanying ID. Additionally, advancing maternal age increased the risk of ASD regardless of paternal age, and paternal age linearly increased risk of ASD only in mothers 35 years of age or younger (Idring et al., 2014, p.112). Sandin et al. (2016) found a relationship between both older and younger than average maternal age and an increased relative risk of ASD in a population-based cohort study. When compared to mothers between the ages of 20-29 years, women ages 40-49 years and less than 20 years were at an increased risk of having children with ASD; advancing paternal age was also associated with this increase. Lung et al. (2018) also found that a maternal age of 40 years or older was associated with a diagnosis of ASD at child age 66 months. Collectively, the connection between increasing maternal age and autism may be explained by exposure to environmental elements, such as air

pollution and specific prescription medications, and the increasing rate of genomic alterations as parents age (Gidaya et al., 2016). The likelihood of experiencing nutritional deficiencies, metabolic conditions, and autoimmune diseases also increases with age, and these factors have been found to be associated with ASD (Atladöttir et al., 2009; Krakowiak et al., 2012; Schmidt et al., 2012). The current study sought to assess these findings further and hypothesized that mothers who give birth after 29 years of age are at an increased risk of having a child with ASD.

Maternal education and autism spectrum disorder. Studies investigating the connection between maternal education and an ASD diagnosis have reported inconsistent results with researchers finding connections between both higher and lower than average levels of maternal education and autism. Leventhal, Brooks-Gunn, McCormick, and McCarton (2000) found that American mothers with a higher level of education were more likely to engage their children in regular doctor's visits, educational services, and psychosocial services between birth and age 5. Mothers of children with autism who have achieved a higher level of education may, therefore, have better access to early and regular intervention to meet the child's needs. Bhasin and Schendel (2007) also found that maternal education was associated with an increased risk of AD. Children of mothers with more than 16 years of education were more than twice as likely to be diagnosed with AD without accompanying ID than their peers; this was not the case for children diagnosed with both AD and ID. Bhasin and Schendel suggested that higher levels of education may result in more accurate and complete reporting of child behaviors from parents to clinicians, and these families were less likely to be examined through the "cultural deprivation" lens by clinicians (p. 672). Durkin et al. (2017) supported the link

between higher maternal education, higher maternal income, and a higher likelihood of diagnosis of ASD in the US. Durkin et al. found that the disparity decreased when children had both ASD and co-occurring ID, suggesting that diagnoses occur at younger ages in these cases due to the severity of the developmental delays present.

In an effort to separate maternal education from the larger socioeconomic status (SES) classification category, Lung et al. (2018) examined the connections between maternal age, maternal level of education, and autism utilizing a large Taiwanese birth cohort study. Lung et al. found a disparity in the association between maternal education and an ASD diagnosis. Mothers with a below average education (defined as individuals without a high school diploma) were more likely to have children who were screened positive on the Modified Checklist for Autism in Toddlers (M-CHAT) at or before child age of 66 months, indicating autism. However, children of mothers with an above average education were also more likely to have a diagnosis of ASD provided by a clinician before 66 months of age. Researchers proposed that these results were due to an under-diagnosis of ASD in Taiwan and recommended that more attention be paid to children from families with lower levels of education to provide early screening and intervention; community-based healthcare services as well as psychological services may not be accessed by parents with lower educational attainment as frequently as their more educated peers. In the current study, sociodemographic risk is defined, in part, as mothers with less than a high school diploma or equivalent and it was likely that a majority of the sample would fall into this category given the nature of the Fragile Families sample. However, due to the aforementioned findings it was hypothesized that both mothers with

below average education and above average education would be more likely to have children diagnosed with ASD.

Household income and autism spectrum disorder. There is contradictory evidence regarding the relationship between household income and ASD, with noted differences among country of origin. Studies performed in the US reported that the rate of ASD is higher in high-income families, whereas European and Asian population-based studies reported an association between lower income and higher prevalence of ASD.

Bhasin and Schendel (2007) examined the association between AD with ID and AD without accompanying ID and income. Children in the high median income group were more likely to be diagnosed with AD, and these findings were magnified for children diagnosed with AD and accompanying ID. The finding that high-income families are more likely to have children diagnosed with ASD is replicated in a number of other studies (Cuccaro et al., 1996; Durkin et al., 2017; Schopler, Andrews, & Strupp, 1979), and there are several hypotheses to explain this. First, children from higher income families are more likely to receive comprehensive and regular medical treatment, including access to diagnostic services, due to financial security (Cuccaro et al., 1996; Schopler et al., 1979). Parents in higher income families are more likely to be better educated and, according to Schopler et al. (1979), more able to report on their child's behavior, needs, and developmental history. Second, Bhasin and Schendel proposed that the association between higher income and autism may be the result of "professional perception" related to the presenting problem, with clinicians assuming that autistic symptoms of children from lower income families are a result of cultural deprivation rather than a neurological disorder (p. 672). Cuccaro et al. (1996) found that children in

higher income families were more likely to be diagnosed with autism due to these clinical assumptions, but researchers also found that diagnosis depended on the expertise of the clinician. Those with a higher level of training were more likely to provide a diagnosis of autism and comorbid disorders than a professional with less experience, and psychologists have long agreed that autism may be overrepresented in higher income groups (Stone, 1987). However, Durkin et al. (2017) found that the ratio indicating the prevalence of ASD in high- and low-income children continues to decrease as the overall prevalence of ASD increased over the last 2 decades.

To validate the findings in the US, Rai et al. (2012) and Delobel-Ayoub et al. (2015) utilized Swedish and French samples, respectively, hypothesizing that access to universal healthcare within the countries would affect the results by giving families access to early screenings and interventions. Both studies reported that lower income was associated with an increased risk of ASD, suggesting that researchers who found the opposite did not fully understand the burden of ASD in groups with a lower SES (Rai et al., 2012, p. 467). Rai et al. found that parents with lower incomes and "manual occupations" were at a higher risk of having children with ASD. Delobel-Ayoub et al.'s study found that both the prevalence of ASD and severe ID were affected by income, with other factors including unemployment, a lack of a high school diploma, immigrant status, and single parent household.

As the interest in autism increases in Asia more population-based studies are being conducted. He et al. (2018) found an association between SES and autism in a nationally representative sample of Chinese children. SES was defined by family income, housing tenure, and highest level of education attained by adults in the family. Among all

children in the sample the prevalence of autism decreased as household income increased. The highest prevalence of autism occurred in "low-education" families (defined as illiterate or primary school education). Both higher household income and adult education were associated with lower prevalence of autism. In the current study, sociodemographic risk includes both below average maternal education and low household income; it is likely that a majority of mothers sampled within the Fragile Families data set are at an average or below average income level due to oversampling of at-risk couples. It is important to understand the diagnosis of ASD in low-income families residing in the US as early-intervention services become more available through local agencies, programs like Head Start, and universal insurance coverage.

Maternal race and autism spectrum disorder. While a difference in autism phenotype by race is not thought to exist (Bertrand et al., 2001) there are differences in prevalence and age of diagnosis between races. From the 1997-2008 National Health Interview Survey, non-Hispanic White children had the highest rate of ASD, followed by Black children and Hispanic children (Boyle et al., 2011). According to several studies (Kogan et al., 2009; Valicenti-McDermott, Hottinger, Seijo, & Shulman, 2012) Black children have a lower incidence of ASD compared to White children; however, there is a higher rate of ASD with accompanying ID in Black children (CDC, 2016). Additionally, Black children are diagnosed at older ages, approximately 1.5 years after White children, on average (Mandell, Listerud, Levy, & Pinto-Martin, 2002). There is also a higher likelihood that ASD behaviors will be perceived by parents as symptoms of conduct disorder and oppositional defiant disorder (ODD) in Black children in middle childhood (Mandell, Ittenbach, Levy, & Pinto-Martin, 2007), suggesting that parents may highlight

their child's disruptive behaviors while deemphasizing symptoms of ASD and possibly changing clinician diagnostic perceptions. Studies have also found that there is a disparity in help-seeking behaviors, with both Black and Hispanic individuals seeking mental health services less often and providing less information to providers than White peers, and this behavior is more common in low-income families (Diala et al., 2000, Dobalian & Rivers, 2008). These findings may be due to a lack of trust in providers. African American families with children with autism have reported a practice of "cultural caring" described as a family protecting their child from perceived harm and potentially stressful interactions (Burkett, Morris, Manning-Courtney, Spann Anthony, & Shambley-Ebron, 2015, p. 3244; Mandell & Novak, 2005). This protection extended to healthcare professionals, and researchers suggest a connection between these precautions, delayed diagnosis, misdiagnosis, and more severe symptoms (Burkett et al., 2015).

With the knowledge that the majority of ASD studies examine the differences between non-Hispanic White and Black children, Becerra et al. (2014) assessed how the risk of ASD in children born in Los Angeles County differed between mothers of different races, ethnicities, and countries of origin. Children of U.S.-born Asian and White mothers and foreign-born Black and Japanese mothers were diagnosed with ASD and co-occurring disorders earlier than children of foreign-born mothers from Central and South America, and Vietnam with a difference of about 6 months. When compared to children of U.S.-born White mothers, children of foreign-born Black mothers were at a 76% higher risk of ASD diagnosis. Children of U.S.-born Black and Hispanic mothers were at a 13% and 14% higher risk of ASD diagnosis, respectively, and children of

mothers born in China and Japan were at 30% lower risk compared to U.S.-born White children (Becerra et al., 2014).

Donohue, Childs, Richards, and Robins (2019) investigated differences in parent reporting of ASD concerns to healthcare providers using the M-CHAT Revised with Follow-Up (M-CHAT(-R)/F). Researchers found a statistically significant effect of race on the number of parent-reported concerns related to ASD, with Black parents having significantly fewer ASD concerns compared to White parents. When ASD-specific behaviors were separated out, race significantly affected the likelihood that parents reported a social concern and a concern of restrictive, repetitive behaviors. White parents were more likely than Black parents to report concerns in both of these domains and this underreporting was not explained by lower ASD symptom severity in Black children. No racial differences were found in the number of non-ASD concerns reported, suggesting that underreporting is autism-specific among Black parents. This also presented contradictory evidence to studies that drew conclusions between lower ASD prevalence and the fact that Black parents were less likely to seek help (Dobalian & Rivers, 2008) and more likely to distrust healthcare providers (Burkett et al., 2015). A diagnostic bias has been hypothesized as a contributing factor to the difference in prevalence and diagnosis of ASD as a function of race. This bias can be defined as differential healthcare behaviors with patients of unlike cultures that influence diagnosis and treatment decisions (Burkett et al., 2015, p. 3245; Mandell et al., 2002). Providers may unconsciously adjust treatment recommendations by race and culture due to stereotyping. For some, this may include a decreased likelihood of ASD diagnosis in African American children (Mandell et al., 2002; Mandell et al., 2007). However, analyses conducted by Bhasin and Schendel

(2007) found that Black children were twice as likely to be diagnosed with AD and AD with accompanying ID than their White peers. Institutionally, more barriers to care and timely diagnosis exist for people of color, including cost of services, access to care in low-income areas, and a lack of family-centered care (Montes & Halterman, 2011, p. 302). Families from non-dominant cultures may also face delays in the diagnostic process. Sansoti, Lavik and Sansoti (2012) found that the time elapsed from date of initial parent concern to date of diagnosis was approximately 2 years. African American children and children of mixed racial background were diagnosed 6 months later, on average, compared to White children (Sansoti et al., 2012). Additionally, Black and African American children with ASD are more likely to be misdiagnosed than White children. Mandell et al. (2007) found that African American children were 2.6 times more likely to be misdiagnosed than White children in general, 5.1 times more likely to receive a misdiagnosis of adjustment disorder, and 2.4 times more likely to receive a misdiagnosis of conduct disorder. In the current study, the potential deleterious effects of these sociodemographic risk factors on ASD will be investigated in a robust, longitudinal data set focusing on at-risk families beginning at childbirth. The results help to clarify the mixed findings noted above while providing additional insight into the connections between parental and environmental factors, the diagnosis of ASD, and attachment security.

Attachment Theory

Attachment theory is primarily attributed to John Bowlby and Mary Ainsworth, with Bowlby beginning his research on parent-child separation during World War II (van Rosmalen, van der Veer, & van der Horst, 2015). As the conceptualization of attachment

theory continued through the latter half of the twentieth century, Bowlby was influenced by Freudian psychoanalysis; Klein's object-relations approach; Lorenz's theory of imprinting and ethological methodologies; and Piagetian developmental psychology, making attachment an interdisciplinary theory (Bretherton, 1992).

During the 1930s and 1940s, much attention was paid to child maltreatment, institutionalization, and the possible deleterious effects of these circumstances on the child (Follan & Minnis, 2009). In an effort to address these behaviors, Bowlby's first empirical study regarding attachment between children and their caregivers detailed 44 cases of children separated from their mothers and receiving treatment via the London Child Guidance Clinic, a study later revised and titled *Forty-Four Juvenile Thieves: Their Characters and Home Lives* (Bowlby, 1944/1947). Of particular interest to Bowlby were 14 children, 11 males and three females, who he described as "affectionless psychopaths" (Follan & Minnis, 2009, p. 640). Their observed behaviors included an inability to establish developmentally appropriate social relationships with both peers and adults and inappropriate behaviors toward strangers (Bowlby, 1944**,** pp. 38, 50). While the study was correlational in design, Bowlby concluded that a relationship existed between early separation from caregivers and maternal deprivation, adolescent criminal behavior, and the development of childhood disorders (van der Horst, van der Veer, & van IJzendoorn, 2007).

Bowlby's first formal statements on his theory of attachment appeared in his papers *The Nature of the Child's Tie to His Mother* (1958), *Separation Anxiety* (1959), and *Grief and Mourning in Infancy and Early Childhood* (1960; Bretherton, 1992). Some of the most important theoretical underpinnings presented include Bowlby's detailed

descriptions of a number of instinctual infant attachment behaviors intended to bind the infant and mother (Bretherton, 1992, p. 762). Bowlby was interested in infants clinging to and following their mothers, and the progression of these behaviors as infants age and their focus on the mother increases. These behaviors were directly related to Harlow's studies on affectional bonds in rhesus monkeys. Bowlby was greatly influenced by his contemporary Harlow as both psychologists were invested in exploring different theories behind the child-caregiver bond and emotional behavior (van der Horst, LeRoy, & van der Veer, 2008). As a result of Bowlby's emerging understandings of ethology, Harlow's work with rhesus monkeys and his experimental developmental research processes became central to attachment (Harlow, 1957). Harlow's concept of affectional systems, described as "the idea that social ontogeny involves the establishment of qualitatively different types of social relationships with a variety of others in the social network as one grows up", established the importance of social experiences that take place in infancy (Suomi & Leroy, 1982, p. 323). Harlow's experiments on blocking the formation of affectional bonds through maternal deprivation reinforced this and upon observing the effects of this deprivation in Harlow's older monkeys, Bowlby conceptualized their behaviors through an ethological and psychoanalytic framework.

In 1969, Bowlby published the first volume of his *Attachment and Loss* trilogy, *Attachment*. Bowlby's discussion of attachment was considered revolutionary as the bond between infant and caregiver was hypothesized to be based on an independent system of survival, rather than human sexuality or an infant's simple association of mother and food (Sroufe, 1986). Infants are predisposed to seek and maintain proximity to their caregiver as an evolutionary, survival mechanism yielding specific attachment behaviors (Sroufe,

1986). This hypothesis suggests that all infants form attachment with a caregiver, but Bowlby's interest was the quality of that attachment (Bowlby, 1982). When an infant is aware that his attachment figure is present, he experiences feelings of security which encourage him to value and continue the relationship (Bowlby, 1982, p. 669). Relatedly, attachment is triggered in unsafe settings; Bowlby theorized that infants experience separation anxiety when a given situation activates escape and attachment behavior simultaneously, but an attachment figure is absent (Bretherton, 1992, p. 763). Bowlby noted that these attachment behaviors are more apparent during infancy and early childhood but the attachment bond continues beyond this age, specifically during times of stress, anxiety, and fear, as the child constructs an internal working model of his environment and himself. Bowlby hypothesized that infants begin to develop this internal working model of attachment before their first birthdays, defined as "a dynamic structure containing affectively charged cognitions about one's lovableness and worthiness… guide[ing] the child's perception and behavior in such a way as to confirm or to fulfill itself (self-fulfilling prophecy)" (Verschueren, Marcoen, & Schoefs, 1996, p. 2493). Children with a secure attachment to their caregiver are likely to develop a secure working model of attachment; they will have positive expectations related to a caregiver's responsivity to needs and availability, whereas children with insecure attachments and insecure working models develop negative expectations (Verschueren et al., 1996). These representations contribute to a child's self-worth, competence, and social-emotional development (Verschueren et al., 1996). Caregivers, therefore, directly shape the child's perception of his environment, self, and self-worth. Attachment is a bidirectional process, wherein children and caregivers influence the actions and reactions

of the other; the relationship between a child's temperament and maternal social support, for example, has been predictive of attachment classification (Crockenberg, 1981). The child constructs a working model of attachment with each attachment figure based on repeated interactions, and this representation provides an understanding of the expectations of caregiving behavior toward the self and vice versa (Verschueren et al., 1996, p. 2494). Bowlby theorized that while nearly all children become attached, attachment security between caregiver and child is dependent on the quality of care. This quality has a direct influence on early personality development, including the child's self-concept and view of others, contributing to the development of an adaptive personality across the lifespan (Grossmann, Grossmann, & Waters, 2005; Kim, Stifter, Philbrook, & Teti, 2014; Sroufe, 1986, p. 845) and efficacious parenting of their own children (Antonucci, Akiyama, & Takahashi, 2010; Waters, Merrick, Treboux, Crowell, & Albersheim, 2003).

Ainsworth and the Classification of Attachment Behavior

Ainsworth's work with Bowlby, as well as her independent ethological research on mother-child attachment, led her to expand the theory of attachment and establish a procedure and corresponding theory for describing individual differences in infant-caregiver attachment (Barnett & Vondra, 1999). Ainsworth's categorical approach to identifying infants' attachment to caregivers was presented along with the development of the Strange Situation Procedure (SSP) and classification system. During the SSP, researchers are interested in three specific behavioral patterns and interactions between the infant, caregiver, and stranger. First, researchers observe the infant's use of his caregiver as a secure base from which he can explore the novel environment (van

Rosmalen et al., 2015). Second, researchers observe the infant's response to the stranger in the novel setting. Third, researchers observe the infant's reaction to the caregiver's departure and the reunion that takes place when the caregiver returns; they are interested in proximity-seeking behaviors of the infant in these anxiety-provoking scenarios. From these scenarios, researchers can gain an understanding about the child's trust in the caregiver and determine an attachment classification. The three attachment patterns originally proposed by Ainsworth were divided into the following secure and insecure types: secure attachment (Type B); insecure, avoidant attachment (Type A); and insecure, ambivalent (or resistant, anxious) attachment (Type C; Ainsworth et al., 1978; Benoit, 2004). These three attachment patterns are considered to be "organized" as the child's responses to caregiver behavior within these relationships are consistent, or the child knows how to interact with his caregiver in given situations (Benoit, 2004).

Secure attachment (Type B). A securely attached child navigates distressing situations in an organized and secure manner. When stressed, secure infants know to approach their caregiver, who is a sensitive and responsive figure. According to a Princeton University study (Huber, 2014), 60% of children in normative samples (ie., non-clinical, middle-class families) displayed a secure attachment and these children show resilience to family instability, parental stress and depression, and poverty. Longitudinally, children with a history of secure attachment are more capable of forming and maintaining close, emotionally healthy familial and peer relationships when compared to insecurely attached children (Moullin, Waldfogel, & Washbrook, 2014; Thompson, 2008). They display more mature strategies to manage social problems and emotional self-regulation, are more conscientious, and report less loneliness than

insecurely attached children (Moullin et al., 2014; Thompson, 2008, p. 361). Researchers determined that securely attached children frame social interactions with more optimism than their insecurely attached peers which leads to a more positive perception of both self and others in middle childhood and adolescence (Cassidy et al., 2003; Lai & Carr, 2018; Ziv, Oppenheim, & Sagi-Schwartz, 2004). Individuals with a secure attachment develop more desirable personality traits in both childhood and adolescence and report higher self-esteem, social self-efficacy, and self-confidence in early and middle childhood (Cassidy et al., 2003; Coleman, 2003; Doyle et al., 2000; Fearon et al., 2010; Kerns et al., 1996; Yunger et al., 2005). Having a secure attachment style may serve as a protective factor against maladjustment and externalizing behaviors (Benoit, 2004; Fearon et al., 2010). In infancy and early childhood, securely attached children hypothetically learn to manage their emotions in a safe environment where distress is effectively addressed in the parent-child dyad (Kerns, 2008, p. 375). This allows children to develop healthy coping skills and build resilience, increasing the likelihood that a child can act independently and continue to explore his environment. This exploration includes the formation of peer relationships through competent interactions learned from caregivers (Kerns, 2008, p. 375). The strategies learned during this early period lead to more adaptive functioning in middle childhood, including problem-solving skills, emotional regulation, and seeking social support (Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000; Fearon et al., 2010; Kerns, Abraham, Schlegelmilch, & Morgan, 2007). Additionally, secure attachment in infancy and childhood was strongly associated with positive psychological outcomes over time when parental sensitivity is maintained (Belsky & Fearon, 2002a, 2002b; Moullin et al., 2014; Raikes & Thompson, 2008),

reinforcing the enduring nature of early childhood experiences and consistently responsive caregiving (Thompson, 2008, p. 361).

Insecure, avoidant attachment (Type A). Just as securely attached infants have an organized strategy for navigating stressful situations with their caregiver, children with insecure, avoidant attachment styles develop a strategy. Unlike securely attached children, however, the avoidant infant's strategy is insecure because the risk for developing adjustment problems increases (Benoit, 2004; Milyavskaya & Lydon, 2012). Caregivers can often be described as ignoring, ridiculing, or becoming annoyed when children are distressed (Benoit, 2004; Lai & Carr, 2018). Infants learn to expect rejection and adjust their behavior to avoid the caregiver (Benoit, 2004; Mills-Koonce, Propper, & Barnett, 2012). When presented with a threat, an infant with an insecure, avoidant attachment will present a strategy of minimizing their dependence on the given attachment figure. They may express anger as a result of the caregiver's unresponsiveness to drive caregivers away, becoming hostile and aggressive (Berlin et al., 2008; Cassidy & Kobak, 1988; DeKlyen & Greenberg, 2008; Mills-Koonce et al., 2012). According to Princeton University (Huber, 2014), 40% of children lack a secure attachment; between 15-25% of infants in in low-risk, normative samples display avoidant attachment (Andreassen, Fletcher, & Park, 2007; Moullin et al., 2014). Avoidant children are often aggressive and rejecting of parental attention, a strategy that serves to minimize child-caregiver attachment through emphasizing the child's pseudo independence (Berlin et al., 2008, p. 338). DeKlyen and Greenberg (2008) state that avoidant children may learn to respond to caregivers in a hostile, antisocial manner, viewing the caregiver as rejecting and emotionally unavailable. Over time, children with

an avoidant attachment style may be at an increased risk for developing externalizing disorders, especially in high-risk populations, and emotional over-regulation (Belsky & Fearon 2002b; Berlin et al., 2008; DeKlyen & Greenberg, 2008; Martins, Soares, Martins, Tereno, & Osório, 2012; Sroufe et al., 2005). When unsuccessful in social interactions avoidant children may react aggressively, even if unprovoked, and refuse to engage in positive peer relationships (Berlin et al., 2008, p. 338; Cassidy & Berlin, 1994; Granot & Mayseless, 2011; McElwain et al., 2003; Sroufe et al., 2005). Aguilar et al. (2000) found that adolescents with early-onset antisocial behavior were more likely to have avoidant attachment styles in infancy when compared to adolescents with later-onset antisocial behavior and those classified as non-disordered.

Insecure, ambivalent attachment (Type C). Infants with insecure, ambivalent attachment styles develop organized patterns to respond to caregivers who provide care in inconsistent and unpredictable ways (Benoit, 2004, p. 542; Lai & Carr, 2018). When in distress, ambivalent children "exaggerate" their negative feelings with angry and resistant responses with the intent of gaining the attention of the inconsistently responsive caregiver (Benoit, 2004, p. 542; Lai & Carr, 2018). Like the avoidant infant, the strategy developed by the ambivalent child is insecure and increases the risk for the subsequent development of poor social and emotional adjustment (Benoit, 2004; Martins et al., 2012). Approximately 10-15% of children are classified as having an ambivalent/resistant attachment style in normative, middle-class families (Barnett & Vondra, 1999; Huber, 2014; van IJzendoorn et al., 1999). Ambivalent children maximize time spent with the caregiver to acquire extra attention; upon finding that their needs may not be met, they may experience anxiety and resist caregiver attempts to soothe and comfort (DeKlyen &

Greenberg, 2008, p. 644; Mills-Koonce et al., 2012; Sroufe, 1983). Behaviorally, ambivalent children may be described as "needy" and "easily overstimulated", and likely to exhibit impulsivity and low frustration tolerance (DeKlyen & Greenberg, 2008, p. 644). Ambivalent infants are more likely than their peers to develop internalizing behaviors later in development, including anxiety disorders and eating disorders, possibly resulting from the anxiety and dependency established in infancy (Salzman, 1997; Symons & Szielasko, 2011, p. 819).

Insecure, disorganized attachment (Type D). Since Ainsworth's initial classification was developed, researchers continued to observe infants whose behavior suggested an insecure attachment but did not present a pattern that is consistent with Ainsworth's system. Main and Solomon (1986, 1990) attempted to provide a new category that could capture the behavior of these infants, but could not find a common, coherent set of behaviors to provide such a classification stating that the only commonality was a lack of intentional, goal-directed behavior (Main & Solomon, 1990, p. 122). These children were categorized as disorganized and/or disoriented (Type D). While Main and Solomon saw a lack of coherence in the coping strategies of these children, they did note that fear was a consistent emotional experience (Barnett & Vondra, 1999). According to Shiller, Izard, and Hembree (1986), this fear response is specific to disorganized children; while the researchers noted expressions of anger in Type A, B, and C infants when they were separated from caregivers, disorganized infants expressed "fear without solution", or fear that is unable to be resolved (Shemmings & Shemmings, 2011, p. 34). This fear may interfere with the development of a consistent coping strategy in times of distress (Barnett & Vondra, 1999, p. 18; Granqvist et al.,

2017). Van IJzendoorn et al. (1999) found that children with ASD, cerebral palsy, and Down syndrome were more likely to display a disorganized attachment style when compared to typically developing peers. Longitudinally, infants with disorganized attachment may be more likely to develop externalizing behaviors including aggression, oppositional problems, and conduct problems (Fearon et al., 2010; Granqvist et al., 2017; van IJzendoorn et al., 1999), and these infants also had an increased likelihood of developing dissociative identity disorder, borderline personality disorder, and antisocial personality disorder (Benoit, 2004; Shemmings & Shemmings, 2011).

Criticisms of Attachment Theory

Over the last 50 years thousands of studies on attachment have been conducted and little has challenged the core principles of Bowlby's theory (Cassidy & Shaver, 2016). However, attachment style classifications and corresponding caregiver expectations may be criticized as being ethnocentric, with the behaviors attributed to secure and insecure attachment styles and the caregiver behaviors thought to contribute to these styles biased toward Western, individualistic cultures (Quinn & Mageo, 2013; Rothbaum et al., 2000). Assumptions of infant and caregiver behaviors include a desire for infant independence as a result of a trusting bond. Goals for infants raised in Eastern and/or collectivistic cultures may be very different. These communities often practice group caregiving which is not considered in classic attachment theory where the focus is on relationships between child and mother. However, numerous studies have demonstrated the applicability of attachment security cross-culturally, both within Western cultures (Bakermans-Kranenburg et al., 2004; Barnett et al., 1998; Dexter et al., 2013; Gedaly & Leerkes, 2016) and between Western and non-Western cultures

(Mesman, van IJzendoorn, & Bakermans-Kranenburg, 2012; van IJzendoorn & Sagi, 1999). The criticism of ethnocentricity is also applied to the two primary methods of assessing attachment security: the SSP and the Attachment Q-sort. Jackson (1993) states that attachment theory makes the assumption that children have a natural inclination to form a single attachment that is hierarchical, or more significant than other attachment relationships, and this may not be valid for all cultures given differences in child-rearing practices. Jackson suggests that the shared-caregiving common in African American families may influence the observation of these families within the SSP, a measure normed on White individuals. Since the time of Jackson's assertion, many researchers have assessed the validity of both the SSP (Anan & Barnett, 1999; Barnett et al., 1998; Candelaria, Teti, & Black, 2011; Dexter et al., 2013) and the AQS (Bakermans-Kranenburg et al., 2004; Candelaria et al., 2011; Posada et al., 1995) with families of color, specifically families identifying as African American or Black, and found that the measures are valid.

Classic attachment theory makes a number of assumptions, some of which are challenged by current theorists. Along with being ethnocentric, attachment theory can be considered politically conservative, anti-feminist, heteronormative, and ableist as the focus of Bowlby and Ainsworth's research was predominantly neurotypical, nuclear families with traditional gender roles; it assumes that mothers are the primary caregivers and provide the most direct support during the critical period of attachment formation (Símonardóttir, 2016). As a result, mothers' actions were traditionally scrutinized and fathers were largely ignored, as they have been the presumptive economic providers for the family since the theory's inception (Cleary, 1999; Duschinsky et al., 2015). Freudian

roots of attachment theory contribute to this "blaming the mother" tendency and the negative "refrigerator mother" stereotype that incorrectly proposed a causal link between a lack of maternal warmth and autism (Cohmer, 2014; Dolnick, 2007; Kanner, 1943). Feminist and progressive theorists hypothesize that the pressures placed on women to prioritize child-rearing drives them away from the workplace, higher education, and social equity (Duschinsky et al., 2015; Símonardóttir, 2016). Contemporary theorists recognize the disproportionate responsibility assigned to women in caregiver roles and no longer discount the role of men and multiple caregivers in attachment. Additionally, more attention has been paid to the stress that women undergo as a result of primary caregiving, especially when faced with socioeconomic stressors, and how this may influence the consistency and sensitivity central to parent-child attachment security (Bakermans-Kranenburg et al., 2004; Cyr et al., 2010; Dexter et al., 2013; Gedaly & Leerkes. 2016).

Attachment Security and Sociodemographic Risk

Environmental risk factors thought to influence attachment security while simultaneously stressing the caregiver include sociodemographic risk, defined as "having a young, poorly educated mother and a low family income" (Gedaly & Leerkes, 2016, p. 557). Low household income and education are two factors that have been found to negatively influence attachment security due to the impact this burden has on parental sensitivity and consistent caregiving (Cyr et al., 2010; Gedaly & Leerkes, 2016; van IJzendoorn et al., 1999). A disproportionate number of infants from low-income, high-conflict families display an insecure, disorganized attachment style (Barnett, Ganiban, et al., 1999; Benoit, 2004; Granqvist et al., 2017; van IJzendoorn et al., 1999), and the

current study utilizes a sample of at-risk families to assess the relationship between attachment security and sociodemographic risk.

Household income, race, and attachment security. Possible associations between household income and attachment security are often difficult to research as there is a significant overlap between income and race (Huston, McLoyd, & Garcia Coll, 1994). According to Dexter et al. (2013) differences in parenting and child outcomes between African American and White families may be attributable to differences in income and stressors associated with poverty, rather than race (p. 629). As a result, many studies examining attachment assess the impact of both income and race. Bakermans-Kranenburg et al. (2004) found that White families had significantly higher levels of parental sensitivity and child attachment security in toddlers compared to African American families. In this study SES was the predictor and not race; parental sensitivity in both ethnic groups was predictive of secure attachment and SES was a significant moderator. Another difficulty in understanding the effects of income on attachment security is the organization of the variable; within numerous studies household income is often one factor in a more complex variable including education and race. Gedaly and Leerkes (2016) assessed the predictive value of sociodemographic risk (defined as maternal age at childbirth, maternal education, and household income relative to needs), maternal insensitivity, and negative maternal behaviors on insecure-disorganized attachment in European American and African American infants. While no main effects were found for sociodemographic risk, risk interacted with maternal insensitivity to predict attachment disorganization. For infants and mothers with higher

sociodemographic risk, insensitivity was associated with higher rating of disorganization on the SSP; this was not found for infants and mothers with lower sociodemographic risk.

A meta-analysis conducted by van IJzendoorn et al. (1999) reviewed 20 studies and described the frequency of insecure-disorganized attachment in clinical and nonclinical groups. Researchers reported that approximately 15% of infants in nonclinical, middle income families from North America can be classified as disorganized (van IJzendoorn et al., 1999, p. 229). For infants in low income families, the percentage of disorganized attachment was statistically significantly higher, between 25% and 34% depending on the attachment classification utilized. Similarly, a meta-analysis conducted by Cyr et al. (2010) assessed the differences in attachment security between children exposed to maltreatment and/or socioeconomic risk and children in low-risk families. Researchers included maternal age at childbirth, maternal education, household income, maternal ethnicity, marital status, and substance use in their definition of socioeconomic risk. Children living in high risk conditions, including those experiencing maltreatment, were less likely to display a secure attachment and more likely to display an insecure-disorganized attachment when compared to low-risk peers. Additionally, children who were exposed to five or more risk factors were as likely to display an insecure-disorganized attachment as children experiencing maltreatment, suggesting that the negative impact of socioeconomic risk is as detrimental to attachment security as maltreatment. A number of these risk factors and the potential deleterious effects on attachment security are explored in the current study.

A number of studies completed on differences in attachment security as a function of race have been completed over the past few decades. Differences in parenting style,

caregiving environment, and disciplinary practices have been researched between racial groups. Initially, most data on attachment were completed on White, middle income families; currently, most research on race and attachment has been conducted on the potential differences between White and Black children. Barnett et al. (1998) assessed Black and White 4- and 5-year-olds in low-income families, finding no differences in secure base behavior during the SSP. The rate of secure attachment in the Black sample was 61%, which is comparable to other studies of low-income children (Huber, 2014). Nearly 2 decades later, Dexter et al. (2013) assessed differences in groups of children of the same age, races, and SES. Researchers found that the two racial groups did not differ significantly in attachment security; however, caregiver behavior differed significantly between securely and insecurely attached children with parents of securely attached children engaging in higher levels of positive affect and responsivity. A difficulty in interpreting these studies and many others is that race is often confounded with low SES, meaning differences in attachment and caregiving attributed to racial differences may be a result of a lack of access to care and financial resources. The current study separates maternal race and income to evaluate the proposed relationships between sociodemographic risk and attachment security. The current study measures four of the sociodemographic risk factors investigated by Cyr et al. (2010) - maternal age, maternal education, maternal household income, and maternal race - and the hypothesized relationship between these factors, lower attachment security, and a higher prevalence of ASD.

Autism Spectrum Disorder and Attachment Security

It has long been established that children on the autism spectrum display significant differences in social-emotional development, including attachment. The *DSM-III-R* definition of autistic disorder included symptoms that can be directly related to attachment behaviors, including differences in reciprocal social interaction as manifested by: (a) "Marked lack of awareness of the existence or feelings of others", (b) "No or abnormal seeking of comfort at times of distress", (c) "No or impaired imitation", (d) "No or abnormal social play"; and (e) "Gross impairment in the ability to make peer friendships" (1987, p. 38). Hallmarks of secure attachment are absent in these symptom descriptions, including the inability to utilize a caregiver as a secure base to gain comfort and co-regulate and to recognize other figures in the environment.

The relationship between autism, attachment, and parental sensitivity is a complex one, as the reciprocal interaction between parent and child is directly affected by ASD symptoms (Doussard-Roosevelt et al., 2003; McKenzie & Dallos, 2017; Rutgers et al., 2007; van IJzendoorn et al., 2007). Some early research on the relationship between attachment and ASD suggested few behavioral differences between children on the spectrum and their neurotypical peers (Ainsworth & Wittig, 1969; Sigman & Mundy, 1989; Sigman & Ungerer, 1984); more current research has provided evidence that individuals with ASD display lower attachment security to caregivers (McKenzie & Dallos, 2017; Rutgers et al., 2004; Rutgers et al., 2007). Challenges in processing social information (Gervais et al., 2004) and joint attention (Naber et al., 2007) are symptoms of autism thought to impact the development of a secure attachment, along with inflexibility, atypical play, deficits in theory of mind, and sensory integration difficulties

(Moran, 2010). Several studies have found that children on the autism spectrum are more likely to be categorized as disorganized than neurotypical children (Capps et al., 1994; McKenzie & Dallos, 2017; Willemsen-Swinkels et al., 2000), and individuals with ASD and co-occurring ID have been found to display even lower attachment security when compared to those with ASD alone (Fletcher, Flood, & Hare, 2016; Rutgers et al., 2004; Rutgers et al., 2007; Yirmiya & Sigman, 2001). While individuals with ASD are more likely to display insecure attachment, some research has shown secure attachment bonds in this population that should be further explored and understood to empower children, caregivers, and interventionists (Bauminger, Solomon, & Rogers, 2010; Chandler & Dissanayake, 2013; Rutgers et al., 2004).

Rutgers et al. (2004) completed a meta-analysis of studies on attachment in children with AD. While some children with autism displayed typical attachment behaviors as defined by the SSP, such as proximity-seeking, distress upon separation, and a preference for familiar individuals over strangers, others displayed atypical behaviors including maintaining contact with the stranger, failing to greet the caregiver during the reunion, and an inability to be comforted by the caregiver through touch (Rutgers et al., 2004, p. 1125). Overall, the meta-analysis found that children with autism displayed significantly lower attachment security to caregivers when compared to children without autism. Researchers reported that 75% of children with AD are intellectually disabled (a rate similar to the statistics provided by the ADDM, 2012, 2014) creating a disparity between the chronological and mental ages of clinical and nonclinical groups. Rutgers et al. used mental age, co-occurring diagnosis of ID, and the presence of other developmental delays as factors used to define the mental development variable. Samples

of children with autism and more severe ID were found to be significantly less secure in their attachment when compared to a control group of neurotypical children. There was not a significant association between autism and attachment in children with autism and higher cognitive functioning (a quotient of mental to chronological age greater than .70). This suggests that lower cognitive capacities may be associated with a challenge to construct an internal working model of attachment in childhood (Fletcher et al., 2016; Rogers, Ozonoff, & Maslin-Cole, 1991, 1993), and that higher cognitive capacities may help children with autism to overcome some of their socioemotional impairments (Dissanayake & Sigman, 2000; Fletcher et al., 2016). The relationship between high-functioning autism (HFA) and average or above average intelligence and a greater likelihood to establish a secure attachment has been repeated in studies by Bauminger et al. (2010) and Chandler and Dissanayake (2013). Finally, Rutgers et al. did not find a significant contrast between younger and older children, reinforcing the concept that attachment security remains fairly stable over time.

Rutgers et al. (2007) sought to address whether children aged 12-42 months with autism and related disorders were less secure in their attachment when compared to non-clinical peers. Children diagnosed with AD, PDD-NOS, ID alone, or a language disorder comprised the clinical sample. AD and PDD-NOS were collapsed into one category called ASD and then divided again into high functioning children without ID and low functioning children with a cut-off IQ score of 70. Researchers were also interested in how parenting challenges differed between groups, hypothesizing that parenting children within the clinical group would relate to more perceived stress and burden (Rutgers et al., 2007, p. 861), a central variable in the current study. Overall, Rutgers et al. (2007) found

that children in the clinical sample were significantly less secure than the non-clinical sample. Children in the combined ASD group, including both high and low functioning groups, displayed significantly lower attachment security than both the non-clinical children and the other children in the clinical group (children diagnosed with ID alone or language disorder). The high-functioning subgroup (children with ASD and an IQ above 70) was found to be the least secure of all groups investigated; therefore, researchers determined that autism, rather than ID, explained the lower attachment security scores contrary to previous studies (Rutgers et al., 2004). Researchers were able to reflect the variations in social-emotional capability in children with ASD and related disorders as well as possible parental factors that can increase effectiveness and the ability to cope with complex child-rearing; these variables are investigated in the current study which expands on possible connections with parenting stress and sociodemographic risk. The finding that children with ASD display lower attachment security than their peers, in general, has been replicated in later studies (Grzadzinski et al., 2014; Kahane & El-Tahir, 2015; Teague et al., 2018); it is the basis for the current study's hypotheses that children with ASD in the Fragile Families sample will have lower attachment security than their neurotypical peers and that sociodemographic risk factors can negatively impact attachment security.

Parenting Stress, Attachment Security, and Autism Spectrum Disorder

The challenges faced by caregivers can impact both the quality of caregiving and the amount of time engaged with children. Stressors include the direct challenges of parenting a child, including the temperament of the child, the parent-child relationship, and attachment bond between child and caregiver. Caregivers also experience stress as a

result of sociodemographic risk, including insufficient income and education, two factors that have been found to negatively influence attachment security due to the impact this burden has on parental sensitivity and consistency (Cyr et al. 2010; Gedaly & Leerkes, 2016; van IJzendoorn et al., 1999). A disproportionate number of infants from low-income, high-conflict families display an insecure, disorganized attachment style (Benoit, 2004; Granqvist et al., 2017, van IJzendoorn et al., 1999). Caregivers of children with ASD manage unique challenges, including the added financial burden of care, therapies, and schooling; the behavioral, cognitive, and socioemotional symptoms that impact daily functioning; and the lifelong responsibility of supporting a child with special needs (Koegel et al., 1992; Oh & Lee, 2009). The stress experienced in caring for children with ASD has been found to be significantly greater when compared to the care of neurotypical children (Hayes & Watson, 2013), and this stress is expected to be observed in the current study. The threshold model (Bernier & Meins, 2008) and family process model (Conger et al., 1992, 1993) provide a framework for the current study to understand the effects of these environmental factors on ASD and attachment security.

The threshold model. The threshold model was established to explain the high variability in parenting, environmental, and individual characteristics in insecure, disorganized attachment. Bernier and Meins (2008) suggest that insecure, disorganized attachment is managed by a threshold set by child characteristics that make him either more vulnerable or resilient to forming this attachment style (pp. 972-973). A higher threshold may serve to protect children from insecure, disorganized attachment, and a lower level may make children more vulnerable. A child's threshold can be breached by atypical and frightening caregiving behaviors and the threshold may be changed

depending on environmental and individual characteristics which can, in turn, impact the parental characteristics associated with attachment security. More specifically, the gene-environment correlation (Plomin, DeFries, McClearn, & McGuffin, 2001; Saltz, 2019) suggests that genes and the environment are not independent, and the genetic child effect occurs when a child's genes impact his parent's behavior and responsiveness (Bernier & Meins, 2008, p. 974; Caspi et al., 2004; Plomin, 1994)). A child's temperament impacts his parent's sensitivity which may promote the development of insecure, disorganized attachment (Bernier & Meins, 2008, p. 974). Relatedly, Barnett, Hunt, et al. (1999) and Ganiban et al. (2000) found that pervasive developmental disorders, like ASD, and Down syndrome were associated with attachment insecurity. According to the threshold model, parents respond to these disorders in a manner that may foster insecure, disorganized attachment, and these disorders may also change the threshold of the child making him more likely to be susceptible to insecure attachment when met with atypical and stressed parenting (Bernier & Meins, 2008). In the current study, factors hypothesized to negatively influence attachment security, or breach a child's threshold, are investigated. The possible negative impact of ASD on attachment security and parental stress is researched, and the threshold model provides a lens in which to interpret the findings.

The family process model. The family process model (Conger et al., 1992, 1993) suggests that economic stressors negatively impact familial relationships via parental emotional, behavioral, and cognitive responses. Economic stress is thought to lead to parents feeling less emotionally stable (Conger et al., 1992, pp. 527-528) which, in turn, will influence their ability to parent effectively and provide the degree of sensitivity necessary for secure attachment formation. The family process model identifies three

dimensions of parental behavior that have direct effects on child and adolescent wellbeing: warm, supportive parenting that includes clear expectations of age-appropriate behavior; a lack of hostility or coercive behavior; and consistent disciplinary practices (Conger et al., 1992, p. 529). These parental factors overlap with those associated with secure attachment formation. Additionally, the economic pressure described within the model can be directly affected by the sociodemographic risk factors listed above and are a focus of the current study: maternal age, maternal education level, maternal household income, and maternal race. As previously mentioned, mothers who identify as a minority are disproportionately impacted by institutional barriers to economic security and education (Duschinsky et al., 2015). The stress experienced as a result may influence caregiver consistency and sensitivity essential to parent-child attachment security (Bakermans-Kranenburg et al., 2004; Cyr et al., 2010; Dexter et al., 2013; Gedaly & Leerkes. 2016).

Parenting stress, sensitivity, and child outcomes. The proposed connection between attachment security and ASD is complex and involves both child and caregiver factors. In an effort to assess the role that parental sensitivity plays in the development of attachment security in children with autism, van IJzendoorn et al. (2007) compared parental behavior in children with ASD, ID, and language delays with neurotypical children. Researchers were interested in the genetic nature of autism, child behavior, and parent responsiveness as variables related to attachment security. The genetic components of autism may impact the parent-child attachment relationship as a parent on the autism spectrum may display differences in the emotional and communication skills necessary to facilitate healthy attachment bonds. Van IJzendoorn et al. posited that the

differences in social interaction, emotional expression, and communication present in children with ASD may affect the responsivity of their parents and cited children's "muted responsiveness to external stimuli" and "emotional signaling [that] has been shown to contain more uncertainty and noise" as specific challenges (2007, p. 599). When responding to children with ASD, verbal cues may need to be replaced with non-verbal prompts, the use of touch and physical proximity to soothe may need to be modified, and the level of prompting and attentiveness may need to be increased (Doussard-Roosevelt et al., 2003; Fletcher et al., 2016). Van IJzendoorn et al. hypothesized that the degree of difficulty in responding to a child will influence parental sensitivity - children with autism may present a more demanding task due to their social differences and the potential for the parents to also be on the autism spectrum. While children with ASD were found to be less secure and more likely to display an insecure, disorganized attachment style in the study, sensitivity did not differ significantly between parents of children with ASD and parents of neurotypical children. For children with ASD, more sensitive parenting was not associated with more attachment security, but for children without ASD more sensitive parenting was associated with greater attachment security. These findings suggest that the biological mechanisms of ASD may be at the core of attachment insecurity, and that the differences in socioemotional processing, joint attention, and sensory integration play a significant role in interrupting the parent-child bond. The current study utilizes this information to support the hypothesis that children with ASD will display lower attachment security than neurotypical peers in the Fragile Families sample utilized.

As a result of the stress that many caregivers experience when parenting a child with ASD, they may lack the patience, consistency, and social support seen in securely attached child-parent dyads (Rutgers et al., 2007). Due to a child's impairments in social interaction, parents may experience a negative impact on their own behavior as they interact with their child (Hoppes & Harris, 1990; Rutgers et al., 2007). Rutgers et al. (2007) assessed how perceived stress and parenting burden differed between parents of children with autism with and without accompanying ID (clinical group) and neurotypical children, hypothesizing that parenting children in the clinical group would be related to higher levels of stress. Overall, researchers found that parents of more securely attached children reported fewer daily hassles, or stressors, compared to their peers, and parents with fewer daily problems also reported greater parental efficacy. Parents of children with ASD who were more securely attached reported fewer daily problems than parents of children with ASD and less attachment security. Parents of clinical children also had a lower SES when compared to the non-clinical sample; a higher SES was associated with more social support, higher parental age, and lower child age. A meta-analysis conducted by Hayes and Watson (2013) supported the finding that caregivers of children with ASD manage specific stressors that are significantly greater than those experienced in both neurotypical families and families with children diagnosed with other disabilities, including Down syndrome, cerebral palsy, and ID. It is suggested that ASD-specific differences in social communication and restrictive, repetitive behaviors are the most stressful to parents; this is accompanied by the high likelihood of co-occurring disorders, the lifetime prognosis, and the "invisibility" associated with ASD (Hayes & Watson, 2013). The current study expands on the understanding of this stress

by measuring how perceived burden impacts the hypothesized relationship between attachment security and autism diagnosis.

Inferences for the Current Study

This review of current literature and seminal research informs the current study and its hypotheses as well as the methodology that was utilized to evaluate the data. The sociodemographic risk factors of maternal age, maternal education, maternal household income, and maternal race have varying impacts on both ASD and attachment security. Utilizing the threshold and family process models as a lens, initial research questions sought to address these impacts, and while the literature supports the proposed hypotheses there is contradictory evidence, as discussed. It was hypothesized that advanced maternal age, both lower and greater than average maternal education, low household income, and maternal minority racial status would act as risk factors for the diagnosis of ASD; low household income and minority racial status were proposed risk factors for lower attachment security in toddlerhood. Subsequent research questions addressed the impact that the presence of ASD has on attachment security. ASD is present at birth and is expected to challenge the formation of the critical attachment bond between mother and child. There is variability in the prevalence of insecure attachment in the ASD population, as discussed. Child factors including cognitive development and the presence of ID have been found to have an impact on attachment security in children with ASD but it was also hypothesized that sociodemographic risk factors would influence this relationship. The maternal variables found to have a significant impact on autism and attachment security were controlled for to better determine any association between ASD and attachment security. Finally, the association between these risk factors, attachment,

autism, and parenting stress was assessed. Children with ASD present different challenges than neurotypical children and the stress experienced may negatively impact parental sensitivity, consistency, and the communication skills needed to develop a secure attachment. Therefore, in families caring for a child with ASD it was hypothesized that when parenting stress is higher attachment security will be lower compared to families with neurotypical children.

Chapter 3: Methods

Overview of Methodology

The purpose of the current study was to examine the relationship between the presence of ASD and attachment security in toddlerhood in a sample of high-risk families. The relationship between the diagnosis of ASD, mother-child attachment security in toddlerhood, and maternal sociodemographic risk was also assessed. Additionally, the potential moderating effects of parenting stress on the relationship between ASD and attachment security was investigated when maternal sociodemographic risk was controlled. The following variables utilized in the current study were collected via self-report by the participants at several waves of the study: demographic data were collected at baseline; parenting stress data were collected at Wave 3, child age 3 years; and ASD data were collected at Wave 6, child age 15 years. Additionally, attachment data were collected from a subsample at Wave 3, child age 3 through use of the TAS-39. Participants with complete data on all of these variables were included in the current study (n = 1842).

Research Questions and Hypotheses

The following are the central research questions and hypotheses posed in the current study:

Research question one. What is the association between maternal sociodemographic risk variables and mother-child attachment security in toddlerhood? Research hypothesis one predicted that maternal sociodemographic risk variables will be associated with lower levels of mother-child attachment security in toddlerhood.

Sociodemographic risk variables included maternal household income and maternal race. It was hypothesized that mothers with low household income and who identify as a racial minority would be more likely to have children with lower attachment security in toddlerhood. Descriptive statistics are presented to understand household income and maternal race within the sample and this question was analyzed using simple linear regression.

Research question two. What is the association between maternal sociodemographic risk variables and a diagnosis of ASD recorded in adolescence? Research hypothesis two predicted that maternal sociodemographic risk variables would be largely associated with increased prevalence of ASD as measured in adolescence, though not all variables may have the same effect. Sociodemographic risk variables included maternal age at childbirth, maternal education, maternal household income, and maternal race. It was hypothesized that mothers older than 29 years at childbirth, mothers with low household incomes, and mothers identifying as a racial minority would be more likely to have children diagnosed with ASD as measured in adolescence. Due to mixed results in current studies, it was hypothesized that women with both below average education and above average education (high school diploma or equivalent) would be more likely to have children diagnosed with ASD. Descriptive statistics are presented to understand sociodemographic risk variables within the autistic and non-autistic samples. This question was analyzed using a logistic regression to understand the effects of maternal age at childbirth, maternal education level, maternal household income, and maternal race on the likelihood that participants were diagnosed with ASD, reported at Wave 6.

Research question three. What is the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood? Research hypothesis three predicted that the presence of ASD as recorded in adolescence would be significantly related to lower levels of mother-child attachment security in toddlerhood when maternal sociodemographic risk variables found to be statistically reliable in questions one and two were controlled. This question was analyzed using multiple linear regression analysis to understand the relationship between autism, maternal sociodemographic variables, and attachment security.

Research question four. Does parenting stress moderate the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood? Research hypothesis four predicted that the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood will be moderated by the level of parenting stress. Participants with children with ASD who are experiencing high levels of parenting stress were predicted to report lower mother-child attachment security when maternal sociodemographic risk variables were controlled for. The direct relationship between mother-child attachment security and ASD was assessed when analyzing research question three. Sociodemographic risk variables determined to be significant when addressing questions one and two were controlled. The interaction between mother-child attachment security, parental stress, and ASD was assessed using multiple regression analysis.

Participants

Population and Sample. The current study is a secondary analysis of data from the FFCW, a nationally representative sample of primarily non-marital births at 75

hospitals across 20 large U.S. cities (populations over 200,000; Reichman et al., 2001). The Fragile Families study was initially created to answer questions regarding non-marital childbearing, welfare reform, the role of fathers with their children and the mothers of their children, and how these factors relate to the wellbeing of children. "Fragile families" are defined as unmarried parents and their children (75% of the sample) with high percentages of urban, low-income, minority individuals. The FFCW follows approximately 4900 children born between the years of 1998 and 2000 across the first 15 years of their lives. Baseline data were collected from both mothers and fathers between the years of 1998 and 2000 on 4898 births by Princeton and Columbia Universities in a non-experimental longitudinal survey (Reichman et al., 2001). Of these births, 3711 were to unmarried parents and 1187 to married parents. Both parents, but primarily mothers, participated in follow-up data collection at child age 1 (Wave 2), age 3 (Wave 3), age 5 (Wave 4), age 9 (Wave 5), and age 15 (Wave 6). Children were interviewed for the first time at age 9 (Wave 5) and were interviewed again at age 15 (Wave 6). A subsample of participants was included in a sub-study that included home visits when the child was aged 3 and 5 years. The Child Care and Parental Employment (CCPE) survey was administered in 18 of 20 cities and children's attachment status and behavior were assessed as part of this module at age 3. FFCW researchers began collecting data for Wave 7, focal child age 22 in 2020 and will include information from both the child and primary caregiver.

Demographics. At baseline (Wave 1) mothers were surveyed and maternal age, maternal education, maternal household income, and maternal race were recorded. For each of these, the current study utilized constructed variables added to the data set. While

the mother's report was typically used there were a few instances where the father's report provided missing information or corrected errors in the mother's reporting, and constructed variables were created by FFCW researchers at Princeton and Columbia Universities. For age, mothers were asked, "How old are you?" and mothers provided an age in years. If the mother reported that she was under the age of 18, additional steps were taken to ensure that screeners were allowed to interview the individual in the given hospital setting. For education, mothers were asked, "What is the highest grade or year of regular school that you have completed?" Responses were coded into the following categories: less than a high school diploma, high school diploma or equivalent, some college or technical school, or college degree or higher. For household income, total income earned before taxes was collected in categorical form: "Thinking about your income and the income of everyone else who lives with you, what was your total household income before taxes in the past 12 months?" To address missing data (about 25% of respondents), researchers utilized mother's report when available and father's report if unavailable. Some respondents provided a range of income (estimation) from the following categories: under $5,000; $5,000-$9,999; $10,000-$14,999; $15,000-$19,999; $20,000-$24,999; $25,000-$34,999; $35,000-$49,999; $50,000-$74,999; greater than $75,000; refused; and don't know. For respondents who provided an income category, the mean value of the range was entered. If neither mother nor father reported income, the variable was estimated using Stata's regression-based impute command and included the following mother and father variables: city, age, years of education, race/ethnicity, earnings, received welfare, and marital status. For race, mothers were asked, "Which of these categories best describes your race?" FFCW researchers constructed a maternal

race variable to eliminate any missing responses and the current study utilizes the following categories: White, non-Hispanic; Black, non-Hispanic; Hispanic; and "other" which includes Asian or Pacific Islander; American Indian, Eskimo, Aleut; and other, not specified.

Human Participants and Ethics Precautions. The current study utilizes secondary data analysis and, as a result, ethical issues and challenges are typically fewer when compared to other forms of data collection. The current study focuses on mothers and children; while children are a vulnerable population for research there are no markers within the data set that connect responses to participant identities. This participant information is held by the Fragile Families researchers. Finally, the George Washington University's Institutional Review Board (IRB) reviewed the proposed study and it was determined that the study met the criteria for exclusion from IRB review.

Power Analysis. Based on the recommendation of Howell (2010), effect sizes were estimated and used to determine the number of participants required for a large effect size and to attain an adequate power level of 0.8. A G*Power analysis was conducted for each research question to assess the sample size for adequate power a priori and it was estimated that 8-77 participants were needed to retain an adequate level of power of 0.8 (Cohens, 1988; Heppner & Heppner, 2004). For the current study, a small or medium effect size was revealed; using Cohen's (1990) standard interpretation, a small effect size is considered to be 0.2 and a medium effect size is considered to be 0.5. It was estimated that 68-1,302 participants were needed to retain an adequate level of power of 0.2, and 29-210 participants were needed for a level of power of .05.

Missing Data. Missing data are a potential threat to external validity in longitudinal data. If participants who are followed from Wave 1 to Wave 6 in the current data set differ from subjects who discontinue follow-up then a biased analysis may provide summaries that are not representative of the original target population. Based on the percentage of missing data found, data imputation can be used to meet criteria for a sample size yielding a power of .80. In the FFCW data set, participants were given the option to skip, refuse to answer, or reply "don't know" to questions posed. For the purposes of the current study, these answers were coded as "missing data" along with participants who were not active in the given wave assessed. Listwise deletion was used to manage missing data. Most deletions were a result of inclusion in the CCPE sub-study, which was optional.

Procedure

Research Design. Secondary data analysis was utilized in the current study; Princeton and Columbia Universities were responsible for the research setting and design. Researchers oversampled unmarried births and included a smaller sample of married parents as a comparison group. A primary goal of the study was the collection of data on unwed parents, specifically unwed and non-resident fathers who have been underrepresented in previous research. Initially small-scale pilot studies were conducted in four cities between 1995 and 1996 by members of a network of primarily minority scholars (Reichman et al., 2001). These studies informed the feasibility of interviewing parents in hospital settings and the likelihood that fathers could be contacted for interview. A second pilot study was completed in Philadelphia in 1997 of unwed couples. From this study, researchers found that interviewing fathers in the hospital setting yielded

the highest response rate and was more representative of non-marital births compared to other data collection strategies. Along with the time constraints of in-home interviews and the ability to interview multiple mothers during one hospital stay, in-hospital interviewing was chosen for baseline data collection which took place between 1998 and 2000.

Cities were chosen based on population (over 200,000), "welfare generosity, the strength of the child support system, and the strength of the local labor market" (Reichman et al., 2001, p. 310). These cities were divided into large and small sample cities based on how they ranked on the above factors and the sample total in each. A total of 20 cities were chosen for the final sample, and 75 hospitals were used across these cities. Approval to interview new parents was obtained from each hospital and their respective IRBs.

Data Collection. A professional survey organization was utilized to collect data across cities. At baseline, eligible mothers were interviewed in the maternity ward and were asked to identify the father, who was either interviewed at the hospital or via telephone. Demographic information was collected from both parents at this time including maternal age, maternal education level, maternal household income, and maternal race. Subsequently, follow-up phone interviews were completed by both mother and father at child age 1 year (Wave 2), age 3 years (Wave 3), and age 5 years (Wave 4). A subsample from 18 of the 20 cities completed the CCPE survey at child ages 3 and 5 years in the home; this included the administration of the TAS-39 to assess mother-child attachment at age 3 years. Follow-up interviews were also completed at child ages 9 (Wave 5) and 15 years (Wave 6). At child age 9 years, mothers, fathers, and children

were interviewed via phone or in the home. Teachers were also surveyed during this wave. At child age 15 years, mothers and children were interviewed via telephone or in the home. Mothers were asked about their perceptions of parenting stress during all waves after baseline.

Measures

Autism Spectrum Disorder. This variable was constructed based on the endorsement of parents or primary caregivers on the FFCW follow-up survey during Wave 6 (child age 15 years). At Waves 5 (child age 9 years) and 6, caregivers were asked, "Has a doctor or health professional ever told you that [CHILD] has any of the following health conditions?" Caregivers indicated agreement by selecting 1 = "yes", 2 = "no", -1 = "refuse to answer", or -2 = "don't know" to a number of mental and physical health concerns. Wave 5 included "Autism" and Wave 6 included "Autism or Asperger's syndrome". Initially, it was assumed that data from Waves 5 and 6 could be combined. While most participants who indicated "yes" at Wave 5 also did so at Wave 6, there were a small number who were not consistent across waves. It was determined that using Wave 6 data only was the best strategy, and individuals who changed their answer from "yes" at Wave 5 to "no" at Wave 6 (n = 5) were excluded.

Parenting Stress. This variable was constructed from mother/primary caregiver responses to questions regarding parenting during Wave 3. Mothers indicated level of agreement (1 = "strongly agree", 2 = "somewhat agree", 3 = "somewhat disagree", 4 = "strongly disagree", -1 = "refuse to answer", -2 = "don't know") to the following statements: (a) "being a parent or guardian is harder than I thought it would be", (b) "I feel trapped by my responsibilities as a parent or guardian", (c) "I find that taking care of

my child(ren) is much more work than pleasure", and (d) "I often feel tired, worn out, or exhausted from raising a family". These items were adapted from the Parenting Stress Index (Abidin, 1995; Reichman et al., 2001) and the Child Development Supplement to the Panel Study of Income Dynamics (Hofferth, Davis-Kean, Davis, & Finkelstein, 1999; Reichman et al., 2001). A number of studies have used these statements to construct a parenting stress variable when analyzing the Fragile Families data (Fomby, 2018; Halpern-Meekin & Turney, 2016; Keyser et al., 2017; Martin et al., 2012; Nomaguchi et al., 2017; Petts, 2018). Likert-style response categories were reverse-coded so that a higher score indicated greater agreement with the experience of stress, and a mean score was calculated. Cases were included if participants addressed at least three of the four questions. The parenting stress subscale consisting of four items has a Cronbach's alpha of .614 at Wave 3, which falls below the standard for reliability ($\alpha = .80$; Field, 2018). A Cronbach's alpha between .58 and .67 was recorded in the studies used to establish the measure for the current study (Halpern-Meekin & Turney, 2016; Martin et al., 2012; Nomaguchi et al., 2017; Petts, 2018).

Sociodemographic data. As mentioned above, mothers were asked at baseline (Wave 1) to report on their age, highest level of education, household income, and race. While mother's report was utilized whenever possible, constructed variables were utilized in the current study to minimize missing data and to correct errors in the data. Constructed variables were based on mother's and father's report and/or Stata's regression-based impute command.

Toddler Attachment Q-Sort. The Everett Waters' 90-item Attachment Q-Sort (AQS) is a well-validated attachment assessment (van IJzendoorn et al., 2004) consisting

of 90 cards, each with specific behavioral characteristics of children between the ages of 1 and 4 years. AQS assessments are conducted within the home, allowing for higher ecological validity, and are considered to be highly applicable across divergent cultures and atypical children. According to van IJzendoorn et al. (2004), "The AQS may even be used to assess infant security in extremely disturbed groups such as autistic children…" (p. 1189; Rutgers et al., 2004), and both Pechous (2001) and Brauner (2003) found the AQS to have high ecological validity for children with ASD between the ages of 12-72 months. The AQS was revised for use in the ECLS-B, resulting in a simplified 39-item version, TAS-39 (Andreassen et al., 2007; Bimler & Kirkland, 2002). In the FFCW, the TAS-39 was conducted on a subsample of FFCW families at Wave 3, child age 3 years during the in-home interview as part of the CCPE sub-study; the final Fragile Families analysis included TAS-39 responses by 2,268 caregivers. The TAS-39 consists of 39 attachment-related items with some variation in wording between the ECLS-B and the set used in the FFCW. Items 24, 33, and 34 in the FFCW replaced the following three items in the ECLS-B TAS-39: "Cries often, regardless of how hard or how long", "Child does not try new things and always wants mother to help", and "Soon loses interest in friendly adult strangers/new visitors" (see Table 1).

Table 1

Items Included in the FFCW TAS-39

Item number	Item description
1	Cooperates willingly with mother and passes things if asked
2	Is very clingy
3	Seeks and enjoys being hugged by mother
4	If asked, child lets friendly strangers hold and share playthings
5	Actively ignores visitors and finds own activities more interesting
6	Generally finds something else to do when finished with an activity and does not go to mother for help
7	When child sees something desirable to play with, child will fuss
8	When child cries, cries loud and long
9	Rarely goes to mother for any help
10	Gets upset if mother leaves or shifts to another place
11	Hugs or cuddles with mother without being asked to do so
12	If there is a choice, child prefers to play with toys rather than friendly adults
13	When others ask child to do something, child readily understands what is wanted but may not obey
14	Child easily becomes angry at mother
15	Cries as a way of getting mother to do what is wanted
16	When child is bored will go to mother looking for something to do
17	Enjoys copying what friendly strangers do
18	Turns away from friendly adult strangers if they come too close
19	Obeys when asked to bring or give something to mother
20	Explores freely in new unfamiliar places
21	Is content to be alone without mother's involvement playing or watching TV
22	When mother does not do what child wants right away, child gets angry
23	Wants to be center of attention
24	When upset by mother's leaving, is hard to comfort by friendly adult strangers
25	A social child who enjoys the company of others
26	Is easily comforted by contact or interaction with mother when crying or otherwise distressed
27	Protests or interrupts if mother shows affection to other people including family members
28	Relaxes when in contact with mother
29	Is fearless (approaches things and people without hesitation)
30	Enjoys being hugged or held by friendly adult strangers
31	Responds positively to helpful hints from mother
32	When mother talks with anybody else, child seeks mother's attention

Table 1 (continued)

Items Included in the FFCW TAS-39

Item number	Item description
33	If wary, pulls back or freezes but does not go looking for mother for comfort or reassurance
34	When child is upset after mother leaves, will sit and cry without attempting to follow
35	Is very independent
36	Eager to join in with friendly adult strangers
37	When mother says follow child does so willingly
38	Cries or otherwise tries to prevent separation if mother is leaving or moving to another place
39	Often wants mother's attention

Over the course of the assessment, mothers divided the 39 attachment-related items into five piles corresponding to a Likert scale: 1 = "applies mostly", 2 = "applies often", 3 = "neither extreme", 4 = "applies sometimes", and 5 = "applies hardly ever". Caregivers were discouraged from sorting items into the intermediary, "neither extreme", pile and instead encouraged to sort items into either "applies often" or "applies sometimes". A method of successive sorts technique was used to create these categories. Bimler and Kirkland (2005) utilized multidimensional scaling, factor analysis, and hierarchical clustering to analyze the raw data. Three attachment classifications were derived from the scores: insecure, avoidant (Type A); secure (Type B); and insecure, resistant (Type C). Insecure, disorganized attachment was not included within the study due to a lack of data meeting this criterion. The variable, "codeabc", categorizes children into 1 = insecure, avoidant; 2 = secure; or 3 = insecure, resistant. Within the sample assessed for attachment security (n = 2,268), Fragile Families reported 47 children were classified as insecure, avoidant; 1,719 children were classified as secure; and 502 children were classified as insecure, resistant. According to Prior and Glaser (2006), the

examination of the 2,268 mothers at Wave 3, child age 3 years yielded attachment patterns comparable to the general population: 75.8% of children were classified as securely attached; 22.1% of children were classified as insecure, resistant; and 2.1% of children were classified as insecure, avoidant.

Factor analysis yielded eight significant factors that were used to classify children in one of the three attachment categories included in the study (see Table 2). Children rated high on a given factor yielded higher positive scores, indicating increased levels of congruence with the description. For example, children with higher positive scores on factor "s" were rated as more cuddly and comforted by close physical contact compared to children with lower negative scores. Multidimensional scaling yielded three additional variables ("b1", "b2", and "b3") used to describe how children fit into the following dimensions of attachment: "security" (b1), "dependency" (b2), and "sociability" (b3). Security and dependency scores were calculated using scaling measures from Waters and Deane's (1985) AQS. A high security score and low dependency score indicated a secure attachment pattern; a low security score and high dependency score indicated an insecure, resistant attachment pattern; and a low security score and low dependency score indicated an insecure, avoidant, attachment pattern. The current study utilized the security dimension of attachment with a range of -1.00-1.00, with higher values indicating more security and lower values indicating less security.

Table 2

Attachment Style Factors

Variable	Description
s	Comfortably cuddly, enjoys and is comforted by close physical contact with parent
t	Cooperative, responsive to directions and suggestions; interaction with parent is harmonious
u	Enjoys company, happy and friendly
v	Independent, little use or reliance on parents, self-sufficient and self-regulating
w	Attention-seeking, reliant on parent's attention or affection, competes with other calls upon them
x	Upset by separation, early upset by parent's actual or anticipated absence
y	Avoids others/Does not socialize, shows little interest in interaction with parent or friendly adults
z	Demanding, fusses, cries, becomes angry if parent's responses are not immediate

Statistical Analysis

All analyses were conducted using SPSS (IBM Corp., 2019). Exploratory data analysis was used to analyze patterns of variation across groups within the FFCW cohort and descriptive statistics and groups comparisons are presented. Research question one was analyzed using linear regression to understand the relationship between maternal household income, maternal race, and mother-child attachment security assessed at Wave 3. Research question two was analyzed using logistic regression to assess the relationship between sociodemographic risk variables (maternal age at childbirth, maternal education, maternal household income, and maternal race) and the diagnosis of ASD. Research question three was analyzed using multiple regression analysis to understand the relationship between autism and attachment security, with sociodemographic risk variables utilized as control variables. Sociodemographic risk variables were determined

when addressing questions one and two and included maternal education, maternal household income, and maternal race. Research question four was analyzed using multiple regression analysis to understand any moderating effects of parenting stress on the relationship between autism and attachment security. Again, the sociodemographic risk variables of maternal education, household income and maternal race were controlled.

Chapter 4: Results

This chapter provides information on FFCW sampling, retention rates, and the current study's sample. A range of assumptions were tested prior to analysis and are summarized along with limitations. The results of the current study are presented and include descriptive statistics as well as findings organized by research question.

Between 1998 and 2000, FFCW researchers collected baseline data from mothers and fathers interviewed in the hospital setting at childbirth. Participants were sampled from hospitals rather than birth records due to a higher response rate and researchers purposefully oversampled cases of nonmarital childbearing (Reichman et al., 2001). Within each hospital, a random sampling of married and unmarried births was completed comprising a final sample. Parent-child dyads were excluded from the study if parents planned to place the child for adoption, the father of the child was deceased, parents were not fluent in English or Spanish, mothers and/or babies were too ill for the mother to complete the interview, or if the baby was deceased. Many hospitals did not allow mothers and father under the age of 18 to be interviewed, and they were excluded. While it was preferred that fathers complete the assessment, cases were not excluded if the father did not participate. A total of 4789 births comprised the sample at baseline. With regard to retention, 90% of mothers were interviewed at Wave 2, 86.4% at Wave 3, 84.5% at Wave 4, 74.6% at Wave 5, and 73% at Wave 6 (Princeton University, 2018).

In the current study, the sample was restricted to mothers who participated in the CCPE sub-study and completed the TAS-39 at Wave 3, endorsed at least 3 of the 4 parenting stress questions at Wave 3, endorsed the child ASD question at Wave 6, and answered all four sociodemographic risk questions at baseline (n = 1842). When

comparing mothers who participated in the CCPE sub-study with those mothers who opted out of the in-home observation, there were no significant differences in maternal age, maternal education, maternal household income, prevalence of ASD, or parenting stress. However, differences were found for maternal race; a chi square test was significant, $X^2(3, N = 3082) = 41.62$, $p < .001$. Of those mothers who opted out of the CCPE sub-study, approximately 43% identified as Black, 28% identified as Hispanic, 24% identified as White, and 4% were classified as "other". In comparison, mothers who participated in the CCPE sub-study identified as follows: approximately 55% Black, 21% Hispanic, 21% White, and 3% "other".

Descriptive Statistics

Descriptive statistics on sociodemographic variables, attachment security, and parenting stress can be found in Tables 3 and 4. Overall, there were more mothers who identified as Black and Hispanic in the sample than is representative of the general population and the median income was lower than the national average. This was expected given the FFCW's oversampling of high-risk families. However, the overall sample was comparable to the general population on attachment security with approximately 75% of toddlers rated as secure. Gender differences in the ASD sample were comparable to the disparity found nationally; males comprised approximately 86% of the sample. Toddlers with ASD ($M = .28$, $SD = .32$) were lower in attachment security than toddlers without ASD ($M = .46$, $SD = .26$), [$t(1840) = 4.44$, $p < .001$]. Mothers of children with ASD ($M = 2.48$, $SD = .32$) reported statistically significantly higher levels of stress than mothers of neurotypical children ($M = 2.26$, $SD = .66$); [$t(1840) = -2.19$, $p = .029$].

Table 3

Descriptive Statistics of Continuous Variables

Variable	Neurotypical				ASD				Difference		
	n	*Range*	*M*	*SD*	*n*	*Range*	*M*	*SD*	*t*	*df*	*p*
Attachment Security	1799	-.78 - .99	.46	.26	43	-.53 - .79	.28	.32	4.44	1840	<.001**
Maternal Age	1799	15 - 43	24.99	5.96	43	19-41	25.09	5.55	-	-	NS
Maternal Income	1799	0 – 133,750	32,308.50	31,240.28	43	3,750 – 133,750	42,864.95	41,371.96	-	-	NS
Parenting Stress	1799	1-4	2.26	.66	43	1-4	2.48	.71	-2.19	1840	.029*

*Significant at .05, **Significant at .001.

Table 4

Descriptive Statistics of Categorical Variables

Variable	*Neurotypical*		*ASD*	
	n	*%*	*n*	*%*
Child Gender	1799	-	43	-
Male	909	50.53%	37	86.05%
Female	890	49.47%	6	13.95%
Maternal Education	1799	-	43	-
Less than HS diploma	582	32.35%	6	13.95%
HS diploma or equivalent	566	31.46%	20	46.51%
Some college/technical degree	475	26.40%	8	18.60%
College degree or higher	176	9.78%	9	20.93%
Maternal Race	1799	-	43	-
White, non-Hispanic	375	20.84%	17	39.53%
Black, non-Hispanic	989	54.97%	18	41.86%
Hispanic	380	21.13%	6	13.95%
Other	55	3.06%	2	4.65%

Assumptions Testing

A series of regression models were utilized to assess the relationships between mother-toddler attachment security (dependent variable) and maternal sociodemographic variables, ASD, and parenting stress. The data were screened for violation of assumptions prior to analysis.

Independence. As previously reported, there is face validity to independence of observations due to random sampling of hospitals at baseline in the FFCW as well as sampling of the mother-child dyads within hospitals.

Multicollinearity. Multicollinearity was addressed for all regression models with multiple independent variables. All predictor variables in research question one yielded Pearson product-moment correlation coefficients less than $r = .50$ suggesting that multicollinearity is not problematic (Field, 2018). There was weak, negative correlation between maternal household income and Black maternal race, $r = -.29$, $n = 1842$, $p < .001$. Like research question one, all predictor variables in research question two yielded Pearson product-moment correlation coefficients less than $r = .50$. There was a weak, positive correlation between maternal education and maternal household income, $r = .26$, $n = 1842$, $p < .001$; a weak, positive correlation between maternal education and Hispanic maternal race, $r = .11$, $n = 1842$, $p < .001$; and a weak, negative correlation between maternal education and Black maternal race, $r = .-.05$, $n = 1842$, $p = .039$. For question three, all Pearson product-moment correlation coefficients were less than $r = .50$. There was a weak, positive correlation between ASD and maternal education, $r = .06$, $n = 1842$, $p = .011$, and a weak, positive correlation between ASD and maternal income, $r = .05$, $n = 1842$, $p = .030$. In the assessment of the relationship between ASD, parenting stress,

and mother-toddler attachment security for research question four, a point biserial correlation did not reveal any evidence of multicollinearity. All correlation coefficients were less than $r = .10$.

Linearity. Research questions one, three, and four employed multiple regression while research question two was assessed using logistic regression because it is the most common method for analyzing a dependent binary variable, such as the diagnosis of ASD (Field, 2018). Each model was chosen based on a careful review of current literature examining similar variables from the FFCW or other relevant data set. Linearity of the statistical models was assessed through graphical examination of relationships among variables before finalizing models.

Normality. The distributions of residuals in research questions one, three, and four were evaluated via histograms, stem-and-leaf plots, and Q-Q plots. When assessing research question one, the standardized residuals of the income variable demonstrated skewness (-.79) and kurtosis (.89) values within the conservative range of -1.0 to 1.0 for normality (Field, 2018). While linear regression is quite robust to the normality assumption, the distribution was not perfectly normal. There is some evidence of smaller than expected tails, however a considerable bell-shaped curve was demonstrated without much skew. Normality tests were performed and showed departures from normality, KS = .058, df = 1842, $p < .001$; W = .964, df = 1842, $p < .001$. For research question three, the residuals of the predictor variables demonstrated skewness (-.81) and kurtosis (.95) values were within a range of -1.0 to 1.0. While other graphs appeared normal, QQ plots reflected some deviation from normality and subsequent tests showed departures from normality, KS = .058, df = 1842, $p < .001$; W = .964, df = 1842, $p < .001$. Finally, for

research question four the residuals of the predictor variables demonstrated skewness (-.82) and kurtosis (1.04) values were within an acceptable range of -3.0 to 3.0 (Field, 2018). Plots were similar to those seen in research question three, and tests of normality showed almost identical results: KS = .066, df = 1842, $p < .001$; W = .963, df = 1842, $p < .001$. Overall, these tests of normality are highly sensitive to sample size, and minor departures from non-normality will be statistically significant in a large sample. Transformation of data procedures are problematic due to the negative attachment security values and the left skewness observed. However, the TAS-39 is derived from the AQS, an established measure of attachment security that accounts for normal distribution of scores. Therefore, it is reasonable to interpret the *p* values of these analyses as approximate.

Homogeneity of variance. For research question one, box and scatter plots of standardized residuals were assessed and there was little evidence of violation of the assumption of homogeneity of variance for both household income and maternal race. A Levene's *F* Test determined that the assumption of homogeneity of variance was met for maternal race, $F(3, 1838) = .62$, $p = .604$. For research question two, box and scatter plots of the relevant variables were used to assess the range of scores for the ASD and neurotypical samples. The range of scores was similar between the two groups. For research question three, box and scatter plots of standardized residuals were assessed for maternal race and household income, respectively, and the ranges of scores were similar across these predictor variables. Levene's *F* Tests determined that the assumption of homogeneity of variance was met for both ASD, $F(1, 1840) = 2.00$, $p = .157$, and maternal education, $F(1, 1840) = .59$, $p = .441$. For research question four, box plots of

standardized residuals were used to assess maternal education, maternal race, and ASD and scatter plots were used to assess household income and parenting stress. Outliers in parenting stress scores were observed and further analyzed using box plots. Ranges of attachment security scores were similar across all of these predictor variables. ASD was assessed again using a Levene's *F* Test which determined that the assumption of homogeneity of variance was met, $F(1, 1840) = .00$, $p = .1.000$. This assumption was also met for maternal education, $F(1, 1840) = .00$, $p = 1.000$, and maternal race, $F(3, 1838) = 1.09$, $p = .353$.

Research Question One

What is the association between maternal sociodemographic risk variables and mother-child attachment security in toddlerhood? It was hypothesized that mothers with low household income and who identify as a racial minority will be more likely to have children with lower attachment security in toddlerhood.

Multiple regression was performed to ascertain the effect of maternal household income and maternal race on mother-toddler attachment security with an alpha of .05 and results can be seen in Table 5. Dummy codes were applied to the four maternal race variables. A significant regression equation was found ($F(4, 1837) = 15.02$, $p < .001$), with an R^2 of .03. Low household income and Black and Hispanic maternal race were found to predict lower mother-child attachment security in toddlerhood. Effect sizes are small, suggesting that maternal household income ($\beta = .10$) and Black ($\beta = -.12$) and Hispanic maternal race ($\beta = -.11$) have minimal effects on mother-child attachment security in toddlerhood as approximately 3% of the variability in attachment security is explained by these variables.

Table 5

Results of Multiple Regression Analysis for Variables Predicting Mother-Child Attachment Security

Variable	*B*	*SE B*	*β*	*t*	*p*
(Constant)	.48	.02	-	27.86	<.001
Household income	8.01 E-7	.00	.10	3.84	<.001
Black	-.06	.02	-.12	-3.82	<.001
Hispanic	-.07	.02	-.11	-3.58	<.001
Other	.06	.04	.04	1.65	.099
R^2		.03			
F		15.02			<.001

Note: N=1842.

Research Question Two

What is the association between maternal sociodemographic risk variables and a diagnosis of ASD recorded in adolescence? It was hypothesized that maternal sociodemographic risk variables will be largely associated with increased prevalence of ASD recorded in adolescence. Specifically, it was hypothesized that mothers with low household income, older than 29 years at childbirth, and those identifying as a racial minority will be more likely to have children diagnosed with ASD. Additionally, it was hypothesized that women with both below average education and above average education will be more likely to have children diagnosed with ASD.

A logistic regression was performed to ascertain the effects of maternal age, maternal education, maternal household income, and maternal race on the likelihood that

participants were diagnosed with ASD, as measured at Wave 6 (see Table 6). Maternal age and maternal education were dummy coded. Maternal age was divided into two categories: below 30 years, and 30 years and above. Maternal education was divided into two categories based on the distribution of years of education in the sample: high school degree or equivalent and below, and some college and above. The regression equation was statistically significant, $\chi^2(6) = 16.57$, $p = .011$. The model explained only 4.5% (Nagelkerke R^2) of the variance in ASD diagnosis and correctly identified 97.7% of the cases. Maternal education and maternal race added significantly to the model. Children of mothers with more than a high school diploma were more likely to have a diagnosis of ASD ($OR = 2.57$). Children of Black mothers were statistically significantly less likely to be diagnosed with ASD than children of White mothers ($OR = .46$). Maternal age and maternal household income were not significant predictors. A subsequent analysis included four poverty categories organized by maternal household income and was not statistically significant.

Table 6

Results of Logistic Regression for Variables Predicting a Diagnosis of ASD

Source	*B*	*SE B*	Wald χ^2	*p*	*OR*	95% *CI OR*
Constant	-3.98	.52	59.54	.000	.02	-
Maternal age	-.64	.42	2.29	.130	.53	[.23, 1.21]
Maternal education	.94	.46	4.26	.039*	2.57	[1.05, 6.28]
Maternal household income	.00	.00	1.01	.316	1.00	[1.00, 1.00]
Maternal race						
Black	-.77	.37	4.33	.037*	.46	[.22, .96]
Hispanic	-.86	.49	3.03	.082	.42	[.16, 1.12]
Other	-.18	.76	.05	.82	.84	[.19, 3.74]

Note. N=1842, *$p < .05$

Research Question Three

What is the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood? It was hypothesized that the presence of ASD as recorded in adolescence would be significantly related to lower mother-child attachment security in toddlerhood when maternal sociodemographic risk variables found to be statistically significant in questions one and two were controlled for.

For model one, a multiple linear regression was calculated to predict mother-child attachment security in toddlerhood based on the control variables examined in questions one and two: maternal education, maternal household income, Black maternal race, and Hispanic maternal race (see Table 7). A significant regression equation was found (*F*(4,

1837) = 19.75, $p < .001$), with and R^2 of .04. All predictor variables were statistically significant.

Table 7

Results of Multiple Linear Regression for Sociodemographic Risk Variables Predicting Mother-Child Attachment Security

Variable	*B*	*SE B*	*β*	*p*
Constant	.45	.02	-	<.001
Maternal education	.06	.01	.11	<.001
Maternal household income	5.63 E-7	.00	.07	.008
Black maternal race	-.07	.02	-.13	<.001
Hispanic maternal race	-.07	.02	-.10	<.001
R^2	.04			
F	19.75			<.001

Note. N=1842.

For model two, the presence of an ASD diagnosis was added as a predictor variable (see Table 8). A significant regression equation was found ($F(5, 1836) = 21.75$, $p < .001$), with and R^2 of .06. All predictor variables were statistically significant; ASD, Black maternal race, and Hispanic maternal race had similar negative effects on mother-child attachment security in toddlerhood. Maternal education and maternal household income had a linear positive effect on attachment security. Only 6% of the variance in mother-child attachment security in toddlerhood was explained.

Table 8

Results of Multiple Linear Regression for Variables Predicting Toddler Attachment Security Including ASD

Variable	*B*	*SE B*	*β*	*p*
Constant	.45	.02	-	<.001
Maternal education	.07	.01	.12	<.001
Maternal household income	5.83 E-7	.00	.07	.006
Black maternal race	-.07	.02	-.14	<.001
Hispanic maternal race	-.07	.02	-.11	<.001
ASD	-.22	.04	-.11	<.001
R^2	.06			
F	21.75			<.001

Note. N=1842.

Research Question Four

Does parenting stress moderate the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood? It was hypothesized that the relationship between the diagnosis of ASD and mother-child attachment security in toddlerhood would be moderated by the level of parenting stress. Participants with children with ASD who experienced high levels of parenting stress were hypothesized to show lower levels of mother-child attachment security when maternal sociodemographic risk variables were controlled for. The direct relationship between mother-child

attachment security, sociodemographic risk, and ASD was assessed when analyzing research question three.

Model one extended the regression equation from research question three. A multiple linear regression was calculated to predict mother-child attachment security in toddlerhood based on maternal education, maternal household income, Black maternal race, Hispanic maternal race, the presence of ASD, and parenting stress (see Table 9). A significant regression equation was found ($F(6, 1835) = 21.54$, $p < .001$), with an R^2 of .07. All predictor variables were statistically significant but only explained 7% of the variability in attachment security. Increasing parenting stress had a negative impact on mother-toddler attachment security, and all other predictor variables had the same effects on attachment found in previous models.

Table 9

Results of Multiple Linear Regression for Variables Predicting Toddler Attachment Security Including Parenting Stress

Variable	*B*	*SE B*	*β*	*p*
Constant	.54	.03	-	<.001
Maternal education	.06	.01	.11	<.001
Maternal household income	5.66 E-7	.00	.07	.007
Black maternal race	-.07	.02	-.13	<.001
Hispanic maternal race	-.07	.02	-.11	<.001
ASD	-.21	.04	-.12	<.001
Parenting stress	-.04	.01	-.10	<.001
R^2	.07			
F	21.54			<.001

Note. N=1842

The interaction term between ASD and parenting stress was added to the regression model. A multiple linear regression was calculated to predict mother-child attachment security in toddlerhood based on maternal education, maternal household income, Black maternal race, Hispanic maternal race, the presence of ASD, parenting stress, and the interaction term ASD*parenting stress (see Table 10). A significant regression equation was found ($F(7, 1834) = 18.84$, $p < .001$), with an R^2 of .07. The moderation effect using grand mean centering was not significant; however, when interpreting the results via the directional nature of the hypothesis, the *p* value for the moderation effect is approaching significance ($p = .056$). All other predictor variables

were statistically significant. Participants' predicted mother-child attachment security in toddlerhood was equal to .54 + .06 (maternal education) + 5.66 E-7 (maternal household income) - .07 (Black maternal race) - .07 (Hispanic maternal race) - .19 (ASD diagnosis) - .04 (parenting stress), where income is measured in dollars; maternal education, Black maternal race, Hispanic maternal race, and ASD are dichotomously coded; and parenting stress is a scale variable. Consistent with the first model 7% of the variability in attachment security was explained.

Table 10

Results of Moderated Regression Analysis

Variable	*B*	*SE B*	*β*	*p*
Constant	.54	.03	-	<.001
Maternal education	.06	.01	.11	<.001
Maternal household income	5.66 E-7	.00	.07	.007
Black maternal race	-.07	.02	-.13	<.001
Hispanic maternal race	-.07	.02	-.11	<.001
ASD	-.19	.04	-.11	<.001
Parenting stress	-.04	.01	-.10	<.001
ASD*parenting stress	-.09	.06	-.04	.111
R^2	.07			
F	18.84			<.001

Note. N=1842

Chapter 5: Interpretations, Conclusions, and Recommendations

Attachment is a lifelong process that helps to ensure survival in infancy and encourages adaptive personality development across the lifespan. Infants who establish low attachment security with their caregivers are more likely to encounter poor outcomes as they develop socially, psychologically, and even physically (Aguilar et al., 2000; Belsky & Fearon 2002b; Benoit, 2004; Berlin et al., 2008; Cassidy & Berlin, 1994; DeKlyen & Greenberg, 2008; Fearon et al., 2010; Lyons-Ruth, 2003; McElwain et al., 2003; Ogawa et al., 1997; Salzman, 1997; Shemmings & Shemmings, 2011; Sroufe et al., 2005; Symons & Szielasko, 2011; van IJzendoorn et al., 1999). Individuals with ASD are at a disadvantage in their ability to form close, reciprocal relationships beginning in infancy and continuing across the lifespan and, based on prior research, children with ASD may be more likely to develop insecure attachment relationships with their caregivers (Barnett, Hunt, et al., 1999; Belsky, 1997; Capps et al., 1994; Ganiban et al., 2000; Rutgers et al., 2004; Rutgers et al., 2007; Willemsen-Swinkels et al., 2000). Caregiver characteristics, including sociodemographic risk variables and parental stress, influence both the attachment security of children (Bakermans-Kranenburg et al., 2004; Bernier & Meins, 2008; Cyr et al., 2010; Dexter et al., 2013; Duschinsky et al., 2015; van IJzendoorn et al., 1999) and the prevalence of ASD diagnosis (Becerra et al., 2014; Bhasin & Schendel, 2007; CDC, 2016; Delobel-Ayoub et al., 2015; Gedaly & Leerkes. 2016; Hayes & Watson, 2013; He et al., 2018; Hoppes & Harris, 1990; Idring et al., 2014; Lung et al., 2018; Rai et al., 2012; Rutgers et al., 2007; Sandin et al., 2016), though the effects are not uniform in existing literature.

In the current study, the FFCW data set provides opportunities for an understanding of the predictors of mother-child attachment security in toddlerhood in a sample of primarily unwed mothers from low SES backgrounds (Reichman et al., 2001). While this oversampling presents some limitations, the robust longitudinal sample follows at-risk families from the focal child's birth through age 15. Overall, approximately 75% of the children assessed as part of the CCPE sub-study using the TAS-39 were classified as securely attached. According to a Princeton University study (Huber, 2014), 60% of children in normative samples display a secure attachment style, making these findings somewhat surprising and suggesting these families are not as "fragile" as hypothesized by the FFCW researchers. While the variables that were significant were highly statistically significant, effect sizes were generally small. The initial research questions were more exploratory in nature and assessed for control variables for latter questions; therefore, it was anticipated that not all hypotheses would be supported or that the variables would not operate as predicted. Lower household income was associated with lower mother-child attachment security, though the effect size was small. Race was significantly related to both attachment security and the prevalence of ASD diagnosis; children of Black and Hispanic mothers displayed lower mother-toddler attachment security in the CCPE subsample and children of Black mothers were less likely to have a diagnosis of ASD when compared to children of mothers who identified as White, non-Hispanic or "other" race (including Asian or Pacific Islander; American Indian, Eskimo, or Aleut; or other). Additionally, children of mothers with higher than average education (more than a high school diploma) were more likely to have a diagnosis of ASD compared to children whose mothers did not earn

a high school diploma. Of the sociodemographic risk variables hypothesized to affect the prevalence of ASD diagnosis, it was surprising that only maternal education and maternal race were significant predictors. A small sample of children with ASD was present in the FFCW data set and this lack of power may explain this absence of association. As previously mentioned, this may be the first study to utilize the ASD variables from the FFCW data set. As hypothesized, the presence of ASD was a statistically significant predictor of mother-child attachment security. Children with ASD displayed lower attachment security at toddlerhood than their neurotypical peers when household income and maternal race were controlled for. Parents of children with ASD reported statistically significantly higher levels of stress than parents of neurotypical children; however, parenting stress did not moderate the relationship between ASD and attachment security as hypothesized. Low household income, Black and Hispanic maternal race, ASD, and high parenting stress were predictive of lower attachment security, and above average maternal education and White maternal race predicted higher attachment security, but the effect size was small. Subsequently, this researcher analyzed the potential interaction of household income and maternal race, ASD and maternal race, and parenting stress and maternal race as well as the possible role of infant temperament as a predictor of mother-toddler attachment security. None of these interactions were statistically significant and no relationship was observed between infant temperament and attachment security. It is possible that the factors used to asses infant temperament in the FFCW data set were accounted for in the attachment security measure.

Interpretations and Conclusions

Research question one. Despite the oversampling from vulnerable populations, children assessed for mother-toddler attachment security using the TAS-39 as part of the ECLS-B subsample at Wave 3 (n = 2268) yielded scores comparable to the general population; 76% were classified as secure (n = 1719) compared to approximately 61% in the ECLS-B sample which also used a version of the TAS (n = 8750; TAS-45; Andreassen et al., 2007). These differences between the samples may be, in part, a result of the differences in observation and rating of attachment behaviors, as mothers assessed the behaviors of their children in the FFCW study and trained observers were used in the ECLS-B. Mean household income skewed lower than the general population and there were a higher number of mothers who identified as Black and Hispanic than what is representative of the US. As hypothesized, both maternal household income and maternal race were statistically significantly related to mother-toddler attachment security. While the results were statistically significant ($p < .001$), income and maternal race explained only 3% of the variability in attachment security with attachment security increasing .008 per hundred thousand dollars of income. The attachment security scores for children of mothers who identified as Black or Hispanic were statistically significantly lower than the security scores of children whose mothers identified as White, non-Hispanic.

Household income was found to be an important factor influencing attachment security along with other sociodemographic risk variables in a review of the literature. In the current study, however, income did not contribute to the variability of attachment security to the extent hypothesized. The literature reflects a challenge in understanding the separate impacts of income and race on attachment security due to their intersecting

effects. Low income has been found to negatively impact attachment security through an indirect relationship; insufficient income challenges the parental sensitivity and consistent caregiving central in establishing secure attachment bonds (Cyr et al., 2010; Gedaly & Leerkes, 2016; van IJzendoorn et al., 1999). The FFCW sample in the current study reported average incomes below the national average at baseline. While maternal household income was a statistically significant predictor of mother-child attachment security in toddlerhood, the effects size was small. Black and Hispanic maternal race yielded similar standardized beta coefficients suggesting that low income and Black and Hispanic maternal race had similar negative impacts on mother-toddler attachment security, likely as a result of societal inequities. However, in the current study the effects of income and race were examined separately. Children of White mothers and mothers who were identified as "other" were similar in their attachment security scores when examined independently from other sociodemographic risk factors and these toddlers yielded statistically significantly higher attachment scores than children of Black mothers and Hispanic mothers, who were also similar in scores. The literature reviewed supports this difference in attachment security between children from White families and children from Black families through the impact of other sociodemographic risk variables, specifically household income, and parenting sensitivity (Bakermans-Kranenburg et al., 2004; Dexter et al., 2013; Huston et al., 1994).

Utilizing data from the National Institute of Child Health and Human Development (NICHD) Early Childcare Research Network, Bakermans-Kranenburg et al. (2004) found that children from White families scored significantly higher on the AQS at 24 months of age when compared to African American children. The family stress model

was used to explain this finding through differences in income and maternal sensitivity between the two groups, with lower household income contributing to poorer maternal sensitivity in African American families. Ultimately, maternal sensitivity was the strongest predictor of attachment security which was measured using a series of video assessments observing mother-child interactions at home and in clinic. Dexter et al. (2013) did not find a difference in attachment security between White and African American preschool children using the SSP. The study's sample was intended to be equivalent on key demographics including household income, parent education, and employment status to illustrate the differences in race only (Dexter et al., 2013). Researchers evaluated children aged 4 and 5 years and their parents from low-income backgrounds and determined that differences in attachment security were due to parent responsivity and warmth rather than race. Compared to both of these studies, the current study utilizes a larger and more diverse sample. However, like the study from Dexter et al. an oversampling of "fragile" families comprises the current data set. Additionally, the FFCW data set does not provide a similar measure of parental sensitivity presenting a limitation for the current study as the cited research consistently supports the relationship between sensitivity and attachment security.

With few exceptions, attachment security has not been well researched in minority families aside from Black and African American mother-child dyads, including Hispanic, Asian, and Native American groups (Posada et al., 1995). These families constitute some of the fastest growing ethnic groups in the US and deserve more attention. Huang, Lewin, Mitchell, and Zhang (2012) investigated the association between child attachment security, maternal sensitivity, and maternal depression in U.S.-

and foreign-born White, Black, Hispanic, and Asian mothers using data from the ECLS-B. The Toddler Attachment Sort-45 was completed at child age 24 months by field interviewers. Researchers observed the lowest attachment security scores in toddlers or U.S.-born Hispanic and U.S.-born Black mothers whereas children of U.S.-born Asian mothers had the highest attachment security scores in the sample. These findings align with those of the current study with toddlers of Asian mothers exhibiting higher attachment security scores than toddlers of both Black and Hispanic mothers. Chronic maternal depression served as a risk factor for insecure attachment and maternal sensitivity served as a protective factor, with depression negatively impacting maternal sensitivity. While income was not reported to directly influence attachment security in this study, the highest income category primarily consisted of Asian families.

Research question two. Logistic regression was used to understand predictors of an ASD diagnosis and it was determined that maternal education and maternal race were the only statistically significant sociodemographic risk variables. Maternal age and household income did not predict the diagnosis of ASD. Compared to children of White mothers, children of Black mothers were statistically significantly less likely to have a diagnosis of ASD. Specifically, the odds ratio for ASD diagnosis for children of Black mothers was 46.3% that of White mothers, indicating the expected probability of ASD diagnosis for children of Black mothers was far lower than for children of White mothers. For example, for a mother with a high school education, under the age of 30, and with an annual household income of $25,000, the estimated probability of ASD diagnosis was 5.1% for children of White mothers, 4.3% for children of mothers who identified in the "other" category, 2.4% for children of Black mothers, and 2.2% for children of Hispanic

mothers. Additionally, the odds ratio for ASD diagnosis for children of mothers who did not earn a high school diploma was 38.9% that of mothers with more than a high school education, indicating the expected probability of ASD diagnosis for children of mothers with less education was far lower than for children of mothers with higher levels of education. The variables of maternal education, maternal income, and maternal race overlap and it is important to note that both education and race were still significant after accounting for all variables. It is challenging to make assumptions about the disparity in ASD diagnosis, maternal education, and maternal race in the FFCW data set for a number of reasons: the sample of participants diagnosed with ASD has not been investigated in studies to date; there is no information on the age of diagnosis, diagnostic process, or severity of ASD-specific symptoms; and there is a lack of information regarding parent attitudes specific to ASD in the data set. However there are a number of possible explanations for the difference in ASD diagnosis between races including a disparity in help-seeking behavior in families of color, a difference in the conceptualization and reporting of ASD symptoms in Black families, and a diagnostic bias from medical and mental health professionals toward families of color.

As previously reported, there are inconsistent results from research studying the relationship between maternal education and child ASD diagnosis, with researchers finding connections between both higher and lower than average levels of maternal education and autism. As a result, the current study hypothesized that both mothers who did not earn a high school diploma and those mothers who attended college, technical school, or beyond would be more likely to have a child diagnosed with ASD at Wave 6 (average maternal education for the FFCW sample was high school diploma equivalent).

However, a significant effect was only found for mothers with above average education, partially supporting the hypothesis and the findings from previous studies (Bhasin & Schendel, 2007; Durkin et al., 2017; Leventhal et al., 2000; Lung et al., 2018). According to Leventhal et al. (2000) American mothers with higher levels of education are more likely to be consistent with medical, educational, and psychological services for their children between birth and age 5 years through greater accessibility to care and adherence to childcare standards. Bhasin and Schendel (2007) found that children of mothers with more than 16 years of education were more than twice as likely to be diagnosed with ASD than mothers with less education. Researchers proposed that higher levels of education led to more accurate reporting of child behaviors and that these families were less likely to be negatively evaluated, or thought of as "culturally deprived", by clinicians (Bhasin & Schendel, 2007, p. 672).

Due to the oversampling of at-risk families in the FFCW data set, the disparity that exists in health seeking behavior among low income households is a possible explanation for the difference in diagnosis between races. Black and Hispanic individuals have been found to seek mental health services less often than White individuals (Diala et al., 2000, Dobalian & Rivers, 2008; Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). A lack of multicultural competency from providers has historically marginalized people of color and contributed to a lack of trust in healthcare professionals (Casas, Suzuki, Alexander, & Jackson, 2017). "Cultural caring" in African American families is one example of how this distrust may impact the interaction of children and mental health professionals (Burkett et al., 2015). Financial and language barriers also decrease the likelihood that certain minority cultures will seek

services (DeNavas-Walt, Proctor, & Lee, 2005). While cultural competency is now an important element of counselor training, most mental health providers are not minorities and this lack of representation within the field may continue to negatively impact help-seeking behavior (Casas, et al. 2017; Montes & Halterman, 2011; SAMHSA, 2015).

Several studies have discussed the differences in reporting of child symptoms in families of color (Barton, Dumont-Mathieu, & Fein, 2012; Donohue et al., 2019; Mandell et al., 2007). Overall, Black and Hispanic individuals provide less information to health professionals when compared to White peers (Diala et al., 2000, Dobalian & Rivers, 2008). Donohue et al. (2019) completed a comprehensive assessment of White and Black parents and their toddlers during initial screenings of ASD. Overall, Black parents reported significantly fewer ASD-related concerns compared to White parents. More specifically, White parents were more likely to report social concerns (35.3% of White parents compared to 17.2% of Black parents) and restricted, repetitive behaviors (25% of White parents compared to 6.9% of Black parents). There were no significant differences observed between racial groups on concerns defined as unrelated to ASD, and researchers determined that this difference in reporting was not due to a lower level of severity of ASD symptoms in the sample of Black toddlers. In fact, Black toddlers exhibited more severe deficits in social skills and affect than their White peers. Similarly, Mandell et al. (2007) found that African American parents were more likely to perceive behaviors related to ASD as symptoms of conduct disorder and ODD prior to and during the diagnostic process when compared to White parents. Researchers suggested that this indicated a deemphasis of ASD-related behaviors and a greater focus on disruptive behaviors. Finally, a diagnostic bias may also contribute to a disparity in the prevalence

of ASD in minority children in the current study (Burkett et al., 2015; Mandell et al., 2002; Mandell et al., 2007). Providers may unconsciously provide inequitable care to patients of different cultures and adjust treatment recommendations and diagnoses as a result of stereotypes.

Research question three. Despite the smaller sample of child participants being diagnosed with ASD (n = 43) and the unequal sample sizes, differences in attachment security were discovered in the ASD and neurotypical groups. Neurotypical children had an average score of .46 (SD = .26) on the attachment security measure and children with ASD had a statistically significantly lower average score of .28 (SD = .32), $t(1840)$ = 4.44, $p < .001$. As hypothesized, all variables were statistically significant predictors of mother-child attachment security in toddlerhood. While above average maternal education (β = *.12)* and higher maternal household income (β = .07) predicted higher attachment security scores, Black (β = -.14) and Hispanic maternal race (β = -.11), and ASD (β = -.11) predicted lower attachment security scores. The overall effect size was small, R^2 = .06.

While it was not hypothesized that maternal education would have the impact observed in the current study, the finding is consistent with the negative impacts of sociodemographic risk on attachment security (Cyr et al., 2010; Gedaly & Leerkes, 2016; van IJzendoorn et al., 1999). Gedaly and Leerkes (2016) hypothesized that having a mother who is "young, poorly educated", and from a low-income family negatively impacts a mother's ability to remain sensitive to the needs of her child. These risk factors are thought to interact with parental insensitivity to negatively affect mother-toddler attachment security (Gedaly & Leerkes, 2016). Cyr et al. (2010) assessed the differences

in attachment security between children exposed to maltreatment and/or socioeconomic risk and children in low-risk families. Children who were exposed to five or more risk factors (maternal age at childbirth, maternal education, household income, maternal ethnicity, marital status, and substance use) were as likely to display an insecure-disorganized attachment as children experiencing maltreatment.

Many symptoms of ASD have the potential to impact the development of secure attachment in infancy and toddlerhood, both on the individual and family system levels. Children with ASD experience challenges in social and emotional processing, play, theory of mind, flexibility, and sensory integration to varying degrees, affecting their ability to connect with caregivers and feel regulated in their environment. Caregivers are likely to find the cues of children with ASD difficult to interpret at times and this may influence their responsivity (van IJzendoorn et al., 2007). The strategies used to soothe an infant with ASD have the potential to be different than those for neurotypical children; specifically, the use of physical proximity may not meet the needs of a child due to sensory integration deficits and the use of verbal cues may not be easily interpreted due to deficits in processing (Doussard-Roosevelt et al., 2003; Fletcher et al., 2016). A lack of emotional feedback from a child with ASD and perceived lack of empathy has also been reported as a specific challenge parents encounter, likely negatively affecting the attachment bond (Pisula, 2011).

It should be noted that this relationship between ASD and lower attachment security may partly be due to misdiagnosis (McKenzie & Dallos, 2017). There is an overlap of symptoms between ASD and insecure attachment style or reactive attachment disorder (RAD), including deficits in emotional regulation, communication, executive

functioning and theory of mind, social interaction and play, flexibility, and sensory integration (Moran, 2010). A meta-analysis completed by McKenzie and Dallos (2017) outlines the challenge in diagnosis due to difficulties separating symptoms associated with this comorbidity. Over time, the two conditions may exacerbate each other, may overshadow one another, or may become indistinguishable from each other, making both diagnosis and conceptualization of a child's needs more complex (McKenzie & Dallos, 2017). Sadiq et al. (2012) assessed the differential diagnoses of children with RAD, children with ASD, and typically developing children on the Autism Diagnostic Interview, Revised (ADI-R) and the Children's Communications Checklist (CCC). Within the RAD group, 40% of children met criteria for ASD and 60% were rated as having autistic behaviors by three independent assessors. Researchers found that the impairments in both semantic and pragmatic communication impacted social relationships in children with RAD, and these deficits were so similar to ASD symptoms that children may have had co-morbid ASD or could have been confused as autistic rather than having poor attachment security (Sadiq et al., 2012). It is important to understand the relationship between the autism spectrum and lower attachment security to allow for complex diagnoses and appropriate treatment considerations (McKenzie & Dallos, 2017).

Research question four. Parents of children with ASD reported higher levels of stress (M = 2.48, SD = .71) when compared to parents of neurotypical children (M = 2.26, SD = .66), $t(1840) = -2.19$, $p = .029$. Maternal education ($\beta = .11$), household income ($\beta = .07$), Black ($\beta = -.13$) and Hispanic maternal race ($\beta = -.11$), ASD ($\beta = -.11$), and parenting stress ($\beta = -.10$) were significant predictors of mother-toddler attachment security and explained 7% of the variance. However, a multiple regression analysis found

that parenting stress did not moderate the relationship between ASD and mother-toddler attachment security, though the *p* value approached significance ($p = .056$, one-tailed) and this proposed moderation requires future attention. The results of the current study support previous findings that caregivers of children with ASD and children with poor attachment security experience a significant degree of parenting stress that is categorically different than that of other caregivers (Dunn, Burbine, Bowers, & Tantleff-Dunn, 2001; Hayes & Watson, 2013; Noh, Dumas, Wolf, & Fisman, 1989; Rutgers et al., 2007).

A number of studies suggest that ASD uniquely impacts the family system as behaviors lead to families feeling stressed through isolation and a lack social relatedness (Blacher, 1984; Estes, Munson, Dawson, Zhou, & Abbott, 2009; Olsson & Hwang, 2003; Rutgers et al., 2007). A lack of adaptability often keeps families in the home, providing a predictable setting; however, these challenges in flexibility make social outings difficult where changes in routine can be met with frustration that feels overwhelming for children with ASD (Noh et al., 1989; Joseph et al., 2015). Parents also report demandingness as a core concern (Estes et al., 2009; Lecavalier, Leone, & Wiltz, 2005; Noh et al., 1989); children who experience frequent and intense behaviors when dysregulated (crying, attention seeking, noncompliance) challenge families to respond with patience and consistency. In a public setting this task often becomes more difficult as parents perceive negative judgement from others that often impacts parental efficacy (Estes et al., 2009; Hayes & Watson, 2013; Rodrigue, Morgan, & Geffken, 1990). Additionally, the family's acceptance of the child's abilities and their concerns about acceptance from others impact community engagement (Griffith, Hastings, Nash, & Hill, 2010; Moes, Koegel,

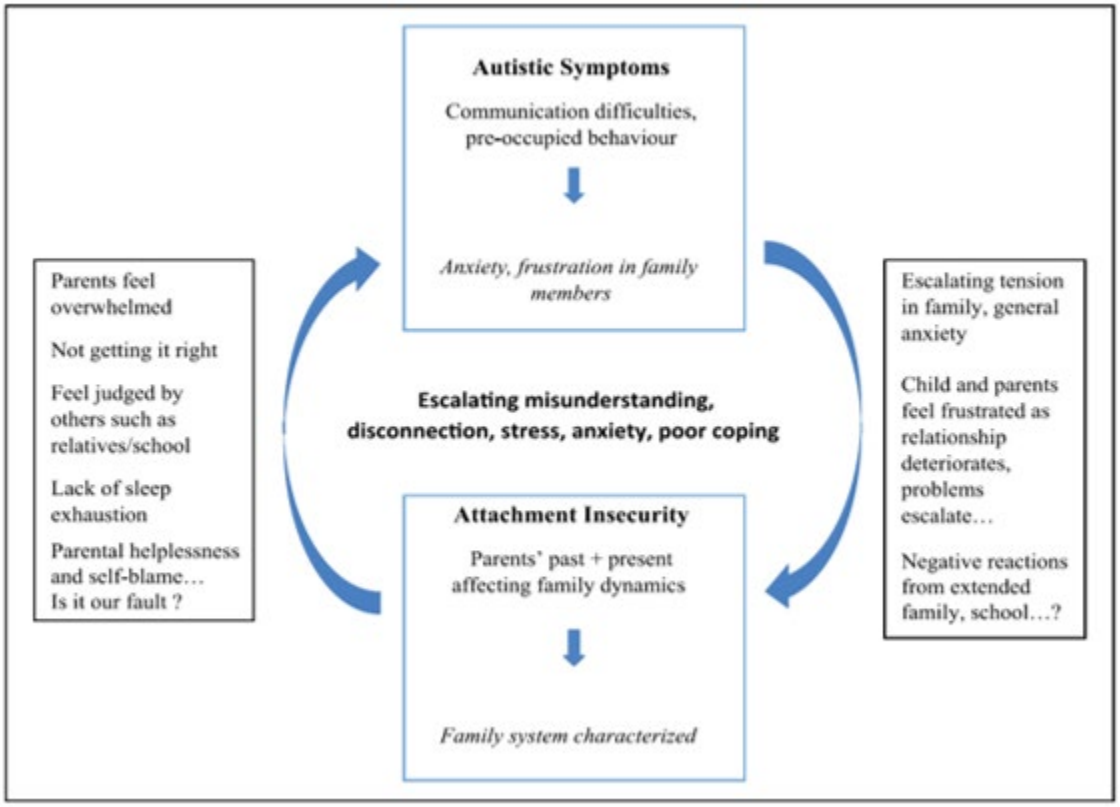
Schreibman, & Loos, 1992; Noh et al., 1989). These challenges can minimize the family's opportunities for engagement and social support, and parents often lack trust in other caregivers' abilities to manage behaviors (Brobst, Clopton, Hendrick, 2009; Estes et al., 2009; Koegel et al., 1992).

Rutgers et al. (2007) completed a comparison of neurotypical families and families with infants and toddlers with ASD and found that children with ASD displayed significantly lower attachment security, as assessed by the Brief Attachment Screening Questionnaire (BASQ). Parents of children with ASD in this study reported more daily stressors than parents of both neurotypical children and children with ID, using the Parenting Daily Hassles questionnaire (PDH). These parents also reported less social support than parents of neurotypical children and lower SES, both contributing factors to increased stress. The co-occurring conditions of ASD and poor attachment security contribute to caregiving stress and McKenzie and Dallos (2017) identify a feedback loop common in these families. Symptoms of both ASD and attachment insecurity contribute to an increase in caregiver anxiety and uncertainty about diagnosis and prognosis. This anxiety can negatively impact caregiver behavior via the attachment bond and response to ASD symptoms. Caregivers then experience feelings of failure and blame, influencing parental efficacy and sensitivity (see Figure 1). Over time, the impact of enduring stress can negatively affect the entire family system. Parents of children with ASD have reported higher rates of depression and anxiety when compared to parents of neurotypical children (Dumas, Wolf, Fisman, & Culligan, 1991; Eisenhower, Baker, & Blacher, 2005; Hamlyn-Wright, Draghi-Lorenz, & Ellis, 2007; Rezendes & Scarpa, 2011), children with Down syndrome (Abbeduto et al., 2004; Dumas et al., 1991; Eisenhower et al., 2005;

Hamlyn-Wright et al., 2007;), and children with cerebral palsy (Eisenhower et al., 2005). Parents of children with ASD also report less overall wellbeing (Blacher & McIntyre, 2006) and poorer perceived parenting competence (Mohammadi, Rakhshan, Molazem, & Gillespie, 2019; Rodrigue et al. 1990).

Figure 1

Interaction Between Symptoms of ASD and Insecure Attachment



Note. Adapted from Autism and Attachment Difficulties: Overlap of Symptoms, Implications and Innovative Solutions, by McKenzie & Dallos, 2017, retrieved from journals.sagepub.com/home/ccp.

Limitations

Limitations of the FFCW Data Set. Despite the large sample and high retention rate across waves, there are some limitations to the sampling of the FFCW data set. First, baseline data were selected to be representative of all nonmarital births in the 20 cities

sampled; the researchers did not seek the same representation of all marital births. Many potential participants were excluded from the study if they were not at least partially fluent in English or Spanish and many hospitals prohibited parents under the age of 18 from being interviewed (Brown, 2014). Second, it is likely that some maternal self-report behaviors were underreported. FFCW researchers noted possible underestimates on alcohol and drug use as well as domestic violence. In the current study, it is possible that participants did not report an accurate level of parenting stress as they feared that by doing so they would be perceived as poor parents. Additionally, participants were not required to address all survey questions; skip, refuse to answer, and "don't know" responses were coded as "missing data" as well as not-in-wave data. Third, attachment security was assessed using the TAS-39 to families who opted to be interviewed in-home at Wave 3. This self-selection may lead to a participant bias as the full FFCW sample did not elect to be assessed and families with attachment difficulties may have chosen not to participate in the CCPE substudy. When comparing mothers who participated in the CCPE sub-study with those mothers who opted out of the in-home observation, there were no significant differences in maternal age, maternal education, maternal household income, prevalence of ASD, or parenting stress. However, differences were found for maternal race; a chi square test was significant, $X^2(3, N = 3082) = 41.62, p < .001$. Of those mothers who opted out of the CCPE sub-study, approximately 43% identified as Black, 28% identified as Hispanic, 24% identified at White, and 4% were classified as "other". In comparison, mothers who participated in the CCPE sub-study identified as follows: approximately 55% Black, 21% Hispanic, 21% White, and 3% "other". As previously mentioned, the TAS-39 was adapted from the AQS, a measure that is intended

to be administered by individuals trained on the assessment. Mother's self-report may have resulted in measurement error of toddler attachment security due to less objectivity on the part of the caregiver and less familiarity with target behaviors when compared to the evaluations of trained observers. Finally, as with all longitudinal studies there was some attrition in the sample; this primarily affected the potential ASD sample from Wave 6 in the current study.

Limitations of the current study. One of the primary focuses of the current study was understanding differences in attachment security between toddlers with ASD and their neurotypical peers. The measure of ASD is a dichotomous variable in a list of health conditions, with parents being asked to indicate "Has a doctor or health professional ever told you that [CHILD] has any of the following health conditions?" This does not provide any detailed information about the ASD diagnosis including age at diagnosis and severity of symptoms. Additionally, a small number of parents reported ASD at Wave 5 (child age 9 years) but did not indicate ASD at Wave 6 (child age 15 years), and it is unclear why this is the case (n = 5)

At Wave 6 the number of cases of ASD were small, though the prevalence of ASD in this sample (approximately 2.3%) was higher than the current national average (1.7%; Baio et al., 2018). However approximately half of that ASD subsample was used for the attachment analyses because of optional participation in the CCPE. The neurotypical sample was much larger, and this lack of equal sample sizes may have challenged the ability to find significant differences. Additionally, the size of the FFCW sample may have impacted the results. Large sample sizes can result in magnification bias (Field, 2018) which may have affected the results by minimizing effect sizes. While

the results suggest attachment security is statistically significantly impacted by ASD; maternal education, household income, and race; and parenting stress, the effects are small.

While the parenting stress measure used in the current study has been utilized in a number of other studies utilizing FFCW data, the reliability falls below the standard of α = .80 (α = .61; Field, 2018). Additionally, The FFCW data set does not provide a measure of parental sensitivity comparable to those reviewed in the literature. Current research consistently supports the impact of parental sensitivity in the first years of a child's life on attachment security (De Wolff & van IJzendoorn, 1997; Huang et al., 2012; Mesman et al., 2012), but the findings in children with ASD are less established (Rutgers et al., 2004; Siller & Sigman, 2002; van IJzendoorn et al., 2007). This lack of information presents a limitation for the current study and is an important consideration for future research.

Finally, the residuals of the regression equations did not follow a normal distribution and the assumption of normality was not met for all questions. Given the large sample size, it is possible that departures from normality were detected that did not have a practical importance. Based on a review of the different plots outlined above, no clear signs of nonnormality were observed and it is likely that any departures did not compromise the results (Field, 2018).

Recommendations

Critical Evaluation of Attachment Theory. As previously discussed, limitations of attachment theory and the standard evaluation of attachment behavior may negatively impact families for whom the theory was not designed. Attachment theory and the

perception of ideal secure attachment behaviors do not fully account for cultural variations in caregiving and there are arguments that the theory is ethnocentric, heteronormative, anti-feminist, and ableist (Símonardóttir, 2016). A critical evaluation of the theory requires an examination of how well it understands the child-caregiver attachment relationships formed in diverse families without pathologizing variations. Dis/ability Critical Race Studies, or DisCrit, is a combination of Critical Race Theory (CRT) and Disability Studies (DS) and can be used to evaluate the efficacy of attachment theory when examining the results of the current study (Annamma, Connor, & Ferri, 2013; Erevelles & Minear, 2010). This intersectional framework analyzes the processes in which individuals are simultaneously raced and "dis/abled" as a result of entrenched racism and discrimination (Annamma et al., 2013); understanding how labels overlap to often disenfranchise individuals who do not fit into one category or who do not fit into a White, non-disabled framework is vital for providing recommendations based on the current study's sample.

Based on the existing research on attachment, low maternal household income, maternal minority racial identity, and child ASD were considered as predictors of poor mother-toddler attachment security in the current study. Viewing these variables as risk factors may suggest that there are inherent challenges for individuals from low income, minority families in forming secure attachment bonds. Rather, the systemic barriers to opportunities create indirect negative associations between these variables and attachment security. Recognizing these barriers and advocating on the part of disenfranchised populations is an important aspect of culturally responsive counseling and providing informed services for the families discussed in the current study.

Interventionists can utilize intergeneration, socioecological, family systems, and intersectionality frameworks to improve their understanding of the family bonds within the sociocultural groups discussed in the current study, recognizing that differences in caregiving are not the same as deficits.

Neurodiversity and Ability. The discussion surrounding autism and ability is changing. A greater clinical understanding of the disorder and the change in diagnostic criteria has led to better diagnostic specificity and high-functioning ASD is diagnosed more frequently (Croen, Grether, Hoogstrate, & Selvin, 2002). A push for inclusive education over pull-out is taking place in American public schools (Williams, Johnson, & Sukhodolsky, 2005) in part because of the need for improved socialization between students on the autism spectrum and their peers (Horrocks, White, & Roberts, 2008; Laushey & Heflin, 2000) and as a natural extension of the federal Individuals with Disabilities Education Improvement Act (IDEA; U.S. Department of Education, 2004). The recognition of different strengths across the spectrum has helped to spur the neurodiversity movement and supports the need for individuals in a child's life to understand that ASD does not preclude ability. This is an important aspect of the current study which seeks to use a strengths-based perspective over a deficit mindset to interpret results. Parents, siblings, friends, educators, clinicians, and romantic partners of individuals with ASD should not presuppose that healthy attachments are impossible. The existing research on attachment and autism is complex and the current study suggests that while ASD negatively impacts attachment security, a number of children in the ASD sample exhibited high attachment security. Caregivers have an important impact on attachment security and those parents exhibiting sensitivity regardless of the severity of

ASD symptoms have been more successful in fostering secure attachment bonds (Capps et al., 1994; Koren-Karie, Oppenheim, Dolev, & Yirmiya, 2009; Slade, 2009).

Future research recommendations. Based on the current study, a number of recommendations for future research can be made to better understand attachment security in individuals with ASD and their families, both in infancy and across the lifespan. These recommendations are associated with cooccurring disorders, the genetic and environmental impact of family members on attachment and ASD, and the longitudinal stability of attachment and autism. While the negative impact of intellectual disability (ID) on attachment security has been researched, few studies have been able to define the differential impact of ID and ASD on attachment. According to both Rutgers et al. (2004) and Grzadzinski et al. (2014), the severity of ID is a better predictor of attachment security than ASD. However, in children with ASD, it can often be difficult to classify cognitive abilities and IQ due to related impairments and a lack of appropriate assessments. While there are a number of cognitive assessments utilized in the FFCW, there were no cognitive measures available that establish IQ or comprehensive cognitive ability in participants with ASD. Future research should assess IQ utilizing assessments valid for individuals with ASD and their functionality. This may involve the use of more traditional intelligence assessments like the Wechsler Intelligence Scale for Children, Fifth Edition (WISC-V); an assessment of nonverbal IQ like the Universal Nonverbal Intelligence Test, Second Edition (UNIT-2); and a caregiver assessment of adaptive skills like the Vineland Adaptive Behavior Scales, Third Edition (VABS-3). Additionally, researchers should examine the relationships between ID, ASD, and attachment security

across time, as individuals change in their abilities and strengths from therapeutic and academic interventions (McKenzie & Dallos, 2017; Perry & Flood, 2016).

It is important to understand attachment security and autism in caregivers due to the generational nature of both. In neurotypical populations, research has established the impact of the caregiver's internal working model of attachment on a child's attachment security; children of caregivers with a secure attachment are more likely to develop secure attachments themselves and children of caregivers with insecure attachment styles are less likely to do so (Fonagy, Steele, Moran, Steele, & Higgitt, 1993; Moullin et al., 2014; van IJzendoorn, 1995). Although the impact of caregiver attachment security on children with ASD is less defined in the literature, several studies have been able to demonstrate the same effects – children with ASD and securely attached caregivers have increased relational, communicative, social problem solving, and play skills (Seskin et al., 2010; Siller & Sigman, 2002). Additionally, caregivers of children with ASD who have insight into their child's behaviors and cognitions, have accepted the child's diagnosis, and have social support are more likely to form secure attachment relationships with them (Kim & Kim, 2009; Koren-Karie et al., 2009; Oppenheim, Koren-Karie, Dolev, & Yirmiya, 2009; 2012). Caregivers with ASD are more likely to have deficits in social-emotional functioning and theory of mind themselves, impacting the skills needed to form attachment bonds with their children and understand their needs (Sasson, Lam, Parlier, Daniels, & Piven, 2013). There is limited research on attachment patterns in adults with ASD; using the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) Taylor, Target, and Charman (2008) found that a small sample of adults with ASD were less likely to be secure and more likely to have an insecure-

avoidant attachment style than the general population. However, researchers concluded that there was insufficient evidence to suggest that these differences were due to ASD or IQ. The AAI has been found to be reliable for adults with ASD without accompanying ID, although some of the assessment's subscales may reflect an individual's ASD rather than their attachment security (Taylor et al., 2008). In the current study, the FFCW does not provide measures of parent attachment security, like the AAI, or an assessment of parent diagnosis of ASD. This information is needed to better understand the predictors of attachment security in children with ASD in a familial context.

As mothers are still assumed to be the primary caregiver for most children, fathers are not well represented in attachment research despite the fact that different caregivers are important in the formation of a child's internal working model (Fletcher & Gallichan, 2016; Rutgers et al., 2004). A focus on fathers is needed to explore the potential roles that differing parenting styles and gender may play in parent-child attachment. Caregivers adopt different parentings styles and will form independent relationships with their children. An understanding of parenting styles across caregivers should be added to the existing literature on mother-child attachment. There is a dearth of research on the impact of caregiver gender on attachment security. In the majority of typically developing children, young boys gravitate toward their fathers more often for social interaction and young girls to their mothers during toddlerhood and early childhood (Belsky, 2019). During this developmental period, attachment bonds are being formed and autism is often diagnosed. The gender disparity in ASD is another important factor to consider; males are four times more likely to be diagnosed with ASD than females and the relationship between fathers and sons should be investigated (Grzadzinski et al., 2014). Very few

studies have been conducted on attachment between children and their fathers, and even fewer between children with ASD and their fathers. The limited number of studies completed on both mothers and fathers and neurotypical children demonstrate mixed results; while some have found a high concordance in attachment quality between the parents (Fox, Kimmerly, & Schafer, 1991; Monteiro, Veríssimo, Vaughn, Santos, & Bost, 2008) other studies report differences in attachment between children, mothers, and fathers (Grzadzinski et al., 2014; Lickenbrock & Braungart-Rieker, 2015; Planalp & Braungart-Rieker, 2013).

Most of the research on early social development and ASD is retroactive wherein parents are asked about their child's behaviors following the sensitive period of attachment between birth and two years of age, which is also the time when the first signs of autism typically occur (Barbaro & Dissanayake, 2009; Perry & Flood, 2016). Instead, children at genetic risk and those displaying early markers for ASD should receive continuous assessment and interventions that go beyond therapies grounded in applied behavior analysis (ABA) to address the social, emotional, and relationship building skills critical to developing a secure attachment. An understanding of the stability of attachment security in individuals with ASD across time is underdeveloped (Fletcher et al., 2016; Waters, Weinfield, & Hamilton, 2000). In order to effectively utilize attachment theory in individuals with ASD, the longitudinal stability of attachment strategies and how social-emotional functioning changes over time must be investigated.

Counseling recommendations. This study's results suggest that assessment and intervention should target low-income households, families of color, and families with low educational attainment. Providing quality services as early as possible in the life of a

child is critical; early diagnosis and intervention increase the likelihood of long-term positive effects in children with ASD (National Institute of Health [NIH], 2017). Early assessment and intervention require access to professionals and assessing the barriers to this access discussed previously. Provision of high-quality services need to be integrated into nontraditional settings outside of clinics and hospitals, like the family's naturalistic settings. National efforts to provide universal childcare, universal pre-kindergarten, and quality daycare align with this recommendation (Cain Miller, 2019; Gambaro, Stewart, & Waldfogel, 2014). Additionally, the dire need for increased federal funding for early diagnosis and intervention can be combined with the funding for these services.

Attachment is only one factor than can contribute to the wellbeing of individuals with autism. Interventions for families with ASD can promote stronger attachment bonds while also addressing deficits in joint attention and social communication, social reciprocity, and engagement. An inability to process social information and deficits in joint attention are two factors in ASD thought to negatively impact attachment security (Gervais et al., 2004; Naber et al., 2007). These challenges can be addressed in the context of the family system to allow for caretakers and siblings to act as interventionists and foster positive relationships. Laushey and Heflin (2000) suggest that poor social functioning is the most profound deficit for children on the autism spectrum due to how pervasive and isolating the symptoms can be. The following recommendations address communication and social challenges and can take place in a family system and, often, in the family's naturalistic settings.

Naturalistic Developmental Behavioral Interventions (NDBIs) are empirically supported interventions that address ASD by integrating ABA principles and

developmental approaches of child learning and development (Schreibman et al., 2015). NDBI interventions utilize the child's natural settings, like their home, school, and after-school programs, to increase the likelihood of long-term behavioral changes through generalization of skills across settings. Within developmentally-appropriate environments, children are active participants in their learning and are rewarded via naturalistic contingencies. Like ABA, a child's chronological and developmental age are considered in the development of a behavioral plan. NDBIs are less structured than other behavioral interventions, like ABA and discrete trial training (DTT), which are often used with older children. This flexibility increases the likelihood for spontaneous child responses and decreases a child's reliance on prompting (Schreibman, 2005). Providing services in naturalistic settings also increases the likelihood that parents are successful in learning and implementing interventions modeled by providers, playing integral roles in promoting their child's social development (Morrier, McGee, & Daly, 2009). NDBIs can be successfully utilized with toddlers, the primary focus of the current study, and integrate parents and other family members to facilitate the social learning, engagement, and communication skills necessary for forming attachment relationships during this critical developmental period (Prizant et al., 2003). There are a number of different NDBIs that may be appropriate for the sample considered in the current study's sample, considering important child and family factors of education, income, race, ASD, and attachment security. Well-researched interventions to consider include pivotal response training (PRT; Koegel & Koegel, 2019; Schreibman & Koegel, 2005), reciprocal imitation training (RIT; Ingersoll, 2008), Social Communication/Emotional

Regulation/Transactional Support (SCERTS; Prizant et al., 2003, 2010), and Project ImPACT (Ingersoll & Wainer, 2013a, 2013b).

DIR/Floortime (Greenspan & Wieder, 1998), or the Developmental, Individual Difference, Relationship-based model, is a play-based assessment and intervention program for children with ASD and other developmental disorders or delays with the goal of developing relational capacities between the child and his caregivers. The developmental approach asks interventionists (therapists, parents, and educators) to follow the child's lead in order to build his capacities for shared attention, self-regulation, reciprocal communication and interaction, creativity, and problem solving in an individualized program respecting each child's differences (Greenspan & Wieder, 1998). DIR/Floortime is typically a part of an interdisciplinary approach with Floortime sessions taking place in the child's natural environment, like NDBIs (Greenspan & Wieder, 2006). Following the child's lead in Floortime sessions involves understanding his specific differences in emotional, social, and cognitive functioning as well as the motor, sensory, and language capacities during interactions as a play partner (Hess, 2016). Studies examining the outcomes of the DIR/Floortime framework have suggested positive changes for both children and caregivers. Two longitudinal studies by Greenspan and Wieder (1997; Wieder & Greenspan, 2005) found that subgroups of children who received DIR/Floortime intervention in toddlerhood or early childhood made long-term gains in emotional, social, and intellectual functioning when measured at 2-8-year follow-up and 10-15-year follow-up. Parents reported that their children performed above average in regulation and shared attention, engagement, two-way intentional affective signaling and communication, social problem solving, and higher order thinking.

Programs for caregivers and children based on Greenspan and Wieder's model demonstrate improvements in emotional and social functioning using the Functional Emotional Assessment Scale (FEAS) and Children's Autism Rating Scale ([CARS] Pajareya & Nopmaneejumruslers, 2011; Solomon, Necheles, Ferch, & Bruckman, 2007). However, developmental play therapy programs like DIR/Floortime and Intensive Interaction are difficult to assess for effectiveness due to the individualized nature of the intervention and the goal of targeting the underlying capacities of each child (Hess, 2016; Hewett, Firth, Barber, & Harrison, 2012; Nind & Hewett, 1994). It is important to note that DIR/Floortime is not considered to be an evidenced-based practice; as of this publication, randomized control trials on Developmental Social Pragmatic (DSP) interventions like DIR/Floortime are few and there is a lack of replication of benefits (Casenhiser, Shanker, & Stieben, 2013; Gershfeld & Smith, 2012).

Social Stories (Gray & Garand, 1993; Gray, 2004) describe scenarios, skills, and concepts using developmentally appropriate language and visual aids to provide the reader with the socially relevant cues, responses, and expectations for a given topic in an individualized short story format (Karkhaneh et al., 2010). Social Stories can provide guidance for adaptive skills and abstract concepts in home, school, and clinical settings. To address attachment in children with ASD, prosocial skills can be the focus of stories and address deficits in self-regulation, social awareness, and socially appropriate behaviors followed by role playing and practice (Thompson & Johnston, 2013). Social Stories are rarely utilized independent of other interventions in individuals with ASD; they are more often combined with behavioral techniques and, therefore, more difficult to assess for efficacy (Ali & Frederickson, 2006; Reynhout & Carter, 2006; Sansoti, Powell-

Smith, & Kincaid, 2004). A systematic review of randomized controlled trials on the use of Social Stories with individuals with ASD conducted by Karkhaneh et al. (2010) found that the intervention has positive, short-term effects for children with high-functioning autism between the ages of 8 and 11 years. This included an improvement in skills such as social interaction, communication, playing games, and understanding nonverbal emotional cues. Like DIR/Floortime, Social Stories are not considered to be an evidence-based practice in early childhood autism intervention due to a lack of replicated studies on their efficacy. As of this publication, the National Standards Project has classified Social Stories and related story-based interventions as an established procedure for increasing social skills and decreasing problem behaviors (Stoeckley, 2020). More needs to be known about long-term behavioral changes as a result of this intervention, as well as the appropriate intensity and duration of the use of Social Stories to maintain positive outcomes (Leaf et al., 2012; Leaf et al., 2020).

Video modeling is growing in popularity across domains, including family and play-based therapies that focus on enhancing communication and relationship quality between children. Video interaction guidance (VIG) is an evidence-based practice based on attachment theory, social learning theory, theories of mediated learning, and intersubjectivity (Gibson, 2014). VIG involves filming interactions between parents and children which are then analyzed according to the contact principles (CP), the verbal and non-verbal responses between individuals during an interaction. For an individual with ASD, these responses may include turn-taking, eye contact, and receptive language (Kennedy, Landor, & Todd, 2010). Using person-entered approaches, caregiver awareness related to their roles in parent-child interaction can increase and an in-depth

exploration of their family dynamics can take place (Gibson, 2014). Doria, Kennedy, Strathie, and Strathie (2014) found that VIG improved parental self-esteem and self-efficacy, as well as family happiness. Small-scale studies have shown that children and adolescents with ASD have benefited from video-based group instruction (VGI) through showing video models demonstrating targeted social behaviors and then asking participants to perform the behaviors within a group setting (Plavnick & Dueñas, 2018). In doing so, participants demonstrate their ability to memorize, imitate, and generalize targeted social behaviors (McCoy & Hermansen, 2007). Adolescents improved in their ability to ask and answer open-ended questions, initiate interactions, maintain a conversation, and demonstrate mutual interest in an object or subject (Dotson, Leaf, Sheldon, & Sherman, 2010; Plavnick, Kaid, & MacFarland, 2015; Plavnick, Sam, Hume, & Odom, 2013); however many of the scenarios where these skills were demonstrated were contrived by the interventionists and need to be generalized to natural settings.

Conclusion

Attachment bonds are critical to human development across the lifespan. Beginning in infancy, early attachment relationships with primary caregivers create a template for future interactions with others and social-emotional wellbeing. While the existence of this internal working model is widely accepted across Western cultures with neurotypical mother-child dyads, research investigating attachment bonds in atypical populations, including individuals with ASD, is underdeveloped. The current study continues the critical discussion of families with ASD and the need for early intervention strategies to address social-emotional functioning.

Threats to attachment security include those that inhibit the caregiver from being consistently supportive and responsive to their child's needs. The current study investigates sociodemographic risk factors that may negatively impact the caregiver's abilities to provide this level of attention. Mothers who have less than a high school diploma or equivalent, have a low household income, identify as either Black or Hispanic, and reported high levels of parenting stress were more likely to have toddlers with have low mother-child attachment security. Additionally, mothers of toddlers with ASD reported lower mother-child attachment security than mothers of neurotypical toddlers. Autism has the potential to impact a child's emotional reciprocity with their caregivers which, in turn, can negatively affect the caregiver's ability to respond to their child. In the current sample, children of mothers with greater than a high school diploma or equivalent were more likely to have a diagnosis of ASD when compared to children of mothers with less education; children of mothers who identify as White were more likely to have an ASD diagnosis compared to children of mothers who identify as either Black. A phenotypical difference is not thought to exist, but the diagnosis of ASD may be less frequent in minority communities due to a lack of access to care and potential misdiagnosis from professionals due to the bias of cultural deprivation.

Families and mental health professionals have the potential to impact critical relationships in early childhood for both neurotypical children and those on the autism spectrum. Early intervention for families with ASD can address challenges in communication and socialization within the family system while also addressing deficits in social information processing and joint attention thought to negatively impact attachment security in individuals with ASD. These strategies can produce meaningful,

longitudinal changes in children and adolescents to improve critical social relationships and quality of life.

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