

HEY, HOW'S THE FAMILY? AN EXAMINATION OF RISK AND PROTECTIVE
FACTORS OF LIFE SATISFACTION OF CAREGIVERS AND
TYPICALLY DEVELOPING SIBLINGS OF CHILDREN
WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

Objective: The purpose of the present study was to examine risk and protective factors associated with the life satisfaction of caregivers and typically developing (TD) siblings of children with autism spectrum disorder (ASD). Method: Participants for this study included 106 families of children with ASD ages 3 to 17 years old, with at least a primary caregiver and a TD sibling ages 11 to 17 years serving as respondents. Of these 106 families, 68 families had a secondary caregiver who also participated in the study. Caregivers reported on the ASD symptom severity and behavioral and emotional problems of their child with ASD and their TD child. Additionally, caregivers self-reported on their distress, perceived social support, and life satisfaction. TD siblings self-reported on their perceived social support and life satisfaction, as well as their own behavioral and emotional problems. Results: PROCESS, a computational tool for SPSS that allows for the examination of indirect effects via bootstrapping techniques (Hayes, 2013, 2018), was used to examine six parallel mediation models. Results revealed no direct effect for characteristics of the child with ASD (i.e., ASD symptom severity, behavioral and emotional problems) on life satisfaction for any family member. Additionally, no indirect effect through social support was found for any family member and no indirect effect of caregiver distress was found for secondary caregivers or TD siblings. However, results indicated an indirect effect of characteristics of the child with ASD on life satisfaction through caregiver distress for primary caregivers. Conclusions: Results of this study provide insight into the functioning of family members of children with ASD and provide important clinical implications for working with the families, as well as suggestions for future research.

LIST OF ABBREVIATIONS AND SYMBOLS

α	Cronbach's alpha, a measure of internal consistency
B	Unstandardized regression coefficients
β	Standardized regression coefficients
CI	Confidence interval: proportion of intervals that contain the true value of the parameter
F	Fisher's F ratio: A ratio of two variances
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
n	Sample size
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation
SD	Standard deviation: amount of variation or dispersion of a set of data values
SE	Standard error of the regression coefficients
T	Computed values of t test
<	Less than
=	Equal to

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CHAPTER 1

INTRODUCTION

Autism spectrum disorder (ASD) is a lifelong neurodevelopmental disorder characterized by pervasive deficits in social communication and interaction, as well as restricted, repetitive behaviors, interests, and activities (American Psychiatric Association [APA], 2013). Symptoms of ASD are typically present in early childhood and cause substantial impairment in the individual's daily functioning in a variety of domains (APA, 2013). According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*), these deficits in social communication and social interaction must include deficiencies in social-emotional reciprocity, nonverbal communication in social interactions, and forming, maintaining, and understanding relationships, and must occur across multiple contexts (APA, 2013). The restricted, repetitive behaviors, interests, and activities associated with ASD can manifest themselves in stereotyped motor abilities, ritualized patterns of behavior, restricted interests, and/or hyper- or hyporeactivity to sensory input (APA, 2013). In addition to the core symptoms of ASD, many individuals experience a number of challenging associated features, including intellectual and/or language impairments, disruptive/challenging behaviors, self-injurious behaviors, and/or co-occurring conditions, such as anxiety, depression, and attention-deficit/hyperactivity disorder (ADHD; APA, 2013). Furthermore, ASD is described as a phenotypically and etiologically heterogeneous disorder (Georgiades et al., 2013; Geschwind, 2009; Wiggins, Robins, Adamson, Bakeman, & Henrich, 2012), which may be best captured by the colloquial saying used in the

clinical and research fields of ASD, coined by Dr. Stephen Shore, that “if you’ve met one person with autism, you’ve met one person with autism” (Autism Speaks, 2017).

Although ASD causes impairments for the diagnosed individual him- or herself, given the functional deficits associated with the core symptoms of ASD and the difficulties related to the challenging behaviors and co-occurring conditions, having a child with ASD can also impose unique challenges on the other family members. Dr. Shore’s quote emphasizes the complexity of the disorder and provides some insight into the uniqueness of individuals with ASD and the unique experience of having a family member with ASD. To date, a large body of research on ASD has focused on or been conducted with the children with ASD themselves. However, in light of the challenges associated with caring for an individual with ASD, additional research should focus on the family members of children with ASD, such as caregivers (e.g., parents) and typically developing (TD) siblings. More specifically, examining risk and protective factors, negative and positive outcomes for these family members may provide insight into the overall functioning for these families.

Research on parents of children with ASD has largely found negative outcomes associated with parenting a child with ASD, including heightened parental stress (e.g., Dabrowska & Pisula, 2010), and depression and anxiety (e.g., Sharpley, Bitsika, & Efremidis, 1997). These negative outcomes tend to be more frequent compared to parents of children with other developmental disabilities and parents of TD children (e.g., Dabrowska & Pisula, 2010; Lee, 2009). Whereas it is fairly well established that parenting a child with ASD can be associated with some negative outcomes (e.g., Dabrowska & Pisula, 2010; Sharpley et al., 1997), literature on the outcomes of TD siblings is somewhat mixed (e.g., Green, 2013; Meadan, Stoner, & Angell, 2010). Some research has found increased emotional and behavioral problems in TD

siblings (e.g., Griffith, Hastings, & Petalas, 2014), while other research has shown no evidence for elevated emotional and behavioral difficulties (e.g., Gold, 1993), and still other studies have reported positive outcomes, such as positive self-concept of TD siblings of children with ASD (e.g., Macks & Reeve, 2007).

Recently, research has begun to focus on more positive outcomes for parents of children with ASD, such as quality of life and life satisfaction (e.g., Ekas & Whitman, 2010). However, despite research on the fact that life satisfaction and subjective well-being have been shown to be positively related to better health outcomes (Diener et al., 2017), this line of research is still underdeveloped and our understanding of the mixed findings of past literature remains limited. Therefore, in addition to examining risk factors, future research should shift its attention to identifying the protective factors that promote positive outcomes for all involved. As such, the purpose of the present study was to examine risk and protective factors associated with the life satisfaction of caregivers and TD siblings of children with ASD, and this study ultimately aimed to provide clinicians with potential points of intervention when working with not only the child with ASD but also the child's caregivers and TD siblings.

The Significance of Studying Families with Children with ASD

According to the Center for Disease Control and Prevention's (CDC) 2014 monitoring study, the most recent estimated prevalence rate of ASD is 1 in 59 children (Baio et al., 2018). Based on the prevalence rate of 1 in 68 children with ASD found by the 2012 monitoring study, the prevalence had increased approximately 123% from 2002 when the estimated prevalence rate for ASD was 1 in 150 children (CDC, 2016a). Prior to the CDC's April 2018 announcement of the updated 1 in 59 children prevalence rate (CDC, 2018a), the reported prevalence rates remained at 1 in 68 children from 2010 to 2012, representing the first reporting period in ten

years without an increase in prevalence (CDC, 2016a, 2016b). Additionally, the most recent APA (2013) estimates of prevalence are that approximately 1% of children and adults worldwide have ASD. Although ASD occurs in all racial, ethnic, and socioeconomic groups (CDC, 2018b), racial and ethnic disparities in prevalence rates have been reported, with estimated prevalence rates of White children being 7% greater than Black children and 22% greater than Hispanic children (Baio et al., 2018). With respect to the financial burden, the lifetime cost of supporting an individual with ASD is estimated between \$1.4 million and \$2.4 million depending on the presence of a co-occurring intellectual disability (Buescher, Cidav, Knapp, & Mandell, 2014). In a study examining medical expenditures for children with ASD, Shimabukuro and colleagues (2008) reported that medical expenditures for children with ASD were an average of \$4,110-\$6,200 greater per year than children without ASD, which is a rate of 4.1 to 6.2 times greater for children with ASD. Additionally, the estimated national cost of children with ASD in the United States is \$11.5 billion to \$60.9 billion per year, including costs associated with the medical and educational care of the child and the loss of parental productivity (Buescher et al., 2014; CDC, 2016b). Given the high and steadily increasing prevalence rates of ASD along with the cost of care for these individuals, ASD is a topic of public and research interest. More specifically, in light of this significant public health impact along with the extensiveness and severity with which the characteristics of ASD can manifest and the potential economic burden that it imposes on families, it seems critical that more research focuses on the family members of children with ASD. As such, examining outcomes, both negative and positive, for caregivers and TD siblings, as well as factors associated with these outcomes, may provide a more comprehensive picture of functioning for these families.

Negative Outcomes for Parents of Children with ASD

Parental stress. Several studies have examined parental stress as a function of raising a child with ASD. For example, with respect to child- and parent-related stress, both mothers and fathers of toddlers with ASD reported significantly greater levels of stress than mothers and fathers of TD toddlers (Baker-Ericzen, Brookman-Fraze, & Stahmer, 2005). In a similar study, Dabrowska and Pisula (2010) examined stress in mothers and fathers of preschool children with ASD, Down syndrome (DS), and TD children, and found that overall parents of children with ASD had higher reported stress than parents of the other two groups. Relatedly, Estes et al. (2013) compared parenting stress and psychological distress in mothers of toddlers with ASD, toddlers with developmental delay (DD), and TD toddlers, and reported that mothers of toddlers with ASD reported greater parenting stress than mothers in the other two groups. Employing a slightly different approach, Brei, Schwarz, and Klein-Tasman (2015) examined factors related to parental stress in mothers of children, ages 2 to 5 years old, who were referred for an ASD evaluation. Results indicated that the mean stress score for the sample was in the 90th percentile and that 60% of parents expressed a clinical-level of total stress (Brei et al., 2015). Interestingly, no significant differences in stress were found between mothers of children diagnosed with ASD and mothers of children not diagnosed with ASD (Brei et al., 2015). Yet, in contrast to the preceding findings, Herring et al. (2006) conducted a study comparing parents of toddlers with a pervasive developmental disorder (PDD) and parents of toddlers with DDs but not a PDD and found no differences between the two parent groups with regard to parenting stress at the time of the children's diagnosis. However, fathers of children with a PDD reported significantly greater stress than fathers of children without a PDD one-year post diagnosis (Herring et al., 2006).

Overall, the majority of these studies found that parents of toddlers with ASD report greater stress than parents of toddlers with other DDs and parents of TD toddlers.

Similar results of heightened parental stress have been found in studies of school-age children with ASD as well. For example, in a study of parents of children 5 to 12 years old with Asperger's Syndrome, Epstein, Saltzman-Benaiah, O'Hare, Goll, and Tuck (2008) found that approximately 75% of mothers and fathers reported clinical levels of parenting stress. Similarly, Hall and Graff (2011) found that 62.7% of mothers and fathers of children with ASD, 21 years of age or younger, reported clinically significant levels of stress and that the mean total stress score for this sample was above the 95th percentile. In addition, May, Fletcher, Dempsey, and Newman (2015) reported a high level of parenting stress in mothers and fathers of young children with ASD under the age of 13. Furthermore, Hoffman, Sweeney, Hodge, Lopez-Wagner, and Looney (2009) compared parental stress in mothers of children with ASD, ages 3 to 16 years old, to parental stress in mothers of TD children, and found that mothers of children with ASD reported higher levels of both child- and parent-related stress. Relatedly, in a study of mothers of children with ASD, 2 to 18 years old, Ekas and Whitman (2010) showed that these mothers reported higher levels of parenting stress than low-risk samples.

In summary, numerous studies have documented higher stress levels among parents of children with ASD compared to parents of children with other disabilities and parents of TD children, which emphasizes the importance of considering parental stress when examining functioning of parents of children with ASD. However, due to the focus on stress, current research has largely ignored potentially positive, co-occurring outcomes for these parents. Prolonged stress is known to negatively impact physical and mental health (Mayo Clinic, 2016; National Institute of Mental Health, 2016), and as reviewed by Brei et al. (2015), parenting stress

is associated with numerous negative outcomes including parent psychopathology, marital and family functioning difficulties, and decreased physical health. Additionally, several studies have only examined parental stress of mothers of children with ASD (e.g., Brei et al., 2015; Ekas & Whitman, 2010; Estes et al., 2013; Hoffman et al., 2009), which leaves unanswered questions about fathers' experiences raising children with ASD. These gaps in the literature highlight the importance of exploring stress levels of both mothers and fathers of children with ASD.

Therefore, future research should consider expanding the examination of parental stress beyond an outcome measure and explore its potential as a risk factor for other outcomes experienced by parents of children with ASD. Research examining parental stress as one potentially influential factor of outcomes for parents of children with ASD may allow researchers the opportunity to identify parental stress as a possible point of intervention for clinicians working with families of children with ASD.

Psychopathology. In addition to stress, a variety of studies have found higher rates of psychopathology in parents of children with ASD compared to parents of children with other disabilities (Hartley, Seltzer, Head, & Abbeduto, 2012; Weiss, 2002) and parents of TD children (Gau et al., 2012; Lee, 2009; Weiss, 2002). Additionally, several studies have shown that a large percentage of parents of children with ASD experience clinically significant symptoms of depression (Bitskia & Sharpley, 2004; Hartley et al., 2012; Sharpley et al., 1997). However, other researchers have found that parents of children with ASD do not report greater psychopathology than parents of children with other disabilities or parents of TD children (Estes et al., 2013).

In several studies examining depression and anxiety in parents of children with ASD, researchers found that approximately 11% to 35% of parents reported depression in the moderate

to severe range and that approximately 22% to 69% of parents reported anxiety in the moderate to severe range (Bitsika & Sharpley, 2004; Firth & Dryer, 2013; Sharpley et al., 1997). In a similar study, parents of children with high functioning autism spectrum disorders (HFASD) reported greater levels of depression than parents of TD children, with more mothers and fathers of children with HFASD reporting clinically significant depression levels, compared to mothers and fathers of TD children (Lee, 2009). Additionally, parents of children with HFASD reported greater anxiety than parents of TD children (Lee, 2009). Furthermore, compared to mothers of TD children, mothers of children with ASD, 3 to 15 years old, endorsed significantly higher symptoms of somatization, obsession, interpersonal sensitivity, depression, anxiety, hostility, paranoid symptoms, and psychoticism (Gau et al., 2012). Similarly, fathers of children with ASD endorsed significantly higher symptoms of obsession, interpersonal sensitivity, hostility, and paranoid symptoms than fathers of TD children (Gau et al., 2012).

In a study examining only mothers, mothers of young children with ASD reported higher symptoms for both depression and anxiety than mothers of young children with intellectual disability (ID), and mothers of TD children (Weiss, 2002). In a study of fathers of adolescents and young adults with DDs, Hartley et al. (2012) found that fathers of individuals with ASD reported higher levels of clinically significant depression symptoms than fathers of individuals with DS and Fragile X syndrome (FXS). In contrast, Estes et al. (2013) found that mothers of toddlers with ASD reported similar levels of psychological distress (e.g., depression, anxiety) compared to mothers of toddlers with DD and mothers of TD toddlers.

In summary, a variety of studies have found higher rates of depression and anxiety symptoms in parents of children with ASD compared to parents of children with other disabilities and parents of TD children. Additionally, many studies have shown that a large

percentage of parents of children with ASD experience clinically significant symptoms of depression and/or anxiety. Overall, this line of research highlights the importance of examining symptoms of depression and anxiety in parents of children with ASD. Similar to the previously described research on parental stress, current research has largely focused on psychopathology as an outcome for parents of children with ASD, thereby ignoring more positive outcomes for these parents. Additionally, future research should consider expanding the examination of psychopathology beyond an outcome variable and explore its potential as a risk factor (i.e., predictor) for other outcomes, such as life satisfaction, experienced by parents of children with ASD. Including psychopathology as one influential factor in a model of multiple predictors that may be related to outcomes for parents of children with ASD could allow researchers to determine the influence of psychopathology in relation to other factors. In addition, including psychopathology of the caregivers of children with ASD may help to identify possible points of intervention for clinicians working with families of children with ASD. Furthermore, although large percentages of parents of children with ASD have been shown to experience clinically significant levels of stress, depression, and/or anxiety, in many cases the majority of these parents are not experiencing clinically significant levels of stress or psychopathology. As such, examining “why” some parents of children with ASD are functioning better than others, and investigating factors that may be associated with better outcomes for these families could provide clinicians with potential points of intervention.

Gender differences in negative outcomes of parents of children with ASD. A large body of research has found gender differences between mothers and fathers of children with ASD regarding parental stress and psychopathology. Dabrowska and Pisula (2010) noted that mothers of children with ASD reported experiencing higher levels of stress related to

dependency and management and limits on family opportunities than fathers of children with ASD, while no gender differences were observed between parents of children with DS or parents of TD children. Relatedly, Herring et al. (2006) found that mothers of children with a PDD and mothers of children with a DD, but not a PDD, both reported more stress than fathers of their respective groups. Using a multilevel modeling approach Jones, Totsika, Hastings, and Petalas (2013) reported that mothers of children with ASD reported experiencing higher levels of stress than fathers. Similarly, using a multilevel modeling approach, Garcia-Lopez, Sarria, and Pozo (2016) found that Spanish mothers of children with ASD reported higher rates of stress than fathers, even after accounting for interdependence.

Regarding psychopathology, several studies have noted that mothers of children with ASD reported greater levels of depression and anxiety than fathers of children with ASD (Jones et al., 2013; Lee, 2009; Sharpley et al., 1997). Garcia-Lopez et al. (2016) also noted that Spanish mothers of children with ASD reported greater anxiety than fathers, even after accounting for interdependence and family income; however, no gender differences were found in levels of depression. In light of the gender differences often found in the stress levels and psychopathology of parents of children with ASD, especially since mothers often reported more negative outcomes than fathers, it is critical that future research includes both mothers and fathers, and that gender differences in outcomes be explored.

Potentially Positive Outcomes for Parents of Children with ASD

Life satisfaction. Subjective well-being (SWB) is a psychological construct concerned with individuals' positive cognitive judgment and affective reactions to personal experiences (Diener, 1984). According to Andrews and Withey (1975), life satisfaction is the cognitive component of the three components of SWB, with positive and negative affect comprising the

two emotional aspects of the construct (as cited in Diener, Emmons, Larsen, & Griffin, 1985). Diener et al. (1985) highlighted that an individual's judgment of his or her own satisfaction is based upon the individual's comparison of his or her current life circumstances against his or her personal standards and is not based on a comparison of life circumstance to externally imposed standards. Similarly, Pavot, Diener, Colvin, and Sandvik (1991) stated: "life satisfaction can be defined as a global evaluation by the person of his or her life" (p. 150). Pavot and Diener (1993) expanded upon the individual uniqueness of a person's assessment of his or her life satisfaction by stating, "Individuals are also likely to have unique criteria for a good life ... Furthermore, individuals may have very different standards for 'success' in each of these areas of their lives" (p. 164). As highlighted by Diener et al. (1985) and Pavot and Diener (1993), the construct of life satisfaction has previously received less research attention than positive and negative affect but constitutes an important aspect of a person's SWB and deserves examination in its own right.

Approximately thirty years after first emphasizing the construct of SWB, Diener and colleagues (2017) published an article to answer the questions: 'Who cares about life satisfaction? Why does it matter?' and highlighted the implications of studying positive outcomes for researchers and clinicians. Although SWB is often studied as an outcome, with the focus being on identifying predictors of SWB, another line of research has examined SWB as a predictor variable for other outcomes (Diener et al., 2017). As reviewed by Diener et al. (2017), SWB (i.e., life satisfaction) has been shown to be related to better health and greater longevity, more supportive social relationships, work productivity, and evolutionary benefits. Specifically outlining the implications for clinical psychology, Diener and colleagues (2017) emphasized that assessing an individual's life satisfaction is not just conceptually rewarding, but can have important relations to other beneficial outcomes, and may serve to highlight various points of

intervention to promote an overall healthier and more satisfying life for the individual. With respect to research, Diener et al. (2017) underscored the importance of examining potential mediators between SWB and outcomes, including health outcomes and social relationships.

Although studying SWB has gained favor in research over the past few decades and has relations with other important outcomes, only a limited number of studies have examined the life satisfaction of parents of children with ASD. Ekas and Whitman (2010) found that mothers of children with ASD reported lower levels of life satisfaction than low-risk samples; however, the mean life satisfaction scores for the overall sample still fell in the “slightly satisfied” range according to the scoring guide of the measure. At the correlational level, Ekas, Lickenbrock, and Whitman (2010) found life satisfaction was positively related to support from friends, support from partner, optimism, positive affect, and psychological well-being for mothers of children with ASD. Additionally, life satisfaction was negatively associated with depression, negative affect, and parenting stress for these mothers (Ekas et al., 2010). In a study of vicarious futurity, hope, and well-being of parents of children with ASD between 4 and 12 years old, Faso, Neal-Beevers, and Carlson (2013) reported life satisfaction in the “slightly satisfied” range for both mothers and fathers. Faso et al. (2013) found significant negative correlations between depression and life satisfaction and between stress and life satisfaction for these parents. Similarly, Hsieh and Lo (2013) examined the occupational experience and SWB of mothers of young children with ASD between the ages of 2 and 6 years old in Taiwan and found median life satisfaction levels in the “slightly dissatisfied” range, with these mothers reporting a whole range of life satisfaction levels from “extremely dissatisfied” to “extremely satisfied.” In a study comparing the self-esteem, social support, and life satisfaction of Chinese parents of children with ASD to parents of TD children, Lu et al. (2015), found that parents of children with ASD

indicated life satisfaction levels in the “slightly dissatisfied” range, while parents of TD children reported neutral levels of life satisfaction. Additionally, social support and self-esteem were shown to be significant predictors of life satisfaction, after controlling for demographic variables, for both parents of children with ASD and parents of TD children; however, social support and self-esteem explained more variance in life satisfaction for parents of children with ASD than parents of TD children (Lu et al., 2015). Furthermore, social support was found to partially mediate the relation between self-esteem and life satisfaction for both groups of parents. Overall, this previous research suggests parents of children with ASD experience varying levels of life satisfaction, and social support is positively associated with life satisfaction, while stress and psychopathology are negatively associated with life satisfaction.

With respect to parents of children with ASD, research has overwhelmingly concentrated on the potentially negative outcomes for these parents, such as stress, depression, and anxiety. However, the field of positive psychology aims to challenge psychology’s current model of pathology and argues that psychology is not only about weakness and damage, but it is also about strength and virtue (Seligman & Csikszentmihalyi, 2000). Additionally, given the general paucity of research on life satisfaction for parents of children with ASD and past research’s primary focus on mothers of children with ASD (e.g., Ekas & Whitman, 2010; Hsiesh & Lo, 2013), future research that includes both parents (i.e., mothers and fathers) and that also explores life satisfaction and other positive outcomes is needed. This shift in focus should provide clinicians with additional information about parents’ overall well-being. In addition, this shift in focusing on positive outcomes and variables potentially related to positive outcomes could help to shed light on possible points of intervention to promote more favorable outcomes overall in parents of children with ASD. Furthermore, in light of the gender differences often cited in

research on negative outcomes for parents of children with ASD, similar gender differences in positive outcomes, such as life satisfaction may also occur.

Risk Factors for Negative Outcomes for Parents of Children with ASD

Autism symptom severity. The severity of their child's autism symptoms is often examined as a predictor of negative outcomes for parents of children with ASD. For example, Garcia-Lopez et al. (2016) found that for both mothers and fathers of children with ASD, greater autism symptom severity was related to greater reported parenting stress. Similarly, Baker-Ericzen et al. (2005) found that their child's cognitive functioning and autism symptom severity predicted child-related stress for mothers of toddlers with ASD, with the child's social interaction deficits being the sole independent significant predictor of mothers' child-related stress. Baker-Ericzen et al. (2005) also noted that these child characteristics were not found to be significant predictors of parent-related stress for mothers or any stress for fathers. In a similar study, Davis and Carter (2008) examined child characteristics associated with parenting stress in mothers and fathers of toddlers with ASD. For mothers, with respect to core autism symptoms, the deficits in social relatedness were related to greater overall parenting stress; whereas for fathers, deficits in communication and reciprocal social interaction were associated with greater overall parenting stress (Davis & Carter, 2008). In another study, ASD symptom severity was significantly positively related to parental depression and parenting stress at the correlational level, however, there was no significant relation between autism symptom severity of the children with ASD and parental life satisfaction at the correlational level (Faso et al., 2013). With respect to a hierarchical linear regression analysis predicting life satisfaction, parental gender and autism symptoms severity were both entered as control variables and neither

predicted life satisfaction, however, hope agency and vicarious futurity were both positive predictors of life satisfaction (Faso et al., 2013).

Furthermore, Ekas and Whitman (2010) reported that autism symptom severity was positively associated with child-related stress and overall parenting stress, and negatively correlated with life satisfaction for mothers of children with ASD. In a path analysis examining parent broader autism phenotype (BAP) and child ASD symptoms severity as predictors for parental stress and depression, with social support and coping as mediators, Ingersoll and Hambrick (2011) found child ASD symptom severity had significant, positive direct effects on both parenting stress and depression in the overall model. Firth and Dryer (2013) examined characteristics of children with ASD (e.g., emotional and behavior problems specific to ASD, social characteristics of ASD) as predictors of parental stress and psychological distress. With respect to parenting stress, results indicated that the social characteristics of ASD and behavioral and emotional impairments specific to ASD accounted for 11.4% of the variance in parenting stress, with the social characteristics of ASD being the only unique predictor of parenting stress (Firth & Dryer, 2013). Regarding psychological distress, the social characteristics of ASD and behavioral and emotional impairments specific to ASD accounted for 21.4% of the variance in general stress, 18% of the variance in anxiety, and 21.7% of the variance in depression for these parents, with ASD behavioral and emotional impairments being the only unique predictor of all three types of psychological distress (Firth & Dryer, 2013). Taking a slightly different approach to measuring autism symptom severity, Brei et al. (2015) examined clinician ratings and parent ratings of ASD symptoms and found that for mothers of children referred for an autism evaluation, clinician ratings were not significantly related to parental distress, but parent ratings were significantly, positively related to parental distress. These results suggest that parent report

of ASD symptom severity is important to collect when examining the association between ASD symptom severity and parental stress (Brei et al., 2015).

Given the frequent association between greater ASD symptoms severity and increased parental stress, ASD symptom severity appears to be an important predictor of negative parental outcomes and may also be a potential predictor of positive parental outcomes, including life satisfaction. With respect to the association between ASD symptom severity and life satisfaction for caregivers of children with ASD, the research is limited and mixed, with one study finding no significant relation (e.g., Faso et al., 2013) and another study finding a significant negative relation (e.g., Ekas & Whitman, 2010). Given the limited, conflicting research, further examination of a possible direct relation between ASD symptom severity and positive outcomes, such as parental life satisfaction, as well as potential mediators, such as social support (Ingersoll & Hambrick, 2011), remains warranted. Additionally, in light of reported differences for mothers and fathers among relations between ASD symptom severity and parental stress (e.g., Baker-Ericzen et al., 2005; Davis & Carter, 2008) and studies that focused only on mothers of children with ASD (e.g., Ekas & Whitman, 2010; Brei et al., 2015), examining gender differences in rating ASD symptom severity and parental stress may provide a more comprehensive picture of parental outcomes.

Child behavior problems. In addition to the core symptoms of ASD, many children exhibit challenging behaviors (e.g., temper tantrums, aggression) that have also been explored as predictors of negative outcomes for parents of children with ASD. For example, Hastings (2003a) examined the psychological well-being of mothers and fathers of children with ASD and found that maternal stress was positively related to child behavior problems, even after controlling for paternal mental health. However, paternal stress was not associated with child

behavior problems when controlling for maternal mental health (Hastings, 2003a). In a study comparing health-related quality of life, including physical and mental health, of parents with school-age children with ASD or HFASD to parents of TD children, Allik, Larsson, and Smedje (2006) found that the outcomes of parents were not related to the child's autism symptom severity. However, better maternal mental health was related to fewer symptoms of hyperactivity and conduct problems, as well as prosocial behavior in the child with ASD and no associations between child behavior problems or prosocial behavior and paternal mental health outcomes were found (Allik et al., 2006).

Griffith, Hastings, Nash, and Hill (2010) investigated maternal well-being in children with ASD, DS, and ID, and reported that mothers of children with ASD rated their child as having more challenging behaviors than mothers of children with DS or ID (Griffith et al., 2010). Additionally, mothers of children with ASD reported greater levels of stress than mothers of children with DS or ID, even after controlling for behavior problems (Griffith et al., 2010). Similarly, Estes et al. (2013) found that although mothers of toddlers with ASD reported more child problem behaviors than mothers of toddlers with DD, and that child behavior problems predicted maternal parenting stress, no group differences emerged between these groups of mothers. Furthermore, in a study of parental stress of mothers of young children referred for an ASD evaluation, Brei et al. (2015) found that problem behaviors of the child with ASD accounted for 15.4% of the variance in parenting stress and made the only unique contribution to parenting stress when problem behaviors, daily living skills, and parent-rated and clinician-rated autism symptoms were examined together. In contrast, Garcia-Lopez et al. (2016) found that for both mothers and fathers of children with ASD, greater child behavior problems were not related to greater reported parenting stress when ASD symptom severity was also examined as a child

variable. However, overall, behavior problems in children with ASD appear to be related to parental outcomes (e.g., Ekas & Whitman, 2010), either in addition to or above and beyond autism symptom severity, and therefore, should be included as a potential risk factor when examining outcomes for parents of children with ASD. Additionally, examining the possible direct relation between behavior problems in children with ASD and parental outcomes, such as life satisfaction, as well as potential mediators of this relation may highlight points of intervention not only for clinicians working the children with ASD but also for clinicians working with the overall family.

In addition, conducting future research that continues to examine both ASD symptom severity and behavior problems together could contribute to further knowledge about outcomes of parents of children with ASD by providing a clearer picture of the factors related to outcomes. Furthermore, several studies have examined ASD symptoms and child behavior problems as an overall construct relating to parent outcomes (Brei et al., 2015; Ekas & Whitman, 2010; Estes et al., 2013; Firth & Dryer, 2013; Garcia-Lopez et al., 2016), while other studies have examined subcategories of ASD symptoms and child behavior problems in relation to outcomes for parents of children with ASD (Allik et al., 2006; Baker-Ericzen et al., 2005; Davis & Carter, 2008). Investigating the relations between the overall constructs of ASD symptom severity, child behavior problems, and outcomes for these parents is important. However, given the phenotypic heterogeneity of ASD (e.g., Georgiades et al., 2013) examining more nuanced relations between subcategories of these constructs and outcomes for parents may provide a more detailed picture of how child factors relate to both positive and negative parental outcomes.

Parental stress and psychopathology. Although parental stress and psychopathology are often used as outcome variables in research with parents with children with ASD, some

studies have examined these factors as predictors of other parental outcomes. In their study of health-related quality of life, Johnson, Frenn, Fettham, and Simpson (2011) examined parenting stress as a predictor of the physical and mental health of parents of children with ASD. For mothers, the stress associated with caregiving was associated with more physical health problems, but not mental health; whereas, for fathers, personal and family life stressors were associated with poorer mental health, and stress related to personal life was associated with poorer physical health (Johnson et al., 2011). Similarly, Dardas and Ahmad (2014) investigated parental distress as a predictor of quality of life for parents of children with ASD and reported that greater parental distress was predictive of lower quality of life for both mothers and fathers. Davis and Carter (2008) explored depression symptoms as a predictor of parental stress and found that greater reported depression symptoms were a positive predictor of greater overall parenting stress in both mothers and fathers of toddlers with ASD. Relatedly, for both mothers and fathers of children with ASD, greater depressive symptoms and parental stress were associated with lower life satisfaction (Faso et al., 2013). In addition to being important outcome measures for the well-being of parents of children with ASD, this research highlights that parental stress and psychopathology also serve as important predictors of parental well-being, such as quality of life and life satisfaction.

Social Support

The construct of social support is complex, and its different facets have been defined, operationalized, and measured in a variety of ways (Barrera, 1986). Barrera (1986) argued for researchers to develop more precise models of different aspects of the construct of social support and to focus on the relations between social support and indicators of distress rather than attempt to solidify a single global concept of social support. Barrera (1986) highlighted three social

support concepts: social embeddedness (i.e., connections to others and the social environment), perceived social support (i.e., cognitive appraisal of availability and adequacy of support from others), and enacted support (i.e., helping behaviors enacted by others). An alternative approach was suggested by Norris and Kaniasty (1996), who underscored that the two main facets of social support that have emerged in the literature are received social support and perceived social support. Norris and Kaniasty (1996) provided expanded definitions for these two different facets of social support: "...*received support* refers to naturally occurring helping behaviors that are being provided, whereas *perceived support* refers to the belief that such helping behaviors would be provided when needed" (p. 489). In his review of concepts of social support, Barrera (1986) emphasized that perceived social support aligned with the stress and coping model (e.g., Lazarus & Folkman, 1984), was the most assessed facet of social support, and was consistently found to be negatively related with distress. Taken together, this research highlights the importance of perceived social support when trying to understand the functioning of those who may experience stressors, such as caregivers of children with ASD.

In addition to clarifying between perceived social support and received social support, researchers often distinguish between formal supports and informal supports. Lipman and Longino (1982) differentiated between informal and formal support and explained the importance of each system individually, as well as their interconnected importance. Formal support refers to support provided by organizations, which "...operates within the context of the bureaucratic structure...Formal organizations are characteristically task oriented, emphasizing technical competence achieved through a specialized division of labor and the application of professional knowledge and skills" (Lipman & Longino, 1982, p. 142). In contrast, informal support refers to support provided by individuals with whom the person has a relationship (e.g.,

family, friends, neighbors; Lipman & Longino, 1982). Additionally, Lipman and Longino (1982) emphasized that formal support is often supplemental to informal support, as formal support often does not meet all the needs of the person seeking support. As highlighted by Lipman and Longino (1982) informal social support is often considered part of an individual's everyday life and formal support may not be as readily available or accessible. Given the importance and accessibility of informal support, it stands to reason that informal support may be more strongly associated with caregiver outcomes.

Social support for parents of children with ASD. Previous studies have explored differences in social support for parents of children with ASD, parents of children with other disabilities, and/or parents of TD children. Comparing perceived social support among mothers of children with ASD, mothers of children with ID, and mothers of TD children, Weiss (2002) reported that mothers of children with ASD reported the lowest levels of emotional support and esteem-boosting friendship. In a study comparing family environment and social support between parents of children with Asperger's Syndrome, parents of children with a learning disability (LD), and parents of TD children, Heiman and Berger (2008) found that parents of children with Asperger's reported the lowest degrees of overall social support, family support, friend support, and support from significant others. In their discussion, the authors postulated that these findings may indicate an increased need for social support among parents of children with Asperger's or may indicate a deterioration of their social support network over time due to the strain of raising their child with Asperger's (Heiman & Berger, 2008).

Research on sources of social support utilized by parents and families with children with ASD has examined the quantity and helpfulness of different types of support. For example, White and Hastings (2004) found that for parents of children ages 13 to 18 with moderate to

profound IDs, including ASD, having a greater number of informal supports (e.g., spouse, friends, or other family members) and practical support (e.g., someone to help around the house) was associated with higher ratings of the helpfulness of the support. Hall and Graff (2011) explored the helpfulness of different types of social supports for parents of children with ASD and found their spouse or partner to be the most helpful form of support, then formal kinship (e.g., relatives), professional services, information kinship (e.g., friends), and social organizations as the least helpful form of social support.

Social support has been studied as an important protective factor for better outcomes in parents of children with ASD. For example, Gray and Holden (1992) examined social support as a predictor of the psychosocial well-being of parents with ASD and found that social support was the strongest predictor of lower parental depression, anxiety, and anger, above and beyond a number of socio-demographic variables of both parents. In their study examining the quantity and helpfulness of different types of support, White and Hastings (2004) found that parents' higher ratings of the helpfulness of informal support sources were associated with lower ratings of stress, depression, and anxiety, even after autism status and child's adaptive and problem behaviors were controlled. Additionally, practical support was also associated with lower anxiety and depression (White & Hastings, 2004). Benson and Karlof (2009) examined the association of stress proliferation, a compounding of stressors and negative outcomes for parents of children with ASD over time and found that greater informal social support was related to decreased parental depression over time. Using a multivariate approach, Simon-Tov and Kaniel (2011) explored the relations between parental stress, parental adjustment (e.g., mental health), parental resources (e.g., social support), and child autism symptom severity for parents of children with a PDD. Results suggested that social support has a direct negative relation with

parental stress but is only indirectly related to the quality of marriage, parental mental health, and child autism symptom severity (Simon-Tov & Kaniel, 2011). In a study of parents of children with ASD and parents of children with ADHD, Lovell, Moss, and Wetherell (2012) reported that greater perceived availability of appraisal support and self-esteem support were related to lower levels of stress, depression, and anxiety.

Social support has also been examined as a mediator of relations between child characteristics and parental outcomes for parents of children with ASD. In their path analysis, Ingersoll and Hambrick (2011) investigated parent BAP and child ASD symptoms severity as predictors of parent stress and depression and examined the mediating effects of adaptive coping, maladaptive coping, and social support. Both parent BAP and child ASD symptoms severity negatively predicted social support, and social support negatively predicted ratings of parental stress and depression (Ingersoll & Hambrick, 2011). More specifically, greater levels of parent BAP and greater reported child ASD symptoms were related to lower reported social support, and low levels of social support were in turn related to higher levels of parental stress and depression (Ingersoll & Hambrick, 2011). Ingersoll and Hambrick's (2011) findings suggested social support was a partial mediator of the relation between child ASD symptom severity and parental depression. In a study of primary caregivers' health-related quality of life, social support was negatively correlated with the functional impairment and behavior problems of the child with ASD and positively correlated with mental and physical health-related quality of life (Khanna et al., 2011). Additionally, in the final model examining factors influencing mental and physical health-related quality of life, social support mediated the impact of child behavior problems on physical quality of life for primary caregivers (Khanna et al., 2011). Overall, previous research highlights the protective nature of social support and the link between greater

social support and better outcomes for parents of children with ASD. Additionally, some of these studies provide evidence of social support acting as a mediator between child characteristics and outcomes for parents of children with ASD.

Examinations of social support for mothers have been particularly prevalent in the field of ASD research. For example, Weiss (2002) reported that across mothers of children with ASD, mothers of children with ID, and mothers of TD children, those who reported more social support reported lower rates of depression, however, mothers of children with ASD reported the highest depression levels among the three groups. Tobing and Glenwick (2006) investigated potential predictors and moderators of psychological distress for mothers of children with PDDs and reported that mothers' satisfaction with social supports, but not the number of social supports, was negatively related to psychological distress. Furthermore, Tobing and Glenwick (2006) examined functional impairment of the child with ASD, parenting stress, social support, parenting sense of competence, and coping strategies as predictors of maternal psychological distress, and found that while the combination of these predictors accounted for 35% of the variance in maternal psychological distress, only satisfaction with social supports emerged as an independent predictor of distress (Tobing & Glenwick, 2006). Using structural equation modeling, Ekas et al. (2010) explored the relations between informal social support, optimism, and well-being for mothers of children with ASD. At the bivariate level, higher levels of social support were associated with lower levels of parenting stress, depression, and negative affect and higher levels of positive affect, life satisfaction, and psychological well-being (Ekas et al., 2010).

In a literature review of the relation between stress and lack of social support for mothers of children with ASD, Boyd (2002) found that both the characteristics of the mother and the characteristics of the child with ASD influenced mothers' decision to seek and use social

support. More specifically, mothers who reported experiencing greater stress were more likely to seek social support (Boyd, 2002). Additionally, challenging child characteristics, such as behavioral difficulties and cognitive limitations, were associated with mothers pursuing social support (Boyd, 2002). In examining the effects of social support, Boyd (2002) concluded that informal social support utilized by mothers of children with ASD was a more effective buffer of stress than formal social support. The relations between child characteristics, maternal stress, and informal support found by Boyd (2002) highlight the importance of further examining these relations in caregivers of children with ASD and especially continuing to explore social support as a protective factor for these caregivers.

Social support for parents of children with disabilities. Broadening the examination of social support to include parents of children with disabilities in general, previous research has examined social support of parents of children with and without disabilities, social support in relation to parental stress and psychopathology (e.g., depression, anxiety), the helpfulness of social support, and the potential moderating effects of social support. Some studies have found no differences in the availability, perceived helpfulness, or level of social support between parents of children with and without disabilities (Brehaut et al., 2004; Britner, Monrog, Pianta, & Marvin, 2003; Button, Pianta, & Marvin, 2001). Previous research has shown that greater levels of social support and greater perceived helpfulness of social support are related to lower parental stress (Dyson, 1997; Guralnick, Hammond, Neville, & Connor, 2008; Hassall, Rose, & McDonald, 2005) and lower levels of depression and anxiety (Sharpley et al., 1997). Additionally, focusing on more positive outcomes, Davis and Gavidia-Payne (2009) reported that family-centered professional support and family support were associated with parents' higher satisfaction with the family's quality of life. Regarding helpfulness of sources of support,

previous research has reported differences in terms of the helpfulness of formal versus informal support, with formal support being rated as slightly more helpful than informal support, and differences in the helpfulness of sources of informal support, such as support from family members being more helpful than support from friends (Davis & Gavidia-Payne, 2009; Greer, Grey, & McClean, 2006).

Moving beyond a description of social support and/or simple relations between social support and outcomes for these parents, Plant and Sanders (2007) examined social support as a moderator of the relation between stressors related to caring for a child with a disability and parental stress in a study of mothers of children ages 12 to 81 months with DDs, including ASD. Results indicated that partner/family support moderated the relation between the level of the child's disability and parenting stress (Plant & Sanders, 2007). Additionally, friend support and external/professional support both moderated the relation between child behavior problems and parent stress (Plant & Sanders, 2007). The different types of social support acted as buffers between the stressors and parenting stress (Plant & Sanders, 2007). These findings suggest that social support is an important factor to consider when examining the relation between stressors and outcomes for parents of children with disabilities.

In summary, social support appears to be an important protective factor for parents raising children with ASD, and parents of children with disabilities in general and should be included as a predictor of outcomes for these parents. Armstrong, Birnie-Lefcovitch, and Ungar (2005) proposed that social support, as a protective factor, has both a main effect and a buffering effect when examining relations between social support and well-being. The authors hypothesized that when social support is a main effect, it is positively associated with an individual's well-being regardless of stressors (Armstrong et al., 2005). Additionally, they

hypothesize that for the buffering effect of social support, that social support serves as a protective factor from stressors (Armstrong et al., 2005). More specifically, social support is hypothesized to act as a buffer between stressors and distress and between stressors and physical and mental health outcomes (Armstrong et al., 2005). Boyd's (2002) literature review provides insight into stressors, such as challenging characteristics of children with ASD that may increase the likelihood that mothers will seek social support. Additionally, Boyd's (2002) review found that informal support was more effective as a buffer for stress than formal support, highlighting the need to continue examining informal social support for parents of children with ASD. Exploring the buffering effect of social support could contribute valuable information about protective factors and favorable outcomes for parents of children with ASD. Additionally, investigating social support as a mediator of the relations between important predictors, such as autism symptom severity and child emotional and behavioral problem, and positive outcomes for parents, such as life satisfaction, may provide a more complete picture of factors related to the functioning of parents of children with ASD.

Negative Outcomes for TD Siblings of Children with ASD

Emotional and behavioral adjustment. The potential for negative outcomes associated with parenting a child with ASD is fairly well established in the literature; however, the results of research examining potentially negative outcomes for TD siblings of children with ASD has been more mixed (e.g., Green, 2013; Meadan et al., 2010; Smith & Elder, 2010). Some studies have found greater rates of difficulties for these siblings while others have reported that siblings of children with ASD are not experiencing problems at a greater rate of difficulty than other siblings. For example, Verte, Roeyers, and Buysse (2003) compared the psychological adjustment of TD siblings of children with HFASD to siblings of TD children. Siblings of

children with HFASD displayed more externalizing and internalizing problems, as reported by their parents, than siblings of TD children, with siblings of children with HFASD between 6 and 11 years old exhibiting the most behavior problems (Verte et al., 2003). Although their parents reported more behavior problems than the comparison group, the mean score for behavior problems for siblings of children with HFASD did not fall into the subclinical or clinical range (Verte et al., 2003). Similarly, Hastings (2003b) found that mothers rated TD siblings of children with ASD as having more peer problems and more overall emotional and behavioral difficulties than a normative sample. Relatedly, Benson and Karlof (2008) showed that parents, mostly mothers, of siblings of children with ASD who themselves were diagnosed with a non-medical disability (e.g., ASD, ADHD) reported more difficulties concerning conduct problems, hyperactivity/inattention, peer problems, and total difficulties than parents of siblings of children with ASD without a non-medical condition (Benson & Karlof, 2008). Additionally, siblings of children with ASD without a non-medical disability experienced more parent-rated emotional problems, and siblings of children with ASD with a non-medical disability experienced more parent-rated problems in all areas except conduct problems when compared to a normative sample (Benson & Karlof, 2008). In a study exploring predictors of adjustment in siblings of children with ASD, Hesse, Danko, and Budd (2013) found while parents, mostly mothers, of siblings of children with ASD reported greater adjustment difficulties than the normative sample, the mean of emotional and behavioral difficulties fell within the “Normal” range. Relatedly, compared to a normative sample, mothers reported that siblings of children with ASD displayed more overall adjustment difficulties, more emotional problems, more conduct problems, and fewer prosocial behaviors, while fathers reported that the siblings exhibited more emotional problems (Griffith et al., 2014). Although these studies suggest higher rates of emotional and

behavior problems in siblings with ASD, a number of the other studies (e.g., Gold, 1993; Hastings, 2003c) found that these siblings still displayed problems within the normal range.

In contrast to the previously reviewed studies, Gold (1993) compared the psychosocial adjustment of TD siblings with brothers with ASD to siblings of TD brothers and found no differences in parent-rated behavior problems. Similarly, Hastings (2003c) reported that TD siblings of children with ASD involved in applied behavior analysis programs had fewer emotional and behavioral problems than a normative sample, as rated by their mothers. Relatedly, Dempsey, Lloren, Brewton, Mulchandani, and Goin-Kochel (2012) examined parent- and teacher-rated emotional and behavioral adjustment of TD siblings of children with ASD, and found that, on average, neither parents nor teachers reported internalizing (e.g., emotional) and externalizing (e.g., behavioral) difficulties in the borderline or clinical range. Additionally, Tomeny, Barry, and Bader (2012) compared the psychosocial adjustment of TD siblings of children with ASD to siblings of TD children and found no differences in parent-rated externalizing or internalizing problems. Furthermore, Hastings and Petalas (2014) explored self-reported adjustment in TD siblings of children with ASD and found that TD siblings self-reported emotional and behavioral problems similar to those of a normative comparison sample.

In light of the mixed and inconclusive findings regarding the emotional and behavioral adjustment of TD siblings with ASD, continued examination of these outcomes in siblings is warranted. Additionally, the majority of current research has only investigated parent-reported adjustment, which may be different from the siblings' perceptions of their own well-being. For instance, Guite, Lobato, Kao, and Plante (2004) showed that parents of children with chronic illness or DD rated their TD child as experiencing more adjustment problems than the siblings

reported themselves. Therefore, it is important to include both parent- and self-reported psychosocial adjustment for TD siblings of children with ASD.

Psychopathology. Some previous research has also examined psychopathology, particularly depression and anxiety, as possible outcomes for TD siblings of children with ASD. For example, Gold (1993) found significantly higher rates of self-reported depression in siblings of brothers with ASD than siblings of TD brothers. Similarly, in a study of adolescent TD siblings of children with ASD, results indicated that 36% of the siblings' self-reported depression symptoms were in the clinically significant range and 8.5% of siblings' self-reported anxiety symptoms were in the clinically significant range (Orsmond & Seltzer, 2009). Additionally, sisters reported greater depression and anxiety symptoms than brothers, and sisters were more likely than brothers to report depression levels in the clinically significant range (Orsmond & Seltzer, 2009). Furthermore, Bitsika, Sharpley, and Mailli (2015) indicated that siblings of children with ASD reported higher rates of generalized anxiety disorder (GAD) and major depressive disorder (MDD) compared to two normative, general population samples, with 38.7% and 28.0% of the siblings meeting diagnostic criteria for GAD and MDD, respectively. The results of these studies highlight the importance of obtaining reports about well-being from the siblings themselves.

In summary, much of the research on outcomes for TD siblings of children with ASD has focused on negative outcomes, such as psychopathology or adjustment difficulties, with mixed results. Although some studies have indicated normal adjustment and/or the lack of emotional and behavioral difficulties for TD siblings of children with ASD, current research is lacking in the exploration of potentially positive outcomes, such as life satisfaction, for these siblings. Additionally, given the mixed finding related to negative outcomes for TD siblings of children

with ASD, gaining a better understanding of positive outcomes may help to explain these mixed findings.

Potentially Positive Outcomes for TD Siblings of Children with ASD

Life satisfaction. The examination of life satisfaction, while somewhat lacking for parents of children with ASD, is often understudied in TD siblings of children with ASD. In fact, Seligson, Huebner, and Valois (2003) argued that despite gaining popularity in research with adults, life satisfaction continues to be largely neglected in research with children and adolescents in general. Although Pavot et al.'s (1991) definition of life satisfaction, as a "global evaluation by the person of his or her life" (p. 150) seems to apply to both adults and children and adolescents, researchers have argued that measurement of life satisfaction in children and adolescents should use different measures than adults, should examine both specific domains and global satisfaction, and should be rated by the children and adolescents themselves (Huebner, 2001; Seligson et al., 2003). Additionally, it has been argued that it is important to examine not only general life satisfaction, but satisfaction in domains important to the lives of children and adolescents (e.g., family, friends, school, self, and living environment; Huebner, 2001; Seligson et al., 2003). Moreover, Huebner (2001) reviewed literature that found the construct of life satisfaction has been differentiated from other constructs of psychological well-being such as self-esteem, depression, and positive affect. Furthermore, Seligson et al. (2003) highlight that examinations of individuals' SWB should include positive and negative indicators of well-being, which emphasizes the importance of research examining both positive and negative outcomes, especially for potentially vulnerable populations, such as TD siblings of children with ASD.

Risk Factors for Negative Outcomes for TD Siblings of Children with ASD

Autism symptom severity of the sibling with ASD. The severity of autism symptoms of the child with ASD has been found to be associated with negative outcomes for parents and has begun to be explored as a possible predictor for outcomes in TD siblings. For example, Benson and Karlof (2008) found that for siblings of children with ASD without a disorder themselves, the severity of ASD symptoms exhibited by their siblings was the strongest predictor of both lower prosocial behaviors and greater emotional and behavioral difficulties. Similarly, Hastings (2003c) reported that autism symptom severity was significantly, positively predictive of emotional and behavioral problems and marginally, negatively predictive of prosocial behaviors for TD siblings of children with ASD. Moreover, Petalas et al. (2012) used a diathesis-stress model to examine the psychological adjustment of TD siblings of children with ASD and reported that autism symptom severity of the sibling with ASD was positively predictive of total emotional and behavioral difficulties and negatively predictive of prosocial behaviors in TD siblings of children with ASD, as reported by their parents. Although the research is somewhat limited, these studies provide evidence that the ASD symptom severity of the sibling with ASD may need to be taken into consideration when examining the well-being of the TD siblings. Furthermore, given the relation between ASD symptom severity in siblings with ASD and the psychological adjustment and emotional/behavioral difficulties of TD siblings, it is warranted to explore the possible relation between ASD symptoms severity and positive outcomes, such as life satisfaction, of TD siblings.

Behavior problems of the sibling with ASD. Behavior problems in children with ASD are another potential predictor of outcomes in TD siblings. Petalas et al. (2012) found that greater behavior problems of siblings with ASD were predictive of greater total difficulties for

TD siblings. Relatedly, Walton (2016) examined risk factors for emotional and behavioral difficulties in 1,973 TD siblings of children with ASD and found that greater behavior problems in siblings with ASD was associated with greater parent-reported internalizing and externalizing symptoms in TD siblings. In contrast, Hastings (2003b) found that behavior problems in siblings with ASD was not a significant predictor of either prosocial behavior or behavioral problems in TD siblings of children with ASD; however, small sample size (22 siblings) may have been a factor in these non-significant findings (Hastings, 2003b). Orsmond and Seltzer (2009) examined a diathesis-stress model with behavior problems of siblings with ASD, life events of TD siblings, and maternal depressive symptoms as the predictors of well-being of TD siblings of children with ASD. Behavior problems in siblings with ASD was included as a predictor in a significant model of TD siblings' depressive symptoms but was not a significant direct predictor of outcome once TD sibling gender and residential status of the sibling with ASD were controlled for in the model (Orsmond & Seltzer, 2008). Similarly, in their examination of self-reported adjustment of TD siblings with ASD, Hastings and Petalas (2014) found that behavior problems of the child with ASD was not a significant predictor of either prosocial behavior or emotional and behavioral difficulties for the TD siblings. In light of the limited research and mixed findings, continued exploration of the association between behavior problems of siblings with ASD and outcomes of TD siblings may help to clarify the factors related to outcomes for TD siblings of children with ASD. Additionally, examining the potential relation between behavior problems of siblings with ASD and positive outcomes for TD siblings, as well as other factors that may be related to sibling behavior problems and/or positive outcomes may help to shed light on the complexities of TD sibling functioning.

Parenting distress. Given the impact parental stress and psychopathology may have on family functioning (Jellett, Wood, Giallo, & Seymour, 2015), parental distress may serve as an additional predictor of outcomes of TD siblings of children with ASD. In a study comparing the adjustment of TD siblings of children with PDD, TD siblings of children with DS, and TD siblings of TD children, Fisman, Wolf, Ellison, and Freeman (2000) found that parental distress was related to sibling adjustment at the beginning of the study and at the 3-year follow-up, across all three groups. Additionally, Fisman et al. (2000) reported that parents of children with PDD reported the highest rates of distress and depression at both time points. Similarly, Hesse et al. (2013) found that parental stress was positively associated with siblings' emotional and behavioral difficulties at the bivariate level; however, it was not a significant individual predictor in the overall significant model of siblings' adjustment. Relatedly, Orsmond and Seltzer (2009) reported that maternal depression was a significant, positive predictor of siblings' depression and anxiety. In contrast, Hastings (2003b) found that maternal stress was not predictive of emotional and behavioral difficulties or prosocial behavior in TD siblings of children with ASD. Again, the small sample size may have been a factor in these non-significant findings (Hastings, 2003b). Similarly, Hastings and Petalas (2014) reported that maternal depression was not a significant predictor of siblings' self-reported adjustment. Given the somewhat limited research and the mixed findings regarding parental distress, future research is needed to further examine the relation between parental distress and outcomes for TD siblings of children with ASD. Additionally, examining parental distress in conjunction with factors related to siblings with ASD and factors related to TD siblings themselves may help pinpoint specific risk and protective factors for TD siblings' positive outcomes, and furthermore, may provide clinicians with person-specific areas for intervention within these families.

Social Support for TD Siblings of Children with ASD

Similar to research conducted with parents of children with ASD and parents of children with other disabilities, social support has been examined as an important protective factor for better outcomes in TD siblings of children with ASD. Hastings (2003c) found that social support moderated the relation between autism symptom severity of the siblings with ASD and the adjustment of TD siblings. Specifically, when autism symptom severity of the sibling with ASD was low, families that reported lower levels of formal social support rated TD siblings as having more emotional and behavioral difficulties compared to families that reported higher levels of formal social support (Hastings, 2003c). Kaminsky and Dewey (2002) conducted a study comparing the psychosocial adjustment of TD siblings of children with ASD, siblings of children with DS, and siblings of TD children, and found that siblings in all three groups reported feeling supported by parents, teachers, classmates, and close friends. Additionally, Kaminsky and Dewey (2002) found that for siblings in all three groups higher levels of reported social support were correlated with lower levels of loneliness, and specifically for siblings of children with ASD, higher levels of reported social support were related to better adjustment in TD siblings. Similarly, Lovell and Wetherell (2016) examined social support as a predictor of depression in TD siblings of children with ASD and found that support from parents and close friends were negatively related to self-reported depression levels. Tsai, Cebula, and Fletcher-Watson (2016) found that with respect to TD siblings in Taiwan and the UK, social support was positively predictive of prosocial behaviors, but was not significantly predictive of emotional and behavioral difficulties.

In summary, social support appears to be an important factor for outcomes for TD siblings of children with ASD. Given the inconclusive findings regarding predictors of outcomes

for siblings, future research should focus on the relation of social support with other potentially predictive risk factors, such as autism symptom severity, behavior problems of the sibling with ASD, and parental distress. Furthermore, examination of the relation of social support to more positive outcomes, such as life satisfaction, in TD siblings of children with ASD is warranted in light of the buffering effect of social support (Armstrong et al., 2005) and the positive impact of life satisfaction on health outcomes (Diener et al., 2017).

Theoretical Frameworks and Rationale for Current Study

Several theoretical frameworks provide a rationale for exploring the experiences of family members of children with ASD by examining both potentially negative and potentially positive outcomes and investigating risk and protective factors associated with these outcomes. Additionally, various theoretical frameworks provide support for the importance of including multiple caregivers (e.g., both mothers and fathers) as well as TD siblings in research.

Stress and coping. As previously reviewed, parents of children with ASD often report clinically significant levels of stress (e.g., Brei et al., 2015) and report higher stress levels than parents of children with other disabilities and parents of TD children (e.g., Dabrowska & Pisula, 2010). As such, successful coping with stressors may be exceedingly important for families of children with ASD. Lazarus and Folkman (1984) conceptualized psychological stress as “a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (p. 19). Lazarus and Folkman (1984) proposed two types of appraisals: primary appraisals, which are a cognitive assessment of positive and/or negative consequences of a situation, and secondary appraisals, which are an evaluation of the person’s resources available for coping with the situation. Researchers have adapted and expanded upon Lazarus and Folkman’s original stress and coping

framework to apply these concepts to families. It has been postulated that three variables determine if a situation is conceptualized as stressful in families: 1) the stressor itself, 2) the family's resources for dealing with the stressor, and 3) the family's perception of the stressor; these variables work together to produce the outcome (e.g., stress response) for the family (Hill 1949; McCubbin & Patterson, 1983). Often, previous research on families of children with a disability has examined the functioning of family members from a psychopathological orientation, meaning researchers assumed parents of children with disabilities experienced stress and psychopathology and siblings experienced maladjustment (Dykens, 2005). Dykens (2005) highlighted that more recent research has moved beyond the assumptions of the psychopathological orientation to examine the functioning of families of children with disabilities from the stress and coping model, which Dykens (2005) argued is a better fit for these families and allows for the possibility that these families are functioning quite well. Applying the stress and coping framework to families of children with ASD highlights the importance of examining factors that could make raising a child with ASD more or less stressful. Factors that increase stress may include the severity of the child's ASD symptoms and co-occurring emotional and behavioral problems. In contrast, investigating resources the family members may have for coping with stress, such as social support, may shed light on variables that could make raising a child with ASD less stressful. Finally, exploring both negative outcomes, such as stress, psychopathology (e.g., depression, anxiety), and positive outcomes, such as life satisfaction, for these family members may provide a more balanced picture of functioning for these families. Likewise, Dykens (2005) argued that research should move further beyond the stress and coping model to examine specifically positive outcomes, given that

families of children with disabilities may not be just coping but may be thriving and even potentially benefiting from having a family member with a disability.

Positive psychology. Since its inception in the early 2000s, positive psychology has gained popularity over the past two decades. Positive psychology is a theoretical framework that focuses on the positive aspects of individuals and situations rather than on deficits and pathology, which have previously dominated the field of psychology (Seligman & Csikszentmihalyi, 2000). Positive psychology is concerned with a person's subjective experiences of well-being, satisfaction, contentment, hope, optimism, and happiness (Seligman & Csikszentmihalyi, 2000). Further, positive psychology aims to challenge the field of psychology's current model of pathology and predominant negative bias (Seligman & Csikszentmihalyi, 2000; Sheldon & King, 2001). Positive psychology argues that psychology is not only about weakness and damage, but it is also about strength and virtue and urges the field of psychology to be more open to positive human conditions (Seligman & Csikszentmihalyi, 2000; Sheldon & King, 2001). As such, Dykens (2005) argued research should focus on and measure distinctly positive outcomes for families of children with a disability and not just measure positivity by the lack or absence of stress or maladjustment. Concepts from positive psychology can be applied to examine potentially positive aspects of raising a child with ASD and to examine individual and family factors that may contribute to positive experiences for these family members. In summary, this theoretical framework of positive psychology that explores potentially positive outcomes, such as life satisfaction, and not just the absence of negative outcomes, such as stress, depression, and anxiety should be applied to families of children with ASD to better understand functioning within this population.

Family systems theory and ecological systems theory. Bowen's family systems theory posits that families function as a system, and within that system, each member of the family plays a role in the overall functioning of the family, which in turn impacts the functioning of the other members of the family (Bowen, 1966, 1974). Additionally, Bowen (1966, 1974) emphasizes family members are emotionally connected and affect each other's thoughts, feelings, and behaviors; and furthermore, change in one family member's functioning will impact change in the functioning of the other family members (Bowen, 1966). Moving beyond the child and his or her nuclear family, Bronfenbrenner's ecological systems theory can be used to further understand children's functioning. Bronfenbrenner (1979) described four environmental systems outside of the individual that help shape a child's development over time: 1) microsystem, consisting of the child's interpersonal relations, such as family, peers/friends, school, 2) mesosystem, the interaction of two or more microsystems, 3) exosystem, the child's broader context with which he or she does not directly interact (e.g., parents' friends), and 4) macrosystem, the broader social context. For the present study, Bronfenbrenner's micro- and meso-systems are the focus for the examination of TD siblings functioning. Taken together, these two theoretical frameworks highlight the importance of studying the individual perspectives and experiences of multiple family members within each family, while taking into consideration family and environmental factors that may influence individual functioning. For TD siblings of children with ASD, these two theoretical frameworks offer insight into the importance of examining TD siblings' functioning from their own perspective, as well as their parents. Additionally, these frameworks highlight the relevance of considering additional factors, such as ASD symptoms and behaviors problems of the sibling with ASD, and parent functioning, when investigating outcomes for these TD siblings.

Sibling Embedded Systems Framework. Recently, Kovshoff, Cebula, Tsai, and Hastings (2017) introduced the Sibling Embedded Systems Framework, which can be specifically applied to siblings of children with ASD and seeks to contextualize siblings' experiences within the family while examining factors that influence sibling outcomes. This framework draws on concepts from the diathesis-stress model, family systems theory, bioecological systems theory, and the Double ABCX model (Kovshoff et al., 2017). Similar to Bronfenbrenner's bioecological systems theory, the Sibling Embedded Systems Framework includes factors at different nested environmental levels (i.e., within sibling, microsystems, mesosystems, exosystem, macrosystem) that interact, over time, to influence sibling outcomes (Kovshoff et al., 2017). Within the individual sibling, factors such as demographics, genetic, and psychological challenges and resources, and perceptions of 'events' are examined (Kovshoff et al., 2017). 'Events,' such as having a family member with ASD, are considered key factors of the microsystems and macrosystems levels (Kovshoff et al., 2017). The authors explain that the use of this neutral term ('event') is purposeful, such that having a family member with ASD may be an 'event' but the framework does not necessarily conceptualize that event as a 'stressor' or 'demand' within the family (Kovshoff et al., 2017). Other factors at the microsystems and macrosystems levels include other family members, peers/friends, school/workplace, and social support networks (Kovshoff et al., 2017). The exosystem includes factors such as social media, parents' social support networks, and local political/social structures, while factors such as religion, wealth/social class, broader political structures, and culture are included in the macrosystem (Kovshoff et al., 2017). Finally, the authors highlight important outcomes to investigate for siblings of children with ASD within this framework, including psychosocial adjustment and life satisfaction/quality of life (Kovshoff et al., 2017). Furthermore, they stress

that research driven by this theoretical framework should ultimately be used in clinical work with families of children with ASD to enhance and improve sibling and family interventions and supports (Kovshoff et al., 2017). As the authors emphasized, no single study can incorporate all elements of the Sibling Embedded Systems Framework (Kovshoff et al., 2017); however, future research including individual factors of the TD sibling, as well as family and environmental factors such as parental distress, characteristics of the sibling with ASD, and social networks of the TD sibling and parents, will help to build a more complete picture of sibling outcomes. Additionally, examining potentially positive outcomes, such as life satisfaction, may help to alleviate the notion that having a sibling with ASD is a largely negative, stressful experience.

Current Study

Previous literature indicates that having a child with ASD in the family can be a challenging experience (e.g., Ooi, Ong, Jacob, & Khan, 2016), and many parents are at risk for heightened distress (e.g., Dabrowska & Pisula, 2010; Sharpley et al., 1997). Additionally, previous literature has also examined potential risk factors for negative outcomes such as autism symptom severity and behavior problems of the child with ASD and parental distress (e.g., Baker-Ericzen, 2005; Garcia-Lopez et al., 2016). Furthermore, gender differences related to outcomes (e.g., stress and psychopathology) have been noted throughout research on parents of children with ASD (e.g., Dabrowska & Pisula, 2010; Herring et al., 2006). However, these findings are often inconsistent, and research is frequently conducted with samples comprised overwhelming of mothers or focused only on outcomes for mothers of children with ASD (e.g., Brei et al, 2015; Ekas & Witman, 2010). Research on TD siblings is relatively limited and often inconclusive with regard to outcomes and the risk and protective factors that predict said outcomes (e.g., Meadan et al., 2010). A common limitation of previous research is that parents

of TD siblings, rather than the siblings themselves, often provide ratings of outcomes—this reliance on single-reporter design may explain some of the mixed findings and likely provides a less comprehensive view of TD sibling functioning.

Although some more recent research has begun to examine social support in families of children with ASD (e.g., Benson & Karlof, 2009; Hastings, 2003c) and more positive outcomes, such as life satisfaction (e.g., Ekas & Whitman, 2010), the majority of past research has focused on either the negative impact of raising a child with a disability or the absence of such negative impact. Therefore, little is known about the potentially positive experience of having a child with ASD as a family member.

Of note, while both biological/genetic factors and environmental factors may influence the outcomes of family members of children with ASD, the primary focus of this proposed study is to examine environmental factors. More specifically, broader autism phenotype (BAP), defined as sub-clinical symptoms related to ASD (e.g., difficulties in social communication, behavioral rigidity) sometimes present in family members of individuals with ASD (e.g., Piven, Palmer, Jacobi, Childress, & Arndt, 1997), has been shown to be related to outcomes in parents (e.g., Ingersoll & Hambrick, 2011) and TD siblings of children with ASD (e.g., Walton & Ingersoll, 2015). Yet, assessing BAP in parents of children with ASD, and examining potential relations with other risk factors, protective factors, and outcomes was beyond the scope of this current project. With respect to BAP in TD siblings, ASD symptoms were assessed via primary caregiver-report. However, in the present study, BAP in TD siblings was examined only as a potential confounding variable of outcomes for TD siblings.

The proposed study aimed to address some of the aforementioned deficits in the current literature. First, this study obtained reports from mothers, fathers, and TD siblings of children

with ASD in order to investigate outcomes in a variety of family members (i.e., not just mothers). Second, this study examined life satisfaction as the primary outcome variable. More specifically, for caregivers, distress and social support served as mediators of the relations between autism symptom severity and life satisfaction, and between child behavior problems and life satisfaction. For TD siblings, the primary caregiver's distress and self-reported social support served as mediators of the relations between autism symptom severity and life satisfaction, and between child behavior problems and self-reported life satisfaction. Finally, parents and the TD sibling reported on sibling emotional and behavioral adjustment and life satisfaction in an attempt to provide a more complete picture of the well-being of these siblings.

Hypotheses

Based on the information above, the following hypotheses were proposed for *caregivers* of children with ASD:

1. The following bivariate correlations were hypothesized: 1a) autism symptom severity in children with ASD would be negatively related to caregiver (e.g., henceforth, “caregiver” will be used to denote parents or other adults who consistently serve in a caregiving role) life satisfaction and caregiver social support, but positively related to caregiver distress; 1b) behavior problems in children with ASD would be negatively related to caregiver life satisfaction and caregiver social support, but positively related to caregiver distress; 1c) caregiver distress would be negatively related to caregiver life satisfaction; 1d) caregiver social support would be positively related to caregiver life satisfaction.
2. Four parallel mediation models were examined such that autism symptom severity or child behavior problems in the child with ASD served as the predictor (X). Autism symptom severity and child behavior problems (X, examined separately) would be

related to caregiver life satisfaction (Y) through caregiver distress (M₁) and caregiver social support (M₂). These analyses were conducted on primary caregivers (hypothesized to consist primarily of mothers) only and then repeated on secondary caregivers (hypothesized to consist primarily of fathers) only. More specifically: 2a) it was predicted that there would be direct effects (i.e., pathway c') of ASD symptom severity and child behavior problems on caregiver life satisfaction, controlling for caregiver distress and social support. 2b) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on caregiver life satisfaction through caregiver distress, controlling for caregiver social support (i.e., pathways a₁ & b₁). 2c) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on caregiver life satisfaction through caregiver social support, controlling for caregiver distress (i.e., pathways a₂ & b₂).

The following hypotheses were proposed for *TD siblings* of children with ASD:

3. The following bivariate correlations were hypothesized: 3a) ASD symptom severity in the child with ASD would be negatively related to TD sibling life satisfaction and TD sibling social support; 3b) child behavior problems in the child with ASD would be negatively related to TD sibling life satisfaction and TD sibling social support; 3c) the primary caregiver's distress would be negatively related to TD sibling life satisfaction; 3d) TD sibling social support would be positively related to TD sibling life satisfaction.
4. Two parallel mediation models were examined such that autism symptom severity or child behavior problems in the child with ASD served as the predictor (X). Autism symptom severity and child behavior problems (X, examined separately) would be related to TD sibling life satisfaction (Y) through the primary caregiver's distress (M₁)

and TD sibling social support (M_2). 4a) It was predicted that there would be direct effects (i.e., pathway c') of ASD symptom severity and child behavior problems on TD sibling life satisfaction, controlling for primary caregiver's distress and TD sibling social support. 4b) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on TD sibling life satisfaction through primary caregiver's distress, controlling for TD sibling social support (i.e., pathways a_1 & b_1). 4c) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on caregiver life satisfaction through TD sibling social support, controlling for primary caregiver's distress (i.e., pathways a_2 & b_2).

Research Questions

Exploratory research questions were proposed in light of questions pertaining to the particular constellations of core ASD symptoms and/or child emotional and behavior problems in children with ASD as they relate to different outcomes for family members of these children. Additionally, given the limited research and mixed findings in the current literature on gender differences and differences between parent ratings and child ratings, the following exploratory research questions were proposed:

1. Which core symptoms of ASD in children with ASD are predictive of distress (e.g., depression, anxiety, stress), social support, and life satisfaction in caregivers of children with ASD, and emotional and behavioral problems, social support, and life satisfaction in TD siblings of children with ASD?
2. Which emotional and behavior problems in children with ASD are predictive of distress (e.g., depression, anxiety, stress), social support, and life satisfaction in caregivers of

children with ASD, and emotional and behavioral problems, social support, and life satisfaction in TD siblings of children with ASD?

3. Are there gender differences (female caregivers vs. male caregivers) in the caregivers' ratings of autism symptom severity, ratings of emotional and behavioral problems for children with ASD, and ratings of emotional and behavioral problems in TD siblings, as well as in their own distress, perceived social support, and life satisfaction?
4. Are there rater differences (caregiver-reported vs. self-reported) in emotional and behavioral problems and life satisfaction of TD siblings?

CHAPTER 2

METHODOLOGY

Participants

Participants for this study included 106 families of children with ASD. In order to be eligible for the present study, families must have included at least one parent/legal guardian of a target child, (i.e., a child with ASD ages 3 to 17), and one TD sibling (ages 11 to 17) who also participated in the study. The two siblings must have been fully biologically related (i.e., the siblings must have the same biological mother and biological father), and the “typically developing sibling(s)” could not have had an ASD or another developmental/intellectual disability diagnosis. Parents with multiple children with ASD between the ages of 3 and 17 years old were asked to select the oldest child. If there was more than one TD sibling that fit the eligibility requirements, parents were asked to select the TD sibling closest in age to the identified child with ASD. Two parents/legal guardians of the children were also invited to participate; however, single-caregiver families were not excluded from participation. The data from the present study were collected in conjunction with a larger study “How’s the Family? A Study of Family Communication and Coping” (IRB Protocol #: 16-002) that includes two other demographic groups with equivalent eligibility criteria: families of children with Down syndrome (DS) or intellectual disability (ID) without ASD, and families of children without disabilities.

The current sample included 106 families of children with ASD ages 3 to 17 years ($M = 11.47$, $SD = 4.00$) with at least a primary caregiver and a TD sibling ages 11 to 17 years ($M = 13.76$, $SD = 1.91$). Of the 106 families, 45 families were recruited through the IAN Research database and registry and 61 families were recruited through Qualtrics Panels. Primary caregivers ranged in age from 33 to 53 years old ($M = 41.40$, $SD = 5.12$), were 87.7% female, 84.8% Caucasian, and 77.1% married. Sixty-three percent of primary caregivers had a college degree or higher. The median income, according to primary caregivers, was \$50,000 to \$74,999. Of these 106 families, 68 families had a secondary caregiver who also participated in the study. Secondary caregivers ranged in age from 31 to 58 ($M = 42.87$, $SD = 6.91$), were 22.1% female, 82.4% Caucasian, and 94.1% married. Forty-four percent of secondary caregivers had a college degree or higher. This demographic information can be found in Table 1.

With respect to the sibling dyads, 82.1% were Caucasian, 13.2% of the siblings with ASD were female, and 52.8% of the TD siblings were female. Thirty-three percent of children with ASD were first-born children and 48.6% of TD siblings were first-born children. Of the children with ASD, 72.1% were diagnosed with autism spectrum disorder, 15.4% were diagnosed with Asperger's disorder, 3.8% were diagnosed with autistic disorder, 7.7% were diagnosed with pervasive developmental disorder, not otherwise specified (PDD-NOS), and 1.0% were diagnosed other, according to primary caregiver report. This demographic information can be found in Table 2.

Table 1

Demographic Characteristics of Primary Caregivers, Secondary Caregivers, & Household

Individual Characteristic	Primary Caregivers		Secondary Caregivers	
	<i>n</i>	%	<i>n</i>	%
Gender				
Female	93	87.7	15	22.1
Male	13	12.3	53	77.9
Race				
White	89	84.9	56	82.4
Black	5	4.8	4	5.9
Hispanic	7	6.7	5	7.4
Asian	2	1.9	2	2.9
Other	2	1.9	1	1.5
Education				
Some high school (10 th , 11 th grade)	1	0.9	1	1.5
High school graduate	12	11.3	13	19.1
Some college (1+ years) or specialized training	28	26.4	24	35.3
College/university graduate (4-year degree)	46	43.4	21	30.9
Graduate professional degree (Master's/Doctorate)	19	17.9	9	13.2
Relation to the children				
Mother	92	86.8	13	19.1
Father	13	12.3	51	75.0
Step-Mother	1	0.9	1	1.5
Step-Father	0	0.0	3	4.4
Marital Status				
Married	81	77.1	64	94.1
Separated/Divorced	10	9.6	0	0.0
Widowed	2	1.9	0	0.0
Never married/living alone	1	0.9	0	0.0
Cohabiting, but not married	11	10.5	4	5.9
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (years)	41.40	5.12	42.87	6.91
Household Characteristic				
	<i>n</i>	%		
Household income				
\$0 – \$49,999	23	23.7		
\$50,000 – \$74,999	29	29.9		
\$75,000 – \$99,999	21	21.6		
\$100,000 – \$124,999	10	10.3		
\$125,000 – \$149,999	3	3.1		
\$150,000+	11	11.3		
	<i>M</i>	<i>SD</i>		
Total people living in household	4.69	1.18		

Table 2

Demographic Characteristics of Children with ASD & TD Siblings

Characteristic	Children w/ ASD		TD Siblings	
	<i>n</i>	%	<i>n</i>	%
Gender				
Female	14	13.2	56	52.8
Male	92	86.8	50	47.2
Race				
White	87	82.1	--	--
Black	6	5.7	--	--
Hispanic	6	5.7	--	--
Asian	1	0.9	--	--
Multiracial	4	3.8	--	--
Other	2	1.9	--	--
Birth order				
First	35	33.0	51	48.6
Second	49	46.2	42	40.0
Third	15	14.2	10	9.5
Fourth	4	3.8	1	1.0
Other	3	2.8	1	1.0
Autism Spectrum Disorders diagnosis				
Autism Spectrum Disorder	75	72.1	--	--
Asperger's	16	15.4	--	--
Autistic Disorder	4	3.8	--	--
Pervasive Development Disorder – Not Otherwise Specified	8	7.7	--	--
Other	1	1.0	--	--
Professional who diagnosed child w/ ASD				
Psychologist	35	33.0	--	--
Pediatrician	21	19.8	--	--
Neurologist	16	15.1	--	--
Psychiatrist	14	13.2	--	--
Other	20	18.9	--	--
Rating of child's overall intellectual functioning				
Well below average	10	9.4	--	--
Below average	28	26.4	--	--
Average	26	24.5	--	--
Above average	22	20.8	--	--
Well above average	20	18.9	--	--
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (years)	11.47	4.00	13.76	1.91

Measures

Measures used for the present study can be found in Appendix A in the order they are discussed below, with the exception of the Strengths and Difficulties Questions (SDQ) due to measure copyrights.

Demographic Questionnaires. Prior to completing the questionnaires, parent(s)/legal guardian(s) self-identified as either a single-caregiver household or a two-caregiver household and parents/legal guardians of two-caregiver households self-identified as either the primary or the secondary caregiver/significant other, which determined the demographic questionnaires each type of participant completed. Caregivers completed brief demographic questionnaires about themselves, their oldest child with ASD, and the TD sibling closest in age to the child with ASD. Demographic questionnaires requested basic demographic information (e.g., age, gender, race), along with additional information about the family structure, household income, and education levels. Caregivers also provided diagnostic information, such as specific diagnosis received, age of diagnosis, and the type of professional who made the diagnosis.

Strengths and Difficulties Questionnaire (SDQ). The SDQ (Goodman, 1997) is a 30-item parent- and self-report measure of child behavior. There are four separate forms according to age and reporter: parent-report forms on children ages 3 and 4, ages 4 to 10, and ages 11 to 17, and a self-report form for children ages 11 to 17. Respondents rated their agreement with statements about their child's behavior/their behavior over the past six months as (0) "*Not True*," (1) "*Somewhat True*," and (2) "*Certainly True*." The SDQ includes items from five subscales: Hyperactivity-Impulsivity (e.g., "Restless, overactive, cannot stay still long"), Emotional Symptoms (e.g., "Many worries or often seems worried"), Conduct Problems (e.g., "Often lies or cheats"), Peer Problems (e.g., "Has at least one good friend"), and Prosocial Behavior

(“Considerate of other people’s feelings;” Goodman, 1997, p. 582). Each of the five subscale scores are achieved by summing the five items of that subscale, creating a score ranging from 0 to 10 (Goodman, 1997). Additionally, the subscale scores of hyperactivity, emotional symptoms, conduct problems, and peer problems can be summed to create a total difficulties score ranging from 0 to 40, with higher scores indicating greater emotional and behavioral difficulty (Goodman, 1997). According to Goodman (2001), the SDQ has adequate reliability for both parent-report and self-report versions for all subscales and the total difficulties score: Hyperactivity-Inattention (parent $\alpha = .77$, self $\alpha = .67$), Emotional Symptoms (parent $\alpha = .67$, self $\alpha = .66$), Conduct Problems (parent $\alpha = .63$, self $\alpha = .60$), Peer Problems (parent $\alpha = .57$, self $\alpha = .41$), Total Difficulties (parent $\alpha = .82$, self $\alpha = .80$), and Prosocial Behavior (parent $\alpha = .65$, self $\alpha = .66$; Goodman, 2001).

Parents/guardians completed the SDQ parent-report form on their oldest child with ASD and on the identified TD sibling closest in age to the identified child with ASD (using the age-appropriate versions for each). TD siblings completed the self-report version on themselves. The SDQ total difficulties score served as the broad measure of emotional and behavioral functioning in the children. For the current study, the SDQ total difficulties scores for the children with ASD as rated by either the primary caregivers or the secondary caregivers were used in examining the hypothesized models for the corresponding caregiver. The SDQ total difficulties score of the children with ASD, as rated by the primary caregivers, was used in examining the hypothesized models for the TD siblings. Additionally, the SDQ total difficulties scores for both children, as rated by the caregivers, were used in independent samples *t*-tests to address Research Question 3. The SDQ total difficulties scores for the TD siblings, as rated by both caregivers and self-reported by the TD sibling, were used in an ANOVA to address

Research Question 4. The SDQ subscale scores for the children with ASD as rated by either the primary caregivers or the secondary caregivers were used in regression analyses to address the caregivers' component of Research Question 2. The SDQ subscale scores for the children with ASD, as rated by the primary caregivers, and the self-reported SDQ subscale score for the TD siblings were used in regression analyses to address the TD siblings' component of Research Question 2.

Measures of internal consistency for each of the SDQ subscales and the SDQ total difficulties scale were calculated for each respondent (primary caregivers, secondary caregivers, and TD siblings) for the current sample. Alpha coefficients for the Emotional Symptoms scale were .72 for primary caregiver report of children with ASD, .72 for primary caregiver report of TD siblings, .73 for secondary caregiver report of children with ASD, .83 for secondary caregiver report of TD siblings, and .73 for TD siblings self-report. For the Conduct Problems scale, alpha coefficients were .70 for primary caregiver report of children with ASD, .67 for primary caregiver report of TD siblings, .78 for secondary caregiver report of children with ASD, .81 for secondary caregiver report of TD siblings, and .68 for TD siblings self-report. The Hyperactivity scale yielded alpha coefficients of .81 for primary caregiver report of children with ASD, .84 for primary caregiver report of TD siblings, .82 for secondary caregiver report of children with ASD, .81 for secondary caregiver report of TD siblings, and .85 for TD siblings self-report. Alpha coefficients for the Peer Problems scale were .53 for primary caregiver report of children with ASD, .61 for primary caregiver report of TD siblings, .55 for secondary caregiver report of children with ASD, .60 for secondary caregiver report of TD siblings, and .61 for TD siblings self-report. For the Prosocial Behavior scale, alpha coefficients were .73 for primary caregiver report of children with ASD, .81 for primary caregiver report of TD siblings,

.78 for secondary caregiver report of children with ASD, .81 for secondary caregiver report of TD siblings, and .72 for TD siblings self-report. The Total Difficulties scale yielded alpha coefficients of .83 for primary caregiver report of children with ASD, .84 for primary caregiver report of TD siblings, .83 for secondary caregiver report of children with ASD, .85 for secondary caregiver report of TD siblings, and .83 for TD siblings self-report. For the current study, the Total Difficulties scale of the SDQ for all three raters demonstrated good internal consistency.

Children's Social Behavior Questionnaire (CSBQ). The CSBQ (Hartman, Luteijn, Serra, & Minderaa, 2006) is a 49-item parent-report measure of autism symptom severity refined from the original 96-item version (Luteijn, Jackson, Volkmar, & Minderaa, 1998; Luteijn, Luteijn, Jackson, Volkmar, & Minderaa, 2000). The CSBQ includes items for six subscales: Behavior/emotions not optimally tuned to the social situation (e.g., "Quickly gets angry"), Reduced contact and social interest (e.g., "Makes little eye contact"), Orientation problems in time, place, or activity (e.g., "Does things without realizing the aim"), Difficulties in understanding social information (e.g., "Takes things literally"), Stereotyped behavior (e.g., "Flaps arms/hands when excited"), and Fear of and resistance to changes (e.g., "Opposes change;" Hartman et al., 2006, p. 335-336). Parents/guardians rated their agreement with each statement regarding their child's behavior over the previous two months as (0) "*does not apply*," (1) "*sometimes or somewhat applies*," or (2) "*clearly or often applies*," with scores ranging from 0 to 98 and higher scores indicating greater ASD symptom severity (Hartman et al., 2006). According to Hartman et al. (2006) the total scale of the CSBQ and all six subscales have demonstrated sufficient internal consistency, inter-rater reliability, and test-retest reliability: total scale ($\alpha = .94$, ICC = .86, $r = .90$), "behavior/emotions not optimally tuned to the social situation" ($\alpha = .90$, ICC = .89, $r = .89$), "reduced contact and social interest" ($\alpha = .85$, ICC = .79,

$r = .88$), “orientation problems in time, place, or activity” ($\alpha = .84$, $ICC = .81$, $r = .82$), “difficulties in understanding social information” ($\alpha = .85$, $ICC = .87$, $r = .80$), “stereotyped behaviors” ($\alpha = .76$, $ICC = .75$, $r = .80$), and “fear of and resistance to changes” ($\alpha = .85$, $ICC = .80$, $r = .83$; Hartman et al., 2006).

Parents/guardians completed a CSBQ on their child with an ASD and on the identified TD sibling. The CSBQ served as a measure of autism symptom severity in the two children and was used as a proxy for assessing broader autism phenotype (BAP) in the TD siblings. For the current study, the CSBQ total scores for the children with ASD as rated by either the primary caregivers or the secondary caregivers were used in examining the hypothesized models for the corresponding caregiver. The CSBQ total score of the children with ASD, as rated by the primary caregivers, was used in examining the hypothesized models for the TD siblings. The CSBQ total score for TD siblings as rated by either the primary caregivers or the secondary caregivers were used as a proxy for BAP in the TD siblings and included in corresponding analyses as a covariate when indicated. The CSBQ subscale scores for the children with ASD as rated by either the primary caregivers or the secondary caregivers were used in regression analyses to address the caregivers’ component of Research Question 1. The CSBQ subscale scores for the children with ASD, as rated by the primary caregivers, was used in regression analyses to address TD siblings’ component of Research Question 1.

Internal consistency coefficients for each of the CSBQ subscales and the CSBQ total scale were calculated for the primary caregivers and secondary caregivers for the present sample. Alpha coefficients for the “Behavior/emotions not optimally tuned to the social situation” scale were .88 for primary caregiver report of children with ASD and .89 for secondary caregiver report of children with ASD. For the “Reduced contact and social interest” scale, alpha

coefficients were .86 for primary caregiver report of children with ASD and .88 for secondary caregiver report of children with ASD. The “Orientation problems in time, place, or activity” scale yielded alpha coefficients of .87 for primary caregiver report of children with ASD and .86 for secondary caregiver report of children with ASD. Alpha coefficients for the “Difficulties in understanding social information” scale were .76 for primary caregiver report of children with ASD and .84 for secondary caregiver report of children with ASD. For the “Stereotyped behavior” scale, alpha coefficients were .84 for primary caregiver report of children with ASD and .87 for secondary caregiver report of children with ASD. Alpha coefficients for the “Fear of and resistance to changes” scale were .75 for primary caregiver report of children with ASD and .74 for secondary caregiver report of children with ASD. The CSBQ total scale yielded alpha coefficients of .93 for primary caregiver report of children with ASD, .90 for primary caregiver report of TD siblings, .95 for secondary caregiver report of children with ASD, and .96 for secondary caregiver report of TD siblings, all of which are considered to demonstrate excellent internal consistency.

Depression, Anxiety, and Stress Scale – 21 (DASS-21). The DASS-21 is the short, 21-item version of the 42-item self-report DASS questionnaire measuring depression, anxiety, and stress (Lovibond & Lovibond, 1995a). The DASS-21 consists of three subscales with seven items per subscale: Depression (e.g., “I felt I had nothing to look forward to”), Anxiety (e.g., “I felt I was close to panic”), and Stress (e.g., “I found it hard to wind down;” Antony, Bieling, Cox, Enns, & Swinson, 1998, p. 179). Respondents rated how much each statement applied to them over the past week using a 4-point Likert scale from (0) “*Did not apply to me at all*” to (3) “*Applied to me very much, or most of the time*” (Lovibond & Lovibond, 1995a). The three subscales of the DASS-21 have shown sufficient internal consistency: depression ($\alpha = .94$),

anxiety ($\alpha = .87$), and stress ($\alpha = .91$; Antony et al., 1998). The total score on the DASS-21 ranges from 0 to 63 and subscale scores range from 0 to 21, with higher scores indicating greater distress (Antony et al., 1998; Lovibond & Lovibond, 1995a). Additionally, the total score and total subscale scores on the DASS-21 may be doubled to allow for comparisons to scores on the original 42-item DASS (Antony et al., 1998), yielding total scores ranging from 0 to 126 for the total score and 0 to 42 for the subscale scores. Parents/guardians completed the DASS-21 on themselves. The DASS-21 total score (doubled) provided the measure of the overall distress experienced by the parents for the present study. Measures of internal consistency for the DASS-21 total scale were calculated for the primary and secondary caregivers for the current sample. Alpha coefficients for the DASS-21 total scale were .94 for both primary and secondary caregivers. For the current study, the DASS-21 total scale yielded good to excellent internal consistency.

Satisfaction with Life Scale (SWLS). The SWLS (Diener et al., 1985) is a brief 5-item self-report measure of overall life satisfaction. Respondents were asked to rate the extent to which they agreed with statements, such as “The conditions of my life are excellent,” using a 7-point Likert scale from (1) “*Strongly Disagree*” to (7) “*Strongly Agree*” (Diener et al., 1985). The 5 items are summed to create a total score ($\alpha = .87$; Diener et al., 1985) ranging from 5 to 35, with higher scores indicating greater overall life satisfaction (Diener et al., 1985). Additionally, Pavot and Diener (1993) reviewed the internal consistency of numerous studies that used the SWLS and reported coefficient alphas between .79 and .89 and provided evidence for construct validity. Parents/guardians completed the SWLS on themselves. The SWLS provided the measure of the level of overall life satisfaction experienced by the parents/guardians in the current study. The current sample yielded internal consistency estimates of .91 for

primary caregivers and .89 for secondary caregivers for the SWLS total scale, thus demonstrating good to excellent internal consistency.

Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS). The BMSLSS (Seligson, et al., 2003) is a 6-item self-report measure of life satisfaction including ratings about the individual's satisfaction with family, friendships, school experience, self, and the living environment. The BMSLSS also includes a question about the individual's overall life satisfaction (Seligson et al., 2003). Respondents were asked to rate their satisfaction with each item, such as "I would describe my satisfaction with my family life as" using a 7-point Likert scale from (1) "*Terrible*" to (7) "*Delighted*" (Seligson et al., 2003, p. 127). The 5 domain items are summed to create a general life satisfaction score ($\alpha = .75$; Seligson et al., 2003), with higher scores indicating greater life satisfaction (Seligson et al., 2003). The mean of the BMSLSS total score is then computed in order to be able to interpret the BMSLSS total score using the anchors from the measure's 7-point Likert scale (i.e., 1 = Terrible, 2 = Unhappy, 3 = Mostly Dissatisfied, 4 = Mixed, 5 = Mostly Satisfied, 6 = Pleased, 7 = Delighted; Seligson et al., 2003). For the purposes of this study, parents/guardians completed the BMSLSS on the identified TD sibling and TD siblings completed this measure on themselves. The TD siblings' self-reported BMSLSS total mean score served as the measure of overall life satisfaction experienced by the TD siblings. The BMSLSS total mean scores for TD siblings, as rated by both caregivers and self-reported by the TD sibling, were used in an ANOVA to address Research Question 4. Alpha coefficients for the BMSLSS total scale were .79 for primary caregiver report of TD siblings, .77 for secondary caregiver report of TD siblings, and .77 for TD siblings self-report, thus demonstrating acceptable internal consistency for all raters in the current sample.

Multidimensional Scale of Perceived Social Support (MSPSS). The MSPSS (Zimet, Dahlem, Zimet, & Farley, 1988) is a 12-item self-report measure of perceived social support from three sources: family, friends, and significant others. Respondents were asked to rate the extent to which they agree with each statement, such as “My family really tries to help me” using a 7-point Likert scale from (1) “*Very Strongly Disagree*” to (7) “*Very Strongly Agree*” (Zimet et al., 1988, p. 35). The MSPSS yields three subscale scores, one for each source of support, as well as a total score, with higher scores indicating greater perceived social support. The means of the MSPSS subscale scores and the MSPSS total score can be computed in order to be able to interpret the MSPSS using the response descriptors as a guide (e.g., 1 to 2.9 = low support, 3 to 5 = moderate support, 5.1 to 7 = high support; Zimet et al., 1988). According to Zimet et al. (1988) the Significant Other ($\alpha = .91$), the Family ($\alpha = .87$), and the Friends ($\alpha = .85$) subscales as well as the total score ($\alpha = .88$) have all demonstrate adequate internal reliability. Parents/guardians and TD siblings each completed this measure about themselves. The mean of the MSPSS total score served as a measure of perceived social support for each family member.

Internal consistency coefficients for each of the MSPSS total scale were calculated for the primary caregivers, the secondary caregivers, and TD siblings for the present sample. Alpha coefficients for the MSPSS total scale were .96 for primary caregivers, .94 for secondary caregivers, and .92 for TD siblings, demonstrating excellent internal consistency for each rater in the current sample.

Procedures

Recruitment. Approval from The University of Alabama Institutional Review Board was obtained prior to recruitment and data collection for the present study, and participation in the current study was confidential and voluntary. Participants were recruited with the assistance

of the Interactive Autism Network (IAN) Research database and registry at the Kennedy Krieger Institute (KKI), Baltimore, Maryland and Qualtrics Panels, an online recruitment service. IAN Research participants and participants of Qualtrics Panels must have received a professional diagnosis of autism spectrum disorder per parent report. Families in these databases were recruited through general advertisements and emails.

IAN is a partnership of the Kennedy Krieger Institute and the Simons Foundation. The IAN Research database and registry recruits eligible research participants for studies of ASD via email. Since the start of IAN Research in April 2007, approximately 60,000 individuals have consented to join IAN Research, with approximately 25,000 of those being individuals diagnosed with ASD. With respect to diagnostic verification for IAN Research, parent report of ASD diagnosis has been clinically validated (Lee et al., 2010; Marvin et al., 2014) and ASD diagnoses are also verified by a review of records provided by parents and professionals (Daniels et al., 2012). A professional diagnosis of ASD must be received to be considered a proband. IAN Research is utilized by family members and individuals impacted by ASD in order to share information via an online format, as well as researchers who may apply to access existing data or recruit research participants for new studies. To date, IAN Research has assisted with recruitment and/or data services for over 500 research studies. The Johns Hopkins Medicine IRB (NA_00002750; PI: Dr. Paul H. Lipkin) oversees IAN Research. For recruitment of the present study, members of the IAN Research database and registry received a general advertisement with information about the current study, including eligibility requirements, study requirements, and participant payment. The family member could then indicate if their family was interested in participating in the current study. If the family member indicated they were interested in the study, they completed a participant contact form and those who met the

eligibility requirements were sent the invitation to participate with instructions and the appropriate survey links.

Qualtrics Panels is an online research recruitment service that works with sample providers to provide respondents based on the needs of a research project (Qualtrics, 2018). Researchers are partnered with a Qualtrics project manager who explores panel options based on target demographics and the eligibility criteria for the study (Brandon, Long, Lorass, Mueller-Phillips, & Vansant, 2014). Qualtrics uses the researcher's requested sample size, target demographics and eligibility requirements, survey complexity, and length of survey to build the panel of potential study participants (Brandon et al., 2014). The International Organization for Standardization (2009) provided a definition of an online panel as "a sample database of potential respondents who declare they will cooperate in future [online] data collection if selected" and the definition of a panel member as an "individual recruited from a documented source who has provided data and appropriate information for validation of identity, given explicit consent to participate in research surveys according to the terms and conditions of panel membership and not opted out" (ISO 26362: Access Panel in Market, Opinion, and Social Research, para. 5). The current study used Qualtrics Panels to recruit participants such that panel members were first sent an initial inquiry to collect eligibility data. Eligible participants were then sent an invitation to participate with instructions and the appropriate survey links.

Data collection. Participants were asked to complete the survey online or a paper and pencil version of the survey. After expressing interest in the study, caregivers were sent an instructional email that contained a separate link for each family member to a secure online survey site to complete the measures. In order to identify participants within the same family and maintain confidentiality, each family was given a randomly generated 4-digit "family code"

that was entered by each participant after informed consent/assent was attained and before beginning the surveys. Additionally, these codes were used to link completed surveys to the payment of participants. However, if a participant preferred a paper packet or had difficulty with access to the Internet, a paper packet of the measures was mailed to them. For paper packets, families were given a randomly generated 4-digit “family code” that was written on their paper packets by the researchers prior to mailing the paper packets to the families. Each family was given a separate envelope in which participating siblings could insert their survey responses and seal (in order to protect confidentiality) prior to parents returning their survey packets. Additionally, these codes were used to link completed surveys to the payment of participants.

Participants were asked to complete all measures. Parent/guardian consent and TD sibling assent were obtained electronically (or via signed consent/assent forms if participants completed paper surveys) prior to completion of measures. Each caregiver (both parents/guardians, when applicable) completed a brief demographic form, the Strengths and Difficulties Questionnaire (SDQ) on each child (i.e., child with ASD and TD sibling), and the Children’s Social Behavior Questionnaire (CSBQ) on each child (i.e., child with ASD and TD sibling), and the Brief Multidimensional Students’ Life Satisfaction Scale (BMSLSS) on the TD sibling. They also completed the Depression Anxiety and Stress Scale (DASS), the Satisfaction with Life Scale (SWLS), and the Multidimensional Scale of Perceived Social Support (MSPSS) on themselves. Each TD sibling completed the SDQ, the BMSLSS, and the MSPSS on themselves. Instructions on which participant should complete each measure and the individual the participant should refer to was included at the beginning of every questionnaire. Additionally, other measures were completed by participants as part of the larger project (“How’s the Family? A Study of Family Communication and Coping”).

Depending on how they were recruited, participants received either a \$15 gift card to a national retailer or online currency (i.e., “Swagbucks”) that could be applied to gift cards following participation.

Data Analysis Plan

Descriptive analyses were conducted to examine means, standard deviations, skew, and kurtosis of all study variables, as well as correlations among variables. Demographic variables (e.g., family income, family size) and BAP of the TD siblings were correlated with the mediator and outcome variables of the parallel mediation models, and any demographic variables and/or BAP found to relate at the $p < .05$ level served as covariates in the appropriate analyses.

The bivariate correlations (Hypotheses 1 & 3) were examined using IBM SPSS Statistics 24 (IBM Corp., 2016) and IBM SPSS Statistics 25 (IBM Corp., 2017). Moving beyond simple relations between predictor variables and outcomes variables, exploring mediator variables allows researchers to answer questions of “how” predictors exert their effect on outcomes (Hayes, 2013, 2018). Parallel mediation models provide researchers with the ability to explore multiple mediating influences simultaneously, with the multiple mediators allowed to correlate but no mediator is hypothesized to ‘causally’ influence another mediator (Hayes, 2013, 2018). As is the nature of cross-sectional study designs, true cause-and-effect relations cannot be examined, however, Hayes (2013, 2018) argues that mediation analyses can be conducted to examine ‘theoretical causation’ as long as the results are interpreted with the appropriate limitations and caveats given the research design. Furthermore, parallel mediation has several advantages over simple mediation, including being able to investigate more complex models and theories, providing a potential power boost for testing indirect effects, and being able to compare the sizes of indirect effects through different mediators (Hayes, 2013, 2018).

The parallel mediation models (Hypothesis 2 [caregivers] and Hypothesis 4 [TD siblings]) were examined using PROCESS, a computational tool for SPSS that allows for the examination of indirect effects via bootstrapping techniques and produces bias-corrected 95% confidence intervals around the indirect effects (Hayes, 2013, 2018). For Hypothesis 2, in four separate parallel mediation models, autism symptom severity *and* child behavior problems of the child with ASD served as individual predictor variables (X), caregiver distress served as one parallel mediator variable (M₁), caregiver social support served as the other parallel mediator variable (M₂), and caregiver life satisfaction served as the outcome variable (Y; see Figures 1 & 2). For these parallel mediation models, primary caregivers and secondary caregivers were examined in two separate models. For Hypothesis 4, in two separate parallel mediation models, autism symptom severity *and* child behavior problems of the child with ASD served as individual predictor variables (X), caregiver distress served as one parallel mediator variable (M₁), TD sibling social support served as the other parallel mediator variable (M₂), and TD sibling life satisfaction served as the outcome variable (Y; see Figures 3 & 4). Using PROCESS (Hayes, 2013, 2018), R^2 values were interpreted to determine the variance in the mediator variables (M₁ & M₂) explained by the predictor variables (X). Additionally, R^2 values were interpreted to determine the variance in the outcome variables (Y) explained by the predictor variables (X) and two mediator variables (M₁ & M₂). The significance of the three best fitting ordinary least squares (OLS) regression models that define each of the parallel mediation models were interpreted via F -statistics and p -values ($p < .05$). The indirect effects of the predictor variables (X) on the outcomes variables (Y) through the mediator variables (M₁ & M₂) were estimated as a_1b_1 and a_2b_2 , and the significance of these indirect effects was determined by examining the bootstrap confidence intervals around the point estimates of each specific indirect

effect. If the bootstrap confidence interval did not contain zero then there was evidence that the predictor variable affects the outcome variable through the mediator variable (Hayes, 2013, 2018).

The Research Questions were examined via multiple regression analyses, independent samples *t*-tests, and analysis of variance (ANOVA) tests. Particular constellations of ASD core symptoms and/or child emotional and behavior problems in children with ASD were examined as predictors of parent outcomes and outcomes for TD siblings (Research Questions 1 & 2) using multiple regression analyses. Specifically, the six subscales of the CSBQ, which represent the core ASD symptoms, served as the predictor variables (*X*) in the nine multiple regression analyses, with outcomes for parents (e.g., distress), outcomes for TD siblings (e.g., emotional and behavioral problems), and outcomes for both (e.g., social support and life satisfaction) serving as criterion variables (*Y*) in the analyses. The four subscales of the total difficulties score of the SDQ, which represent emotional and behavior problems of children with ASD, as well as the prosocial behavior subscale of the SDQ, served as the predictor variables (*X*) in the nine multiple regression analyses examining outcomes for family members of children with ASD (*Y*). All six subscales of the CSBQ were examined together as predictors of outcome, and in separate analyses the five subscales of the SDQ were examined together as predictors of outcome. As Research Questions 1 and 2 both focus on investigating which ASD core symptoms and/or child emotional and behavior problems in children with ASD as predictors of parent outcomes and outcomes for TD siblings, the forced entry (Enter) method of multiple regression was used. More specifically, all the subscales of the CSBQ and SDQ were entered simultaneously into their respective multiple regression analyses as predictors of outcomes for family members of children with ASD. Regarding interpretation of results, R^2 values were

examined to determine the variance in outcome variables (Y) explained by the predictor variables (X), and the significance of these regressions will be interpreted via *F*-statistics and *p*-values ($p < .05$). Additionally, standardized beta values (β) and associated *t*-statistic and *p*-values ($p < .05$) will be examined to determine the ‘importance’ and significance of individual predictors in the overall regression models.

Prior to conducting the multiple regression analyses, the correlations among the subscales of the CSBQ and the correlations among the subscales of the SDQ were examined for any highly correlated variables (e.g., correlations above .80) as a first step to identifying any possible multicollinearity (Field, 2009). Although assessing for multicollinearity among predictor variables should be completed for all multiple regression analyses (Field, 2009), previous research has found correlations among the subscales of the CSBQ and the SDQ to be below .80. For example, Hartman et al. (2000) reported significant correlations among the six subscales of the CSBQ ranging from .32 to .59. With respect to the SDQ, research has found correlations among the subscales of the parent-reported SDQ ranging from .17 to .52 (Goodman, 2001; Hawes & Dadds, 2004; Muris, Meesters, & van den Berg, 2003), and correlations among the subscales of the self-reported SDQ ranging from .19 to .53 (Goodman, 2001; Muris et al., 2003). Therefore, the current study expected to find similar correlation values among the subscales of the CSBQ and SDQ to previous research, which generally indicates that multicollinearity among these subscales likely will not be present. However, possible multicollinearity was further assessed by examining values of two collinearity diagnostics for values of concern: variance inflation factor (VIF) and tolerance. Values equal to or greater than 10 for the VIF and values less than .1 for the tolerance statistics are often cited as cutoff values of concern for multicollinearity (Field, 2009). Issues of multicollinearity were not found in the present study,

the data supported analyses of the subscales of the CSBQ and/or subscales of the SDQ as simultaneous predictors (see Results section for details).

Group differences (i.e., Research Questions 3 & 4) were examined via independent samples *t*-tests and ANOVA tests. Specifically, for Research Question 3, group differences between female caregivers and male caregivers with respect to ratings of ASD symptom severity, ratings of behavioral difficulties for the child with ASD, and ratings of emotional and behavioral adjustment in TD siblings were examined via independent samples *t*-tests. Additionally, for Research Question 3, group differences between female caregivers and male caregivers with respect to ratings of parental distress, perceived social support, and life satisfaction were examined via independent samples *t*-tests. Significance of independent samples *t*-tests were determined by the *t*-statistic and *p*-values ($p < .05$). For Research Question 4, group differences between caregiver-reported (i.e., primary caregiver and secondary caregiver) and self-reported (i.e., TD sibling) emotional and behavioral adjustment and life satisfaction of TD siblings were explored via ANOVA, with subsequent post-hoc tests, determined based on factors present in the data (e.g., control over familywise error rate, statistical power, and group sample sizes; Field, 2009), for any significant group differences. Significant group differences were determined via the *F*-statistics and *p*-values ($p < .05$) for the overall ANOVA analyses, and significance of specific mean differences were determined via *p*-values ($p < .05$).

Power analysis. A post hoc power analysis using the program G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) was conducted to estimate the power of the current study's sample size to detect a moderate effect size for the proposed parallel mediation models. Using the statistical test for linear multiple regression, fixed model, R^2 increase, with the following parameters, an estimated moderate effect size (*Cohen's* $f^2 = .15$), an alpha of .05, a total sample

size of 106, three tested predictors and five total predictors, the estimated power was calculated to be approximately 0.92.

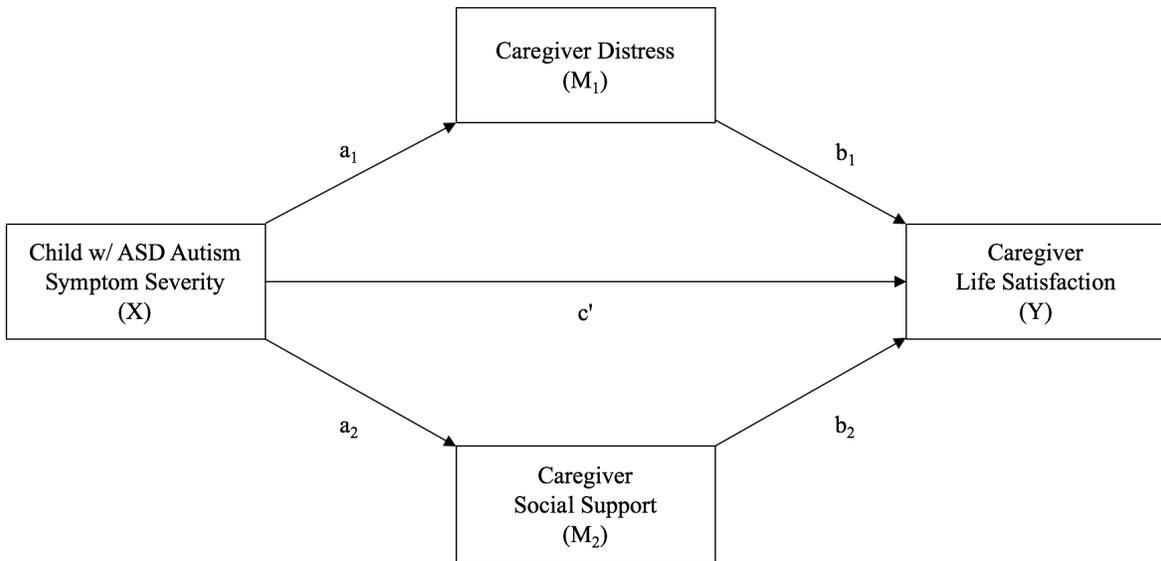


Figure 1. Parallel mediation model for caregivers (primary and secondary caregivers) with autism symptom severity of the child with ASD as the predictor variable.

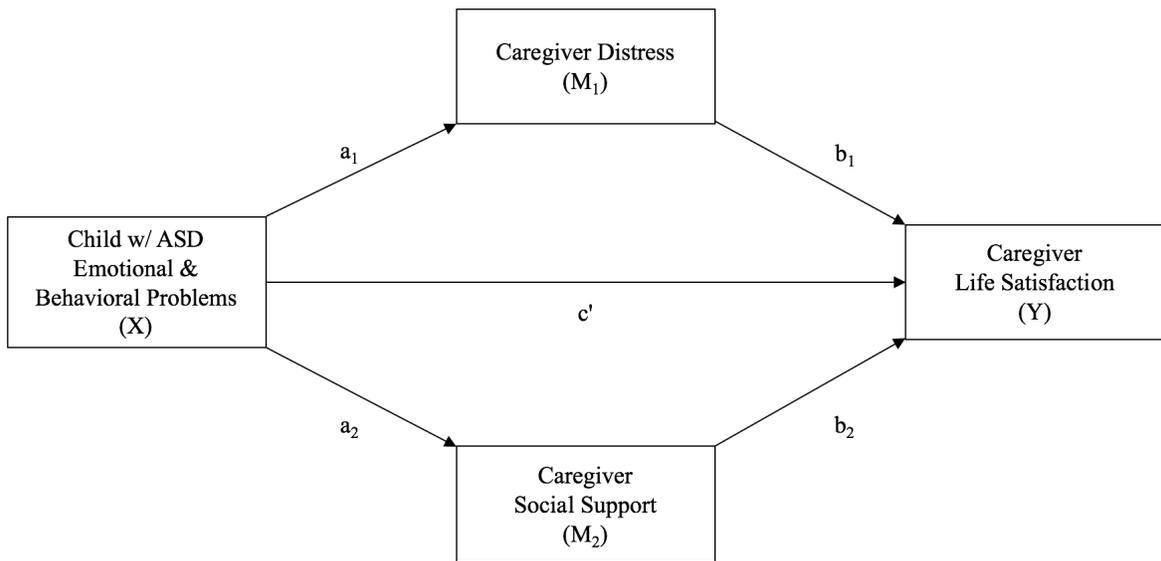


Figure 2. Parallel mediation model for caregivers (primary and secondary caregivers) with emotional and behavioral problems of the child with ASD as the predictor variable.

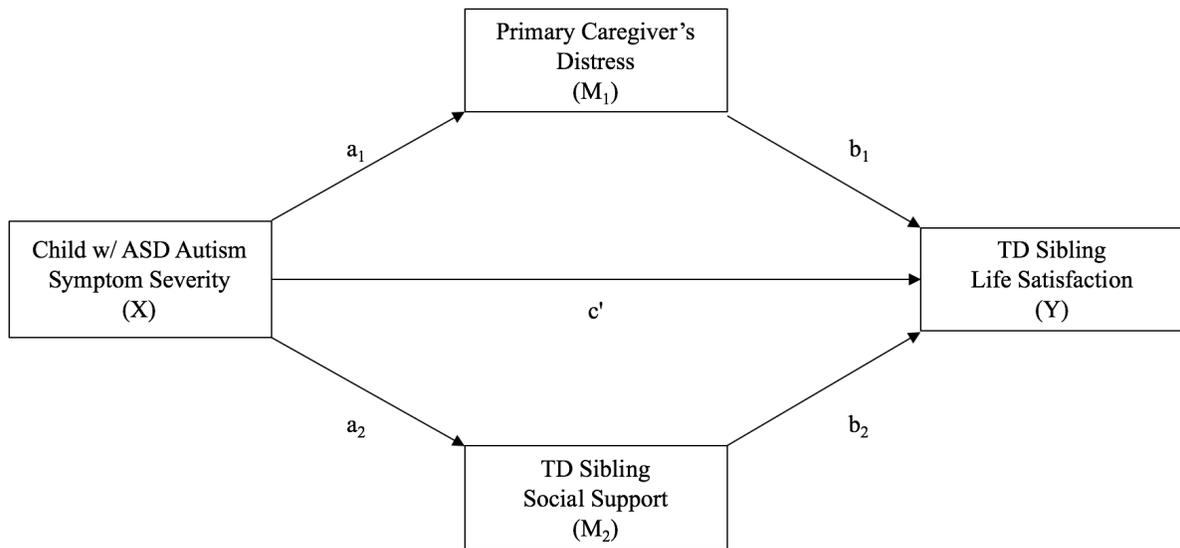


Figure 3. Parallel mediation model for TD siblings with autism symptom severity of the child with ASD as the predictor variable.

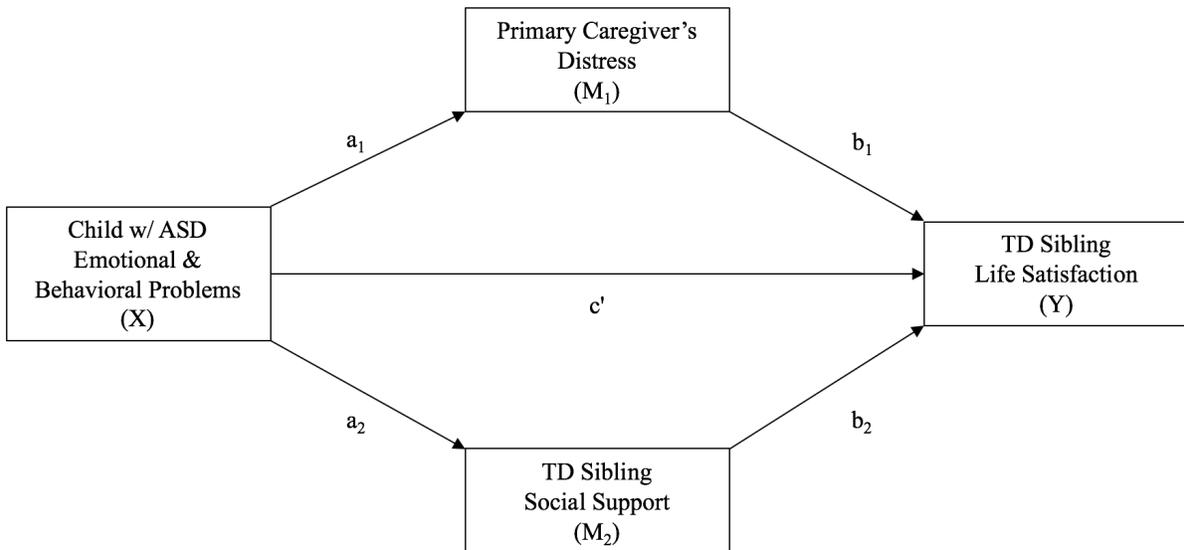


Figure 4. Parallel mediation model for TD siblings with emotional and behavioral problems of the child with ASD as the predictor variable.

CHAPTER 3

RESULTS

Prior to conducting statistical analyses to examine the hypotheses of this study, all study variables for primary caregivers, secondary caregivers, and TD siblings were examined descriptively (e.g., mean, standard deviation, skewness, kurtosis, and range; see Tables 3, 4, 5). All data were examined for any irregularities, significant outliers, and z -score values greater than ± 2.5 suggesting either skewness or kurtosis. The CSBQ total score for children with ASD, the SDQ total score for children with ASD, the MSPSS total mean score, and the SWLS total score as rated by primary caregivers were all consistent with symmetrical and mesokurtic distributions (see Table 3). However, the CSBQ total score for TD siblings ($z = 3.96$), the SDQ total for TD siblings ($z = 4.62$), and the DASS total score ($z = 4.45$) as rated by primary caregivers were each found to be consistent with positively skewed, but mesokurtic distributions. Nevertheless, given the large sample size ($n = 106$) and the mesokurtic shape of these distributions, it was determined that the distributions of the CSBQ total for TD siblings, the SDQ total for TD siblings, and the DASS total score for primary caregivers were appropriate for use in parametric tests. Specifically, the sampling distribution of large samples tends to be normal regardless of the shape of the data distributions collected (e.g., central limit theorem), significance tests of skewness and kurtosis should be interpreted with caution with larger sample sizes, and only severe violations of normality assumptions typically impact the validity of statistical inferences of large samples (Field, 2009; Hayes, 2018). Additionally, the parallel mediation models in PROCESS use bootstrapping, a resampling technique, which does not make assumptions about

the normality of the sampling distribution and bootstrapped confidence intervals often yield more accurate inferences with respect to hypothesis testing (Field, 2009; Hayes, 2018). As shown by Table 4, for secondary caregivers, CSBQ total score for children with ASD, the SDQ total score for children with ASD, and the SWLS total score were all consistent with symmetrical and mesokurtic distributions. However, the CSBQ total for TD siblings and the DASS total score as rated by secondary caregivers were each found to be consistent with a positively skewed ($z = 8.92; 6.04$, respectively) and leptokurtic distribution ($z = 18.24; 6.20$, respectively).

Additionally, the SDQ total score for TD siblings as rated by the secondary caregiver was found to be consistent with a positively skewed ($z = 3.97$), but mesokurtic distribution, and the MSPSS total mean score was found to be consistent with a slightly negatively skewed ($z = -2.72$), but mesokurtic distribution.

Upon further examination of the CSBQ total for TD siblings, three outliers were identified using the boxplots from SPSS, which defines outliers as values more than 1.5 interquartile ranges from the end of the box (IBM SPSS, 2016). This variable was winsorized, meaning that the outliers were replaced with the next highest score, which resulted in a less positively skewed ($z = 2.81$) and mesokurtic ($z = -0.48$) distribution. The CSBQ total for TD siblings transformed score was used in all subsequent analyses. Upon further examination of the DASS total, three outliers were identified using the boxplots from SPSS, and this variable was winsorized, meaning that the outliers were replaced with the next highest score, which resulted in a less positively skewed ($z = 3.47$) and mesokurtic ($z = 0.54$) distribution. The DASS total transformed score was used in all subsequent analyses. Given the sample size ($n = 68$) and the mesokurtic shape of these distributions it was determined that the distributions of the winsorized CSBQ total for TD siblings, the SDQ total for TD siblings, the MSPSS total mean score, and the

winsorized DASS total score for primary caregivers were appropriate for use in parametric tests, based on the central limit theorem and simulation research (Field, 2009; Hayes, 2018).

Additionally, as mentioned above, the parallel mediation models in PROCESS use bootstrapping, which does not make assumptions about the normality of the sampling distribution (Field, 2009; Hayes, 2018).

As shown by Table 5, TD siblings' self-reported BMSLSS total mean score was consistent with a symmetrical and mesokurtic distribution. However, their self-reported SDQ total score was consistent with a positively skewed ($z = 3.32$), but mesokurtic distribution, and their MSPSS total mean score was found to be consistent with a negatively skewed ($z = -5.23$) and leptokurtic distribution ($z = 4.85$). Upon further examination of the MSPSS total mean score, three outliers were identified using the boxplots from SPSS, and this variable was winsorized, meaning that the outliers were replaced with the next highest score, which resulted in less negatively skewed ($z = -2.69$), but mesokurtic distribution. The MSPSS total mean transformed score was used in all subsequent analyses. Given the large sample size ($n = 106$) and the mesokurtic shape of these distributions, it was determined that the distributions of the self-reported SDQ total score and the winsorized MSPSS total mean score were appropriate for use in parametric tests, based on the central limit theorem and simulation research (Field, 2009; Hayes, 2018). Again, the parallel mediation models in PROCESS use bootstrapping, which does not make assumptions about the normality of the sampling distribution (Field, 2009; Hayes, 2018). Next, the correlations among key study variables for each participant group (e.g., primary caregivers, secondary caregivers, TD siblings) were analyzed using Pearson correlation coefficients (see Tables 3, 4, 5). Correlations related to the main hypotheses will be discussed in further detail when examining the results of the hypotheses tested.

Table 3

Correlations Among Study Variables and Descriptive Statistics as Reported by Primary Caregivers

Construct	1	2	3	4	5	6	7
1. ASD Symp. Sev. – Child w/ ASD	--	.16	.74***	.06	.33**	-.03	-.12
2. ASD Symp. Sev. – TD Sibling		--	.11	.72***	.001	-.15	-.05
3. Bhv./Emo. Probs. – Child w/ ASD			--	-.01	.36***	-.14	-.17†
4. Bhv./Emo. Probs. – TD Sibling				--	.04	-.26**	-.13
5. Distress					--	-.43***	-.59***
6. Social Support						--	.60***
7. Life Satisfaction							--
Descriptive Statistics	1	2	3	4	5	6	7
Valid <i>N</i>	106	106	106	106	106	106	106
Mean	48.49	10.34	19.32	7.98	30.07	5.23	22.13
Standard Deviation	17.67	9.01	7.00	5.89	23.75	1.31	7.10
<i>Z</i> _{skewness}	0.08	3.96	-0.06	4.62	4.45	-2.89	-1.75
<i>Z</i> _{kurtosis}	-0.06	0.37	-1.11	2.09	1.21	-0.62	-1.09
Potential Range of Scores	0 – 98	0 – 98	0 – 40	0 – 40	0 – 126	1 – 7	0 – 35
Actual Range of Scores	6 – 97	0 – 37	2 – 35	0 – 27	0 – 102	1.58 – 7	5 – 35

Note. ASD Symp. Sev. = ASD symptom severity as measured by the CSBQ (Children’s Social Behavior Questionnaire); Child w/ ASD = caregiver-report about child with ASD; TD Sibling = caregiver-report about TD sibling; Bhv./Emo. Probs. = behavioral and emotional problems as measured by the SDQ (Strengths and Difficulties Questionnaire); Distress = self-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); Social Support = self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); Life Satisfaction = self-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); *Z*_{skewness} = *z*-score for skewness (skewness/standard error of skewness); *Z*_{kurtosis} = *z*-score for kurtosis (kurtosis/standard error of kurtosis).

† *p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Table 4

Correlations Among Study Variables and Descriptive Statistics as Reported by Secondary Caregivers

Construct	1	2	3	4	5	6	7
1. ASD Symp. Sev. – Child w/ ASD	--	.09	.70***	-.07	.32**	-.04	-.09
2. ASD Symp. Sev. – TD Sibling		--	-.01	.68***	.19	.09	.12
3. Bhv./Emo. Probs. – Child w/ ASD			--	-.09	.18	-.03	-.02
4. Bhv./Emo. Probs. – TD Sibling				--	.10	.09	.11
5. Distress					--	-.32**	-.50***
6. Social Support						--	.60***
7. Life Satisfaction							--
Descriptive Statistics	1	2 ^a	3	4	5 ^a	6	7
Valid <i>N</i>	68	68	68	68	68	68	68
Mean	48.32	12.53	18.18	8.46	20.65	5.51	24.21
Standard Deviation	19.53	10.60	6.90	6.22	17.54	1.08	6.73
<i>Z</i> _{skewness}	0.81	2.81	1.83	3.97	3.47	-2.72	-1.71
<i>Z</i> _{kurtosis}	0.10	-.048	0.18	2.89	0.54	1.04	-0.93
Potential Range of Scores	0 – 98	0 – 98	0 – 40	0 – 40	0 – 126	1 – 7	0 – 35
Actual Range of Scores	4 – 98	0 – 36	5 – 38	0 – 29	0 – 64	2.17 – 7	9 – 35

Note. ASD Symp. Sev. = ASD symptom severity as measured by the CSBQ (Children’s Social Behavior Questionnaire); Child w/ ASD = caregiver-report about child with ASD; TD Sibling = caregiver-report about TD sibling; Bhv./Emo. Probs. = behavioral and emotional problems as measured by the SDQ (Strengths and Difficulties Questionnaire); Distress = self-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); Social Support = self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); Life Satisfaction = self-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); *Z*_{skewness} = *z*-score for skewness (skewness/standard error of skewness); *Z*_{kurtosis} = *z*-score for kurtosis (kurtosis/standard error of kurtosis).

^aDescriptive statistics are for winsorized variables.

[†]*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Table 5

Correlations Among Study Variables and Descriptive Statistics for Typically Developing Siblings

Construct	1	2	3	4	5	6	7	8
1. ASD Symp. Sev. – Ch. w/ ASD (PC)	--	.16	.74***	.06	.17 [†]	.33**	-.23*	-.14
2. ASD Symp. Sev. – TD Sib. (PC)		--	.11	.72***	.47***	.001	-.32**	-.24*
3. Bhv./Emo. Probs. – Ch. w/ ASD (PC)			--	-.01	.07	.36***	-.17 [†]	-.23*
4. Bhv./Emo. Probs. – TD Sib. (PC)				--	.66***	.04	-.35***	-.30**
5. Bhv./Emo. Probs. – TD Sib. (SR)					--	.05	-.30**	-.42***
6. Distress (PC)						--	-.12	-.16
7. Social Support (SR)							--	.61***
8. Life Satisfaction (SR)								--
Descriptive Statistics	1	2	3	4	5	6	7 ^a	8
Valid <i>N</i>	106	106	106	106	106	106	106	106
Mean	48.49	10.34	19.32	7.98	9.44	30.07	5.93	5.45
Standard Deviation	17.67	9.01	7.00	5.89	5.86	23.75	0.77	0.84
<i>Z</i> _{skewness}	0.08	3.96	-0.06	4.62	3.32	4.45	-2.69	-0.93
<i>Z</i> _{kurtosis}	-0.06	0.37	-1.11	2.09	-0.08	1.21	-0.28	-1.17
Potential Range of Scores	0 – 98	0 – 98	0 – 40	0 – 40	0 – 40	0 – 126	1 – 7	1 – 7
Actual Range of Scores	6 – 97	0 – 37	2 – 35	0 – 27	1 – 27	0 – 102	4.08 – 7	3.40 – 7

Note. ASD Symp. Sev. = ASD symptom severity as measured by the CSBQ (Children's Social Behavior Questionnaire); Ch. w/ ASD (PC) = primary caregiver report about child with ASD; PC = primary caregiver; TD Sib. (PC) = primary caregiver report about TD sibling; Bhv./Emo. Probs. = behavioral and emotional problems as measured by the SDQ (Strengths and Difficulties Questionnaire); SR = self-report for TD siblings; Distress (PC) = primary caregiver reported distress as measured by the DASS (Depression Anxiety and Stress Scale); Social Support (SR) = self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); Life Satisfaction (SR) = self-reported life satisfaction as measured by the BMSLSS (Brief Multidimensional Students' Life Satisfaction Scale); *Z*_{skewness} = *z*-score for skewness (skewness/standard error of skewness); *Z*_{kurtosis} = *z*-score for kurtosis (kurtosis/standard error of kurtosis).

^aDescriptive statistics are for winsorized variable.

[†]*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Preliminary Analyses

Internal consistency. Coefficient alphas were calculated for each total scale and each relevant subscale for each participant group (e.g., primary caregivers, secondary caregivers, TD siblings) to determine the internal consistency for the current sample. The corresponding coefficient alphas are reported in the Measures subsection of the Method section.

Covariates. Demographic variables (e.g., age of child with ASD, household income, sibling birth order) and BAP of the TD siblings (i.e., TD Sibling CSBQ) were examined as potential covariates to be included in the parallel mediation models for each participant group. Covariates were determined by using bivariate correlations between possible control variables (e.g., demographic variables, TD Sibling BAP) and the mediator and outcome variables (i.e., caregiver distress [mediator], social support [mediator], life satisfaction [outcome]; see Table 6). Nine families were missing information about household income and family size. In order to avoid listwise deletion and include these families in the analyses, the median household income category (\$50,000 – \$74,999) and the mean family size (4.69) were used in order to fill the missing data points. One family was missing information about the TD sibling's birth order, in order to include this family in the analyses the median birth order value (2) was used in order to fill the missing data point. Two families were missing information about caregivers' race, these families were excluded from analyses for their respective parallel mediation models.

The following variables were related to at least one mediator (i.e., caregiver distress, social support) or the outcome variable (i.e., life satisfaction) for the parallel mediation models for the primary caregivers: child with ASD's age, child with ASD's gender (female = 1, male = 2), TD sibling's birth order, siblings' race (dichotomized: non-white = 0, white = 1), primary caregiver's race (dichotomized: non-white = 0, white = 1), and household income. The

following variables were related to at least one mediator (i.e., caregiver distress, social support) or the outcome variable (i.e., life satisfaction) for the parallel mediation models for the secondary caregivers: child with ASD's age, secondary caregiver's age, siblings' race (dichotomized: non-white = 0, white = 1), secondary caregiver's race (dichotomized: non-white = 0, white = 1), child with ASD's birth order, and secondary caregiver's gender (female = 1, male = 2). The following variables were related to at least one mediator (i.e., caregiver distress of the primary caregiver, TD sibling social support) or the outcome variable (i.e., life satisfaction) for the parallel mediation models for the TD siblings: TD siblings BAP (i.e., TD Sibling CSBQ), child with ASD's age, child with ASD's gender (female = 1, male = 2), TD sibling's birth order, siblings' race (dichotomized: non-white = 0, white = 1), primary caregiver's race (dichotomized: non-white = 0, white = 1), TD sibling's gender (female = 1, male = 2), primary caregiver's education, and household income. Inclusion of covariates in each parallel mediation model was executed using the covariate matrix option in PROCESS (Hayes, 2018), which allows for specification of specific control variables for different models of the mediator(s) and the outcome variable.

Table 6

Correlations of Potential Covariates with Mediator and Outcome Variables

Potential Control Variables	Mediator and Outcome Variables								
	Distress (PC)	Distress (SC)	Soc. Supp. (PC)	Soc. Supp. (SC)	Soc. Supp. (SR)	Life Sat. (PC)	Life Sat. (SC)	Life Sat. (SR)	
ASD Symp. Sev. – TD Sib (PC)	.001	--	-.15	--	-.32**	-.05	--	-.24*	
ASD Symp. Sev. – TD Sib (SC)	--	.19	--	.09	--	--	.12	--	
ASD Child Age	-.36***	-.34**	.26**	.28*	-.08	.31**	.36**	.003	
ASD Child Gender	-.21*	.04	.17 [†]	.14	-.06	.13	-.04	-.10	
ASD Child Birth Order	.14	.08	-.15	-.20 [†]	-.01	-.18	-.25*	-.09	
TD Sibling Age	.05	.01	.01	-.01	-.03	-.04	-.01	-.05	
TD Sibling Gender	.03	-.19	-.04	.01	-.20*	.08	.11	.08	
TD Sibling Birth Order	-.20*	-.20 [†]	-.01	.004	-.11	.10	.01	-.09	
Siblings' Race	-.25**	-.01	-.04	.27*	.01	.09	.15	< .001	
PC Age	-.02	--	.004	--	.01	.003	--	.14	
PC Gender	-.08	--	.05	--	-.02	.15	--	.05	
PC Race	-.34***	--	.08	--	.001	.12	--	-.08	
PC Marital Status	-.04	--	-.01	--	.05	.04	--	.12	
PC Education	-.12	--	.09	--	.04	.12	--	.28**	
SC Age	--	-.31*	--	-.03	--	--	.02	--	
SC Gender	--	-.02	--	-.24*	--	--	-.07	--	
SC Race	--	-.05	--	.36**	--	--	.26*	--	
SC Marital Status	--	-.11	--	-.13	--	--	-.09	--	
SC Education	--	-.19	--	-.03	--	--	.14	--	
Household Income	-.07	-.07	.07	-.09	.10	.28**	.16	.28**	
Family Size	-.10	-.12	-.02	.10	.03	.03	.04	-.03	

Note. PC = primary caregiver report; SC = secondary caregiver report; SR = TD sibling self-report; ASD Symp. Sev. = ASD symptom severity as measured by the CSBQ (Children's Social Behavior Questionnaire); TD Sib (PC) = primary caregiver's report of TD sibling's functioning; TD Sib (SC) = secondary caregiver's report of TD sibling's functioning; Distress = caregiver self-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); Soc. Supp. = self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); Life Sat. (PC) & Life Sat. (SC) = self-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); Life Sat. (SR) = self-reported life satisfaction as measured by the BMSLSS (Brief Multidimensional Students' Life Satisfaction Scale); Gender: coded as 1 = female, 2 = male; Race: coded as 0 = nonwhite, 1 = white; Marital Status: 0 = not married, 1 = married.

[†] $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Analyses for Main Hypotheses

Analyses for Hypothesis 1. The following bivariate correlations were hypothesized: 1a) autism symptom severity in children with ASD would be negatively related to caregiver life satisfaction and caregiver social support, but positively related to caregiver distress; 1b) behavior problems in children with ASD would be negatively related to caregiver life satisfaction and caregiver social support, but positively related to caregiver distress; 1c) caregiver distress would be negatively related to caregiver life satisfaction; and 1d) caregiver social support would be positively related to caregiver life satisfaction. Analyses revealed no significant correlation between autism symptoms severity in children with ASD and caregiver life satisfaction for primary caregivers ($r = -.12, p = .230$) or secondary caregivers ($r = -.09, p = .468$). Additionally, no significant relation was found between autism symptoms severity in children with ASD and caregiver social support for primary caregivers ($r = -.03, p = .750$) or secondary caregivers ($r = -.04, p = .762$). However, analyses revealed a significant positive correlation between autism symptoms severity in children with ASD and caregiver distress for primary caregivers ($r = .33, p = .001$) and secondary caregivers ($r = .32, p = .008$). Analyses revealed no significant relation between behavior problems in children with ASD and caregiver life satisfaction for primary caregivers ($r = -.17, p = .074$) or secondary caregivers ($r = -.02, p = .900$). Additionally, no significant correlation was found between behavior problems in children with ASD and caregiver social support for primary caregivers ($r = -.14, p = .152$) or secondary caregivers ($r = -.03, p = .803$). However, analyses revealed a significant positive relation between behavior problems in children with ASD and caregiver distress for primary caregivers ($r = .36, p < .001$), however, no significant relation was found for secondary caregivers ($r = .18, p = .140$). Results indicated a significant negative correlation between caregiver distress and caregiver life satisfaction for both

primary caregivers ($r = -.59, p < .001$) and secondary caregivers ($r = -.50, p < .001$).

Additionally, results indicated a significant positive relation between caregiver social support and caregiver life satisfaction for both primary caregivers ($r = .60, p < .001$) and secondary caregivers ($r = .60, p < .001$).

Analyses for Hypothesis 2. The second hypothesis included four parallel mediation models, which examined autism symptom severity or child behavior problems in the child with ASD as separate predictors (X) of caregiver life satisfaction (Y) through caregiver distress (M_1) and caregiver social support (M_2). Specifically, it was hypothesized that: 2a) there would be direct effects (i.e., pathway c') of ASD symptom severity and child behavior problems on caregiver life satisfaction, controlling for caregiver distress and social support. 2b) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on caregiver life satisfaction through caregiver distress, controlling for caregiver social support (i.e., pathways a_1 & b_1). 2c) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on caregiver life satisfaction through caregiver social support, controlling for caregiver distress (i.e., pathways a_2 & b_2). These analyses were conducted on primary caregivers only and then repeated on secondary caregivers only.

Each parallel mediation model was examined using PROCESS (Hayes, 2013, 2018), and indirect effects were analyzed using bootstrapping analytical methods (i.e., 10,000 resamples with replacement) to estimate bias-corrected 95% confidence intervals (CI) around point estimates of the indirect effects, with CIs not inclusive of zero indicating significant indirect effects (Hayes, 2013, 2018; Preacher & Hayes, 2008).

First, the parallel mediation model for primary caregivers' ratings of autism symptom severity for their child with ASD as the predictor variable (X), caregiver distress (M_1) and

caregiver social support (M_2) as the mediator variables, and caregiver life satisfaction as the outcome variable (Y) was examined. Covariates were included in the model based on their relation to either mediator variable or the outcome variable. As such, age of the child with ASD, gender of the child with ASD, siblings' race, primary caregiver's race, and TD sibling's birth order were included as covariates for the pathway including caregiver distress. Age of the child with ASD was included as a covariate for the pathway including caregiver social support. Additionally, age of the child with ASD and household income were included as covariates for the pathways including caregiver life satisfaction. The unstandardized regression coefficients, standard errors, and model summary information for this parallel mediation model are presented in Table 7. In this model, autism symptom severity of children with ASD did not demonstrate a direct pathway to caregiver life satisfaction, when controlling for caregiver distress and caregiver social support ($B = 0.001$, $SE = 0.03$, $p = .971$). However, bootstrapped confidence intervals indicated an indirect effect through caregiver distress ($B = -0.04$, $Boot SE = 0.02$, $95\% CI = [-0.07, -0.01]$). Although there was no total effect of autism symptom severity of children with ASD on caregivers' life satisfaction, Hayes (2009) argued that these indirect effects are still able to be interpreted and still provide valuable information about indirect effects on outcomes through intervening variables. The specific indirect effect of autism symptom severity on caregiver life satisfaction through caregiver distress is the amount by which two cases that differ by one unit on autism symptom severity are estimated to differ on life satisfaction as a result of the effect of autism symptom severity on caregiver distress, which in turn affects caregiver life satisfaction, holding caregiver social support constant. As such, two cases that differ by one unit on X (i.e., autism symptom severity) are estimated to differ by -0.04 units on Y (i.e., life satisfaction) through caregiver distress, with those caregivers who rated their child's autism symptoms as

more severe self-reporting lower level of life satisfaction. In contrast, no indirect effect through caregiver social support was found ($B = 0.01$, Boot $SE = 0.02$, 95% CI = [-.03, .04]). Results of these analyses are depicted in Figure 5.

Table 7

Parallel Mediation Model for Primary Caregivers with Autism Symptom Severity Serving as the Predictor Variable

Antecedents	Consequents								
	Distress (M ₁)			Social Support (M ₂)			Life Satisfaction (Y)		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
ASD Sev. – Child w/ ASD (X)	0.30	0.12	.015	0.003	0.01	.706	0.001	0.03	.971
Distress (M ₁)	--	--	--	--	--	--	-0.12	0.02	< .001
Social Support (M ₂)	--	--	--	--	--	--	2.30	0.41	< .001
Age – Child w/ ASD	-1.38	0.61	.025	0.09	0.03	.004	0.05	0.13	.706
Gender – Child w/ ASD	-5.34	6.36	.404	--	--	--	--	--	--
Siblings' Race	-1.54	7.03	.828	--	--	--	--	--	--
PC's Race	-12.39	7.62	.107	--	--	--	--	--	--
TD Sibling Birth Order	-0.74	2.94	.803	--	--	--	--	--	--
Household Income	--	--	--	--	--	--	0.67	0.21	.003
Constant	54.40	15.31	.001	4.01	0.58	< .001	7.93	3.39	.021
	$R^2 = .25$			$R^2 = .08$			$R^2 = .56$		
	$F(6, 98) = 5.45, p < .001$			$F(2, 102) = 4.27, p = .017$			$F(5, 99) = 24.66, p < .001$		
							Coeff.	Boot SE	95% CI
Indirect effect of X on Y through Distress (M ₁)							-0.04	0.02	[-.07 – -.01]
Indirect effect of X on Y through Social Support (M ₂)							0.01	0.02	[-.03 – .04]
Total indirect effect of X on Y (M ₁ + M ₂)							-0.03	0.03	[-.08 – .02]

Note. Distress = caregiver-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); M₁ = mediating variable 1; Social Support = caregiver-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); M₂ = mediating variable 2; Life Satisfaction = caregiver-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); Y = outcome variable; Coeff. = unstandardized regression coefficient; SE = standard error; ASD Sev. = ASD symptom severity as measured by the CSBQ (Children's Social Behavior Questionnaire); Child w/ ASD = caregiver-report about child with ASD; X = predictor variable; PC = primary caregiver; TD Sibling = typically developing sibling; Gender: coded as 1 = female, 2 = male; Race: coded as 0 = nonwhite, 1 = white; Boot SE = bootstrap standard error; 95% CI = 95% bootstrap confidence interval.

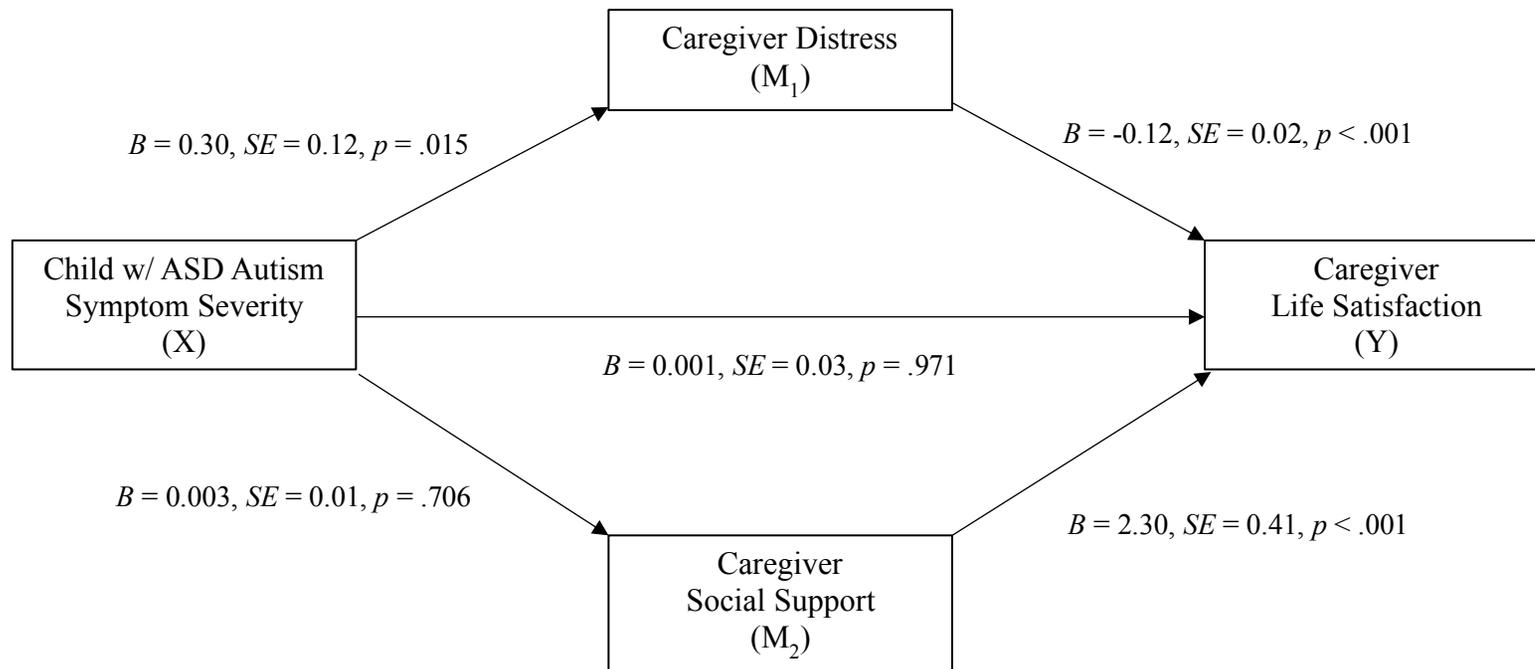


Figure 5. Results of parallel mediation model for primary caregivers with autism symptom severity of the child with ASD serving as the predictor variable.

Second, the parallel mediation model for secondary caregivers with autism symptom severity as the predictor variable (X), caregiver distress (M₁) and caregiver social support (M₂) as the mediator variables, and caregiver life satisfaction as the outcome variable (Y) was examined. Due to the smaller sample size of secondary caregivers, only covariates that were related to at least one mediator variable and the outcome variable were included in the analyses. As such, age of the child with ASD and secondary caregiver's race were included as covariates in the model. The unstandardized regression coefficients, standard errors, and model summary information for this parallel mediation model are presented in Table 8. In this model, autism symptom severity of children with ASD did not demonstrate a direct pathway to caregiver life satisfaction, when controlling for caregiver distress and caregiver social support ($B = 0.02$, $SE = 0.03$, $p = .608$). Additionally, no indirect effects through caregiver distress ($B = -0.03$, Boot $SE = 0.02$, 95% CI = [-.08, .003]) or caregiver social support were found ($B = -0.01$, Boot $SE = 0.01$, 95% CI = [-.04, .02]). Results of these analyses are depicted in Figure 6.

Table 8

Parallel Mediation Model for Secondary Caregivers with Autism Symptom Severity Serving as the Predictor Variable

	Consequents								
	Distress (M ₁)			Social Support (M ₂)			Life Satisfaction (Y)		
Antecedents	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
ASD Sev. – Child w/ ASD (X)	0.22	0.11	.040	-0.002	0.01	.758	0.02	0.03	.608
Distress (M ₁)	--	--	--	--	--	--	-0.12	0.04	.003
Social Support (M ₂)	--	--	--	--	--	--	2.86	0.65	< .001
Age – Child w/ ASD	-1.41	0.56	.015	0.04	0.35	.318	0.19	0.18	.317
SC's Race	3.73	5.97	.534	0.83	0.38	.030	0.39	1.96	.841
Constant	22.79	8.35	.008	4.52	0.53	< .001	7.75	4.23	.072
	$R^2 = .19$			$R^2 = .15$			$R^2 = .48$		
	$F(3, 64) = 4.95, p = .004$			$F(3, 64) = 3.67, p = .017$			$F(5, 62) = 11.34, p < .001$		
							Coeff.	SE	p
Total Effect of X on Y							-0.02	0.04	.706
							Coeff.	Boot SE	95% CI
Indirect effect of X on Y through Distress (M ₁)							-0.03	0.02	[-.08 – .003]
Indirect effect of X on Y through Social Support (M ₂)							-0.01	0.01	[-.04 – .02]
Total indirect effect of X on Y (M ₁ + M ₂)							-0.03	0.03	[-.10 – .02]

Note. Distress = caregiver-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); M₁ = mediating variable 1; Social Support = caregiver-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); M₂ = mediating variable 2; Life Satisfaction = caregiver-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); Y = outcome variable; Coeff. = unstandardized regression coefficient; SE = standard error; ASD Sev. = ASD symptom severity as measured by the CSBQ (Children's Social Behavior Questionnaire); Child w/ ASD = caregiver-report about child with ASD; X = predictor variable; SC = secondary caregiver; Race: coded as 0 = nonwhite, 1 = white; Boot SE = bootstrap standard error; 95% CI = 95% bootstrap confidence interval.

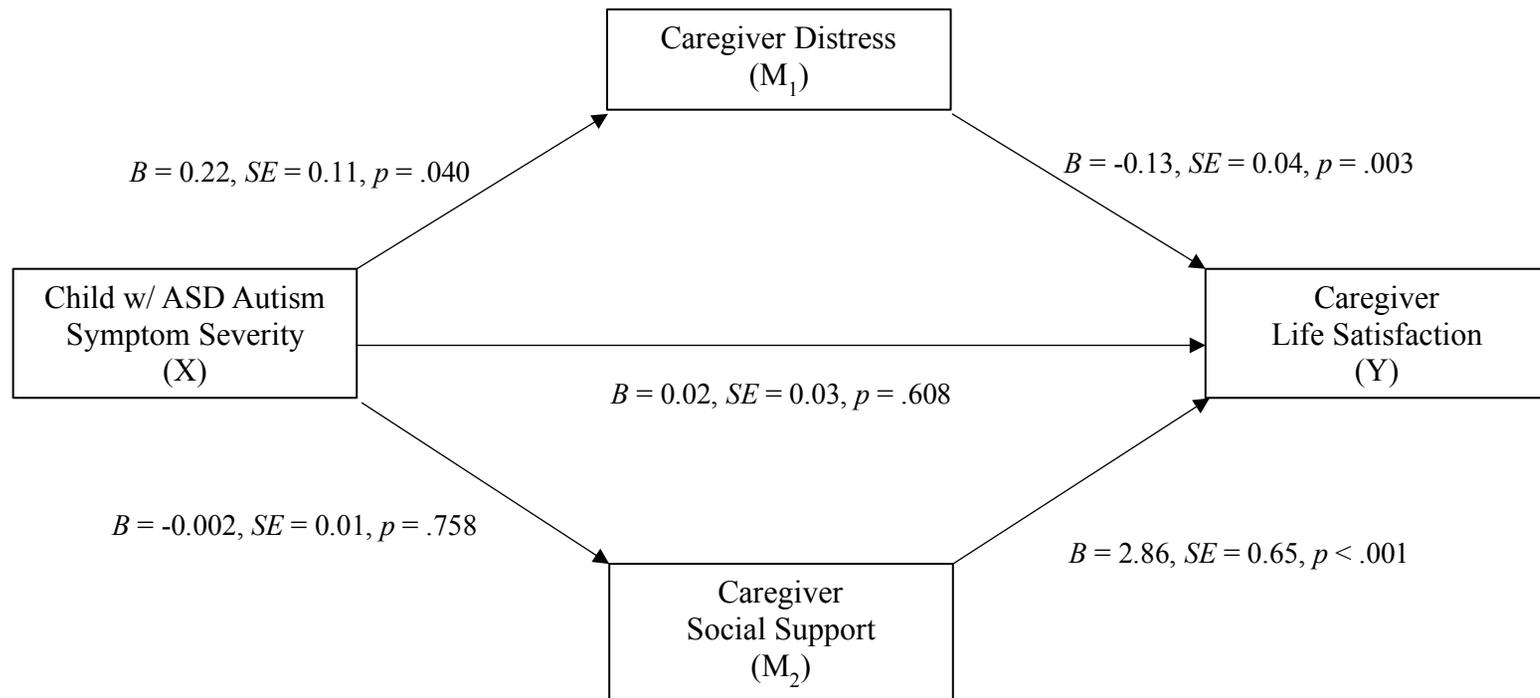


Figure 6. Results of parallel mediation model for secondary caregivers with autism symptom severity of the child with ASD serving as the predictor variable.

Third, the parallel mediation model for primary caregiver-reported child behavior problems for their child with ASD as the predictor variable (X), caregiver distress (M_1) and caregiver social support (M_2) as the mediator variables, and caregiver life satisfaction as the outcome variable (Y) was examined. Covariates were included in the model as they were related to either mediator variable or the outcome variable. As such, age of the child with ASD, gender of the child with ASD, siblings' race, primary caregiver's race, and TD sibling's birth order were included as covariates for the pathway including caregiver distress. Age of the child with ASD was included as a covariate for the pathway including caregiver social support. Additionally, age of the child with ASD and household income were included as covariates for the pathways including caregiver life satisfaction. The unstandardized regression coefficients, standard errors, and model summary information for this parallel mediation model are presented in Table 9. In this model, child behavior problems of children with ASD did not demonstrate a direct pathway to caregiver life satisfaction, when controlling for caregiver distress and caregiver social support ($B = 0.01$, $SE = 0.07$, $p = .856$). However, bootstrapped confidence intervals indicated an indirect effect through caregiver distress ($B = -0.10$, $Boot SE = 0.05$, $95\% CI = [-.20, -.02]$). As previously stated, based on Hayes' (2009) argument, although there was no total effect of behavior problems of children with ASD on caregivers' life satisfaction, the indirect effect through caregiver distress was interpreted. The specific indirect effect of child behavior problems on caregiver life satisfaction through caregiver distress is the amount by which two cases that differ by one unit on child behavior problems are estimated to differ on life satisfaction as a result of the effect of child behavior problems on caregiver distress, which in turn affects caregiver life satisfaction, holding caregiver social support constant. As such, two cases that differ by one unit on X (i.e., child behavior problems) are estimated to differ by -0.10 units on Y

(i.e., life satisfaction) through caregiver distress, with those caregivers who rated their child as experiencing a greater degree of behavior problems self-reporting lower level of life satisfaction. In contrast, no indirect effect through caregiver social support was found ($B = -0.03$, Boot $SE = 0.04$, 95% CI = [-.12, .06]). Results of these analyses are depicted in Figure 7.

Table 9

Parallel Mediation Model for Primary Caregivers with Emotional and Behavioral Problems Serving as the Predictor Variable

Antecedents	Consequents								
	Distress (M ₁)			Social Support (M ₂)			Life Satisfaction (Y)		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
Bhv./Emo. – Ch. w/ ASD (X)	0.87	.31	.007	-0.01	0.02	.478	0.01	0.07	.856
Distress (M ₁)	--	--	--	--	--	--	-0.12	0.02	< .001
Social Support (M ₂)	--	--	--	--	--	--	2.30	0.41	< .001
Age – Child w/ ASD	-1.31	0.61	.032	0.09	0.03	.009	0.05	0.13	.693
Gender – Child w/ ASD	-5.10	6.32	.422	--	--	--	--	--	--
Siblings' Race	-3.08	7.03	.662	--	--	--	--	--	--
PC's Race	-11.20	7.60	.144	--	--	--	--	--	--
TD Sibling Birth Order	-0.78	2.91	.791	--	--	--	--	--	--
Household Income	--	--	--	--	--	--	0.66	0.21	.002
Constant	51.40	15.29	.001	4.49	0.58	< .001	7.73	3.49	.029
	$R^2 = .26$			$R^2 = .08$			$R^2 = .56$		
	$F(6, 98) = 5.79, p < .001$			$F(2, 102) = 4.47, p = .014$			$F(5, 99) = 24.67, p < .001$		
							Coeff.	Boot SE	95% CI
Indirect effect of X on Y through Distress (M ₁)							-0.10	0.05	[-.20 – -.02]
Indirect effect of X on Y through Social Support (M ₂)							-0.03	0.04	[-.12 – .06]
Total indirect effect of X on Y (M ₁ + M ₂)							-0.13	0.08	[-.29 – .01]

Note. Distress = caregiver-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); M₁ = mediating variable 1; Social Support = caregiver-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); M₂ = mediating variable 2; Life Satisfaction = caregiver-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); Y = outcome variable; Coeff. = unstandardized regression coefficient; SE = standard error; Bhv./Emo. = behavioral and emotional problems as measured by the SDQ (Strengths and Difficulties Questionnaire); Ch. w/ ASD & Child w/ ASD = caregiver-report about child with ASD; X = predictor variable; PC = primary caregiver; TD Sibling = typically developing sibling; Gender: coded as 1 = female, 2 = male; Race: coded as 0 = nonwhite, 1 = white; Boot SE = bootstrap standard error; 95% CI = 95% bootstrap confidence interval.

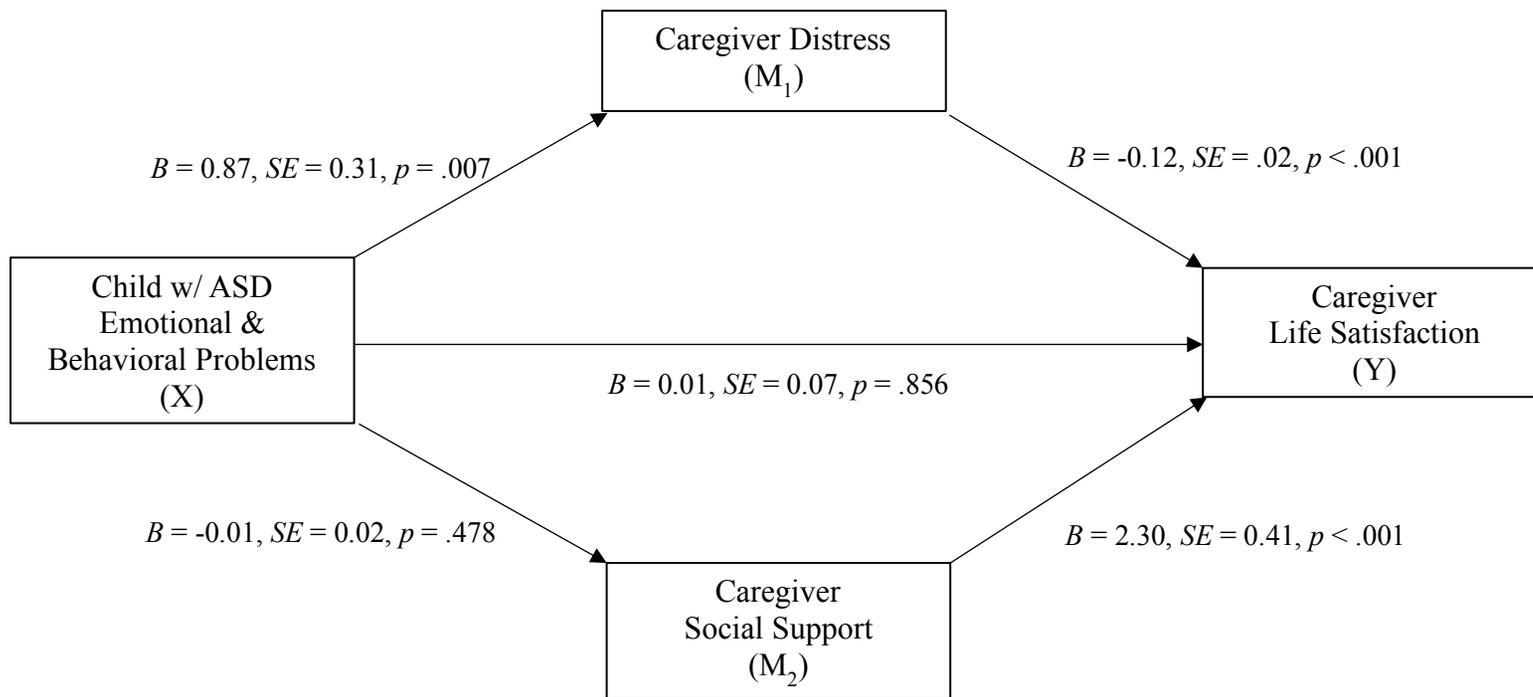


Figure 7. Results of parallel mediation model for primary caregivers with emotional and behavioral problems of the child with ASD serving as the predictor variable.

Finally, the parallel mediation model for secondary caregiver-reported child behavior problems for their child with ASD as the predictor variable (X), caregiver distress (M_1) and caregiver social support (M_2) as the mediator variables, and caregiver life satisfaction as the outcome variable (Y) was examined. Due to the smaller sample size of secondary caregivers, only covariates that were related to at least one mediator variable and the outcome variable were included in the analyses. As such, age of the child with ASD and secondary caregiver's race were included as covariates in the model. The unstandardized regression coefficients, standard errors, and model summary information for this parallel mediation model is presented in Table 10. In this model, child behavior problems of children with ASD did not demonstrate a direct pathway to caregiver life satisfaction, when controlling for caregiver distress and caregiver social support ($B = 0.07$, $SE = 0.09$, $p = .445$). Additionally, no indirect effects through caregiver distress ($B = -0.04$, $Boot SE = 0.05$, $95\% CI = [-.14, .06]$) or caregiver social support were found ($B = -0.01$, $Boot SE = 0.05$, $95\% CI = [-.10, .09]$). Results of these analyses are depicted in Figure 8.

Table 10

Parallel Mediation Model for Secondary Caregivers with Emotional and Behavioral Problems Serving as the Predictor Variable

Antecedents	Consequents								
	Distress (M ₁)			Social Support (M ₂)			Life Satisfaction (Y)		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
Bhv./Emo. – Ch. w/ ASD (X)	0.29	0.30	.333	-0.005	0.02	.803	0.07	0.09	.445
Distress (M ₁)	--	--	--	--	--	--	-0.12	0.04	.003
Social Support (M ₂)	--	--	--	--	--	--	2.87	0.65	< .001
Age – Child w/ ASD	-1.61	0.57	.006	0.04	0.03	.295	0.19	0.18	.301
SC's Race	5.40	6.06	.376	0.82	0.37	.031	0.36	1.95	.856
Constant	29.04	8.63	.001	4.50	0.53	< .001	7.19	4.32	.101
	$R^2 = .15$			$R^2 = .15$			$R^2 = .48$		
	$F(3, 64) = 3.62, p = .018$			$F(3, 64) = 3.65, p = .017$			$F(5, 62) = 11.47, p < .001$		
Total Effect of X on Y							Coeff.	SE	p
							0.02	0.12	.853
							Coeff.	Boot SE	95% CI
Indirect effect of X on Y through Distress (M ₁)							-0.04	0.05	[-.14 – .06]
Indirect effect of X on Y through Social Support (M ₂)							-0.01	0.05	[-.10 – .09]
Total indirect effect of X on Y (M ₁ + M ₂)							-0.05	0.08	[-.19 – .12]

Note. Distress = caregiver-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); M₁ = mediating variable 1; Social Support = caregiver-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); M₂ = mediating variable 2; Life Satisfaction = caregiver-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); Y = outcome variable; Coeff. = unstandardized regression coefficient; SE = standard error; Bhv./Emo. = behavioral and emotional problems as measured by the SDQ (Strengths and Difficulties Questionnaire); Ch. w/ ASD = caregiver-report about child with ASD; X = predictor variable; SC = secondary caregiver; Race: coded as 0 = nonwhite, 1 = white; Boot SE = bootstrap standard error; 95% CI = 95% bootstrap confidence interval.

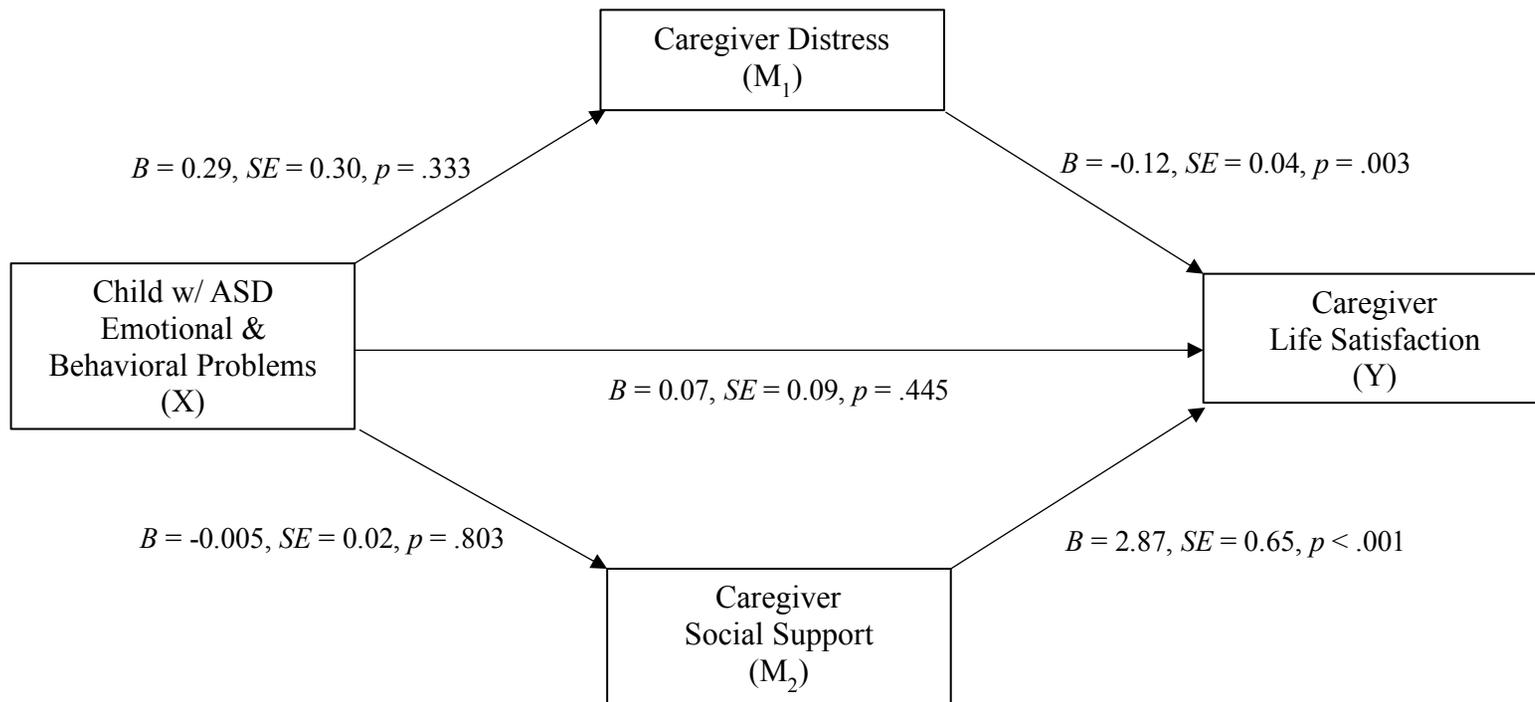


Figure 8. Results of parallel mediation model for secondary caregivers with emotional and behavioral problems of the child with ASD serving as the predictor variable.

Analyses for Hypothesis 3. The following bivariate correlations were hypothesized: 3a) ASD symptom severity in the child with ASD would be negatively related to TD sibling life satisfaction and TD sibling social support; 3b) child behavior problems in the child with ASD would be negatively related to TD sibling life satisfaction and TD sibling social support; 3c) the primary caregiver's distress would be negatively related to TD sibling life satisfaction; 3d) TD sibling social support would be positively related to TD sibling life satisfaction. Analyses revealed no significant correlation between autism symptoms severity in children with ASD, as rated by the primary caregivers, and life satisfaction for TD siblings ($r = -.14, p = .144$). However, a significant negative relation was found between autism symptoms severity in children with ASD, as rated by the primary caregivers, and TD siblings' social support ($r = -.23, p = .019$). Analyses revealed a significant negative correlation between behavior problems in children with ASD, as rated by the primary caregivers, and life satisfaction for TD siblings ($r = -.23, p = .019$). However, no significant relation was found between behavior problems in children with ASD, as rated by the primary caregivers, and TD siblings' social support ($r = -.17, p = .090$). Results indicated no significant correlation between primary caregiver's distress and TD siblings' life satisfaction ($r = -.16, p = .106$). However, a significant positive relation was found between TD siblings' social support and TD siblings' life satisfaction ($r = .61, p < .001$).

Analyses for Hypothesis 4. The fourth hypothesis included two parallel mediation models, which examined autism symptom severity or child behavior problems in the child with ASD as separate predictors (X) of TD sibling life satisfaction (Y) through primary caregiver's distress (M₁) and TD sibling social support (M₂). The two parallel mediation models were examined using PROCESS (Hayes, 2013, 2018), and indirect effects were analyzed using bootstrapping analytical methods (i.e., 10,000 resamples with replacement) to estimate bias-

corrected 95% confidence intervals (CI) around point estimates of the indirect effects, with CIs not inclusive of zero indicating significant indirect effects (Hayes, 2013, 2018; Preacher & Hayes, 2008).

For the two parallel mediation models, the following was hypothesized: 4a) It was predicted that there would be direct effects (i.e., pathway c') of ASD symptom severity and child behavior problems on TD sibling life satisfaction, controlling for primary caregiver's distress and TD sibling social support. 4b) It was predicted that there would be indirect effects of ASD symptom severity and child behavior problems on TD sibling life satisfaction through primary caregiver's distress, controlling for TD sibling social support (i.e., pathways a₁ & b₁). 4c) It was predicted that there would also be indirect effects of ASD symptom severity and child behavior problems on caregiver life satisfaction through TD sibling social support, controlling for primary caregiver's distress (i.e., pathways a₂ & b₂).

First, the parallel mediation model for primary caregivers' ratings of autism symptom severity of their child with ASD as the predictor variable (X), primary caregiver distress (M₁) and TD sibling social support (M₂) as the mediator variables, and TD sibling life satisfaction as the outcome variable (Y) was examined. Covariates were included in the model as they were related to either mediator variable or the outcome variable. As such, age of the child with ASD, gender of the child with ASD, siblings' race, primary caregiver's race, and TD sibling's birth order were included as covariates for the pathway including primary caregiver's distress. The primary caregivers' ratings of autism symptoms severity of their TD child (i.e., BAP of TD siblings) and the gender of the TD sibling were included as covariates for the pathway including TD sibling social support. Additionally, the primary caregivers' ratings of autism symptoms severity of their TD child (i.e., BAP of TD siblings), the primary caregiver's level of education,

and household income were included as covariates for the pathways including TD sibling life satisfaction. The unstandardized regression coefficients, standard errors, and model summary information for this parallel mediation model is presented in Table 11. In this model, autism symptom severity of children with ASD did not demonstrate a direct pathway to TD sibling life satisfaction, when controlling for primary caregiver distress and TD sibling social support ($B = 0.0001$, $SE = 0.004$, $p = .989$). Additionally, no indirect effects through primary caregiver distress ($B = -0.001$, $Boot SE = 0.001$, $95\% CI = [-.004, .001]$) or TD sibling social support were found ($B = -0.004$, $Boot SE = 0.003$, $95\% CI = [-.01, .001]$). Results of these analyses are depicted in Figure 9.

Table 11

Parallel Mediation Model for TD Siblings with Autism Symptom Severity Serving as the Predictor Variable

Antecedents	Consequents								
	PC Distress (M ₁)			Social Support (M ₂)			Life Satisfaction (Y)		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
ASD Sev. – Child w/ ASD (X)	0.30	0.12	.015	-0.01	0.004	.070	0.0001	0.004	.989
Distress (M ₁)	--	--	--	--	--	--	-0.003	0.003	.375
Social Support (M ₂)	--	--	--	--	--	--	0.60	0.09	< .001
ASD Sev. – TD Sibling	--	--	--	-0.02	0.01	.003	-0.01	0.01	.308
Age – Child w/ ASD	-1.38	0.61	.025	--	--	--	--	--	--
Gender – Child w/ ASD	-5.34	6.36	.404	--	--	--	--	--	--
Gender – TD Sibling	--	--	--	-0.23	0.14	.101	--	--	--
Siblings' Race	-1.54	7.03	.828	--	--	--	--	--	--
PC's Race	12.39	7.62	.107	--	--	--	--	--	--
TD Sibling Birth Order	-0.74	2.94	.803	--	--	--	--	--	--
Household Income	--	--	--	--	--	--	0.06	0.03	.054
PC's Education	--	--	--	--	--	--	0.17	0.07	.012
Constant	54.40	15.31	.001	6.89	0.28	< .001	0.64	0.69	.357
	$R^2 = .25$			$R^2 = .16$			$R^2 = .47$		
	$F(6, 98) = 5.45, p < .001$			$F(3, 101) = 6.47, p = .001$			$F(6, 98) = 14.48, p < .001$		
							Coeff.	Boot SE	95% CI
Indirect effect of X on Y through PC Distress (M ₁)							-0.001	0.001	[-.004 – .001]
Indirect effect of X on Y through Social Support (M ₂)							-0.004	0.003	[-.01 – .001]
Total indirect effect of X on Y (M ₁ + M ₂)							-0.01	0.003	[-.01 – .0002]

Note. PC = primary caregiver report; Distress = caregiver-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); M₁ = mediating variable 1; Social Support = TD sibling self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); M₂ = mediating variable 2; Life Satisfaction = TD sibling self-reported life satisfaction as measured by the BMSLSS (Brief Multidimensional Students' Life Satisfaction Scale); Y = outcome variable; Coeff. = unstandardized regression coefficient; SE = standard error; ASD Sev. = ASD symptom severity as measured

by the CSBQ (Children's Social Behavior Questionnaire); Child w/ ASD = caregiver-report about child with ASD; X = predictor variable; TD Sibling = typically developing sibling; Gender: coded as 1 = female, 2 = male; Race: coded as 0 = nonwhite, 1 = white; Boot *SE* = bootstrap standard error; 95% CI = 95% bootstrap confidence interval.

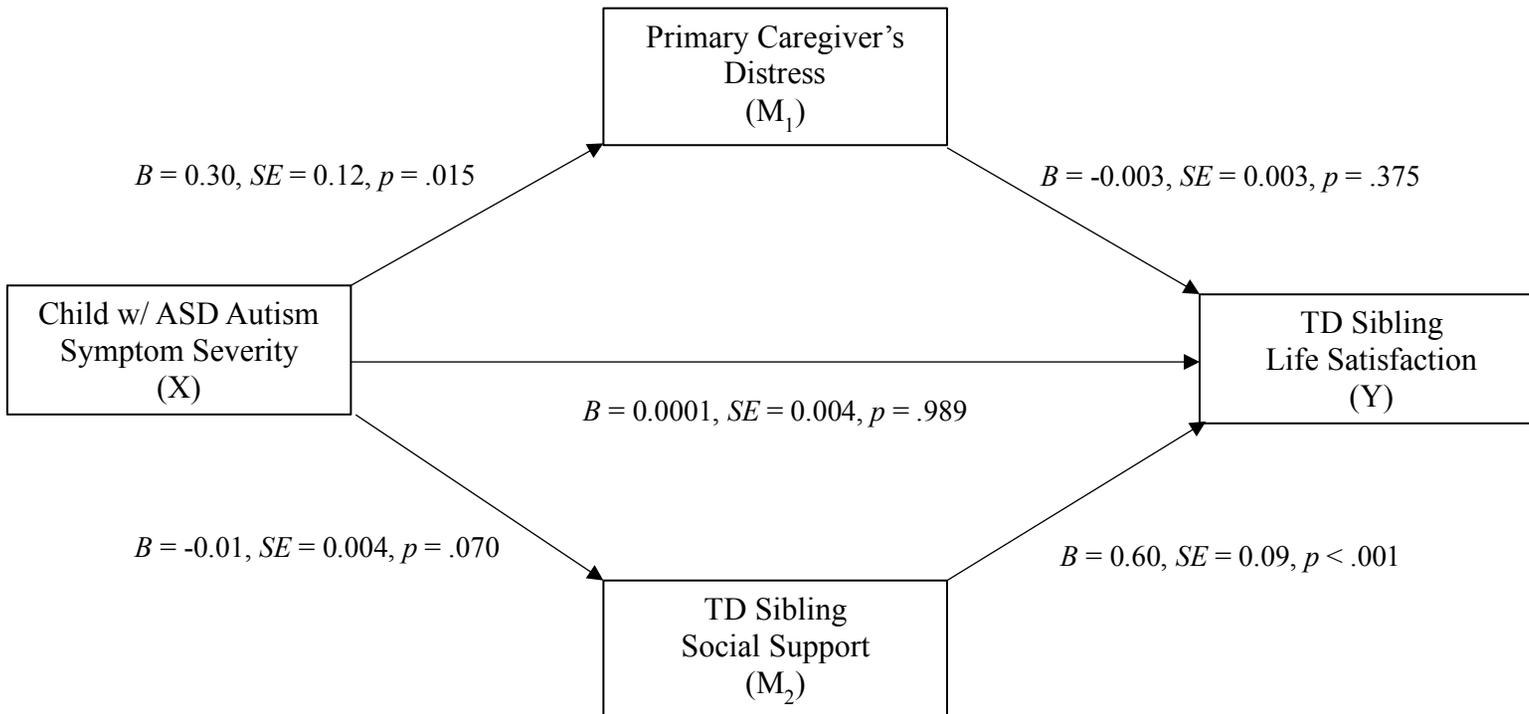


Figure 9. Results of parallel mediation model for TD siblings with autism symptom severity of the child with ASD serving as the predictor variable.

Finally, the parallel mediation model for primary caregiver-reported child behavior problems for their child with ASD as the predictor variable (X), primary caregiver distress (M_1) and TD sibling social support (M_2) as the mediator variables, and TD sibling life satisfaction as the outcome variable (Y) was examined. Covariates were included in the model as they were related to either mediator variable or the outcome variable. As such, age of the child with ASD, gender of the child with ASD, siblings' race, primary caregiver's race, and TD sibling's birth order were included as covariates for the pathway including primary caregiver's distress. The primary caregivers' ratings of autism symptoms severity of their TD child (i.e., BAP of TD siblings) and the gender of the TD sibling were included as covariates for the pathway including TD sibling social support. Additionally, primary caregivers' ratings of autism symptoms severity of their TD child (i.e., BAP of TD siblings), the primary caregiver's level of education, and household income were included as covariates for the pathways including TD sibling life satisfaction. The unstandardized regression coefficients, standard errors, and model summary information for this parallel mediation model is presented in Table 12. In this model, child behavior problems of children with ASD did not demonstrate a direct pathway to TD sibling life satisfaction, when controlling for primary caregiver distress and TD sibling social support ($B = -0.01$, $SE = 0.01$, $p = .184$). Additionally, no indirect effects through primary caregiver distress ($B = -0.001$, $Boot SE = 0.003$, $95\% CI = [-.01, .004]$) or TD sibling social support were found ($B = -0.01$, $Boot SE = 0.01$, $95\% CI = [-.02, .003]$). Results of these analyses are depicted in Figure 10.

Table 12

Parallel Mediation Model for TD Siblings with Emotional and Behavioral Problems Serving as the Predictor Variable

Antecedents	Consequents								
	PC Distress (M ₁)			Social Support (M ₂)			Life Satisfaction (Y)		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
Bhv./Emo. – Ch. w/ ASD (X)	0.87	0.31	.007	-0.02	0.01	.180	-0.01	0.01	.184
PC Distress (M ₁)	--	--	--	--	--	--	-0.002	0.003	.596
Social Support (M ₂)	--	--	--	--	--	--	0.51	0.08	< .001
ASD Sev. – TD Sibling	--	--	--	-0.03	0.01	.001	-0.01	0.01	.434
Age – Child w/ ASD	-1.31	0.61	.032	--	--	--	--	--	--
Gender – Child w/ ASD	-5.10	6.31	.422	--	--	--	--	--	--
Gender – TD Sibling	--	--	--	-0.26	0.16	.103	--	--	--
Siblings' Race	-3.08	7.03	.662	--	--	--	--	--	--
PC's Race	-11.20	7.60	.144	--	--	--	--	--	--
TD Sibling Birth Order	-0.78	2.91	.791	--	--	--	--	--	--
Household Income	--	--	--	--	--	--	0.06	0.03	.039
PC's Education	--	--	--	--	--	--	0.16	0.07	.021
Constant	51.40	15.29	.001	6.90	0.33	< .001	1.41	0.68	.040
	$R^2 = .26$			$R^2 = .16$			$R^2 = .46$		
	$F(6, 98) = 5.79, p < .001$			$F(3, 101) = 6.47, p = .001$			$F(6, 98) = 14.06, p < .001$		
							Coeff.	Boot SE	95% CI
Indirect effect of X on Y through PC Distress (M ₁)							-0.001	0.003	[-.01 – .004]
Indirect effect of X on Y through Social Support (M ₂)							-0.01	0.01	[-.02 – .003]
Total indirect effect of X on Y (M ₁ + M ₂)							-0.01	0.01	[-.02 – .003]

Note. PC = primary caregiver report; Distress = caregiver-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); M₁ = mediating variable 1; Social Support = TD sibling self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); M₂ = mediating variable 2; Life Satisfaction = TD sibling self-reported life satisfaction as measured by the BMSLSS (Brief Multidimensional Students' Life Satisfaction Scale); Y = outcome variable; Coeff. = unstandardized regression coefficient; SE = standard error; Bhv./Emo. = behavioral and emotional problems

as measured by the SDQ (Strengths and Difficulties Questionnaire); Ch. w/ ASD = caregiver-report about child with ASD; X = predictor variable; TD Sibling = typically developing sibling; Gender: coded as 1 = female, 2 = male; Race: coded as 0 = nonwhite, 1 = white; Boot *SE* = bootstrap standard error; 95% CI = 95% bootstrap confidence interval.

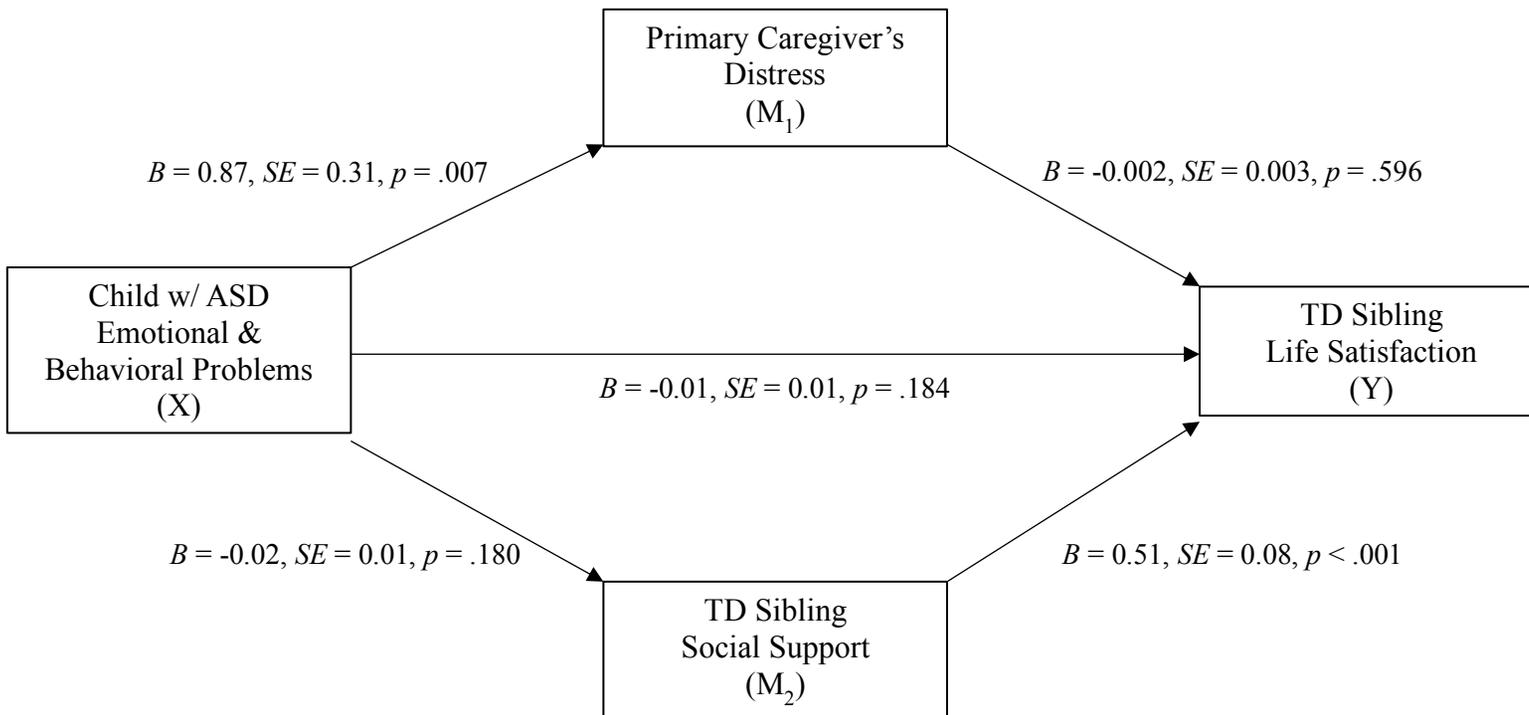


Figure 10. Results of parallel mediation model for TD siblings with emotional and behavioral problems of the child with ASD serving as the predictor variable.

Analyses for Research Questions

Four exploratory research questions were proposed in light of questions pertaining to the particular constellations of core ASD symptoms and/or child emotional and behavioral problems in children with ASD as they relate to different outcomes for family members of these children. The ASD core symptoms and child emotional and behavioral problems in children with ASD were examined as predictors of caregiver outcomes and outcomes for TD siblings (i.e., Research Questions 1 & 2) using multiple regression analyses. Group differences (i.e., Research Questions 3 & 4) were examined via independent samples *t*-tests and ANOVA tests.

Analyses for Research Question 1. The following research question was posed: Which core symptoms of ASD in children with ASD are predictive of distress, social support, and life satisfaction in caregivers of children with ASD, and emotional and behavioral problems, social support, and life satisfaction in TD siblings of children with ASD? The six subscales of the CSBQ, which represent the core ASD symptoms, served as predictor variables (X) in the nine multiple regression analyses, where outcomes for caregivers (e.g., distress), outcomes for TD siblings (e.g., emotional and behavioral problems), and outcomes for both (e.g., social support and life satisfaction) served as criterion variables (Y) in the analyses. Prior to conducting the multiple regression analyses, the correlations among the subscales of the CSBQ were examined for any highly correlated variables (e.g., correlations above .80) to identify any possible multicollinearity (Field, 2009). All correlations among the six subscales of the CSBQ, for both the primary caregivers and secondary caregivers, were below $r = .80$. Additionally, collinearity diagnostics of tolerance and VIF were examined for all multiple regression analyses and were found to be within acceptable limits (Field, 2009).

For primary caregivers, the overall model including all six subscales of the CSBQ as predictors of primary caregivers' distress was significant and explained 24% of the variance ($R^2 = .24$, $F(6, 99) = 5.10$, $p < .001$). When all six CSBQ subscales were entered simultaneously, only the subscale "Difficulties in understanding social information" emerged as a significant negative predictor of primary caregivers' distress ($\beta = -.376$, $t(105) = -3.41$, $p = .001$; all other p -values $> .05$; Appendix B, Table B1). The overall model including all six subscales of the CSBQ as predictors of primary caregivers' social support was not significant ($R^2 = .02$, $F(6, 99) = 0.30$, $p = .938$), and none of the six CSBQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B2). The overall model including all six subscales of the CSBQ as predictors of primary caregivers' life satisfaction also was not significant ($R^2 = .05$, $F(6, 99) = 0.84$, $p = .539$), and none of the six CSBQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B3).

For secondary caregivers, the overall models including all six subscales of the CSBQ as predictors of secondary caregivers' distress ($R^2 = .14$, $F(6, 61) = 1.60$, $p = .162$), as predictors of secondary caregivers' total social support ($R^2 = .05$, $F(6, 61) = 0.48$, $p = .819$), and as predictors of secondary caregivers' total life satisfaction ($R^2 = .03$, $F(6, 61) = 0.33$, $p = .918$) were not significant, and no subscales emerged as significant predictors when entered simultaneously in any of the models (all p -values $> .05$; Appendix B, Tables B1, B2, and B3, respectively).

For TD siblings, the overall model including all six subscales of the CSBQ, as rated by the primary caregiver, as predictors of TD siblings' emotional and behavioral problems was not significant ($R^2 = .05$, $F(6, 99) = 0.93$, $p = .479$), and none of the six CSBQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B1). The overall model including all six subscales of the CSBQ as predictors of TD siblings' social

support was not significant at the $p < .05$ level, but was approaching significance ($R^2 = .11$, $F(6, 99) = 2.00$, $p = .073$). When all six CSBQ subscales were entered simultaneously, only the subscale “Reduced contact and social interest” emerged as a significant negative predictor of TD siblings’ social support ($\beta = -.279$, $t(105) = -2.37$, $p = .020$; all other p -values $> .05$; Appendix B, Table B2). The overall model including all six subscales of the CSBQ as predictors of TD siblings’ life satisfaction was not significant ($R^2 = .07$, $F(6, 99) = 1.28$, $p = .273$), and none of the six CSBQ subscales emerged as significant predictors when entered simultaneous (all p -values $> .05$; Appendix B, Table B3).

Analyses for Research Question 2. The following research question was posed: Which emotional and behavioral problems in children with ASD are predictive of distress, social support, and life satisfaction in caregivers of children with ASD, and emotional and behavioral problems, social support, and life satisfaction in TD siblings of children with ASD? The four subscales of the total difficulties score of the SDQ, which represent emotional and behavioral problems of children with ASD, as well as the prosocial behavior subscale of the SDQ, served as the predictor variables (X) in the nine multiple regression analyses examining outcomes for family members of children with ASD (Y). Prior to conducting the multiple regression analyses, the correlations among the subscales of the SDQ were examined for any highly correlated variables (e.g., correlations above .80) to identify any possible multicollinearity (Field, 2009). All correlations among the five subscales of the SDQ, for both the primary caregivers and secondary caregivers, were below $r = .80$. Additionally, collinearity diagnostics of tolerance and VIF were examined for all multiple regression analyses and were found to be within acceptable limits (Field, 2009).

For primary caregivers, the overall model including all five subscales of the SDQ as predictors of primary caregivers' distress was significant and explained 13% of the variance ($R^2 = .13$, $F(5, 100) = 3.10$, $p = .012$). When all five SDQ subscales were entered simultaneously no subscales emerged as significant predictors of primary caregivers' distress (all p -values $> .05$; Appendix B, Table B4). The overall model including all five subscales of the SDQ as predictors of primary caregivers' social support was not significant ($R^2 = .04$, $F(5, 100) = 0.89$, $p = .488$), and none of the five SDQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B5). The overall model including all five subscales of the SDQ as predictors of primary caregivers' life satisfaction was not significant ($R^2 = .04$, $F(5, 100) = 0.82$, $p = .541$), and none of the five SDQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B6).

For secondary caregivers, the overall model including all five subscales of the SDQ as predictors of secondary caregivers' distress (e.g., depression, anxiety, stress) was not significant ($R^2 = .06$, $F(5, 65) = 0.82$, $p = .540$), and none of the five SDQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B4). The overall model including all five subscales of the SDQ as predictors of secondary caregivers' social support was not significant ($R^2 = .07$, $F(5, 62) = 0.87$, $p = .507$), and none of the five SDQ subscales emerged as significant predictors when entered simultaneously (all p -values $> .05$; Appendix B, Table B5). The overall model including all five subscales of the SDQ as predictors of secondary caregivers' life satisfaction was not significant ($R^2 = .08$, $F(5, 62) = 1.14$, $p = .347$). When all five SDQ subscales were entered simultaneously, the subscale "Prosocial Behavior" emerged as a significant positive predictor of secondary caregivers' life satisfaction, however,

given that the overall model was not significant the individual predictors should not be interpreted, all other p -values $> .05$ (Appendix B, Table B6).

For TD siblings, the overall model including all five subscales of the SDQ for children with ASD, as rated by primary caregivers, as predictors of TD siblings' self-reported emotional and behavioral problems ($R^2 = .01$, $F(5, 100) = 0.22$, $p = .955$), as predictors of TD siblings' total social support ($R^2 = .06$, $F(5, 100) = 1.36$, $p = .247$), and as predictors of TD siblings' total life satisfaction ($R^2 = .07$, $F(5, 100) = 1.54$, $p = .183$) were not significant, and no subscales emerged as significant predictors when entered simultaneously in any of the models (all p -values $> .05$; Appendix B, Tables B4, B5, and B6, respectively).

Analyses for Research Question 3. The following research question was posed: Are there gender differences (female caregivers vs. male caregivers) in the caregivers' ratings of autism symptom severity, ratings of emotional and behavioral problems for children with ASD, and ratings of emotional and behavioral problems in TD siblings, as well as in their own distress, perceived social support, and life satisfaction? For Research Question 3, group differences between female caregivers and male caregivers with respect to ratings of ASD symptom severity, ratings of behavioral difficulties for the child with ASD, and ratings of emotional and behavioral adjustment in TD siblings were examined via independent samples t -tests. Additionally, for Research Question 3, group differences between female caregivers and male caregivers with respect to ratings of parental distress, perceived social support, and life satisfaction were examined via independent samples t -tests.

Results indicated there were no significant difference in caregivers' ratings of autism symptoms severity for children with ASD for female caregivers ($M = 49.16$, $SD = 18.56$) and male caregivers ($M = 47.23$, $SD = 18.10$), $t(172) = 0.67$, $p = .503$. No significant differences

were found in caregivers' ratings of emotional and behavioral problems for children with ASD for female caregivers ($M = 19.11$, $SD = 6.94$) and male caregivers ($M = 18.48$, $SD = 7.03$), $t(172) = 0.57$, $p = .569$. Results indicated there were no significant differences in caregivers' ratings of emotional and behavioral problems for TD siblings for female caregivers ($M = 7.90$, $SD = 5.86$) and male caregivers ($M = 8.61$, $SD = 6.26$), $t(172) = -0.75$, $p = .453$. Significant differences were found in caregivers' ratings of parental distress for female caregivers ($M = 29.48$, $SD = 23.95$) and male caregivers ($M = 21.34$, $SD = 17.29$), $t(172) = 2.40$, $p = .017$. Results indicated there were no significant differences in caregivers' social support for female caregivers ($M = 5.32$, $SD = 1.32$) and male caregivers ($M = 5.38$, $SD = 1.08$), $t(172) = -0.31$, $p = .760$. No significant differences were found in caregivers' life satisfaction for female caregivers ($M = 22.19$, $SD = 7.15$) and male caregivers ($M = 24.17$, $SD = 6.65$), $t(172) = 1.81$, $p = .071$.

Analyses for Research Question 4. The following research question was posed: Are there rater differences (caregiver-reported vs. self-reported) in emotional and behavioral problems and life satisfaction of TD siblings? For Research Question 4, group differences between caregiver-reported (i.e., primary caregiver and secondary caregiver) and self-reported (i.e., TD sibling) emotional and behavioral adjustment and life satisfaction of TD siblings were explored via ANOVA, with subsequent post-hoc tests as indicated. Results indicated no significant differences between ratings of emotional and behavioral adjustment of TD siblings for primary caregivers ($M = 7.98$, $SD = 5.89$), secondary caregivers ($M = 8.46$, $SD = 6.22$), and TD siblings ($M = 9.44$, $SD = 5.86$), $F(2, 277) = 1.63$, $p = .198$. No significant differences were found between ratings of TD siblings' life satisfaction for primary caregivers ($M = 5.38$, $SD = 0.80$), secondary caregivers ($M = 5.56$, $SD = 0.78$), and TD siblings ($M = 5.45$, $SD = 0.84$), $F(2,$

276) = 1.11, $p = .331$. As no significant main effects were found, no post-hoc analyses were conducted.

CHAPTER 4

DISCUSSION

ASD is a heterogeneous, lifelong neurodevelopmental disorder characterized by pervasive deficits in social communication and interaction, and restricted, repetitive behaviors, interests, and activities, and is often accompanied by co-occurring psychological disorders and challenging associated features (APA, 2013; Georgiades et al., 2013). In light of the challenges associated with caring for an individual with ASD, research should focus on the family members of children with ASD. Research on parents of children with ASD has largely focused on negative outcomes associated with parenting a child with ASD, including heightened parental stress (e.g., Dabrowska & Pisula, 2010), and depression and anxiety (e.g., Sharpley et al., 1997), and has found that these negative outcomes tend to be more frequent in parents of children with ASD compared to parents of children with other DDs and parents of TD children (e.g., Dabrowska & Pisula, 2010; Lee, 2009). While literature on the outcomes of TD siblings is somewhat mixed (e.g., Green, 2013; Meadan et al., 2010), research has likewise focused on negative outcomes, such as increased emotional and behavioral problems in TD siblings (e.g., Griffith et al., 2014) or the absence of these difficulties (e.g., Gold, 1993). Nevertheless, research has recently begun to focus on more positive outcomes for parents of children with ASD, such as quality of life and life satisfaction (e.g., Ekas & Whitman, 2010), and more positive outcomes for TD siblings, such as positive self-concept (e.g., Macks & Reeve, 2007). Additionally, research has begun to examine potential protective factors, such as social support for these family members (e.g., Ingersoll & Hambrick, 2011).

In response to the increased need for more research focused on potentially positive outcomes for families of children with ASD, and with supportive rationale from several theoretical frameworks, including stress and coping (Lazarus & Folkman, 1984) and positive psychology (Seligman & Csikszentmihalyi, 2000), the current study aimed to examine risk and protective factors associated with the life satisfaction of caregivers and TD siblings of children with ASD. More specifically, the present study examined distress and social support as mediators of the relations between autism symptom severity of the child with ASD and caregivers' self-reported life satisfaction, and between child behavior problems of the child with ASD and self-reported life satisfaction of caregivers. Additionally, the current study examined the primary caregiver's distress and self-reported social support as mediators of the relations between primary caregiver reported autism symptom severity of the child with ASD and self-reported life satisfaction, and between primary caregiver reported child behavior problems of the child with ASD and TD siblings' self-reported life satisfaction.

Data were collected via online surveys from 106 families of children with ASD ages 3 to 17 years. A primary caregiver and a TD sibling ages 11 to 17 years participated for each family. Sixty-eight of the 106 families had a secondary caregiver also participate in the study. Primary caregivers were majority female, Caucasian, biological parents who were married, well educated, and had an annual median household income between \$50,000 – \$74,999. Secondary caregivers, were majority male, Caucasian, biological parents who were married, and fairly well educated. The children with ASD were majority male, Caucasian, and not the first-born child. TD siblings were almost equally male and female, majority Caucasian, and approximately half were first-born children.

Functioning for Family Members of Children with ASD

Primary and secondary caregivers' ratings of their children's functioning. With respect to autism symptom severity, as measured by the CSBQ, both primary and secondary caregivers rated their child with ASD's autism symptom severity similarly to parents of children with high-functioning autism (HFA), children with pervasive developmental disorder not otherwise specified (PDDNOS), and children with a dual diagnosis of attention-deficit/hyperactivity disorder and pervasive development disorder not otherwise specified (ADHD+PDDNOS) in Hartman et al.'s (2006) study examining the psychometric properties of the refined CSBQ. Additionally, primary and secondary caregivers rated their TD child's autism symptom severity, as measured by the CBSQ, similarly to parents of TD children in Hartman et al.'s (2006) study. Regarding emotional and behavioral difficulties, as measured by the SDQ, both primary and secondary caregivers rated their child with ASD in the "Abnormal" range according to cutoff scores for the measure (Goodman, 1997; SDQ Info). Additionally, the mean score of emotional and behavioral difficulties for children with ASD in the current sample was greater than 1.5 standard deviations above the mean of the normative sample of 4- to 17-year-olds (SDQ Info) and greater than 2.5 standard deviations above the mean of a community sample of Dutch children and adolescents (Muris et al., 2003). Both primary and secondary caregivers rated their TD child's emotional and behavioral difficulties, as measured by the SDQ, in the "Normal" range according to cutoff scores for the measure (Goodman, 1997; SDQ Info). In addition, the mean score of caregiver-rated emotional and behavioral difficulties for TD siblings was similar to the mean of the normative sample of 4- to 17-year-olds (SDQ Info) and similar to the mean of a community sample (Muris et al., 2003). These findings suggest that the ratings of

caregivers in this study, regarding the autism symptom severity and emotional and difficulties of their children with ASD and TD children, are similar to those of previous research.

Primary and secondary caregivers' ratings of their own functioning. Regarding self-reported distress, primary caregivers rated their depression and stress in the "Normal" to "Mild" ranges, and their anxiety in the "Normal" range, according to cutoff scores for the DASS (Lovibond & Lovibond, 1995b). Secondary caregivers rated their depression, anxiety, and stress all within the "Normal" range (Lovibond & Lovibond, 1995b). Additionally, both primary and secondary caregivers reported mean depression, anxiety, and stress levels similar to those of the normative sample in Lovibond and Lovibond's (1995a) study of the DASS. In comparison to another study of parents of children with ASD in which 35%, 22%, and 20% of their sample reported severe to extremely severe levels of depression, anxiety, and stress, respectively (Firth & Dryer, 2013), 15%, 14%, and 16% of the primary caregivers in the current sample reported severe to extremely severe levels of depression, anxiety, and stress, respectively, and furthermore, 9%, 4.5%, and 10% of secondary caregivers in the current sample reported severe to extremely severe levels of depression, anxiety, and stress, respectively. As such, overall the DASS ratings of the caregivers in the current sample were lower than the ratings of the parents in Firth and Dryer's (2013) study, indicating the caregivers in the current sample reported lower levels of distress. With respect to social support, as measured by the MSPSS, both primary and secondary caregivers rated their level of perceived social support as "high" and similar to the means of two studies examining the psychometric properties of the MSPSS with undergraduate college students and community samples of pregnant women, adolescents, and pediatric residents (Zimet et al., 1988; Zimet, Powel, Farly, Werkman, & Berkoff, 1990). The caregivers in the current sample rated their perceived social support higher than a sample of Chinese parents

of children with ASD, who rated their support in the “moderate” range (Lu et al., 2015). Finally, regarding life satisfaction as measured by the SWLS, both primary and secondary caregivers rated their life satisfaction in the “slightly satisfied” range and reported mean life satisfaction similar to that of the undergraduate college students and community geriatric adult samples included in Diener et al.’s (1985) study of the SWLS. The caregivers in the current sample reported life satisfaction levels similar to those of a sample of mothers of children with ASD and another sample of parents of children with ASD, both of which also rated their life satisfaction in the “slightly satisfied” range (Ekas & Whitman, 2010; Faso et al., 2013); however, the current sample reported higher life satisfaction than a sample of Chinese parents of children with ASD (Lu et al., 2015) and a sample of Taiwanese mothers of children with ASD (Hsieh & Lo, 2013), both of which rated their life satisfaction in the “slightly dissatisfied” range. Overall, these findings suggest primary and secondary caregivers of children with ASD are functioning quite well given that they reported normal to mild levels of distress, perceived themselves to be highly supported, and rated themselves as “slightly satisfied” in terms of life satisfaction. Furthermore, these results indicate that the caregivers in the current sample are functioning similarly to other normative samples, and somewhat better than some previous samples of parents of children with ASD (Firth & Dryer, 2013; Hsieh & Lo, 2015; Lu et al., 2015).

TD siblings’ ratings of their own functioning. With respect to self-reported emotional and behavioral difficulties, as measured by the SDQ, TD siblings reported emotional and behavioral difficulties within the “Normal” range according to cutoff scores for the measure (SDQ Info) and reported levels similar to TD children and adolescents in a community sample (Muris et al., 2003). Regarding social support, as measured by the MSPSS, TD siblings rated their level of perceived social support as “high” and similar to the mean for adolescents in Zimet

et al.'s (1990) study. Finally, with respect to life satisfaction, as measured by the BMSLSS, TD siblings rated their life satisfaction in the "mostly satisfied" range, almost reaching the "pleased" range, and reported a mean life satisfaction similar to that of children and adolescents in Seligson et al.'s (2003) study of the BMSLSS. Overall, the results of the current study indicate TD siblings, like their caregivers, are functioning quite well, as they self-reported "normal" levels of emotional and behavioral difficulties, perceived themselves to be highly supported, and rated themselves as "mostly satisfied" in terms of life satisfaction. Furthermore, these findings indicated that TD siblings of children with ASD in the current study are functioning similarly to other TD children and adolescents in previous research studies.

Caregiver Findings from Main Hypotheses

Correlates of caregivers' functioning. Hypothesis 1, which examined bivariate correlations among the study variables involved in the parallel mediation models for caregivers, was partially supported. For both primary and secondary caregivers, no significant relation was found between caregiver-reported ASD symptoms severity in the child with ASD and self-reported life satisfaction or self-reported social support. However, a significant positive correlation was found between caregiver-reported ASD symptoms severity in the child with ASD and self-reported distress for both primary and secondary caregivers, as originally hypothesized. Additionally, for both primary and secondary caregivers, results indicated no significant correlation between caregiver-reported emotional and behavioral difficulties of the child with ASD and self-reported life satisfaction or self-reported social support. However, Hypothesis 1 was again partially supported by a significant positive correlation between caregiver-reported emotional and behavioral difficulties of the child with ASD and self-reported distress for primary caregivers. In contrast, no significant relation was found between caregiver-reported emotional

and behavioral difficulties of the child with ASD and self-reported distress for secondary caregivers. With respect to self-reported life satisfaction, Hypothesis 1 was also partially supported in that a significant negative relation emerged between distress and life satisfaction and a significant positive correlation emerged between social support and life satisfaction, for both primary and secondary caregivers. Overall, eight bivariate correlations between study variables were proposed for Hypothesis 1, four of which were supported for primary caregivers and three of which were supported for secondary caregivers.

Examining similarities and differences between results of the current and results of previous literature helps shed some light on the current findings. Although the relation between autism symptom severity and life satisfaction for parents of children with ASD has not been extensively studied, Faso et al. (2013) also found no relation between these constructs at the correlational level. In contrast to the current findings, Ekas and Whitman (2010) found a negative relation between autism symptoms severity and life satisfaction of mothers of children with ASD. In support of the current study's finding of a significant negative relation between distress and life satisfaction, Faso et al. (2013) also reported strong negative associations between depression and stress and self-reported life satisfaction for parents of children with ASD. With respect to the relation between autism symptom severity and social support, Ingersoll and Hambrick (2011) reported a significant negative association between these two constructs, which is in contrast to the findings of the current study. Alternatively, the positive association between autism symptoms severity and parental distress is fairly well established in previous literature (Brei et al., 2015; Ekas & Whitman, 2010; Firth & Dryer, 2013; Ingersoll & Hambrick, 2011), and supports the current study's findings.

Similar to the relation between emotional and behavioral problems and primary caregiver distress in the present study, Firth and Dryer (2013) also noted significant positive correlations between behavior problems and parenting stress and distress. Hastings (2003c) reported significant positive correlations between child behavior problems and maternal depression and anxiety, but no significant relations for child behavior problems and paternal depression and anxiety. As the majority of primary caregivers in the present study were mothers and the majority of secondary caregivers were fathers, Hastings' (2003c) results may shed some light on the findings of the current study. More specifically, mothers may be more strongly affected by child characteristics than fathers because, traditionally, mothers are more likely to assume the majority of parenting responsibilities and may spend more time with their children, relative to fathers (Raley, Bianchi, & Wang, 2012), resulting in greater distress for mothers in comparison to fathers. Additionally, it is important to note that the lack of a significant association for secondary caregivers may also be explained by the smaller sample size, which may not have had the statistical power to detect the relation.

Although only some of the hypothesized bivariate correlations were supported, the results of the current study seem to indicate that assessing for autism symptom severity of the child with ASD is important when examining outcomes for caregivers of these children, especially with respect to caregiver distress (e.g., stress, anxiety, and depression). The mixed findings of the current study pertaining to emotional and behavioral problems of children with ASD and outcomes for caregivers, as well as the somewhat mixed findings of previous literature, suggest that these relations should continue to be explored in future research.

Parallel mediation models for caregivers. Hypothesis 2 examined parallel mediation models with autism symptom severity of the child with ASD or emotional and behavioral

problems of the child with ASD as the predictors of life satisfaction, with distress and social support serving as mediators. Hypothesis 2 was partially supported for primary caregivers but was unsupported for secondary caregivers. For primary caregivers, results indicated no significant direct pathway between autism symptoms severity of the child with ASD and self-reported life satisfaction when controlling for distress and social support. Additionally, the findings did not support the presence of an indirect effect of autism symptoms severity of the child with ASD on life satisfaction through perceived social support. However, an indirect effect of autism symptoms severity of the child with ASD on life satisfaction through distress emerged. Similar results were found for primary caregivers when emotional and behavioral problems of the child with ASD was the predictor in that no significant direct pathway or indirect effect through social support were found. However, again, an indirect effect of emotional and behavioral problems of the child with ASD on life satisfaction through distress was found for primary caregivers.

In contrast to the results for primary caregivers, Hypothesis 2 was completely unsupported for secondary caregivers. More specifically, no significant direct pathways were found between autism symptoms severity of the child with ASD or emotional and behavioral problems of the child with ASD and self-reported life satisfaction, when controlling for distress and social support. Additionally, the results did not support the presence of indirect effects through distress or perceived social support for either model for secondary caregivers.

No significant correlations emerged between autism symptom severity of the child with ASD and life satisfaction or between behavioral and emotional problems of the child with ASD and life satisfaction for primary caregivers. Statistically, bivariate correlations are equivalent to the total effect in a mediation model without covariates (Hayes, 2013, 2018). With respect to

mediation models, the interpretability of indirect effects in the absence of a total effect of the predictor variable on the outcome variable has been a point of controversy. Baron and Kenny (1986) proposed a causal steps approach to examining mediation, in which the predictor variable must be related to the mediator variable, the predictor variable must be related to the outcome variable, and the mediator variable must be related to the outcome variable. Furthermore, in order for a variable to qualify as a mediator, a previously established significant relation between the predictor variable and the outcome variable must be reduced or no longer significant when the relation between the predictor variable and the mediator variable and the relation between the mediator variable and the outcome variable are controlled (Baron & Kenny, 1986). Hayes (2009) argues that requiring a significant association between the predictor variable and the outcome variable as a prerequisite for mediation limits researchers' ability to find evidence for indirect effects, as it is possible for a third variable to be "causally" between a predictor variable and an outcome variable even if the two are not associated. Additionally, Hayes (2009) suggests that the term "mediator" be avoided when there is no significant association between the predictor variable and outcome variable. Rather, he recommends referring to the predictor variable's indirect effect on the outcome variable through the intervening variable (Hayes, 2009). Further, Hayes (2009) asserted, "That X can exert an indirect effect on Y through M in the absence of an association between X and Y becomes explicable once you consider that a total effect is the sum of many different paths of influence, direct and indirect, not all of which may be part of the formal model" (p. 414). In other words, potentially significant relations that were proposed by the researcher (e.g., indirect pathways) and that could help explain the construct of interest should not be discounted or ignored because of the absence of the proposed relation between the predictor variable and the outcome variable. More specifically, Hayes (2009)

argues that a significant total effect of the predictor variable on the outcome variable is not a prerequisite for examining indirect effects. As such, indirect effects in the absence of total effects were interpreted below.

Child characteristics and caregiver life satisfaction. Examining the results of the caregiver parallel mediation models, first, autism symptoms severity of the child with ASD did not predict life satisfaction, when controlling for distress and social support for either primary or secondary caregivers. Additionally, emotional and behavioral problems of the child with ASD did not predict life satisfaction when controlling for distress and social support for either primary or secondary caregivers. Similar to these results, Faso et al. (2013) found that autism symptom severity, when entered as a control variable, did not predict life satisfaction of parents of children with ASD when entered into a multiple regression analysis along with parental gender, hope, and vicarious futurity. However, in contrast to the current results, Ekas and Whitman (2010) reported child behavior problems uniquely predicted lower levels of life satisfaction after controlling for demographic variables and ASD symptoms in a study with mothers of children with ASD. Although the relation between child characteristics in children with ASD and caregiver life satisfaction has not been extensively studied, the non-significant results of the current study are somewhat surprising given the theoretical basis for these relations and the presence of these relations in other studies of caregiver life satisfaction (e.g., Athay, 2012, 2013; Early, Gregoire, & McDonald, 2002). Possible explanations for these non-significant findings are offered.

First, although the associations between characteristics of children with ASD (i.e., ASD symptom severity, emotional and behavioral problems) and negative outcomes for parents, such as stress, depression, and anxiety are well established (e.g., Firth & Dryer, 2013; Ingersoll &

Hambrick, 2011), it is possible that these child characteristics are less predictive of positive outcomes for caregivers. For example, in examining both positive and negative outcomes for mothers of children with ASD, Ekas and Whitman (2010) noted that while autism symptom severity and behavior problems of children with ASD were somewhat associated with positive maternal outcomes, these child characteristics were much better predictors of negative outcomes. As such, it stands to reason that other factors are likely better predictors of life satisfaction for caregivers of children with ASD.

For example, previous research has shown demographic variables (e.g., family income, maternal education, family size) for family members of children with ASD to be related to outcomes (e.g., depression, psychological well-being; Abbeduto et al., 2004; Garcia-Lopez et al., 2016; Macks & Reeves, 2007). Although only examined as a control variable in the current study, household income was a positive predictor for primary caregivers' life satisfaction and the age of the child with ASD was a positive predictor of secondary caregivers' life satisfaction. Given these findings, it is possible that families with higher household income may have more access to resources, that may be directly related to their life satisfaction and may ameliorate some of the challenges related to their child's ASD symptoms and/or emotional and behavioral difficulties. Another possibility is that families with older children with ASD have learned to more effectively manage their child's ASD symptoms and/or emotional and behavioral difficulties, potentially resulting in greater life satisfaction.

Additionally, it may be that characteristics of the caregivers themselves are more predictive of their life satisfaction than characteristics of their children. It is possible that positive traits and characteristics such as self-esteem, self-efficacy, optimism, resilience, and hope may be more related to life satisfaction and other constructs of caregivers' well-being. For

example, Garcia-Lopez et al. (2016) found self-efficacy was negatively related to stress, depression, and anxiety, and positively related to psychological well-being for mothers and fathers of children with ASD. Similarly, Halstead, Ekas, Hastings, and Griffith (2018) found that maternal resilience moderated the relationship between child behavioral and emotional problems and maternal outcomes for mothers of children with ASD and other DDs.

Additionally, Faso et al. (2013) reported vicarious futurity and hope as predictors of life satisfaction for parents of children with ASD. From a theoretical perspective, positive psychology asserts that virtues and strengths, such as hope and optimism, are important to study in order to gain a full picture of psychological functioning (Seligman & Csikszentmihalyi, 2000; Sheldon & King, 2001). The current study assessed for caregiver distress but did not assess for any positive characteristics or traits, which is something that should be included in future research examining positive outcomes.

Another possible explanation for the non-significant relations between child characteristics and caregiver life satisfaction comes from the stress and coping theoretical framework (e.g., Lazarus & Folkman, 1984). The stress and coping framework emphasizes that the occurrence of a stressor alone does not produce a response to the stressor, but rather the presence of a stressor interacts with the person's perception of the event as a stressor, as well as the person's appraisal of their resources to cope with the stressor, to produce the response (Lazarus & Folkman, 1984). Previous literature suggests parents' positive perceptions of their children with disabilities are associated with less negative psychological health outcomes, and that these perceptions can mediate and moderate relations between severity of the child's disability and parenting stress (Blacher & Baker, 2007; Paczkowski & Baker, 2008; Plant & Sanders, 2007). It is possible that the caregivers in this study do not conceptualize raising a child

with ASD as a stressor. Additionally, these caregivers may also have positive perceptions of raising their child with ASD, either instead of or in combination with perceiving raising a child with ASD as a stressor. Furthermore, given that previous research on parental positive perceptions of children with disabilities has been examined in relation to fewer negative outcomes, the relation between positive perceptions of raising a child with ASD and parental negative outcomes may be similar to or different from positive outcomes and warrants exploration in future research.

Indirect effects of child characteristics on life satisfaction through distress. The results of the current study indicated indirect effects of characteristics of the child with ASD (i.e., autism symptom severity, emotional and behavioral problems) on caregiver life satisfaction through caregiver distress for primary caregivers only. These results indicated primary caregivers of children with more severe autism symptoms were more likely to experience greater levels of distress, which in turn was negatively related to their reported life satisfaction. Similarly, these results indicated primary caregivers of children with more emotional and behavioral problems were more likely to experience greater level of distress, which in turn was negatively related to their reported life satisfaction. These indirect effects were found in the absence of total effect of child characteristics on life satisfaction, indicating there is something unique about this relation when distress is entered into the model. Distress in caregivers of children with ASD is often examined as the outcome variable (e.g., Bitskia & Sharpley, 2004; Dabrowska & Pisula, 2010), and has been occasionally used as a predictor variable for other caregiver outcomes (e.g., Johnson et al., 2011; Dardas & Ahmad, 2014). However, caregiver distress is not often explored as a mediator (i.e., intervening variable), especially with respect to positive outcomes. Given that caregiver distress was found to be a significant intervening

variable between child characteristics and life satisfaction for primary caregivers, distress may be a valuable point of intervention for addressing functioning in these caregivers.

For secondary caregivers, no significant indirect effects of characteristics of the child with ASD on caregiver life satisfaction through caregiver distress were found. It is possible that the smaller sample size of the secondary caregivers (68 participants) contributed to the lack of significant findings. It is also likely that these caregivers who self-identified as the secondary caregiver of their children have less direct parenting responsibilities than those who self-identified as the children's primary caregiver. As such, primary caregivers may experience greater caregiver burden than secondary caregivers, and autism symptom severity has been found to be predictive of greater caregiver burden and caregiver burden has been shown to be related to lower levels of life satisfaction (Centinbakis, Bastug, & Ozel-Kizil, 2018). However, the current study did not directly assess perceptions of caregiver burden, which may be a factor related to life satisfaction for both primary and secondary caregivers.

Indirect effects of child characteristics on life satisfaction through social support. The findings of the current study did not support the presence of indirect effects of characteristics of the child with ASD (i.e., autism symptom severity, emotional and behavioral problems) on life satisfaction through perceived social support for either primary or secondary caregivers. At the bivariate level, child characteristics were not significantly associated with social support or caregiver life satisfaction, however, social support was strongly related to life satisfaction. The lack of association between characteristics of the child with ASD and caregiver social support is somewhat surprising given Boyd's (2002) review of the literature which found challenging child characteristics to be related to mothers of children with ASD seeking social support. Additionally, this lack of relation is surprising from a theoretical perspective. Drawing again

from the stress and coping literature, the resources of individuals or families are a part of the appraisal of the stressor in that the individuals/families evaluate if they have the resources to effectively handle the stressor (Lazarus & Folkman, 1984). As previously hypothesized, the caregivers in the current study may not be conceptualizing raising a child with ASD as a stressor and therefore, the link between being stressed and needing resources may not be applicable. Given that the caregivers in the current sample indicated a high level of perceived social support, it is possible that these families are well equipped to handle these challenges, and the level of perceived support appears independent of the child characteristics measured.

Another possible explanation for the lack of findings concerning social support again comes from the stress and coping literature. In addition to social support, resources of the family are also conceptualized to include coping strategies in general (Lazarus & Folkman, 1984). Folkman and Lazarus (1980) conceptualized coping as a process by which an individual uses different strategies to manage a stressful situation depending on the needs of the person at the time, and much of the literature has focused on problem-focused coping versus emotion-focused coping. Previous literature has suggested coping strategies play an important role in accounting for better outcomes for caregivers of children with disabilities (e.g., Dabrowska & Pisula, 2010; Pakenham et al., 2005). In light of this line of research and the “high supported” current sample, coping strategies among caregivers of children with ASD may be more strongly related to challenging child characteristics and/or caregiver life satisfaction. It may be beneficial for future research to include examination of both social support and coping strategies to better understand if and/or how these variables interrelate.

Sibling Findings from Main Hypotheses

Correlates of TD siblings' functioning. Hypothesis 3 examined bivariate correlations among the study variables involved in the parallel mediation models for TD siblings and was partially supported. No significant relation was found between primary caregiver-reported ASD symptoms severity in the child with ASD and self-reported life satisfaction for TD siblings. However, results indicated a significant negative correlation between primary caregiver-reported ASD symptoms severity in the child with ASD and TD sibling perceived social support. Unlike with ASD symptom severity, there was a significant negative relation between primary caregiver-reported emotional and behavioral problems in the child with ASD and self-reported life satisfaction for TD siblings. However, no significant correlation was found between primary caregiver-reported emotional and behavioral problems of the child with ASD and TD sibling perceived social support. Additionally, no significant association was found between primary caregiver's distress and self-reported life satisfaction for TD siblings. However, a significant positive relation was found between TD sibling perceived social support and self-reported life satisfaction for TD siblings. Overall, Hypothesis 3 proposed six bivariate correlation between study variables, three of which were supported for TD siblings.

With respect to negative outcomes for TD siblings of children with ASD, the previous literature is mixed, with some studies finding greater rates of difficulties for these siblings and other studies finding no differences in rates of difficulties for these siblings compared to siblings of children/adolescents without ASD (e.g., Meadan et al., 2010). Regarding positive outcomes for TD siblings of children with ASD, especially life satisfaction, there is a paucity of research. As such, the findings of the current study add to the growing literature on the functioning of TD

siblings, especially with respect to positive outcomes. At the correlational level, three significant relations were found which warrant further exploration and explanation.

First, there was a significant negative association between primary caregiver-reported autism symptom severity in the child with ASD and TD sibling perceived social support, indicating greater caregiver-reported ASD symptoms severity was associated with less self-reported social support for TD siblings. Interestingly, no significant association was found between primary caregiver-reported emotional and behavioral problems of the child with ASD and TD sibling perceived social support. These two contrasting findings suggest there is something about degree of ASD symptom severity rather than just general emotional and behavioral difficulties of the child with ASD that is related to social support for TD siblings of children with ASD. Given the social deficits characteristics of ASD, it is possible the social difficulties experienced by the sibling with ASD may negatively impact the TD sibling's ability to cultivate a social support network. Additionally, although broader autism phenotype (BAP) in TD siblings was only examined as a potential covariate for the parallel mediation model analyses, results indicated a significant negative relation between primary caregiver-reported ASD symptom severity in TD siblings (i.e., BAP) and TD sibling perceived social support. Therefore, it is possible that social difficulties experienced by TD siblings may lead to difficulties in cultivating a social support network.

Second, there was a significant negative relation between primary caregiver-reported emotional and behavioral problems in the child with ASD and self-reported life satisfaction for TD siblings. This significant relation is similar to previous research on negative outcomes for TD siblings, which has shown behavior problems in children with ASD are related to negative

outcomes for TD siblings, particularly greater behavioral and emotional problems experienced by the TD siblings (e.g., Petalas et al., 2012; Walton, 2016).

Third, results of the current study indicated a significant positive correlation between TD sibling perceived social support and TD sibling self-reported life satisfaction. Although the specific relation between social support and life satisfaction for TD siblings of children with ASD has not previously been explored, the findings of the present study are supported by previous literature which has shown greater social support is associated with better outcomes for TD siblings of children with ASD (e.g., Hastings, 2003c; Kaminsky & Dewey, 2002).

Parallel mediation models for TD Siblings. Hypothesis 4 examined parallel mediation models with primary caregiver-rated autism symptoms severity of the child with ASD or emotional and behavioral problems of the child with ASD as the predictors of TD sibling-reported life satisfaction, with primary caregivers' distress and social support serving as mediators. Similar to the results for secondary caregivers found for Hypothesis 2, Hypothesis 4 was completely unsupported for TD siblings. More specifically, no significant direct pathways emerged between autism symptom severity of the child with ASD or emotional and behavioral problems of the child with ASD and self-reported life satisfaction when controlling for primary caregiver distress and TD sibling perceived social support. Additionally, the results did not support the presence of indirect effects through primary caregiver distress or TD sibling perceived social support for either model for TD siblings.

Characteristics of siblings with ASD and TD sibling life satisfaction. At the correlational level, primary caregiver-reported autism symptoms severity of the child with ASD was not related to TD sibling life satisfaction, nor did it predict life satisfaction when controlling for primary caregiver distress and TD sibling perceived social support in the parallel mediation

model. Interestingly, although a significant, negative bivariate relation was found between primary caregiver-reported emotional and behavioral problems in the child with ASD and self-reported life satisfaction for TD siblings, emotional and behavioral problems in the child with ASD did not predict life satisfaction when controlling for primary caregiver distress and TD sibling perceived social support in the parallel mediation model. Although child characteristics of the siblings with ASD (i.e., autism symptom severity, emotional and behavioral problems) have been shown to predict negative outcomes for TD siblings, especially greater emotional and behavioral difficulties and lower prosocial behaviors (e.g., Benson & Karlof, 2008; Hastings & Petalas, 2014; Petalas et al., 2012), the findings of the current study suggest that other factors may be stronger predictors of TD siblings' life satisfaction.

Beyond methodological concerns (e.g., limited statistical power), one possible explanation for the non-significant findings in the parallel mediation models is that demographic variables are better predictors of TD sibling life satisfaction than the characteristics of their sibling with ASD. With respect to the current study, household income and primary caregivers' education level were entered into the models as potential covariates. For both models, primary caregivers' education level was a significant positive predictor of TD sibling life satisfaction. For the model with behavioral and emotional problems serving as the predictor variable, household income was a significant, positive predictor of TD sibling life satisfaction, and household income was approaching significance as a positive predictor of TD sibling life satisfaction for the model with autism symptom severity serving as the predictor variable. Previous research has found lower socioeconomic status/family income to be related to poorer outcomes for TD siblings of children with ASD, especially with respect to greater reported emotional and behavioral problems (Macks & Reeve, 2007; Petalas, Hastings, Nash, Lloyd, &

Dowey, 2009; Quintero & McIntyre, 2010; Walton, 2016). With respect to the findings of the current study, primary caregivers' education and household income may provide more resources for the family in general, which may yield better services for the child with ASD and TD sibling. Additionally, these families may have resources that can provide an environment where the TD sibling is not as involved in the care of their sibling with ASD, which may allow the TD siblings' life satisfaction to be independent of the functioning of their sibling with ASD.

Another possible explanation for the non-significant relation between child characteristics of the sibling with ASD and TD sibling self-reported life satisfaction is that life satisfaction for the TD sibling is independent of the broader family. TD sibling functioning being independent of the family is somewhat contradictory to the theoretical framework of family systems theory, which emphasizes that families function as a system and the system impacts the functioning of each member of the family (Bowen 1966, 1974). However, this proposed explanation has theoretical support within the ecological systems theory (Bronfenbrenner, 1979) and the Sibling Embedded Systems Framework (Kovshoff et al., 2017), both of which assert that a multitude of factors at different levels can impact the functioning of children, and specifically TD siblings of children with ASD. As such, it is possible that factors within the TD siblings themselves (e.g., biological and environmental factors, personal perceptions), as well as other factors outside the family (e.g., peers, school/work, community) may contribute to TD siblings' life satisfaction, which allows for TD siblings' life satisfaction to be independent of the family's functioning. As highlighted by Kovshoff et al. (2017), every factor potentially involved in outcomes for TD siblings of children with ASD cannot be examined in a single study, however, the results of this study emphasize the need to examine other potential factors related to TD sibling self-report life satisfaction.

Additionally, as suggested for caregivers, TD siblings may not conceptualize having a sibling with ASD as a stressor (i.e., the stress and coping theoretical framework; Lazarus & Folkman, 1984), and thus the characteristics of the sibling with ASD might not be related to positive outcomes for the TD siblings. Furthermore, it is possible that in addition to not viewing having a sibling with ASD as a stressor, TD siblings may experience positive benefits of having a sibling with ASD. For example, in a review of literature on the well-being of siblings of individuals with ASD, Green (2013) highlighted research finding positive impacts of having a sibling with ASD, including better sibling relationships, family resilience, increased self-competence, and positive psychosocial and emotional development. The findings of the present study and Green's (2013) review of the literature highlight the importance of continuing to examine positive outcomes for TD siblings of children with ASD, as well as examining positive factors that may contribute to these outcomes.

Indirect effects of child characteristics on life satisfaction through primary caregiver distress. At the bivariate level, the results of the current study did not show a significant relation between primary caregivers' distress and self-reported life satisfaction of TD siblings. Additionally, with respect to the parallel mediation models, no significant indirect effects of primary caregiver-reported characteristics of the sibling with ASD on TD sibling life satisfaction through primary caregiver distress were found. The previous literature on the relation between parental distress and TD siblings' outcomes is mixed, where some studies have shown parental distress to be related to and/or predictive of negative outcomes for TD siblings (e.g., Fisman et al., 2000, Hesse et al, 2013, Orsmond & Seltzer, 2009), while other studies have not found a significant relation (e.g., Hastings, 2003b; Hastings & Petalas, 2014). With respect to positive

outcomes, the findings of the current study provide some evidence that caregivers' distress may not be related to self-reported life satisfaction of TD siblings.

As suggested above, it is possible that TD's siblings' life satisfaction is independent of family functioning, including that of their caregivers. As previously hypothesized, other factors related to the siblings themselves and their broader environment (e.g., Bronfenbrenner, 1979; Kovshoff et al., 2017) may be better predictors of TD sibling life satisfaction. More specifically, TD siblings' own emotional and behavioral difficulties may be more predictive of TD sibling self-reported life satisfaction than the psychological functioning of their caregivers or sibling with ASD. From a positive psychology perspective (Seligman & Csikszentmihalyi, 2000), positive traits and characteristics, such as self-esteem and optimism, may be more related to TD siblings' life satisfaction. It was beyond the scope of the current study to include these constructs in the overall model, but future research should examine the impact of factors within TD siblings, both positive and negative, that may be related to their self-reported life satisfaction.

Indirect effects of child characteristics on life satisfaction through social support. At the correlational level, TD sibling perceived social support was positively related to their self-reported life satisfaction. However, with respect to the parallel mediation models, no significant indirect effects of primary caregiver-reported characteristics of the sibling with ASD on caregiver life satisfaction through TD sibling perceived social support were found. Results indicated that while ASD symptom severity and behavioral and emotional difficulties of the sibling with ASD did not predict social support of the TD sibling, the primary caregiver-reported autism symptom severity of the TD siblings (i.e., BAP), which was entered into the model as a covariate, did significantly predict lower levels of TD sibling self-reported perceived social support. Additionally, although no indirect effects emerged, TD sibling perceived social support

significantly predicted higher levels of TD sibling life satisfaction, over and above covariates in the models. Interestingly, for both parallel mediation models, when life satisfaction was the outcome and social support and primary caregiver distress were entered into the model as intervening variables, the covariate of autism symptoms severity of the TD sibling (i.e., BAP) was not significant, which could indicate social support is important to life satisfaction over and above TD siblings' own autism symptoms associated with BAP. These findings suggest TD sibling social support is an important factor in TD sibling life satisfaction.

Examination of Findings from the Exploratory Research Questions

The present study proposed four exploratory research questions pertaining to the particular constellations of core ASD symptoms and/or child emotional and behavioral problems in children with ASD as they relate to different outcomes for family members of these children. The majority of these analyses yielded non-significant results, however, some of the results deserve further interpretation and examination.

First, for primary caregivers, the overall model of the six subscales of the measure of autism symptom severity (i.e., Behavior/emotions not optimally tuned to the social situation, Reduced contact and social interest, Orientation problems in time, place, or activity, Difficulties in understanding social information, Stereotyped behavior, Fear of and resistance to changes) for the child with ASD explained 25% of the variance in primary caregivers' distress scores. Interestingly, whereas the overall model was significant, the only autism symptom category that emerged as a significant negative predictor of primary caregivers' distress was "Difficulties in understanding social information," which is a category of symptoms related to difficulties in understanding appropriate behavior in a variety of social contexts (Harman et al., 2006). Although the current study did not make any directional hypotheses related to the exploratory

research questions, this finding seems somewhat counter-intuitive, as greater difficulties in understanding social information predicted lower levels of caregiver distress.

Second, for TD siblings, the overall model of the primary caregiver-rated six subscales of the measure of autism symptom severity for the child with ASD predicting TD siblings' social support approached significance, and one subscale emerged as a significant negative predictor. More specifically, greater reduced contact and social interest (e.g., "makes little eye contact," "does not initiate play with other children") by the sibling with ASD predicted lower TD sibling perceived social support. As previously hypothesized, the social deficits of the sibling with ASD may negatively impact TD siblings' ability to cultivate supportive social networks. However, it is important to note that the overall model was only trending toward significance, and therefore, this unique predictor should be interpreted with caution.

Third, for primary caregivers, the overall model of the five subscales of the measure of emotional and behavioral problems (i.e., Hyperactivity-Impulsivity, Emotional Symptoms, Conduct Problems, Peer Problems, Prosocial Behavior) for the child with ASD explained 13% of the variance in primary caregivers' distress scores. However, no specific areas of emotional and behavioral problems emerged as individual significant predictors. This finding suggests that the overall emotional and behavioral problems of the child with ASD predicts primary caregivers' distress, but no specific problem area is more predictive than others.

Finally, female caregivers reported more distress than male caregivers. Previous research has also shown gender differences in parental stress and psychopathology, with mothers of children with ASD reporting more stress, depression, and anxiety than fathers of children with ASD (e.g. Dabrowska & Pisula, 2010; Garcia-Lopez et al., 2016; Jones et al., 2013). However, given that mothers are often presumed to be the primary caregivers of their children, based on

typical societal norms, these findings may be confounded by caregiver burden. For example, in a study comparing parent-rated stress and well-being as well as biomarkers for stress, Foody, James, and Leader (2015) found that mothers of children with ASD reported greater parenting responsibility, distress, depression, and anxiety than fathers of children with ASD. Additionally, Garcia-Lopez et al. (2016) proposed differences in involvement in caregiving, with mothers being more involved in caregiving as a possible explanation for their findings of gender differences in stress, anxiety, depression, and psychological well-being between mothers and fathers of children with ASD. As such, future research should consider including an assessment of caregiver burden and/or perceived parenting responsibility in order to better understand any differences in distress between mother and fathers.

Limitations and Directions for Future Research

Whereas the results of the present study provide some insight into the functioning of family members of children with ASD, these results should be interpreted with a number of limitations in mind. First, a comparison sample of families of TD children was not included in this study. Some previous research has found differences in functioning for families of children with ASD when compared to families of children with other DDs or families of TD children (e.g., Hoffman et al., 2009; Lee, 2009; Lu et al., 2015), however, other research has found no differences (e.g., Herring et al., 2006; Tomeny et al., 2012). A comparison study of families of children with ASD and families of TD children would allow researchers to compare and contrast the functioning of different family members, particularly related to life satisfaction. In addition, exploring the functioning of families of TD children and the proposed models of this study may provide a more concrete explanation for the unsupported hypotheses of the present study.

Second, the relatively small sample size of the current study, especially with respect to secondary caregivers, may have contributed to some of the hypothesized relations not being found to be statistically significant because the power to detect the relations in the parallel mediation models may have been too low. For example, previous research has shown a significant predictive relation between autism symptom severity of the children with ASD and increased parental distress (e.g., Davis & Carter, 2008; Ingersoll & Hambrick, 2011). Similarly, the significant predictive relation between emotional and behavioral problems in children with ASD and increased parental distress is also fairly well established in previous literature (e.g., Estes et al., 2013; Firth & Dryer, 2013). These relations were found to be statistically significant in the present study for primary caregivers, but not secondary caregivers, which may have been due to the small sample size of the secondary caregiver group. In general, increasing the size of the overall sample, and especially the subsample of secondary caregivers, may improve the statistical power of the models in order to better detect the hypothesized relations, even if effect sizes are small.

Third, the sample for the present study was relatively homogeneous, with the majority of participants being Caucasian, well-educated, married, with approximately half the sample reporting an annual household income between \$50,000 and \$99,999. Additionally, some demographic factors (e.g., household income, race, age) were related to the mediator variables (i.e., caregiver distress, social support) and the outcome variable (i.e., life satisfaction), which suggests that certain demographic factors may impact functioning for family members of children with ASD. Furthermore, previous research has examined demographic variables as potential risk factors (e.g., low socioeconomic status, sibling birth order, family size, parental education) for negative outcomes for TD siblings of children with ASD (e.g., Macks & Reeves,

2007; Tomeny, Barry, & Bader, 2014) and parents of children with ASD (Abbeduto et al., 2004). Given the demographic characteristics of the current sample, caution should be practiced when generalizing the present findings to minority or socioeconomically disadvantaged families of children with ASD. The overall functioning of families of children with ASD was fairly positive with normal to mild level of distress, high levels of perceived social support, and fair levels of life satisfaction. It is possible that family members from minority and socioeconomically disadvantaged background may experience more stress and negative outcomes in their daily lives, which may also impact their perceptions of having a family member with ASD. As such, these families may have responded differently to the questionnaires used in the current study. Overall, obtaining a more heterogeneous sample may provide a more complete picture of the functioning of families of children with ASD.

Fourth, there are several methodological limitations of the current study. The present research design was cross-sectional, using self-report questionnaires. Although the current study attempted to collect data from multiple family members from each family in order to obtain more information about each individual family member's functioning and the overall functioning of the families, all data collected were self-reported at one time point. Given the cross-sectional nature of this study, causality cannot be determined. Additionally, the reliance on caregivers to report both on their children's functioning (i.e., child with ASD & TD sibling) as well as their own functioning may have resulted in shared method variance. However, this study attempted to curb some of the possible shared method variance by having TD siblings self-report on their own functioning (e.g., social support, life satisfaction). Although, including self-report data from children comes with its own inherent limitation in that it restricts the age range of the children who can be involved in the study. The current study included only TD siblings between the ages

of 11 and 17 years old in order to comply with appropriate age ranges for the measures and to increase the probably of accurate self-reporting of their own functioning from the TD siblings. Furthermore, ASD diagnosis, severity of ASD symptoms, and emotional and behavioral problems of both the child with ASD and the TD sibling were self-reported by caregivers, rather than verified and rated by a clinician using formal assessment tools (e.g., Autism Diagnostic Observation Schedule [ADOS], Autism Diagnostic Interview [ADI]). However, families recruited from the IAN Research database and registry have a child with ASD whose diagnosis was verified per the participant registration process of IAN Research. In contrast, eligibility criteria for study participation for families recruited through Qualtrics Panels relied solely on caregiver report for ASD diagnostic status of the children. A more formal assessment of diagnostic criteria, ASD symptom severity, and emotional and behavioral problems by a clinician may have provided more insight into the functioning of the children with ASD and their TD siblings. However, previous research has suggested that parent report of ASD symptom severity is important to collect when examining the association between ASD symptom severity and parental stress, over and above clinician rated ASD symptom severity (Brei et al., 2015). Finally, assessing the functioning of family members of children with ASD over time using a longitudinal study design may yield more variable and robust results, and provide more insight into direction of effects. Overall, future research should address some of the methodological short comings of the current study.

Fifth, both biological/genetic factors and environmental factors may influence the outcomes of family members of children with ASD. Although caregiver-reported ASD symptoms for the TD siblings was conceptualized as a proxy for broader autism phenotype (BAP) in TD siblings, it was beyond the scope of the current study to assess for BAP in

caregivers of children with ASD. Moreover, the focus of the present study was to examine environmental factors that may be related to outcomes for family members of children with ASD. However, not assessing for BAP in caregivers of children with ASD and using BAP in TD siblings only as a potential covariate is a limitation of the current study, as it does not allow for the examination of biological/genetic factors that may influence functioning in family members of children with ASD. As such, future research would benefit from including both biological/genetic factors and environmental factors that may influence the functioning of family members of children with ASD.

Sixth, issues related to construct validity and shared variance could be present if distress and life satisfaction were opposite ends of the same construct. In the current study, the negative relation between self-reported caregiver distress and life satisfaction was strong and statistically significant, however, there was no statistically significant relation between primary caregivers' distress and TD siblings self-reported life satisfaction. Although the relations between distress and life satisfaction for caregivers were strong, they were not perfect correlations, indicating that the two measures are likely measuring different, but related constructs for caregivers of children with ASD. It has been argued that positive outcomes, such as life satisfaction, are conceptually different from a decrease in or absence of negative outcomes, such as distress (Seligman & Csikszentmihalyi, 2000). Additionally, it has been argued that studying distinctly positive outcomes, not just a lack of maladjustment, in families of children with disabilities is an important direction for the field (Dykens, 2005). Although the conceptual argument for examining both life satisfaction and distress separately and in relation to each other is sound, given the strong correlation between the two constructs, the results of the present study should be interpreted with this relation in mind.

Finally, recruitment for this study was conducted with the assistance of the Interactive Autism Network (IAN) Research database and registry at the Kennedy Krieger Institute, Baltimore, Maryland and Qualtrics Panels, through online recruitment advertisements. As such, it is possible that families of children with ASD who are connected to IAN Research or Qualtrics may be inherently different than parents who are not connected to these online recourses. Additionally, the IAN Research database and registry is exclusively for individuals with ASD and their family members, while Qualtrics Panels is a broader research recruitment tool which identified eligible research participants (i.e., families of children with ASD) from larger online research panels, as such there may be differences in the participants who are members of the two online research communities. In addition, families and family members who chose to participate may also be inherently different than those who did not choose to participate. Given the recruitment methods, the demographic characteristics of the sample, and the generally positive self-reported functioning of the family members of children with ASD who participated, it could be that families who did not participate in this study may have fewer resources, may experience less favorable functioning, and may not have had the time to commit to participating in the current study. Additionally, it is important to acknowledge that families who participated in the current study came from both recruitment sources (i.e., IAN Research and Qualtrics Panels), and study findings should be examined with these recruitment sources and strategies in mind. Future research should utilize different recruitment strategies (e.g., diagnostic clinics, psychological clinics, speech and language clinics, hospitals, special education programs, support groups) in order to recruit more diverse families with different resources and potentially different levels of functioning.

Further suggestions for future research. Based on the findings of the current study and previous literature, future research should continue to focus on positive outcomes for family members of children with ASD. Previous research has overwhelmingly focused on negative outcomes for family members of children with ASD; however, a shift in focus toward positive outcomes and factors related to positive outcomes may allow researchers to identify potentially positive experiences of these family members. Additionally, based on the results of the current study, many other individual factors (e.g., personality traits, coping strategies), environmental factors (e.g., family functioning), and biological factors (e.g., broader autism phenotype) should be explored with respect to positive outcomes, such as life satisfaction. Furthermore, given that the results of the present study were somewhat different depending on the family member, future research should continue to further examine the functioning of different members of families with children with ASD, especially secondary caregivers and TD siblings.

Conclusions and Potential Clinical Implications

Despite the general lack of support for the hypothesized parallel mediation models, several important conclusions can be drawn from the results of the current study. First, one of the major aims of the current study was to provide information about positive outcomes (i.e., life satisfaction) and functioning for family members of children with ASD. In general, family members of children with ASD in the current sample appear to be functioning quite well with respect to caregiver distress, social support, and life satisfaction. This highlights the importance of researchers continuing to explore positive outcomes for family members of children with ASD. Additionally, these results suggest that clinicians working with families of children with ASD may want to assess for caregiver distress, social support, and life satisfaction to identify

those family members who may be functioning at an adequate level and those who may be struggling.

Second, this study's results indicated primary caregivers of children with more severe autism symptoms were more likely to experience greater levels of distress, which in turn was negatively related to their reported life satisfaction. Similarly, the results of the current study indicated primary caregivers of children with more emotional and behavioral problems were more likely to experience greater levels of distress, which in turn was negatively related to their reported life satisfaction. These findings are especially interesting given that the present study did not find significant relations between autism symptom severity and life satisfaction or between emotional and behavioral problems and life satisfaction at the bivariate level for primary caregivers. Regarding clinical implications, targeting both the characteristics of the child with ASD and the primary caregivers' distress as points of intervention may be beneficial for primary caregivers' life satisfaction.

Third, the current study aimed to contribute to the existing literature on families of children with ASD by examining functioning across multiple family members: primary caregivers, secondary caregivers, and TD siblings. Overall, the results of this study indicate some variation in functioning and factors related to functioning across family members. Given these results, it is important for clinicians working with these families to inquire about the functioning of each family member individually and design interventions to target the needs of each family member as applicable.

Finally, although social support did not serve as an intervening variable between characteristics of the child with ASD and family members' life satisfaction, social support did emerge as a consistent correlate of better life satisfaction. As such, clinicians working with these

families should assess each members' perceived social support, inform families about available resources and supports, and encourage families to take advantage of these supports.

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APPENDIX A: STUDY MEASURES

Demographic and Diagnostic Form Completed by Primary Caregiver on Child with an ASD

DEMOGRAPHIC QUESTIONNAIRE

Child's Age: _____ **Child's Gender:** Female _____ Male _____

Child's Race: White _____ Black _____ Hispanic _____ Asian _____ Multiracial _____
Other (please specify) _____

This child's birth order rank: First (Oldest) _____ Second _____ Third _____ Fourth _____
Other (please specify) _____

What diagnosis was given to your child? Autism Spectrum Disorder _____ Asperger's _____ Autistic Disorder _____ PDD-NOS _____ Other (please specify) _____

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

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

Who diagnosed your child? Psychologist _____ Pediatrician _____ Neurologist _____
Psychiatrist _____ Other (Please specify) _____

Has your child received any other diagnoses? *(Please select all diagnoses received)*

ADHD _____ Anxiety _____ Conduct Disorder _____ Depression _____
Learning Disability _____ Intellectual Disability/Mental Retardation _____
Oppositional Defiant Disorder _____
Other (please specify) _____

Please rate your child's overall intellectual functioning level:

Well Below Average _____ Below Average _____ Average _____ Above Average _____
Well Above Average _____

What is your child's current school placement?

Fully Mainstream _____ Mainstream with an Aid _____ Partially Mainstream _____
Partially Self-Contained _____ Fully Self-Contained _____
Other (please specify) _____

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

Applied Behavioral Analysis (ABA) _____ Early Intervention Services _____
Physical Therapy _____ Occupational Therapy _____ Psychological Treatment _____
Speech Therapy _____
Other (Please Specify) _____

Demographic and Diagnostic Form Completed by Primary Caregiver of a Two-Parent Household on Themselves

DEMOGRAPHIC QUESTIONNAIRE ABOUT YOU

Your Gender: Female _____ Male _____ **Your Age:** _____ years

Your relation to the children: Mother _____ Father _____ Step-Mother _____
Step-Father _____ Grandmother _____ Grandfather _____ Aunt _____ Uncle _____
Other (please specify) _____

Your Race: White _____ Black _____ Hispanic _____ Asian _____ Multiracial _____
Other (please specify) _____

Marital Status: Married _____ Separated _____ Divorced _____ Widowed _____
Never Married/Living Alone _____ Cohabiting, but not married _____

Education: What is the highest level of education you have completed:

- _____ 6th grade or less
- _____ Junior high school (7th, 8th, 9th grade)
- _____ Some high school (10th, 11th grade)
- _____ High school graduate
- _____ Some college (at least 1 year)
or specialized training
- _____ College/university graduate
(4-year degree)
- _____ Graduate professional degree
(Master's, Doctorate)

Demographic Questionnaire Completed by Primary Caregiver on Typically-Developing Sibling

DEMOGRAPHIC QUESTIONNAIRE

Child's gender: Female _____ Male _____ **Child's age:** _____ years

This child's birth order rank: First (Oldest) _____ Second _____ Third _____ Fourth _____
Other (please specify) _____

This child's race: White _____ Black _____ Hispanic _____ Asian _____ Multiracial _____
Other (please specify) _____

What type of school does this child attend?

Traditional (Public _____ Private _____ Other _____) Home-School _____ Boarding _____ Military _____
College/University _____
Other (Please Specify) _____

Please rate this child's overall performance in school:

A-B ___ B-C ___ C-D ___ D-F ___

You have already indicated that this child does not have an Autism Spectrum Disorder or intellectual disability. Has this child ever received a different diagnosis? Yes _____ No _____

If yes, please indicate below: (Please select all diagnoses received)

ADHD _____ Anxiety _____ Conduct Disorder _____ Depression _____

Learning Disability _____

Oppositional Defiant Disorder _____

Other (please specify) _____

Does this child receive any mental health services? Yes _____ No _____

If yes, please describe: _____

Demographic Questionnaire on Parents and Family Completed by Partner/Significant Other of the Primary Caregiver of the Children in the Family OR Primary Caregiver of a Single-Parent Household

**DEMOGRAPHIC QUESTIONNAIRE
ABOUT YOU AND YOUR FAMILY**

Your Gender: Female _____ Male _____ **Your Age:** _____ years

Your relation to the children: Mother _____ Father _____ Step-Mother _____
Step-Father _____ Grandmother _____ Grandfather _____ Aunt _____ Uncle _____
Other (please specify) _____

Your Race: White _____ Black _____ Hispanic _____ Asian _____ Multiracial _____
Other (please specify) _____

Marital Status: Married _____ Separated _____ Divorced _____ Widowed _____
Never Married/Living Alone _____ Cohabiting, but not married _____

Education: What is the highest level of education you have completed:

- _____ 6th grade or less
- _____ Junior high school (7th, 8th, 9th grade)
- _____ Some high school (10th, 11th grade)
- _____ High school graduate
- _____ Some college (at least 1 year)
or specialized training
- _____ College/university graduate
(4-year degree)
- _____ Graduate professional degree
(Master's, Doctorate)

Income: What is the total annual income of your household?

(Combine the income of all people living in your house.)

- | | | |
|----------------------------|------------------------------|------------------------------|
| _____ \$ 0 -- \$ 4,999 | _____ \$35,000 -- \$49,999 | _____ \$150,000 -- \$174,999 |
| _____ \$ 5,000 -- \$ 9,999 | _____ \$50,000 -- \$74,999 | _____ \$175,000 -- \$199,999 |
| _____ \$10,000 -- \$14,999 | _____ \$75,000 -- \$99,999 | _____ \$200,000 -- \$224,999 |
| _____ \$15,000 -- \$24,999 | _____ \$100,000 -- \$124,999 | _____ \$225,000 -- \$249,999 |
| _____ \$25,000 -- \$34,999 | _____ \$125,000 -- \$149,999 | _____ \$250,000 and above |

How many total people live in your household?

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

Children's Social Behavior Questionnaire (CSBQ)

The following are a number of statements about children's behaviors. Please rate each item as to how child in the preceding two months. The possible answers are Does Not Apply (0), Sometimes or Somewhat Applies (1), and Clearly or Often Applies (2). PLEASE ANSWER ALL ITEMS.

	Does Not Apply	Sometimes or Somewhat Applies	Clearly or Often Applies
1. Talks confusedly; jumps from one subject to another in speaking	0	1	2
2. Only talks about things that are of concern for himself/herself	0	1	2
3. Does not fully understand what is being said to him/her i.e., tends to miss the point	0	1	2
4. Frequently says things that are not relevant to the conversation	0	1	2
5. Does not understand jokes	0	1	2
6. Takes things literally e.g., does not understand certain expressions	0	1	2
7. Is exceptionally naive; believes anything you say	0	1	2
8. Over-reacts to everything and everyone	0	1	2
9. Draws excessive attention to him/herself	0	1	2
10. Flaps arms/hands when excited	0	1	2
11. Makes odd, fast movements with fingers or hands	0	1	2
12. Sways to and fro	0	1	2
13. Does not look up when spoken to	0	1	2
14. Acts as if others are not there	0	1	2
15. Lives in a world of his/her own	0	1	2
16. Makes little eye contact	0	1	2
17. Dislikes physical contact	0	1	2
18. Does not seek comfort	0	1	2
19. Does not initiate play with other children	0	1	2
20. Has little or no need for contact with others	0	1	2
21. Does not respond to initiatives by others e.g., does not play along when asked	0	1	2
22. Is unusually sensitive to certain sounds (e.g., always hears certain sounds earlier than other people)	0	1	2
23. Is extremely pleased by certain movements and keeps doing them e.g., turning around and around	0	1	2
24. Smells objects	0	1	2

	Does Not Apply	Sometimes or Somewhat Applies	Clearly or Often Applies
25. Constantly feels objects	0	1	2
26. Is fascinated by certain colors, forms, or moving objects	0	1	2
27. Has difficulties doing two things simultaneously e.g., he/she cannot dress and listen to parent at the same time	0	1	2
28. Does things without realizing what stage of the activity he/she has reached (beginning, middle, ending)	0	1	2
29. Does things without realizing the aim e.g., constantly has to be reminded to finish things	0	1	2
30. Shows sudden changes of mood	0	1	2
31. Quickly gets angry	0	1	2
32. Stays angry for a long time e.g., when he/she does not get his/her way	0	1	2
33. Cannot be made enthusiastic about anything; does not particularly like anything	0	1	2
34. Does not show his/her feelings in facial expressions and/or bodily posture	0	1	2
35. Does not appreciate danger	0	1	2
36. Barely distinguishes between strangers and familiar people e.g., readily goes with strangers	0	1	2
37. Is disobedient	0	1	2
38. Cannot be corrected in situations in which he/she has done something wrong	0	1	2
39. Takes in information with difficulty	0	1	2
40. Makes inconsiderate remarks e.g., remarks that are painful to others	0	1	2
41. Does not appreciate it when someone else is hurt or sad	0	1	2
42. Makes a fuss over little things; “makes a mountain out of a mole-hill”	0	1	2
43. Does not know when to stop, e.g., goes on and on about things	0	1	2
44. Is extremely stubborn	0	1	2
45. Panics in new situations or if change occurs	0	1	2
46. Remains clammed up in new situations or if change occurs	0	1	2
47. Opposes change	0	1	2
48. Gets lost easily e.g., when out with someone	0	1	2
49. Has no sense of time	0	1	2

Depression, Anxiety, and Stress Scale - 21 (DASS-21)

DASS₂₁

Name:

Date:

Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3

19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

Satisfaction with Life Scale (SWLS)

Satisfaction with Life Scale

Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

- 7 - Strongly agree
- 6 - Agree
- 5 - Slightly agree
- 4 - Neither agree nor disagree
- 3 - Slightly disagree
- 2 - Disagree
- 1 - Strongly disagree

- _____ In most ways my life is close to my ideal.
- _____ The conditions of my life are excellent.
- _____ I am satisfied with my life.
- _____ So far I have gotten the important things I want in life.
- _____ If I could live my life over, I would change almost nothing.

- 31 - 35 Extremely satisfied
- 26 - 30 Satisfied
- 21 - 25 Slightly satisfied
- 20 Neutral
- 15 - 19 Slightly dissatisfied
- 10 - 14 Dissatisfied
- 5 - 9 Extremely dissatisfied

Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS)

Brief Multidimensional Students' Life Satisfaction Scale

Seligson, J., Huebner, E. S., & Valois, R. F. (2003). Preliminary validation of the Brief Multidimensional Students' Life Satisfaction Scale. *Social Indicators Research*, 61, 121-145.

These six questions ask about your satisfaction with different areas of your life. Circle the best answer for each.

1. I would describe my satisfaction with my family life as:
 - a) Terrible
 - b) Unhappy
 - c) Mostly dissatisfied
 - d) Mixed (about equally satisfied and dissatisfied)
 - e) Mostly satisfied
 - f) Pleased
 - g) Delighted
2. I would describe my satisfaction with my friendships as:
 - a) Terrible
 - b) Unhappy
 - c) Mostly dissatisfied
 - d) Mixed (about equally satisfied and dissatisfied)
 - e) Mostly satisfied
 - f) Pleased
 - g) Delighted
3. I would describe my satisfaction with my school experience as:
 - a) Terrible
 - b) Unhappy
 - c) Mostly dissatisfied
 - d) Mixed (about equally satisfied and dissatisfied)
 - e) Mostly satisfied
 - f) Pleased
 - g) Delighted
4. I would describe my satisfaction with myself as:
 - a) Terrible
 - b) Unhappy
 - c) Mostly dissatisfied
 - d) Mixed (about equally satisfied and dissatisfied)
 - e) Mostly satisfied
 - f) Pleased
 - g) Delighted
5. I would describe my satisfaction with where I live as:
 - a) Terrible
 - b) Unhappy
 - c) Mostly dissatisfied
 - d) Mixed (about equally satisfied and dissatisfied)
 - e) Mostly satisfied
 - f) Pleased
 - g) Delighted
6. I would describe my satisfaction with my overall life as:
 - a) Terrible
 - b) Unhappy
 - c) Mostly dissatisfied
 - d) Mixed (about equally satisfied and dissatisfied)
 - e) Mostly satisfied
 - f) Pleased
 - g) Delighted

Multidimensional Scale of Perceived Social Support (MSPSS)

Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988)

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
 Circle the "2" if you **Strongly Disagree**
 Circle the "3" if you **Mildly Disagree**
 Circle the "4" if you are **Neutral**
 Circle the "5" if you **Mildly Agree**
 Circle the "6" if you **Strongly Agree**
 Circle the "7" if you **Very Strongly Agree**

1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7	SO
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	SO
3.	My family really tries to help me.	1	2	3	4	5	6	7	Fam
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7	Fam
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7	SO
6.	My friends really try to help me.	1	2	3	4	5	6	7	Fri
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7	Fri
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7	Fam
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	Fri
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7	SO
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7	Fam
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7	Fri

The items tended to divide into factor groups relating to the source of the social support, namely family (Fam), friends (Fri) or significant other (SO).

APPENDIX B: MULTIPLE REGRESSION TABLES FOR RESEARCH QUESTIONS 1 & 2

Table B1

Examination of Autism Symptom Severity Subscales Predicting Primary and Secondary Caregiver Distress and Self-Reported Emotional and Behavioral Problems of TD Siblings

Predictor Variables	Criterion Variables		
	Primary Caregiver Distress	Secondary Caregiver Distress	TD Sibling Bhv./Emo. Probs.
Tuned	.22 [†]	.03	.10
Social	.21 [†]	.13	.17
Orientation	.26 [†]	-.19	-.18
Understanding	-.38 ^{**}	.19	.09
Stereotyped	.06	.25	.11
Change	.04	.03	-.03
<i>R</i> ²	.24 ^{***}	.14	.05

Note. Distress = self-reported distress as measured by the DASS (Depression Anxiety and Stress Scale); Bhv./Emo. Probs. = behavioral and emotional problems self-reported by TD Siblings via the SDQ (Strengths and Difficulties Questionnaire); Tuned = Behavior/emotions not optimally tuned to the social situation; Social = Reduced contact and social interest; Orientation = Orientation problems in time, place, or activity; Understanding = Difficulties in understanding social information; Stereotyped = Stereotyped behaviors; Change = Fear of and resistance to changes. Standardized regression coefficients reported for each predictor.

[†]*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Table B2

Examination of Autism Symptom Severity Subscales Predicting Primary Caregiver, Secondary Caregiver, and TD Sibling Social Support

Predictors Variables	Criterion Variables		
	Primary Caregiver Social Support	Secondary Caregiver Social Support	TD Sibling Social Support
Tuned	.06	-.03	-.04
Social	-.10	-.11	-.28*
Orientation	.02	.09	.21
Understanding	.08	.07	-.02
Stereotyped	-.09	.08	-.23 [†]
Change	-.03	-.17	< .001
<i>R</i> ²	.02	.05	.11 [†]

Note. Social Support = self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support); Tuned = Behavior/emotions not optimally tuned to the social situation; Social = Reduced contact and social interest; Orientation = Orientation problems in time, place, or activity; Understanding = Difficulties in understanding social information; Stereotyped = Stereotyped behaviors; Change = Fear of and resistance to changes. Standardized regression coefficients reported for each predictor.

[†]*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Table B3

Examination of Autism Symptom Severity Subscales Predicting Primary Caregiver, Secondary Caregiver, and TD Sibling Life Satisfaction

Predictors Variables	Criterion Variables		
	Primary Caregiver Life Satisfaction	Secondary Caregiver Life Satisfaction	TD Sibling Life Satisfaction
Tuned	-.03	-.001	-.08
Social	-.06	-.09	-.15
Orientation	-.14	.17	.21
Understanding	.20	-.03	-.06
Stereotyped	-.07	-.17	-.06
Change	-.05	-.01	-.12
<i>R</i> ²	.05	.03	.07

Note. Primary Caregiver and Secondary Caregiver Life Satisfaction = self-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); TD Sibling Life Satisfaction = self-reported life satisfaction as measured by the BMSLSS (Brief Multidimensional Students' Life Satisfaction Scale); Tuned = Behavior/emotions not optimally tuned to the social situation; Social = Reduced contact and social interest; Orientation = Orientation problems in time, place, or activity; Understanding = Difficulties in understanding social information; Stereotyped = Stereotyped behaviors; Change = Fear of and resistance to changes. Standardized regression coefficients reported for each predictor.

[†]*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Table B4

Examination of Emotional and Behavioral Subscales Predicting Primary and Secondary Caregiver Distress and Self-Reported Emotional and Behavioral Problems of TD Siblings

Predictor Variables	Criterion Variables		
	Primary Caregiver Distress	Secondary Caregiver Distress	TD Sibling Bhv./Emo. Probs.
Emotional Symptoms	.11	.14	.04
Conduct Problems	.10	-.03	-.06
Hyperactivity-Impulsivity	.20 [†]	.03	.04
Peer Problems	.11	.04	.07
Prosocial Behavior	.09	-.17	-.04
R^2	.13 [*]	.06	.01

Note. Bhv./Emo. Probs. = behavioral and emotional problems self-reported by TD Siblings via the SDQ (Strengths and Difficulties Questionnaire). Standardized regression coefficients reported for each predictor.

[†] $p < .10$. ^{*} $p < .05$. ^{**} $p < .01$. ^{***} $p < .001$.

Table B5

Examination of Emotional and Behavioral Subscales Predicting Primary Caregiver, Secondary Caregiver, and TD Sibling Social Support

Predictor Variables	Criterion Variables		
	Primary Caregiver Social Support	Secondary Caregiver Social Support	TD Sibling Social Support
Emotional Symptoms	-.09	-.14	-.06
Conduct Problems	-.06	.13	.02
Hyperactivity-Impulsivity	.05	.12	.01
Peer Problems	-.04	-.13	-.17
Prosocial Behavior	.14	.11	.12
R^2	.04	.07	.06

Note. Social Support = self-reported social support as measured by the MSPSS (Multidimensional Scale of Perceived Social Support). Standardized regression coefficients reported for each predictor.

[†] $p < .10$. ^{*} $p < .05$. ^{**} $p < .01$. ^{***} $p < .001$.

Table B6

Examination of Emotional and Behavioral Subscales Predicting Primary Caregiver, Secondary Caregiver, and TD Sibling Life Satisfaction

Predictor Variables	Criterion Variables		
	Primary Caregiver Life Satisfaction	Secondary Caregiver Life Satisfaction	TD Sibling Life Satisfaction
Emotional Symptoms	.01	.003	-.21 [†]
Conduct Problems	-.05	.18	-.07
Hyperactivity-Impulsivity	-.09	-.04	.04
Peer Problems	-.11	-.06	-.05
Prosocial Behavior	.03	.27*	.05
<i>R</i> ²	.04	.08	.07

Note. Primary Caregiver and Secondary Caregiver Life Satisfaction = self-reported life satisfaction as measured by the SWLS (Satisfaction with Life Scale); TD Sibling Life Satisfaction = self-reported life satisfaction as measured by the BMSLSS (Brief Multidimensional Students' Life Satisfaction Scale). Standardized regression coefficients reported for each predictor.

[†]*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

APPENDIX C: IRB APPROVAL



March 7, 2016

Theodore Tomeny, PhD
Department of Psychology
College of Arts & Sciences
Box 870348

Re: IRB Application #: 16-002
Application Title: How's the Family? A Study of Family Communication and Coping

Dear Dr. Tomeny:

The University of Alabama IRB has received the revisions requested by the full board on 2/19/16. The board has reviewed the revisions and your protocol is now approved for a one-year period. Please be advised that your protocol will expire one year from the date of approval, 2/19/16.

If your research will continue beyond this date, complete the IRB Renewal Application by the 15th of the month prior to project expiration. If you need to modify the study, please submit the Modification of An Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent/assent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number.

Good luck with your research.

Sincerely,



Stuart Usdan, PhD
Chair, Non-Medical Institutional Review Board