

SOCIAL AND BEHAVIORAL OUTCOMES OF SIBLINGS OF CHILDREN WITH
AUTISM

A Dissertation

by

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ABSTRACT

This study utilized an integrated family systems and diathesis stress model when investigating social and behavioral outcomes of siblings of children with autism. The study compared siblings of children with autism (n = 11) to a control group (n = 14) to look at social skills, externalizing behavior problems, internalizing behavior problems, and parent stress. The study also examined other factors potentially related to social and behavioral outcomes of siblings of children with autism such as age of siblings, sibling sex, and potential subthreshold levels of autistic symptoms. The study further examined factors such as family size, age of sibling, parental stress, and severity of autism in relation to their ability to predict outcomes related to parental stress, sibling social skills, externalizing behaviors, and internalizing behaviors of siblings of children with autism.

Results this study found that siblings of children with autism did not exhibit more externalizing behavior problems, internalizing behavior problems, or greater delays in social skills than members of the control group. Further, birth order and sibling sex did not impact any social or behavioral outcome for siblings of children with autism in the study. The study did find that parents of children with autism experience more overall stress than parents of typically developing children. Additionally, parental stress was found to account for variance in externalizing behavior problems in siblings of children with autism.

DEDICATION

I dedicate this work to my family members who have loved me so much throughout my graduate school years. I also want to recognize my good friend Kyle Mohan for his unwavering support throughout my graduate school journey. Lastly, I want to thank my lovely girlfriend Rikki Shannon for pushing me past my limits to finish.

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CHAPTER I

INTRODUCTION

Researchers first became interested in studying siblings of children with disabilities following the major advances in the legal rights and status of children with handicaps during the 1970s (McHale, Sloan, & Simeonsson, 1986). In the early 1970s, several acts formed from the civil rights movement of the 1960s changed the way individuals with disabilities were treated within the school and community settings (Jacob & Hartshorne, 2007). Specifically, the Education of All Handicapped Children Act PL 94-142 in 1975 was at the forefront of these changes. This act ensured that individuals with disabilities were allowed to have access to a free and appropriate public education and prohibited schools from excluding these students from activities on the basis of a disability. This act further required schools to take steps to prevent harassment of these children and to provide accommodations to children with disabilities to ensure equal opportunities for all students (Eddy, 2011). Prior to these changes many children with disabilities including autism had been institutionalized. As a result of these changes, children with autism were less likely to be institutionalized, more likely to live at home, and more likely to be educated in their home school district. This meant that children with disabilities needed to be integrated back into the family system and the schools (McHale et al., 1986).

The Family System

Research centered on typically developing siblings of children with autism and other disabilities have often implemented a family-systems perspective (Fisman et al.,

1996; Petalas et al., 2012; Rivers & Stoneman, 2003). Cox and Payley (2003) described this perspective by conceptualizing a family as a system rather than a set of individuals, because family members often interact and have an influence on one another. Further, Cox and Payley (2003) indicated three crucial components when considering the family as a system: wholeness and order, hierarchical structure and adaptive self-organization. The component of wholeness and order in a family is the idea that the whole is greater than the sum of its parts (Cox & Payley, 2003). This means that the characteristics of the family as a whole, cannot be understood simply by understanding the characteristics of each individual family member. The idea of hierarchical structure indicates that there are several subsystems such as parent-child relationships, marital relationships, and sibling relationships that underlie the larger family system. Lastly, the concept of adaptive self-organization indicates that families adapt to changes and challenges as a complete family system (Cox & Payley, 2003).

The ideas outlined through the family systems perspective indicate it is important to consider the family as a whole when attempting to understand the effect that a sibling with autism has on other typically developing children within the family environment. A plethora of studies have found that specific symptoms related to autism (behavior problems) as well as parental problems may contribute to outcomes for typically developing children with siblings that have autism (Hesse, Danko, & Budd, 2013; Meyer, Ingersoll & Hambrick, 2011; Petalas et al., 2012; Rivard, Terroux, Parent-Boursier, & Mercier, 2014; Rivers & Stoneman, 2003).

Factors Affecting Sibling Outcome

The literature has identified several factors that may contribute to outcomes for typically developing siblings of children with autism within the context of the family system. Demographic factors such as race/ethnicity, socio-economic status (SES), and family size have been considered in previous research related to siblings of children with autism (Sage & Jegatheesan, 2010; Macks & Reeve, 2007; Walton, 2016). Research has shown that family race/ethnicity plays a crucial role in how families view children with autism, and how they choose to educate other children in the family about autism (Sage & Jegatheesan, 2010). Prior research has also suggested that family SES is a contributing factor regarding outcomes among siblings of children with autism (Hesse et al., 2013; Macks & Reeve, 2007; Petalas, Hastings, Nash, Lloyd & Dowey, 2009; Walton, 2016). This seems reasonable as families coming from greater socio-economic backgrounds may be able to afford more intervention services for the child with autism and take on less of the overall responsibility in caring for that child on a day to day basis. Previous studies focused on family size have been inconclusive but suggest that family size may play a crucial role in outcomes of typically developing siblings of children with autism, with larger family size acting as protective factor for these children (Kaminsky & Dewey, 2002; McHale et al., 1986; Pilowsky, Yirmiya, Doppelt, Gross-Tsur, & Shalev, 2004). It is speculated that larger family size may act as a protective factor for children with siblings who have autism and that this could be explained by the fact that siblings may feel less embarrassed about having a sibling with a disability in larger families (McHale et al., 1986).

In addition to family factors such as race/ethnicity, family size and SES there are also a number of factors related to the typically developing siblings of children with autism that require consideration. Several studies have examined the association between sibling age and both internalizing and externalizing problems and have led to inconclusive results (Rodrigue, Geffken, & Morgan, 1993; Shivers, Deisenroth, & Taylor, 2013; Verté, Roeyers, & Buysse, 2003). The gender of the typically developing sibling has also been considered and it has been found that gender may play an important role in the different problems that the child may face (Gold, 1993; Hastings, 2003a; Shivers et al., 2013; Verté et al., 2003). Previous research also suggests that birth order rank may be an important factor to examine when researching siblings of children with autism (Hastings, 2003a; Petalas et al., 2009; Schmidt et al., 2013; Tomeny, Barry, & Bader, 2012).

When researching siblings of children with autism from a family systems conceptualization there are also several factors related to the family that should be carefully considered. Research has examined associations between autism severity/symptomology in the child with autism in the family and outcomes for both siblings and parents within the family system (Hastings, 2003a; Petalas et al., 2012; Shivers et al., 2013; Tomeny et al., 2012). Several studies also examined parental stress, which has been shown to be related to autism severity and symptomology (Meyer et al., 2011; Shivers et al., 2013). The research suggests that parental problems including stress are important to consider when looking at outcomes of siblings of children with autism (Fisman et al., 1996; Heese et al., 2013; Meyer et al., 2011; Shivers et al., 2013;

Tomeny, Barry, & Bader, 2014). One final factor that is important to consider is the impact that interventions will have on the family system including siblings (Cebula, 2012).

Statement of the Problem

Siblings play a crucial role in child development (McHale, Updegraff, & Whiteman, 2012) and their interactions influence many things including cognitive development, social skills, and positive self-concept (Brody & Stoneman, 1986; Brody, Kim, Murry, & Brown, 2003; Powell & Gallagher, 1993; Whiteman, McHale, & Crouter 2007). There has been an abundance of research on some of the basic effects of having a sibling with a disorder; however, there is much less research focused specifically on the effects on socio-emotional development when having a sibling with an autism spectrum disorder. Overall, past research has yielded negative, neutral and even positive effects on children who have siblings with autism depending on the study sample and measures used (Macks & Reeve, 2007; Rodrigue et al., 1993; Shivers et al., 2013; Tomeny et al., 2012; Verté et al., 2003). There is yet, no definitive answer on how having a sibling with autism affects the socio-emotional development and social skills of typically developing children. Some research studies have made attempts to identify certain risk and protective factors that may help to mediate the outcomes of socio-emotional development for children with siblings who have autism (Fisman et al., 1996; Meyer et al., 2011); however, these factors and their importance in determining outcomes are not clearly understood.

The purpose of this study was to determine whether siblings of children with autism demonstrate significant problems in the following areas: internalizing problems, externalizing problems, and social skills. This study also will consider the extent to which factors such as gender, family size, birth order, and autism severity contribute to the outcome of siblings of children with autism. It is hypothesized that siblings of children with autism will exhibit higher levels of autistic behavior than siblings of typically developing children. Further, it is hypothesized that siblings of children with autism will exhibit higher levels of internalizing and externalizing behavior problems than siblings of typically developing children, and will exhibit lower levels of social skills than siblings of typically developing children. It also is hypothesized that parents of children with autism will exhibit higher levels of parental stress than parents of typically developing children. Finally, it is hypothesized that there will be an interaction effect for parental stress with problem behaviors (internalizing and externalizing), social skills, as well as family demographic factors.

This study is unique as it will measure the construct of social skills in a different way than previous studies in the literature. The construct of social skills will include components such as cooperation, assertion, communication and self-control that have rarely been examined in previous research. The current study also will be using several psychometric instruments that have not been used in the previous research or that have been used very rarely to measure dependent variables such as internalizing behaviors, externalizing behaviors, and social skills. It also will include the construct of parental stress as a factor in sibling outcome.

Clinical Importance

A better understanding of potential positive and negative effects on siblings of children with autism specific to externalizing behaviors, internalizing behaviors, and social skills would be very beneficial in identifying and meeting the needs of these children. This coupled with a more complete understanding of how risk and protective factors contribute to these outcomes could help to identify siblings of children who are at increased risk for social or behavioral difficulties. Further, having a better understanding of social and behavioral outcomes of siblings of children with autism has the potential to inform prevention and intervention efforts in this area. Lastly, if siblings of children with autism are being affected positively by having a sibling with autism, it is crucial to understand and identify this phenomenon. By understanding possible positive effects, it might then be possible to integrate new ideas and concepts into programs that focus on building social skills, even for children who do not have a sibling with autism.

CHAPTER II

LITERATURE REVIEW

The family systems model stresses interconnectivity of members within a family (communication of an individual with other family members) as well as reciprocal ways in which each family member influences each other (Cox & Payley, 2003). The vast majority of research investigating children with disabilities and their typically developing siblings also has considered other family members (Fisman et al., 1996; Kaminsky & Dewey, 2002; Meyer et al., 2011). Understanding the family system, including parents, is believed necessary to understand the outcomes of siblings of children with autism (Hesse et al., 2013; Meyer et al., 2011; Petalas et al., 2012; Rivard et al., 2014; Rivers & Stoneman, 2003). Specifically, studies have found that parents of child with disabilities may experience greater levels of stress (Fisman et al., 1996; Hesse et al., 2013; Rao & Beidel, 2009; Shivers et al., 2013; Tomeny et al., 2012). Additionally, previous research has reported that these families tend to have lower family cohesion, family adaptability and marital satisfaction than other families (Brobst, Clopton & Hendricks, 2009; Gau et al., 2012; Higgins, Baily & Pearce, 2005).

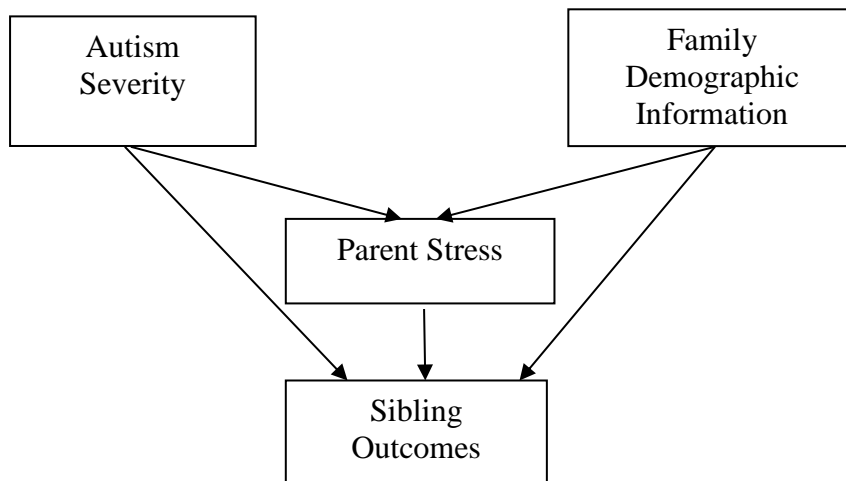
In conjunction with the family systems model, outcomes of siblings with autism have been investigated from a biological-genetic approach integrating a diathesis-stress model (Bauminger & Yirmiya, 2001, Petalas et al., 2012; Orsmond & Seltzer, 2009). This integrated model proposes that some siblings of children with autism might have sub-threshold levels of autism themselves (i.e., the genetic component) and that this, along with the family stress they experience, might lead to less favorable outcomes for

these children. Results from both Petalas et al. (2012) and Orsmond and Seltzer (2009) suggested that the integration of a diathesis-stress model within the larger family systems model may be helpful in understanding outcomes in siblings of children with autism.

The model that will be utilized in this study integrates family systems and diathesis-stress (see Figure 1). The model begins with consideration of autism symptom severity (i.e., including challenging behavior) and acknowledges that this is a critical risk factor (Ross & Cuskelly, 2006; Tomeny et al., 2012). The model also acknowledges family demographic variables (Kaminsky & Dewey; Macks & Reeve, 2007) and parental well-being (Fisman et al., 1996; Rao & Beidel, 2009) as potential factors impacting social and behavioral outcomes of siblings of children with autism such as internalizing behavior, externalizing behaviors, and social skills.

Figure 1.

Family Systems Stress-Diathesis Integrated Model



Within the demographic factors, the model considers family size (Kaminsky & Dewey, 2002; McHale et al., 1986; Pilowsky et al., 2004), race/ethnicity (Sage & Jegatheesan, 2010), socio-economic status (Hesse et al., 2013; Macks & Reeve, 2007; Petalas et al, 2009), birth order (Hastings, 2003a; Petalas et al., 2009; Schmidt et al., 2013; Tomeny et al., 2014), and educational placement/care for the child with autism (Cebula, 2012; Harper, Dyches, Harper, Roper & South, 2013). Regarding family size, the availability of other typically developing children within the family is a potential resiliency factor (Kaminsky & Dewey, 2002; McHale et al. 1986). Similarly, how autism is viewed from the culture (race/ethnicity) may affect the family system and support systems available to the family (Sage & Jegatheesan, 2010). Parental well-being is not only affected by symptom severity, and demographics, but is also believed to be a bidirectional factor in the family system diathesis stress integration (Fisman et al., 1996; Hesse et al., 2013; Rivard et al., 2014; van Steijn et al., 2014). Thus, severity of symptoms and challenging behavior may result in increased stress. At the same time, parents who are less stressed and depressed may have more available mental resources to help them work effectively with the child with autism, resulting in decreased problematic behaviors and improved functioning of that child (Fisman et al., 1996; Stoneman, 2005). Their additional resources also will be more available to the sibling(s) of the child with autism. Parental biological vulnerabilities (e.g., parents who may themselves have broader autism phenotypes or other disorder) may experience greater levels of stress and be less available to children in the family (Rivard et al., 2014; van

Steijn et al., 2014). Each of these factors not only affects parental role and stress, but also the role of siblings in the family system.

Role of Siblings in the Family System

Within the family system, it is important to consider the importance of sibling relationships. Data collected as part of the Survey of Income and Program Participation (SIPP) by the United States Census Bureau in 2009 revealed that the majority of children growing up in the United States have at least one sibling (approximately 78% of all children; Kreider & Ellis, 2011). Research has found that siblings spend more time together than they do with parents or peers outside of the school setting (Larson & Richards, 1994; McHale & Crouter, 1996). In a meta-analysis conducted by McHale et al. (2012), it was revealed that typically developing children can affect their siblings both directly (i.e., sibling's extensive contact with one another throughout childhood) and indirectly (i.e., ripple effects of the child's behavior throughout the family system). McHale et al. (2012) acknowledged that most research conducted related to sibling influence has been conducted with a focus on direct influence as opposed to indirect influence.

McHale et al. (2012) further reported that siblings can influence each other in a variety of both negative and positive ways. Typically developing siblings can influence each other negatively in some ways such as risky sexual behaviors (McHale, Bissell & Kim, 2009) and adolescent substance use (Fagan & Najman, 2005). Additionally, research has indicated that typical siblings influence the development of positive behaviors such as prosocial behaviors (Brody et al., 2003; Whiteman et al., 2007),

empathy (Tucker, Updegraff, McHale, & Crouter, 1999) and academic engagement (Bouchey, Shoulberg, Jodl, & Eccles, 2010). In summary, it appears that siblings influence each other's outcomes in many ways, both negatively and positively across a number of behaviors. What happens when one of the siblings has a disability in terms of direct effects and ripple effects?

Siblings of Children with Disabilities

Given the importance of interactions within the family and the roles of siblings, it is crucial to consider if and how the system changes when one (or more) of the children in the family has a disability or medical disorder. Specific populations have included siblings of children with a chronic illness (Long, Marsland & Alderfer, 2013; Wood, Sherman, Hamiwka, Blackman & Wirrell, 2008), children with intellectual disability (ID; Bågenholm & Gillberg, 1991; Neece, Blacher, & Baker, 2010), and children with autism (Macks & Reeve, 2007; Shivers et al., 2013; Tomeny et al, 2012). Research findings relating to each of the following populations will be summarized in the paragraphs below.

Siblings of Children with Chronic Illness

First, several studies have examined the effect that having a sibling with a chronic medical illness has on other children within the family environment (Long et al., 2013; Vermaes, van Susante, Anna, & van Bakel, & Hedwig, 2012; Wood et al., 2008). Vermaes et al. (2012) conducted a meta-analysis that examined the effects of childhood chronic medical conditions on siblings of that child within the family. The meta-analysis included chronic health conditions such as diabetes, epilepsy, spinal bifida, and

cancer. Results of the meta-analysis revealed that siblings of children with chronic medical conditions were at slightly increased risk for exhibiting greater internalizing and externalizing problems than siblings of typically developing children. This research is consistent with work done by Long et al. (2013) supporting the finding that siblings of children with cancer are at increased risk for exhibiting internalizing problems. In contrast, research conducted by Wood et al. (2008) investigated internalizing problems such as anxiety and depression in typically developing siblings of children with intractable epilepsy and found that typically developing children were not at more risk for depression or anxiety than other children. It is important to note that this was found when the siblings were reporting the data. Alternatively, it is noteworthy that parent reports of the typically developing siblings indicated that they were more at risk for internalizing problems than the general population (Wood et al., 2008).

In summary, the research available on siblings of children with chronic medical conditions indicates that these children often experience increased externalizing and internalizing problems such as depression and anxiety (Long et al., 2013; Vermaes et al., 2012; Wood et al., 2008). Additionally, research appears to indicate child rating versus parent ratings may be an important factor when reporting internalizing problems (Wood et al., 2008). Specifically, it appears that children may rate themselves as having less internalizing behaviors, while parents may tend to indicate more overall problems (Wood et al., 2008).

Siblings of Children with Intellectual Disability

There also have been many studies that have investigated the possible impact of a child with an intellectual disorder (Bägenholm & Gillberg, 1991; Neece et al., 2010), Down syndrome (Kaminsky & Dewey, 2002; Mulroy, Robertson, Aiberti, Leonard, & Bower, 2008; Rodrigue et al., 1993), or Rett Syndrome (Mulroy et al., 2008) on the family system. A study conducted by Bägenholm and Gillberg (1991) found that siblings of children with Down Syndrome were more likely to experience internalizing problems such as worry about the future and loneliness than siblings of typically developing children. These findings are consistent with research conducted by Mulroy et al. (2008) in which siblings of children with Down syndrome and Rett Syndrome were compared to siblings of typically developing children. Rodrigue et al. (1993) also found that siblings of children with Down syndrome were more likely to experience both internalizing and externalizing behavior problems than siblings of typically developing children. In contrast Kaminsky and Dewey (2002) found that siblings of children who had Down syndrome were not at increased risk for feelings of loneliness or psychosocial adjustment problems. Overall, the research focused on internalizing and externalizing behaviors of siblings of children who have intellectual disabilities is limited and inconsistent, with some studies indicating potential feelings of loneliness and psychosocial adjustment difficulties (Bägenholm & Gillberg, 1991; Mulroy et al., 2008; Rodrigue et al., 1993).

Siblings of Children with Autism

Of interest for this study is the effect on siblings of children with autism. In many cases, the child with autism also may have an intellectual disability or a chronic illness. In those cases, the characteristic behaviors of autism potentially result in additive effects. Even if there is no co-occurring disorder or disability, there is a potential for positive and negative effects on siblings of children with autism. Key studies that have considered siblings of children with autism are detailed in Appendix A.

Current literature has noted some significant differences between siblings of children with autism and siblings of typically developing children as early as the first year of life (Presmanes, Walden, Stone, & Yoder, 2007; Yirmiya et al., 2006). Both the Presmanes et al. (2007) and Yirmiya et al. (2006) studies found that siblings of children with autism displayed less interest in joint attention tasks than children in a control group. Additionally, Yirmiya et al. (2006) found that siblings of children with autism displayed more neutral affect during a still face paradigm than children in the control group. There is also empirical evidence that siblings of children with autism struggle with language related skills, such as initial language acquisition and verbal fluency skills (Hughes, Plumet, & Leboyer, 1999; Yirmiya et al., 2006).

Social and Behavioral Effects on Siblings of Children with a Disability

There have been studies conducted to investigate the social effects on typically developing siblings of children with a disability (Mulroy et al., 2008; Rodrigue et al., 1993; Stoneman, 2005). Some studies have reported no notable differences in social skills for these children in comparison to siblings of typically developing children

(Rodrigue et al., 1993), while other studies have noted both positive and negative social impacts for these children (Mulroy et al., 2008). For example, Mulroy et al. (2008) found that parents reported that siblings of children with disabilities often experienced negative social issues such as greater difficulty with peer acceptance and establishing relationships with their siblings than siblings of typically developing children. At the same time, the study also provided evidence to support the idea that having a sibling with a disability may be socially advantageous to typically developing siblings in some ways. Parents highlighted several positive impacts that the child with a disability had on siblings within the household. For example, siblings of children with disabilities such as Down syndrome and Rett Syndrome were often more patient, caring/compassionate, mature, and tolerant than siblings of typically developing children. Finally, results indicated that siblings of children with disabilities were also more appreciative of their own health, life, and gifts than siblings of typically developing children (Mulroy et al., 2008). This research is consistent with other work that previously identified some of these positive social advantages for siblings of children with disabilities (Stoneman, 2005).

For siblings of children with autism, initial differences observed early in childhood led researchers to investigate whether siblings of children with autism exhibit deficits in social skills and psychosocial adjustment in comparison to siblings of typically developing children. There is a body of research that supports the idea that siblings of children with autism experience more social problems than siblings of typically developing children (Griffith, Hastings & Petalas, 2014; Hastings, 2003a;

Mohapatra, 2012; Oerlemans et al., 2014). Oerlemans et al. (2014) found that siblings of children with autism (ages 6-11 years old) had more difficulty recognizing facial and auditory emotions than children who were siblings of typically developing peers. Additionally, Hastings (2003a) found that males who were younger siblings of children with autism experienced the most overall deficits in social skills and demonstrated the least amount of prosocial behavior in comparison to older siblings of children with autism and siblings of typically developing children. Mohapatra et al. (2012) observed siblings of children with autism at play and asked the child's parent to rate the child's social skills. Results of this study were inconsistent with other studies finding no social dysregulation, but significant social problems being reported by parents. In summary, there is some evidence to support the idea that having a sibling with autism may negatively impact acquisition of social skills (Hastings, 2003a; Mohapatra, 2012; Oerlemans et al., 2014).

In contrast to the findings above, some studies have claimed that having a sibling with autism may yield benefits for a child (Macks & Reeve, 2007; Verté et al., 2003) or may not have any effect at all on social development (Kaminsky & Dewey, 2002; Smith, Ronski, & Sevcik, 2013; Tomeny et al., 2012). Some research suggests that having a sibling with autism may increase positive feelings of self-concept and social competence, which may lead these children to have a more positive view of their own behavior, social skills, intelligence, and scholastic performance than siblings of typically developing children (Macks & Reeve, 2007; Verté et al., 2003). In particular, Macks and Reeve (2007) speculated that these findings may be due to the fact that the sibling is

comparing themselves to the child with autism such that the experience of being a sibling of a child with autism may enhance psychosocial adjustment. Interestingly, Verté et al. (2003) found that sisters of children with autism were more likely than brothers to have increased positive self-concept and social competence when compared to children of typically developing siblings. Although some studies have found that having a sibling with autism may affect social skills development positively or negatively, no difference between siblings of children with autism, siblings of children with Down syndrome, and siblings of typically developing children emerged on social skills, self-concept and social competence (Rodrigue et al., 1993; Tomeny et al., 2012). In conclusion, the research on social skills and psychosocial development for siblings of children with autism is currently inconclusive.

Siblings and Externalizing Behaviors

There have been a few studies conducted to investigate whether having a sibling with autism increases the frequency of externalizing behaviors such as hyperactivity and physical aggression in typically developing siblings (Dempsey, Llorens, Brewton, Mulchandani, & Goin-Kochel, 2012; Di Biasi et al., 2016; Hastings, 2003a; Rodrigue et al., 1993; Tomeny et al., 2012; Verté et al., 2003). Results of these studies have yielded inconclusive results. Some studies have found that having a sibling with autism increases the likelihood of externalizing behavior problems when compared to siblings of typically developing children (Hastings, 2003a; Rodrigue et al., 1993; Verté et al., 2003). In contrast to these findings, other research has suggested that siblings of children with autism are not more likely to experience externalizing behavior problems

than siblings of typically developing children (Dempsey et al., 2012; Di Biasi et al., 2016; Tomeny et al., 2012). Further, research has indicated that there are not significant differences in externalizing behavior problems when siblings of children with autism were compared to sibling of children with Down syndrome (Rodrigue et al., 1993). In summary, the literature regarding externalizing behaviors for siblings of children with autism is currently inconclusive.

Siblings and Internalizing Disorders

Prior research investigating internalizing problems such as anxiety, loneliness, and feelings of anger in typically developing children with a sibling who has autism also has yielded inconclusive results (Bägenholm & Gillberg, 1991; Bitsika, Sharpley & Mailli, 2015; Dempsey et al., 2012; Di Biasi et al., 2016; Kaminsky & Dewey, 2002; Ross & Cuskelly, 2006; Tomeny et al., 2012; Verté et al., 2003). Several studies have indicated that siblings of children with autism may exhibit more internalizing problems than siblings of typically developing children (Bägenholm & Gillberg, 1991; Bitsika et al., 2015; Pollard, Barry, Freedman, & Kotchick, 2013; Rodrigue et al. 1993; Ross & Cuskelly, 2006; Shivers et al., 2013). In a study conducted by Shivers et al. (2013), data were collected on 1,755 siblings of children with autism between the ages of 6-11 years of age. Results indicated that siblings of children with autism were at increased risk for experiencing subclinical levels of anxiety when compared to a normative sample. The study also revealed that male siblings in middle childhood were at slightly more risk of experiencing subclinical levels of anxiety than females or males of different ages. Results of the study also found that more behavior problems exhibited by the child with

autism were predictive of greater levels of sibling stress (Shivers et al., 2013). This is a finding that has been confirmed and that can be expanded to siblings of children with Down syndrome (Pollard et al., 2013). In a study conducted by Bitsika et al. (2015) it was found that siblings of children with autism were more likely to experience symptoms of generalized anxiety disorder (GAD) and major depressive disorder (MDD). Ross and Cuskelly (2006) also found a relationship between the child with autism's problem behaviors and the typically developing sibling's internalizing problems. Solarsh (2016) found that siblings of children with autism experienced increased stress levels when their siblings with autism exhibited more behavior problems and had weak social skills. Ross and Cuskelly (2006) suggested that siblings of children with autism may experience more anger than other children due to their siblings with autism being physically aggressive and damaging their property.

Other research suggests that siblings of children with autism and other disorders may experience feelings of loneliness and anxiety about their future (Bägenholm & Gillberg, 1991; Rodrigue et al., 1993). Specifically, Bägenholm and Gillberg (1991) and Rodrigue et al. (1993) found that siblings of children with autism, as well as siblings of children with other disabilities such as ID and Down syndrome were more likely to feel lonely and experience anxiety about the future. Further, Bägenholm and Gillberg (1991) suggested that some of these internalizing problems related to anxiety about the future and feelings of loneliness may be due to these children seeing their sibling with autism as a burden for the future, which makes them more worried than other children. Other research findings have indicated that a child with autism in the family does not put the

sibling(s) at increased risk for experiencing internalizing problems (Dempsey et al., 2012; Di Biasi et al., 2016; Kaminsky & Dewey, 2002; Tomeny et al., 2012). In conclusion, research concerning siblings of children with autism and internalizing behaviors has yielded inconclusive results, very much like the previous research discussed on social development and externalizing behaviors.

Contributing Factors to Sibling Outcome

As Ferraioli and Harris (2010) and Di Biasi et al. (2016) noted, there are several areas of inconsistencies throughout the literature regarding the effects that a child with autism has on other children (siblings) within a family. An obvious consideration is the level of symptom severity and challenging behaviors exhibited by the child with autism (Shivers et al., 2013; Tomeny et al., 2012). Following a family systems model and collecting data about factors such as family size, race/ethnicity, and socioeconomic status (SES) may help to understand the different findings and lead researchers to clearer more conclusive results when researching siblings of children with autism (Sage & Jegatheesan, 2010; Walton, 2016). Additionally, it is important to consider things such as the birth order and gender of the sibling of the child with autism, as well as the stress level of the parent and parenting relationship status (Fisman et al., 1996; Meyer et al., 2011; Tomeny et al., 2014). Finally, the educational placement and care of the child with autism may play an important role in shaping the family environment in which the sibling lives (Cebula, 2012; Harper et al., 2013). In a study conducted by Harper et al. (2013) it was found that number of hours of respite care for the child with autism was

positively correlated with marital satisfaction. It is believed that investigating these factors will help researchers to better understand past inconclusive research results.

Symptom Severity

Some researchers have hypothesized that the degree of autism severity or diagnostic category of autism might be associated with greater externalizing and internalizing problems in typically developing siblings of these children (Shivers et al., 2013; Tomeny et al., 2012). For example, Tomeny et al. (2012) conducted a study with 42 dyads of children with autism and typically developing siblings and 42 dyads of two typically developing siblings and sought to investigate whether autism symptom severity moderated externalizing or internalizing behaviors in siblings of children with autism. Results of the study were consistent with other research findings (Shivers et al., 2013) and revealed that autism severity and diagnostic category were not moderators for externalizing and internalizing behaviors in typically developing siblings (Tomeny et al., 2012). Tomeny et al. (2012) and Ross and Cuskelly (2006) discovered a significant relation between maladaptive behaviors in the child with autism and their typically developing sibling. This suggests that it is the externalizing problem behaviors of the child with autism that are related to increased risks for internalizing and externalizing problems in siblings of children with autism rather than the diagnostic category or severity of the autism itself. Research by Shivers et al. (2013) and Petalas et al. (2012) have yielded similar conclusions to the conclusions drawn in Tomeny et al. (2012).

Researchers have investigated the severity of autistic symptoms and interventions received and have yielded inconclusive results (Irvin, McBee, Boyd, Hume, & Odom,

2012; Siller, Reyes, Hotez, Hutman, & Sigman, 2014). Additionally, several research studies have examined the services received by children with autism (Irvin et al., 2012; Siller et al., 2014; Thomas, Ellis, McLaurin, Daniels, & Morrissey, 2007). Also, some research has focused on the effects of interventions received by the child with autism on their typically developing siblings (Cebula, 2012; Hastings, 2003b). Cebula (2012) hypothesized that families using a home-based Applied Behavior Analysis (ABA) program for the child with autism would also yield benefits for typically developing siblings in the families in terms of psychosocial adjustment, as well as improved quality of relationship with the child with autism. The study yielded inconclusive evidence regarding the impact of ABA interventions on siblings and families of children with autism. Specifically, results did not find any statistically significant differences between ABA groups and control groups for the siblings for overall quality of relationship with the child with autism, the typically developing sibling self-concept, or the typically developing sibling's behavioral adjustment. At the same time, parents reported more positive interactions between children with autism and their typically developing siblings with the use of an ABA intervention (Cebula, 2012). This is consistent with Hastings (2003b) who found that siblings of children with autism and their parents were not negatively affected by participating in an intensive ABA program.

Demographic Variables: Racial/Ethnic/Gender Differences

Research examining the effect of racial/ethnic factors on outcomes of typically developing siblings of children with autism is extremely limited. Sage and Jegatheesan (2010) provided the one of the only studies found to date focusing on this topic. This

study looked at the perspectives of parents and older typically developing siblings from families with a child with autism. One family was European American and the other family was Asian American (Vietnamese). This study found that the parents of the two families differed greatly in their reasoning for why they had a child with autism. The European American family attributed genetics as the main reason for having a child with autism, while the Asian American family attributed karma and retribution for past evil deeds as the main reason for having a child with autism. Additionally, both families differed greatly in how they coped with having a child with autism. The European American parents educated the typically developing sibling about autism and encouraged the sibling to play cooperatively with the child with autism, while the Asian American parents did not educate the typically developing sibling about autism. Subsequently, the European American siblings shared a warm relationship and played together, while the Asian American siblings played together less frequently and did not share as warm of a relationship (Sage & Jegatheesan, 2010). Findings from Sage and Jegatheesan (2010) suggest that race and ethnicity may be important factors to consider when examining sibling relationships among typically developing siblings and children with autism from a family systems perspective. Researchers have noted the lack of research concerning the impact of race and ethnicity in this area of research (Rivers & Stoneman, 2003; Sage & Jegatheesan, 2010).

In addition to race and ethnicity, the gender of the typically developing sibling also has been found to be important when examining outcomes of siblings of children with autism (Gold, 1993; Hastings, 2003a; Shivers et al., 2013; Verté et al., 2003;

Walton, 2016). Generally, research has noted a more negative impact on male siblings of children with autism than females (Walton, 2016), with males being more likely to experience anxiety (Shivers et al., 2013) and behavior problems (Hastings, 2003a). Interestingly, Verté et al. (2003) found that sisters of children with autism rated themselves higher on measures of self-perception and perceived social competence than siblings of typically developing children. While evidence is far from conclusive concerning the effects on race, ethnicity, and gender of siblings of children with autism there is emerging evidence that these factors may play a crucial role in outcomes (Gold, 1993; Hastings, 2003a; Sage & Jegatheesan, 2010; Shivers et al., 2013; Verté et al., 2003; Walton, 2016).

Demographic Variables: Socioeconomic Status (SES)

SES is a common environmental risk factor in many areas of child and adolescent psychopathology (Conger et al., 2002). Despite this fact, there has been limited research that has addressed this potential risk factor in the adjustment of siblings of children with autism and other disabilities. Prior research that has examined family SES has concluded that it may act as a potential risk factor for siblings of children with autism (Hesse et al., 2013; Macks & Reeve, 2007; Petalas et al., 2009; Walton, 2016). Specifically, Hesse et al. (2013) found that siblings from higher SES households with a child with autism had better overall adjustment than siblings from lower SES households. Macks and Reeve (2007) found that lower SES, along with other demographic risk factors, significantly predicted the psychosocial and emotional adjustment of siblings of children with autism. The study also found that factors such as

low family SES were more likely to negatively impact siblings of children with autism than siblings of typically developing children (Macks & Reeve, 2007). Taken together the current literature supports the idea that household SES is an important variable to consider when examining outcomes of siblings of children with autism, and that higher family SES may lead to better outcomes (Hesse et al., 2013; Macks & Reeve, 2007; Petalas et al., 2009; Walton, 2016).

Other Demographic Variables

Family Size

Several researchers have attempted to examine the family size as a potential factor when looking at social and behavioral outcomes in typically developing siblings of children with autism (Kaminsky & Dewey, 2002; McHale et al., 1986; Pilowsky et al., 2004; Walton, 2016). Findings from these studies suggest that family size may impact siblings of children with autism differently than normal children. For example, Kaminsky and Dewey (2002) found that larger family size acted as a protective factor for siblings of children with autism when the typically developing sibling is older than the sibling with autism. They theorized that larger family size may equate to siblings of children with autism feeling less responsibility for taking care of their sibling with autism both now and into the future. The extent to which this would be true if the siblings were younger than the child with autism could not be determined from their sample. Despite this limitation, their findings were consistent with findings from McHale et al. (1986) and Walton (2016), who found that in large families the siblings of children with autism felt less embarrassment toward their sibling and reported fewer

feelings of stress regarding taking care of the child with autism. In contrast, Pilowsky et al. (2004) found that larger family sizes were associated with greater delay in typically developing sibling's socialization skills. Thus, the current research is inconclusive with respect to the siblings of children with autism and family size with both positive and negative effects identified (Kaminsky & Dewey, 2002; McHale et al., 1986; Pilowsky et al., 2004).

Age and Birth Order

As noted previously, important considerations include the relative place in the family system of the typical sibling (Hastings, 2003a; Petalas et al., 2009; Schmidt et al., 2013; Tomeny et al., 2014) and age of the typically developing sibling (Shivers et al., 2013; Verté et al., 2003). Research indicates that siblings of children with autism who are in middle childhood (i.e., between the ages of 6-11 years old) exhibit more externalizing behavior problems (Verté et al., 2003) and more internalizing problems such as anxiety (Shivers et al., 2013) than siblings of children with autism in other age ranges. Tomeny et al. (2014) examined the effect of birth order on siblings of children with autism. Results indicated that younger siblings of children with autism, especially of those who exhibited externalizing problem behaviors, were at greater risk of exhibiting externalizing behaviors themselves. This result is consistent with other research that suggests being the younger sibling of a child with autism may put the typically developing sibling at increased risk for externalizing and internalizing problems (Hastings, 2003a; Petalas et al., 2009; Tomeny et al., 2014).

Additionally, Tomeny et al. (2014) found that birth order of the child with autism moderated the relation between externalizing behaviors in children with autism and externalizing behaviors in their typically developing siblings. Research further indicated that children with autism are often the first-born child within a family (Schmidt et al., 2013). This fact coupled with research indicating that younger siblings of children with autism are at increased risk for externalizing and internalizing behaviors (Hastings, 2003a; Petalas et al., 2009; Tomeny et al., 2014) suggests that factors of age and birth order are extremely important to consider when researching siblings of children with autism.

Familial Biological and Psychological Vulnerabilities

Prior research indicates that there are often biological and psychological vulnerabilities present in families of children with autism (Fisman et al., 1996; Georigades et al., 2013; Meyer et al., 2011; Petalas et al., 2012; Pickles, St. Clair, & Conti-Ramsden, 2013; Robel et al., 2014). Georigades et al. (2013) conducted a study in which they followed siblings of children with autism from birth to three years of age. Results indicated that a statistically significant number of the children in the study (19%) evidenced some autistic traits by 12 months of age and that these traits continued to be present with time, but were not predictive of later diagnoses of autism at age three. Results of Pickles et al. (2013) further support and expand the research conducted by Georgiades et al. (2013). Pickles et al. (2013) examined social and communication skills across 726 first degree relatives of four different groups: autism, speech language impairment, Down syndrome, and speech language impairment/autism. They found that

first degree relatives of individuals in both the autism group and the speech language/autism groups evidenced greater social deficits than members of other groups. Additionally, the study found that siblings of children within the speech language impairment/autism group had higher than expected rates of autism. Taken as a whole, it is apparent that first degree relatives and especially siblings of children with autism may be at increased risk for manifesting subthreshold autistic traits (Georgiades et al., 2013; Pickles et al., 2013; Robel et al., 2014).

Parental Well-Being and Vulnerability

In addition to identifying potential risks for subthreshold traits and potential effects on siblings, there is also evidence to suggest that parents of children with autism may experience psychological vulnerabilities (Rao & Beidel, 2009), and that these vulnerabilities may be important to understanding sibling relationships within the family (Fisman et al., 1996; Hesse et al., 2013; Shivers et al., 2013; Tomeny et al., 2012). For example, Fisman et al. (1996) found that parents of children with Pervasive Developmental Disorder (PDD; previously a designation on the spectrum) experienced greater parental distress and anxiety than parents of children with Down syndrome or parents of typically developing children. Parental distress and depression mediated the relation between group membership and parental reporting of both internalizing and externalizing behaviors in siblings of children with autism (Fisman et al., 1996). Other researchers have yielded similar findings (Meyer et al., 2011; Petalas et al., 2012). Overall, the research indicates that parents of a child with autism may experience more psychological issues such as greater stress, anxiety, and depression than parents of

typically developing children (Rao & Beidel, 2009). Further, it was found that increased parental stress may lead to more negative outcomes for siblings of children with autism (Fisman et al., 1996; Meyer et al., 2011; Petalas et al., 2012). Additionally, it was found that reduced parental stress and a more positive parental perception of the child with autism will lead to more positive outcomes for siblings of children with autism (Hesse et al., 2013).

Methodological Issues with the Current Knowledge Base

There are inconsistencies across the literature pertaining to outcomes of siblings and families of children with autism (Di Biasi et al., 2016; Ferraioli & Harris, 2010). Various literature reviews concerning this area of research have identified many methodological limitations within the current research base that may account for the inconsistencies (Bauminger & Yirmiya, 2001; Cuskelly, 1999; Seltzer, Abbeduto, Krauss, Greenberg, & Swe, 2004). The main methodological limitations include small sample size, lack of multiple respondents, the types of measures used in studies, large age ranges in studies, lack of control for demographic factors, lack of longitudinal research, problems with control groups, and lack of control for subthreshold levels of autistic symptomology found in typically developing siblings. Each of these methodological limitations will be discussed in more detail.

Need for Multiple Respondents

One weakness in the currently literature is that most previous research has only included information from a single respondent, either the sibling or a parent (Hastings, 2007; Mack & Reeve, 2007). This is problematic as information from more respondents

is best practice in research (Cuskelly, 1999). Macks and Reeve (2007) found that parents and siblings of children with autism may have very different views about the sibling's psychosocial and emotional adjustment. Parents tended to view the sibling's social and emotional adjustment negatively, while the siblings tended to view their adjustment more positively. There were several explanations for the discrepancy that were presented. First, it is possible that parents are spending so much time attending to the child with autism that they may not have an accurate idea of how having a sibling with autism is affecting the non-disabled sibling's social and emotional functioning. Second, it is possible that parents may recognize the frustration and stress they experience from having a child with autism and assume that their non-disabled children also harbor these behaviors (Macks & Reeve, 2007). Another explanation is that the sibling of the child with autism may compare themselves to their sibling with autism and may therefore view their own social and emotional functioning favorably in comparison (Macks & Reeve, 2007).

Overall, different family members (siblings and parents), may have very different perceptions on how a child with autism is affecting the social and emotional functioning of the typical sibling (Macks & Reeve, 2007). The fact that multiple respondents were not used in past studies may be one reason for some of the inconsistent findings. If parents and siblings have different perceptions about social and emotional functioning, their perceptions may also be different on other factors as well, which suggests that future research should attempt to collect information from multiple respondents rather than just one (Macks & Reeve, 2007).

Sample Size and Composition

Several studies have indicated that small sample sizes may be an important factor to consider when attempting to explain inconsistencies within the current research surrounding siblings of children with autism (Dempsey et al., 2012; Di Biasi et al., 2016; Hastings, 2003a; Kaminsky & Dewey, 2002). One specific example of this is that smaller sample sizes may have led to the inconsistencies noted earlier concerning the presence of externalizing behavior problems among siblings of children with autism (Bägenholm & Gillberg, 1991; Dempsey et al., 2012; Hastings, 2003a; Rodrigue et al., 1993; Tomeny et al., 2012; Verté et al., 2003). Upon review, it was found that many of the studies reporting differences in externalizing behavior problems between the groups had sample sizes with less than 30 siblings of children with autism (Bägenholm & Gillberg, 1991; Hastings; 2003a; Rodrigue et al., 1993; Verté et al., 2003). Thus, sample size may help to explain some of the inconsistencies found across the research; it is plausible that smaller sample sizes may have led to type 1 errors in the research.

Similarly, differences can be best understood by examining the composition of the sample. For example, the socio-demographic factors of race/ethnicity, culture, and SES may help to explain some of the inconsistencies. Sage & Jegatheesan, (2010) found stark differences in the way Caucasian and Asian American families perceived autism that led to differences in sibling relationships. This is one of the only studies to have considered race/ethnicity and it has been noted by several researchers that more research is needed in this area of the literature (Cuskelly, 1999; Rivers & Stoneman, 2003; Sage & Jegatheesan, 2010; Seltzer et al., 2004). There are several studies conducted outside of

the United States that yielded higher levels of internalizing behaviors in siblings (Bägenholm & Gillberg, 1991; Gold, 1999; Ross & Cuskelly, 2006) as compared to those conducted within the United States (Dempsey et al., 2012; Rodrigue et al., 1993; Tomeny et al., 2012). Similarly, differences in the level of externalizing behaviors can be seen in relation to the country in which the study was conducted (Dempsey et al., 2012; Hastings, 2003a, Tomeny et al., 2012; Verté et al., 2003). The SES of the participants in the study also could pose a problem (Hesse et al., 2013; Macks & Reeve, 2007; Petalas et al., 2009), with samples at times weighted heavily to higher income levels (Rodrigue et al., 1993; Shivers et al., 2013). Most the studies are predominantly Caucasian (Meyer et al., 2011; Petalas et al., 2012; Pollard et al., 2013; Smith et al., 2013; Tomeny et al., 2012), providing minimal information on underrepresented groups. It is also noteworthy that several studies have documented differences in access to service based around family socio-demographic factors such as race/ethnicity and family SES (Irvin et al., 2012; Siller et al., 2014; Thomas et al., 2007). These factors further impact the generalizability of the findings.

Other important components of sample composition include the age range of the participants in relation to the size of the family. The age of siblings of children with autism is important as age appears to be an important variable in helping to better understand outcomes in the literature (Shivers et al., 2013; Verté et al., 2003) along with birth order (Hastings, 2003a; Petalas et al, 2009; Schmidt et al., 2013; Tomeny et al., 2014). Researchers conducting meta-analyses in this area of research have identified the wide age ranges employed in studies as a possible confounding variable (Cuskelly, 1999;

Seltzer et al., 2004). Specifically, Cuskelly, (1999) highlighted the idea that children at different ages may respond differently to having a sibling with autism. These ideas appear to suggest that there is a need for future research to have smaller age ranges so that outcomes of siblings with autism can be understood at various ages and developmental levels. For example, the inconsistent findings of two studies that found directly contrasting results for sibling loneliness may be due to wide age ranges of the siblings (Bägenholm & Gillberg, 1991; Kaminsky & Dewey, 2002) with the former including siblings five to 20 years old and the latter, eight to 18 years old. Additionally, several researchers have identified family size as an important factor to consider when examining sibling outcome in child with autism (Kaminsky & Dewey, 2002; McHale et al., 1986; Pilowsky et al., 2004). A failure to control for family size along with other demographic variables may be a reason for inconsistent findings in the literature (Cuskelly, 1999; Seltzer et al., 2004).

Measures Used for Outcome Variables

Another factor that may help to explain some of the inconsistent research results is the measures that various studies employed for outcome variables (Macks & Reeve, 2007). Several of the studies reporting no difference in internalizing problems across the groups employed a global measure of psychological adjustment as the main instrument of choice (Dempsey et al., 2013; Kaminsky & Dewey, 2002; Rodrigue et al., 1993; Tomeny et al., 2012). At the same time, there were also some studies that used a global measure with group differences evident (Ross & Cuskelly, 2006; Shivers et al., 2013). In contrast, studies that found group differences often employed measures more

specialized toward identifying specific internalizing problems such as anxiety and depression (Bägenholm & Gillberg, 1991; Gold, 1993; Pollard et al., 2013). Thus, it appears that studies that employ measures that target specific problems may better detect differences on constructs of interest.

Control Groups and Longitudinal Research

Researchers studying the outcomes of siblings and families of children with autism have noted that lack of adequate comparison groups used in studies (Petalas et al., 2009; Pilowsky et al., 2004; Seltzer et al., 2004) along with a lack of longitudinal research (Hastings, 2007; Petalas et al., 2009) are potential shortcomings in the current literature. Seltzer et al. (2004) noted that future studies should attempt to match comparative control groups across variables such as age, gender, and birth order. Moreover, in some studies, rather than a control group, the study relied on normative data (Bitsika et al., 2015; Dempsey et al., 2012; Di Biasi et al., 2016; Hastings, 2003a; Ross & Cuskelly, 2006). Petalas et al. (2009) explained that comparing groups to a normative control versus an actual control group may lead to different outcomes, as with the Rossiter and Sharpe (2001) study. In addition to comparison group problems, some researchers have also identified a lack of longitudinal research within the literature (Hastings, 2007; Petalas et al., 2009). This is important as longitudinal research is one form of research methodology from which casual relations between variables can be adequately established and changes in adjustment over time can be documented (Hastings, 2007).

Purpose of Study

From a family systems diathesis stress integrated perspective, it is critical to look at factors that affect the outcomes of siblings of children with autism. Some of the factors that are important to a model, as presented in Figure 1, include the severity of autism for the affected child, demographic considerations, and parental well-being, as well as sibling adjustment. A focus on siblings of children with autism is important given the role of siblings in development, especially social emotional development, within the family system (McHale et al., 2012; Powell & Gallagher, 1993).

Siblings play a crucial role in child development (McHale et al., 2012) and their interactions influence many things including cognitive, affective, and social skills as well as positive self-concept (Brody et al., 2003; Powell & Gallagher, 1993; Whiteman et al., 2007). There has been an abundance of research pertaining to outcomes of siblings with autism related to externalizing behavior problems (Dempsey et al., 2012; Hastings, 2003a; Rodrigue et al., 1993; Tomeny et al., 2012; Verté et al., 2003) and internalizing behavior problems (Bägenholm & Gillberg, 1991; Dempsey et al., 2012; Kaminsky & Dewey, 2002; Ross & Cuskelly, 2006; Tomeny et al., 2012; Verté et al., 2003) yielding inconsistent findings across each area. Although there have been some studies that examined social skills (Kaminsky & Dewey, 2002; Macks & Reeve, 2007; Mohapatra, 2012; Oerlemans et al., 2014; Smith et al., 2013), the current study utilized an extremely comprehensive construct of social skills including elements of cooperation, responsibility and assertion that have not previously been used in this literature.

The current research also has examined a host of factors believed to be associated with outcomes of siblings of children with autism including race/ethnicity (Sage & Jegatheesan, 2010), SES (Hesse et al., 2013; Macks & Reeve, 2007; Petalas et al., 2009), family biological and psychological vulnerabilities (Fisman et al., 1996; Georigades et al., 2013; Meyer et al., 2011; Petalas et al., 2012; Pickles et al., 2013), gender and birth order (Hastings, 2003a; Shivers et al., 2013; Tomeny et al., 2014; Verté et al., 2003), and educational placement/interventions received (Cebula, 2012). Many studies have not controlled for any of these factors; this may be a contributing factor to the inconsistencies found in the existing research. Similarly, many studies have not considered the effect of parental stress in relation to other factors. Other limitations in this body of research include sample size, age range of the participants, and failure to assess broader autism phenotype symptoms in typically developing siblings (Bauminger & Yirmiya, 2001; Dempsey et al., 2012; Petalas et al., 2012; Seltzer et al., 2004).

The purpose of this study was to examine potential differences between siblings of children with autism and siblings of typically developing children in the areas of externalizing problems, internalizing problems, and social skills. The study sought to improve on previous research in a variety of ways. Specifically, the study utilized a psychological instrument Social Skills Improvement System (SSIS; Gresham & Elliot, 2008) that had not been used before in this area of literature to measure the construct social skills in a very comprehensive manner. Additionally, this study focused on siblings of children with autism between the ages of 6-11 years of age to address previous research issues related to large age ranges and considered parental stress as a

contributing variable. Lastly, this study used an autism screening measure for both the sibling of the child with autism and the child with autism in an attempt to consider the broader autism phenotype (Petalas et al., 2012) and presence of subthreshold symptoms in typically developing siblings.

Research Questions and Hypotheses

1. Do the two groups (siblings of children with autism, siblings of children who are typically developing) exhibit differences in terms of subthreshold levels of autistic behaviors, parental stress, birth order, age, or other demographic variables?
 - a) Do siblings of children with autism exhibit higher levels of autistic behavior as measured by the Autism Spectrum Rating Scales (ASRS) DSM-5 Index (Goldstein & Naglieri, 2009) as compared to siblings of children who are typically developing? It is hypothesized that siblings of children with autism will exhibit higher levels of autistic behavior than siblings of typically developing children.
 - b) Do parents of children with autism exhibit higher levels of parental stress (as measured by the Total Stress scale on the Parenting Stress Index-Short Form (PSI-4-SF; Abidin, 2012)) as compared to parents of typically developing children? It is hypothesized that parents of children with autism will exhibit higher levels of parental stress than parents of typically developing children as measured by the PSI-SF (Abidin, 2012).
 - c) Do the two groups differ on demographic variables (e.g., size of family, birth order of sibling, age of sibling, SES, race/ethnicity, or gender) as

indicated by the demographic form? It is hypothesized that the two groups will not differ on demographic variables listed above.

2. Do siblings of children with autism exhibit significantly higher levels of problem behaviors and delayed social skills as compared to children of typically developing peers?

- a) Do siblings of children with autism exhibit significantly higher levels of internalizing or externalizing problems [as measured by the Externalizing and Internalizing Behavior Composites on the Behavior Assessment Scale for Children, Second Edition-Parent Report (BASC-2 PRS; Reynolds & Kamphaus, 2006) and the Externalizing and Internalizing Behavior Problems Subdomains on the Social Skills Improvement System (SSIS; (Gresham & Elliot, 2008)] as compared to children of typically developing peers? It is hypothesized that siblings of children with autism will exhibit higher levels of internalizing and externalizing behavior problems than siblings of typically developing children.
- b) Do siblings of children with autism exhibit significantly lower levels of social skills [as measured by the Social Skills domain on the SSIS (Gresham & Elliot, 2008)] as compared to children of typically developing siblings? It is hypothesized that siblings of children with autism will not exhibit significantly lower levels of social skills than siblings of typically developing children.

- c) If differences emerged, is there an interaction effect for parental stress with problem behaviors, or social skills? Is there an interaction effect for severity of ASRS (Goldstein & Naglieri, 2009) symptoms of the child with Autism? Is there an interaction effect for family size? It is hypothesized that there will be an interaction effect for parental stress with problems behaviors and social skills. It is further hypothesized that there will be interaction effects between for autism severity and family size for both problem behaviors and social skills.
3. Are there significant differences based on demographic variables?
- a. Do variables of sex and race/ethnicity (indicated by demographic questionnaire) differ in the presentation of internalizing behavior problems [as measured by the Internalizing Behaviors Composite of the BASC-2 PRS (Reynolds & Kamphaus, 2006) and the Internalizing Problems Subdomain of the SSIS (Gresham & Elliot, 2008)], externalizing behavior problems [as measured by the Externalizing Behaviors Composite of the BASC-2 (Reynolds & Kamphaus, 2006) and the Externalizing Problems Subdomain of the SSIS (Gresham & Elliot, 2008)], and social skills [as measured by the SSIS Social Skills Domain (Gresham & Elliot, 2008)]? It is hypothesized that males will exhibit more externalizing behavior problems and delayed social skills than females, while females will exhibit more internalizing behavior problems than males. It is further hypothesized that there will be no notable

differences for behavior problems (internalizing or externalizing) and social skills among children of different racial/ethnic groups.

b. Does birth order of the typically developing sibling (indicated by demographic questionnaire) impact internalizing behavior problems (as measured by the Internalizing Behaviors Composite of the BASC-2 PRS (Reynolds & Kamphaus, 2006) and the Internalizing Problems Subdomain of the SSIS (Gresham & Elliot, 2008)), externalizing behavior problems (as measured by the Externalizing Behaviors Composite of the BASC-2 (Reynolds & Kamphaus, 2006) and the Externalizing Problems Subdomain of the SSIS (Gresham & Elliot, 2008)), and social skills (as measured by the SSIS Social Skills Domain (Gresham & Elliot, 2008))? It is hypothesized that typically developing siblings who are younger than the child with autism will be more likely to exhibit greater problem behaviors and more delayed social skills than those who are older than the child with autism.

4. To what extent is family size (total number of children in the family), severity of child with autism [as measured by ASRS (Goldstein & Naglieri, 2009)] and/or parenting stress [PSI-SF (Abidin, 2012)] predictive of problem behaviors or delayed social skills? It is hypothesized that smaller family sizes and lower family SES will place siblings of children with autism at increased risk for experiencing behavior problems and delayed social skills. Additionally, it hypothesized that greater parental stress and autism severity will place siblings of children with autism at

increased risk for experiencing behavior problems (internalizing and externalizing)
as well as delayed social skills.

CHAPTER III

METHODS

This study used a cross-sectional design with a limited sample consistent with most research with low-incidence populations, as well as previous research conducted in this area of the literature (Bägenholm & Gillberg, 1991; Hastings; 2003a; Rodrigue et al., 1993; Verté et al., 2003). Further this study implemented a quasi-experimental design in which data was collected from two different groups of parents about their children. The first group was a sibling of children with autism group, while the second group was a sibling of typically developing children (control group).

Participants

The siblings of children with autism group was composed of parents with at least two children where at least one child had a diagnosis of Autism Spectrum Disorder (ASD) or Autism, and the other child was between 6-11 years old. The siblings of typically developing children (control group) was composed of parents with two or more children where at least one of the children was between 6-11 years of age and no child had a diagnosis/disorder. Families in which one or more children had a diagnosis of a neurodevelopmental disorder were not eligible to participate in the control group. Additionally, due to the measures implemented as part of the study, participants who were not fluent in English, or who did not have a child that met the age criteria were not eligible for participation in the study.

Participants in the study were recruited using Institutional Review Board (IRB) approved research flyers. As part of the recruiting process approximately 50 different

organizations across 27 different states were contacted by the researcher and asked to share the flyers. Organizations included: state and national level autism organizations, research organizations, mental health agencies and a daycare center. Additionally, the researcher gained consent to have research flyers posted in public spaces including: libraries, community centers, and restaurants. To further recruit participants, the researcher attended a story hour at two different libraries and made brief announcements about the research study from an IRB approved script.

Recruiting took place over the course of 14 months. Individuals who were interested in the study contacted the researcher and were mailed a research packet. During this time, a total of 93 research packets were distributed and 26 packets were returned yielding a 28% response rate. Of the 26 research packets that were returned, one of the packets was not able to be included in the research study because the sibling being reported on did not meet age criteria for the study. The demographics of the participants in the study can be found in Table 1 below.

Table 1
Participant Demographic Information

| | Control Group (N = 14) | | Autism Sibling Group (N = 11) | |
|--------|---------------------------|--------|-------------------------------------|--------|
| | N | % | N | % |
| Gender | | | | |
| Male | 8 | 57.14% | 6 | 54.54% |
| Female | 6 | 42.86% | 5 | 45.45% |

Table 1 Continued

| | Control Group (N = 14) | | Autism Sibling Group (N = 11) | |
|-------------------------------------|---------------------------|-------------|-------------------------------------|-------------|
| | N | % | N | % |
| Race/Ethnicity (Mother) | | | | |
| Black | 1 | 7.14% | 0 | 0.00% |
| Asian/Pacific Islander | 0 | 0.00% | 1 | 9.09% |
| Hispanic | 2 | 14.29% | 1 | 9.09% |
| Native American | 0 | 0.00% | 0 | 0.00% |
| Biracial | 3 | 21.43% | 3 | 27.27% |
| White | 3 | 21.43% | 6 | 54.54% |
| Other/Unreported | 5 | 38.46% | 0 | 0.00% |
| Father Education Level ¹ | | | | |
| Some High School | 1 | 7.69% | 2 | 18.18% |
| High School | 2 | 15.38% | 2 | 18.18% |
| Some College/2 Year Degree | 2 | 15.38% | 4 | 36.36% |
| College 4 Year Degree | 2 | 15.38% | 0 | 0.00% |
| Graduate Degree | 6 | 46.15% | 3 | 27.27% |
| Mother Education Level ¹ | | | | |
| Some High School | 2 | 15.38% | 0 | 0.00% |
| High School | 1 | 7.69% | 2 | 18.18% |
| Some College/2 Year Degree | 2 | 15.38% | 4 | 36.36% |
| College 4 Year Degree | 3 | 23.08% | 1 | 9.09% |
| Graduate Degree | 5 | 38.46% | 4 | 36.36% |
| | | Mean (SD) | | Mean (SD) |
| Age of Child Participant | 14 | 7.86 (1.83) | 11 | 9.00 (1.34) |
| Grade | 14 | 2.43 (1.74) | 11 | 3.70 (1.34) |

The study included a total of 11 families participating in the siblings of children with autism group, and 14 families participating in the control group. Many participants were White with parents reporting having at least a two-year degree. A descriptive analysis of participant data did not reveal a significant difference between parental education, race, age, and birth order between the two groups in this study. It was noted that siblings in the autism group were slightly older than their counterparts in the control group but this was not significant ($p>.05$). The difference with regard to grade level was also non-significant ($p>.05$); however, children in the siblings of autism group were in a higher grade at school than siblings in the control group.

For children diagnosed with autism in the siblings of autism group, physicians and psychologists or psychiatrists were equally likely to be the health professional making the initial diagnosis of autism. It was reported that most children diagnosed with autism in this study displayed mild to moderate autism symptom severity. Approximately one third of the families in this group reported participating in a home-based program for their child with autism, while almost three quarters of the group reported that the child with autism received outpatient therapy. Nearly half of the families indicated that their child with autism participated in some form of Applied Behavior Analysis (ABA). A complete breakdown of information on the children diagnosed with autism can be found in Table 2 below.

Table 2

Demographics for Children with Autism (N=11)

| | Autism Sibling Group (N=11) | |
|-----------------------------------|-----------------------------|--------|
| | N | % |
| Individual Making Diagnosis | | |
| Physician | 3 | 27.27% |
| School Psychologist | 1 | 9.09% |
| Psychologist/Psychiatrist | 3 | 27.27% |
| Other | 3 | 27.27% |
| Unknown | 1 | 9.09% |
| Severity of Autism | | |
| Mild | 6 | 54.54% |
| Moderate | 4 | 36.36% |
| Severe | 1 | 9.09% |
| Home Program | | |
| Yes | 4 | 36.36% |
| No | 7 | 63.36% |
| Outside Therapy | | |
| Yes | 8 | 72.72% |
| No | 3 | 27.27% |
| Applied Behavior Analysis Program | | |
| Yes | 5 | 45.45% |
| No | 3 | 27.27% |
| Not Sure | 3 | 27.27% |

Procedures

Participants were recruited for this study by contacting autism awareness groups, mental health agencies, community centers, libraries, and a daycare center. In all cases research flyers approved by the Institutional Review Board (IRB) at Texas A&M University were distributed on various community bulletin boards (including electronic bulletin boards), electronic news letters, and list serves. Individuals interested in participating in the study were asked to contact the researcher by telephone or e-mail (this information was located on all IRB approved fliers). Once initial communication was made between the research and potential participants, the potential participants provided a good mailing address and the research packet was shipped.

All materials needed for the study were contained within the research packets. The estimated time of participation in the study was 60 minutes. The Institutional Review Board (IRB) at Texas A&M University waived the requirement of written consent for the study to remain anonymous and potential research participants instead reviewed an Information Sheet about the study prior to participation. In addition to the Information Sheet each research packet contained an IRB approved Compensation Sheet, IRB approved Demographic Questionnaire, research protocols and a business reply envelope. Participants had the option of completing an IRB approved compensation sheet to enter a drawing for a \$50 gift card. Once participants completed the study materials they mailed them back to Texas A&M University in the business reply envelopes. The business reply envelopes were returned to the Principal Investigator at the Department of Educational Psychology at Texas A&M University.

As research packets were received, Compensation Sheets were separated from research packets and any identifying information was removed from materials to maintain participant anonymity. Research materials were then reviewed to ensure that participants met all criteria needed in order to participate. Materials from participants who were not eligible to participate in the study were shredded. Next, research packets were coded by group membership. For example, “AU-1” indicated the first research packet obtained from the siblings of children with autism group and “Cont-1” was used for the first research packet obtained from the control group. All research protocols collected were stored in a secured location within the Department of Educational Psychology at Texas A&M University.

Protocols were then scored consistent with standardization. Once protocols were coded and scored, data were entered into a Microsoft Excel spreadsheet. All identifying information was excluded from the data base and entered using the codes assigned. Information from the control group was entered first followed by information from the siblings of children with autism group. The database was encrypted and only the researchers were given access. After the study, all hard copies of research materials were shredded. The database will be maintained by the Protocol Director and Primary Investigator for at least three years following completion of the study.

Instruments

Demographic Questionnaire.

The study required participants to complete an IRB approved demographic questionnaire. This is a common practice within the current autism research literature

(Cebula, 2012; Fisman et al., 1996; Hesse et al., 2013; Petalas et al., 2012; Pollard et al., 2013). The demographic questionnaire collected information about family socio-economic status by asking parents about their educational attainment. Additionally, the demographic questionnaire collected information about race and ethnicity of participants. The demographic questionnaire also asked questions about family size, birth order, age, and grade level of the child being reported on. For the siblings of children with autism group birth order specific to the child with autism was also determined. These demographic variables are included as these factors have been found to be important in previous research (Hastings, 2003a; Kaminsky & Dewey, 2002; Tomeny et al., 2014). Finally, for the siblings of children with autism group the demographic questionnaire included questions related to the educational placement and intervention services the child with autism was currently receiving, as some researchers have begun to consider the effects of placement on typically developing siblings (Cebula, 2012). A complete list instruments and their corresponding constructs for the study can be found in Table 3 at the end of the chapter. The researcher developed forms are included in Appendix B.

Behavioral Assessment System for Children-2: Parent Report (BASC-2 PRS; Reynolds & Kamphaus, 2006)

The Behavioral Assessment System for Children, Second Edition-Parent Rating Scales (BASC-2 PRS; Reynolds & Kamphaus, 2006) is an instrument that can be used to measure externalizing behaviors, internalizing behaviors, and adaptive skills in children. The BASC-2 PRS form used in this study was the child form (ages 6-11) and contained

a total of 160 items (Reynolds & Kamphaus, 2006). Each item on the BASC-2 PRS (Reynolds & Kamphaus, 2006) asked parents to rate their child on a four-point Likert-type scale (1=Never, 2=Sometimes, 3=Often, and 4=Almost Always). This study used the BASC-2 PRS (Reynolds & Kamphaus, 2006) to obtain information from parents about potential behavior problems in siblings of children with autism and siblings of typically developing children.

This study utilized the Externalizing Behavior Problems Composite on the BASC-2 to measure potential externalizing behavior problems among the two different groups. The Externalizing Behavior Problems Composite measures a child's overall disruptive behavior, aggression, and conduct problems (Reynolds & Kamphaus, 2006). The Internalizing Behavior Composite on the BASC-2 was used to measure behavior problems related depression, anxiety, and somatization (Reynolds & Kamphaus, 2006).

The BASC-2 PRS (Reynolds & Kamphaus, 2006) has not been widely used within the literature related to siblings of children with autism. It is noted that Macks and Reeve (2007) as well as Solarsh (2016) used the BASC-2 PRS to collect information about typically developing siblings of children with autism like the current study. Additionally, there have been a host of researchers that have been interested in studying potential externalizing (Dempsey et al., 2012; Hastings, 2003a; Rodrigue et al., 1993; Tomeny et al., 2012) and internalizing behavior problems (Gold, 1993; Pollard et al., 2013; Ross & Cuskelly, 2006; Shivers et al., 2013) in siblings of children with autism who have employed different instruments in their studies. There also have been several researchers interested in studying social skills in siblings of children with autism who

have elected to use different measures than the BASC-2 (Kaminsky & Dewey, 2002; Mohapatra, 2012; Oerlemans et al., 2014). Despite not being used frequently in the literature the BASC-2 reports good overall reliability and validity with regards to the components of interest in the current study. The BASC-2 manual purports that the test-retest reliability of the Externalizing and Internalizing Behavior Problems Composites, for the BASC-2 PRS, are .91 and .77 respectively. Further, the inter-rater reliability for these two composites was reported at .76 and .78 respectively (Reynolds & Kamphaus, 2006).

Several research studies have used the Child-Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) to measure both internalizing and externalizing behavior problems (Dempsey et al., 2012; Kaminsky & Dewey, 2002; Ross & Cuskelly, 2006; Shivers et al., 2013; Tomeny et al., 2012). The BASC-2 manual noted that concurrent validity was examined by comparing scores from the BASC-2 PRS with scores from the CBCL (Achenbach & Rescorla, 2001). Results indicated both the Externalizing and Internalizing Behavior Problem Composites on the BASC-2 were highly correlated with the Externalizing and Internalizing Problems scales on the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach & Rescorla, 2001). Specifically, there was a .83 correlation between the measures for externalizing behavior problems and a .68 correlation for internalizing behavior problems (Reynolds & Kamphaus, 2006). Reynolds and Kamphaus (2006) further indicated that scores from the BASC and CBCL have been highly correlated when examining earlier additions of each test as well. This is important to consider as several of the studies in the literature likely employed

previous versions of the CBCL (Achenbach, 1991; Fisman et al., 1996; Gold, 1993; Rodrigue, et al., 1993).

Social Skills Improvement System (SSIS)-Parent Form (Gresham & Elliot, 2008)

The Social Skills Improvement System (SSIS; Gresham & Elliot, 2008) is an instrument that measures both problem behaviors and social skills in children ages 3 to 18 years of age. This study implemented the SSIS-Parent Form to collect information about externalizing behavior problems, internalizing behavior problems, and social skills in both sibling groups. The SSIS is a relatively new measure. It has not been used in any published research on siblings of children with autism at the current time, but has been employed in previous research in which the social skills of a child with autism were being examined (Mathews, Erkfritz-Gay, Knight, Lancaster & Kupzyk, 2013; Neuhaus, Bernier & Beauchaine, 2014). The Parent Form of the SSIS (Gresham & Elliot, 2008) consists of 79 statements that ask parents how often a behavior occurs using Likert-type format (N-Never, S-Seldom, O-Often, and A-Almost Always).

The Social Skills domain on the SSIS is further broken down into seven subdomains including Communication, Cooperation, Assertion, Responsibility, Empathy, Engagement, and Self-Control (Gresham & Elliot, 2008). This study will use all SSIS measures under the Social Skills domain to measure the construct of social skills within the study. The Cooperation subdomain measures a child's propensity to help others, share, and comply with rules (Gresham & Elliot, 2008). The Assertion subdomain measures a child's ability to initiate behaviors such as asking other people for

information, introducing oneself to a stranger or responding to actions of other people (Gresham & Elliot, 2008). The SSIS manual indicates that the Empathy subdomain measures the level of respect and concern that a child has for the views or perspectives of another individual. The Communication subdomain measures the child's ability to take turns, and act appropriately in various environments, while the Responsibility subdomain measures the child's ability to show regard for property and communicate with adults (Gresham & Elliot, 2008). The Engagement subscale on the SSIS measures the child's ability to initiate conversations and join activities in progress (Gresham & Elliot, 2008). Lastly, the Self-Control subdomain measures how well a child responds to situations that involving conflict and no conflict (Gresham & Elliot, 2008).

The SSIS also yields a Problem Behaviors domain that is composed of six subdomains including Externalizing, Bullying, Hyperactivity/Inattention, Internalizing, and Autism Spectrum (Gresham & Elliot, 2008). The SSIS manual indicates that the Externalizing subdomain examines variables such as ability to control temper, verbal aggression, and physical aggression. Additionally, the SSIS manual describes the Internalizing subdomain as measuring feelings of sadness and anxiety (Gresham & Elliot, 2008). This study will use information from the Externalizing and Internalizing subdomains to cross check information in these areas collected with the BASC-2 (Reynolds & Kamphaus, 2006).

The SSIS-Parent Form has a reported overall test-retest reliability of .87 and an internal reliability of .93 (children 8-12) and a .95 (children 13-18; Gresham & Elliot 2008). The SSIS-Parent Form also has been found to have good concurrent validity

when compared to other measures being used in the field. For example, the Social Skills Domain on the SSIS has a correlation of .52 with the Social Skills Subscale of the BASC-2 (Gresham & Elliot, 2008; Reynolds & Kamphaus, 2006). Additionally, the Externalizing and Internalizing Subdomains on the SISS are correlated with the Externalizing Problems and Internalizing Problems Composites on the BASC-2 at .75 and .59 respectively (Gresham & Elliot, 2008; Reynolds & Kamphaus, 2006).

Parent Stress Index-Short Form (PSI-4-SF; Abidin, 2012)

In conjunction with the Family Systems Model the Parent Stress Index-Short Form (PSI-4-SF; Abidin, 2012) was used to assess levels of parenting stress, which has been shown to be associated with the quality of sibling relationships (Rivers & Stoneman, 2003). The PSI-SF (Abidin, 2012) contains 36 items that are presented to the participant in a Likert-style format (1=Strongly Agree, 2=Agree, 3=Not Sure, 4=Disagree, and 5=Strongly Disagree). The PSI-4-SF is directly derived from the full-length Parenting Stress Index (Abidin, 2012). The items on the PSI-SF are broken down into three domains which include: Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child (Abidin, 2012). These three domains then yield the Total Stress scale, which is an overall score of parenting stress.

Various versions of the PSI (Abidin,1986) and PSI-SF (Abidin, 1990; Abidin, 2012) have been used extensively in research that focused on families with children who have autism (Cebula, 2012; Fisman et al., 1996, Hesse et al., 2013; Rivard et al., 2010; Tomeny et al., 2012). The PSI-4-SF manual reported that the PSI-4-SF has good internal consistency with all alphas near .90 (Abidin, 2012). Additionally, it is reported

that the test-retest reliability for the coefficient for the Total Stress scale is .84 for the PSI-4-SF (Abidin, 2012). Lastly, the PSI-4-SF is reported to have good validity with the larger PSI and the correlation between the Total Stress scales for these two measures was .98 (Abidin, 2012).

Autism Spectrum Rating Scales (ASRS; Goldstein & Naglieri, 2009)

The Autism Spectrum Rating Scales (ASRS; Goldstein & Naglieri, 2009) is an instrument that was completed by parents for the child with autism and their typically developing sibling, as well as the sibling of typically developing children. The ASRS measures various symptoms related to autism such as: stereotyped behaviors, rigid behaviors, unusual use of language and social communication (Goldstein & Naglieri, 2009). This study used the Autism Spectrum Rating Scales (ASRS; Goldstein & Naglieri, 2009) to obtain information about the severity of autistic symptoms exhibited by the child in the family with autism. Investigating autism symptom severity helped to expand previous work in the literature that examined the effects of autism symptom severity on typically developing siblings of children with autism (Shivers et al., 2013; Tomeny et al., 2012). Additionally, this study employed the ASRS (Goldstein & Naglieri, 2009) to obtain information about possible autism symptoms that may be present within the typically developing sibling of the child with autism as past research has noted that autism may have a genetic component (Georgiades et al., 2013; Pickles et al., 2013; Robel et al., 2014). Rather than solely relying on normative data, siblings of children with autism will be compared to the typically developing sibling group.

The ASRS is a relatively new psychological instrument and has not been used in prior research conducted on siblings of children with autism. The ASRS was employed to measure autism severity in previous research conducted by Matthews (2012). Both test-retest reliability and internal reliability for the parent form of the ASRS measure were found to range from .92 to .96 and .92 to .95 respectively (Goldstein & Naglieri, 2009). Additionally, the discriminant validity of the ASRS for children with autism and children without autism was reported to be above .90. The ASRS parent form also has good concurrent ratings (.80 to .83) with DSM IV-TR criteria for autism (Goldstein & Naglieri, 2009). Scoring has now been revised to reflect the DSM-5 and will be used for this study (Goldstein & Naglieri, 2009).

Table 3

Measures and Constructs

| <i>Constructs</i> | <i>Measure</i> |
|--|---|
| Race, Ethnicity, Family SES, Educational Placement/Intervention for child with autism, birth order and gender of siblings. | Demographic Questionnaire |
| Externalizing Behaviors | BASC-2 PRS Externalizing Composite; SSIS Externalizing Problems Subdomain |
| Internalizing Behaviors | BASC-2 PRS Internalizing Composite; SSIS Internalizing Problems Subdomain |
| Social Skills | SSIS-Social Skills Domain |
| Family Functioning/Parental Stress | PSI-4-SF Total Stress Scale |
| Autistic Symptoms of Target Sibling | ASRS DSM-5 Index |

Table 3 Continued

| <i>Constructs</i> | <i>Measure</i> |
|---|------------------|
| Autistic Symptoms of Child with Autism | ASRS DSM-5 Index |

CHAPTER IV

RESULTS

Data Analysis

The first analyses conducted on the data set evaluated the data to confirm assumptions of normality. Descriptive statistics including number of data points, minimum scores, maximum scores, means, standard deviations and variances are displayed in Table 4 below. With regards to number of data points it is important to note that one participant in the study did not complete the PSI-SF (Abidin, 2012) or SSIS (Gresham & Elliot, 2008) accounting for the total sample size of 24 data points in this area rather than 25. Additionally, five out of eleven of the participants in the siblings of children with autism group had a sibling under the age of six not allowing for the completion of the ASRS (Goldstein & Naglieri, 2009) for that child. For all analyses, $p < .05$ was used as the level of significance to avoid Type II error.

When analyzing the descriptive statistics data, it was noted that the majority of scores recorded were within normal limits. The SSIS (Gresham & Elliot, 2008) produced a higher variability of scores with the maximum Social Skills score being 3 standard deviations above the mean score of 100 and the Problem Behaviors scale recording a minimum value of greater than 3 standard deviations below the mean. The researcher chose to include these scores in the data due to the small sample size in the study. Additionally, the researcher believed that typical standard scores might not be representative of the siblings of children with autism group.

Table 4
Descriptive Statistics for Data Set

| Descriptive Statistics for Data Set | | | | | |
|---|----|---------------|---------------|--------|--------------------|
| | N | Minimum Score | Maximum Score | Mean | Standard Deviation |
| Externalizing Behavior Composite (BASC-2) | 25 | 37 | 70 | 48.28 | 8.64 |
| Internalizing Behavior Composite (BASC-2) | 25 | 37 | 77 | 51.12 | 11.67 |
| Social Skills (SSIS) ¹ | 24 | 50 | 116 | 97.33 | 16.01 |
| Problem Behaviors (SSIS) ¹ | 24 | 82 | 145 | 103.79 | 15.24 |
| Total Stress (PSI-4-SF) ² | 24 | 32 | 65 | 49.87 | 9.27 |
| ASRS Total Score (Sibling) | 25 | 31 | 66 | 49.56 | 8.67 |
| ASRS Total Score (Sib-AU) | 6 | 61 | 81 | 69.00 | 8.81 |
| ASRS DSM-IV TR Scores (Sibling) | 25 | 34 | 66 | 51.08 | 8.87 |
| ASRS DSM-IV TR Scores (Sib-AU) | 6 | 57 | 85 | 70.00 | 10.47 |

Notes. ¹Missing data for 1 control participant; ²Missing data for five children with autism in the siblings of children with autism group; ³ Behavior Assessment System for

Children, Second Edition (BASC-2); ⁴Social Skills Improvement System (SSIS); ⁵Parent Stress Index, Fourth Edition-Short Form (PSI-4-SF); ⁶Autism Spectrum Rating Scale (ASRS); ⁷Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition Text Revised (DSM-IV TR); ⁸Siblings of children with autism group (Sib-AU).

As part of the analysis examining data collected for assumptions of normality the skewness and kurtosis of the data set was analyzed. Skewness and kurtosis statistics for the data set can be found in Table 5 below. When considering the skewness of the data the researcher determined that most scores were relatively close to zero indicating a relatively normal distribution of scores. One exception to this finding was the Social Skills score on the SSIS (Gresham & Elliot, 2008) which was reported to be -1.18. This finding indicates negative skewness (i.e., the mean < median; more scores were indicative of problem behaviors than reflected by the mean). Also noteworthy were the Externalizing Behavior Composite of the BASC-2 (Reynolds & Kamphaus, 2006) with a skewness of .1.01 and Problem Behaviors on the SSIS (Gresham & Elliot, 2008) with a skewness of .99. Both statistics indicate that problem behaviors have a positive skew (i.e., the mean > median; more scores were indicative of not problematic behaviors than reflected by the mean). This is to be expected given that the siblings did not have a diagnosed disorder.

Table 5

Skew and Kurtosis for Data Set

| | Skewness and Kurtosis for Data Set | | | |
|---|------------------------------------|----------------|-----------|----------------|
| | Skewness | | Kurtosis | |
| | Statistic | Standard Error | Statistic | Standard Error |
| Externalizing Behavior Composite (BASC-2) | 1.01 | .46 | .52 | .90 |
| Internalizing Behavior Composite (BASC-2) | .77 | .46 | -.27 | .90 |
| Social Skills (SSIS) ¹ | -1.18 | .47 | 1.83 | .92 |
| Problem Behaviors (SSIS) ¹ | .99 | .47 | .91 | .92 |
| Total Stress (PSI-4-SF) ² | .03 | .47 | -1.17 | .92 |
| ASRS Total (Sibling) | -.14 | .46 | -.336 | .90 |
| ASRS Total (Sib-AU) | .55 | .85 | -2.04 | 1.74 |
| ASRS DSM-IV TR (Sibling) | -.22 | .46 | -.87 | .90 |
| ASRS DSM-IV TR (Sib-AU) | .39 | .85 | -1.10 | 1.74 |

Notes. ¹Missing data for 1 control participant; ²Missing data for one 1 Autism sib participant; ³Behavior Assessment System for Children, Second Edition (BASC-2); ⁴Social Skills Improvement System (SSIS); ⁵Parent Stress Index, Fourth Edition-Short Form (PSI-4-SF); ⁶Autism Spectrum Rating Scale (ASRS); ⁷Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition-Text Revised (DSM-IV TR); ⁸Siblings of children with autism group (Sib-AU).

When examining kurtosis for the data set it appears that most of the data are relatively mesokurtic. For the Social Skills on the SSIS (Gresham & Elliot, 2008) the kurtosis appears somewhat leptokurtic with greater peak than would be expected in a normal population. In contrast, kurtosis for the Total Stress on the PSI-SF (Abidin, 2012) indicate a platykurtic trend indicating that parents tended to score stress levels broadly resulting in a flatter distribution. Additionally, the kurtosis for the ASRS (Goldstein & Naglieri, 2009) Total Score for siblings recorded platykurtic score of -2.04 indicating that sibling behavior was distributed broadly, more so than a normal distribution. Lastly, the kurtosis for the ASRS (Goldstein & Naglieri, 2009) DSM IV TR for children with autism also yielded a broader than expected range of behaviors. Given the sample size and emphasis on clinical conditions, these deviations from a normative sample are expected.

Between Group Differences: Autism Specific

The first part of research question number one examined potential differences between the two groups with regard to subthreshold levels of autistic traits as measured by the ASRS DSM-5 Index and Total Score (Goldstein & Naglieri, 2009). To answer this question an ANOVA was conducted to compare mean scores from the two groups (see Table 6). Statistically significant differences for autism traits as measured by the ASRS DSM-5 Index and Total Score (Goldstein & Naglieri, 2009) were not detected. Results indicated an *F* score of .13 on the ASRS DSM-5 Index and an *F* score of .94 on the ASRS Total Score (Goldstein & Naglieri, 2009).

Between Group Differences: Parental Stress

Parental stress level as measured by the Total Stress scale on the Parent Stress Index, Fourth Edition-Short Form (PSI-4-SF; Abidin, 2012) was compared across groups using an ANOVA analysis (see Table 6). Results indicated a statistically significant difference in parental stress when comparing parents of the children with autism to parents of typically developing children. Specifically, it was found that parents of children with autism experienced significantly more stress than parents in the control group. Results indicated an F score of 5.02 ($p = .04$) with a Cohen's d score of .93.

Between Group Differences: Externalizing and Internalizing Behaviors

The researcher conducted an ANOVA to determine whether the two groups in the study differed significantly on internalizing and externalizing behaviors. The Externalizing and Internalizing Behavior Composites on the BASC-2 PRS (Reynolds & Kamphaus, 2006) were used to measure externalizing and internalizing behaviors. Additionally, the Problem Behaviors scale on the SSIS (Gresham & Elliot, 2008) was also explored for potential group differences (see Table 6). Results found no statistically significant differences between the groups for externalizing behaviors, as an F score of .54 was recorded, or internalizing behaviors where an F score of .25 was noted. When considering the Problem Behaviors scale on the SSIS (Gresham & Elliot, 2008) no differences between groups were noted. An F score of .02 was obtained for the ANOVA.

Between Group Differences: Social Skills

An ANOVA analysis was conducted to determine whether the two groups differed significantly on social skills as measured by the Social Skills Domain on the SSIS (Gresham & Elliot, 2008). Results found that the two groups did not differ significantly in social skills. An *F* score of 1.14 was recorded (see Table 6).

Table 6
ANOVA Results

| | N | F | <i>p</i> | Cohen's <i>d</i> |
|---|----|------|----------|------------------|
| Externalizing Behavior Composite (BASC-2) | 24 | .54 | .47 | ---- |
| Internalizing Behavior Composite (BASC-2) | 24 | .25 | .62 | ---- |
| Social Skills (SSIS) | 24 | 1.14 | .30 | ---- |
| Problem Behaviors (SSIS) | 24 | .02 | .89 | ---- |
| Total Stress (PSI-4-SF) | 23 | 5.02 | .04 | .93 |
| ASRS Total Score (Sibling) | 24 | .94 | .34 | ---- |
| ASRS DSM-IV TR Scores (Sibling) | 24 | .13 | .72 | ---- |

Notes. ¹Missing data for 1 control participant; ²Behavior Assessment System for Children, Second Edition (BASC-2); ³Social Skills Improvement System (SSIS); ⁴Parent Stress Index, Fourth Edition-Short Form (PSI-4-SF); ⁵Autism Spectrum Rating Scale (ASRS); ⁶Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition-Text Revised (DSM-IV TR).

Effect of Demographic Factors

Potential differences in outcomes when considering various demographic factors such as gender, race/ethnicity, and birth order were of interest. With the small homogenous sample size obtained for this study it was not possible to draw conclusions about the impact of race/ethnicity with regards to outcomes for siblings of children with autism. The study did however consider the sibling gender and birth order when on behavioral and social outcomes including: externalizing behaviors, internalizing behaviors, and social skills. Additionally, autism symptomology and parental stress were also considered as an additional exploratory analysis.

Means and standard deviations for both boys and girls appeared to be within normal limits across outcome measurements. There were no statistically significant findings when comparing boys to girls on externalizing behavior problems, internalizing behavior problems, or overall problem behaviors. Further, there were not statistically significant findings when comparing boys to girls on social skills or parental stress levels. Interestingly, boys appeared to exhibit greater autism symptomology than girls when considering the ASRS (Goldstein & Naglieri, 2009) Total Score ($p = .03$) and DSM-IV TR score ($p = .02$).

Table 7

Gender Differences by Scale (N=25)

| | <i>Mean (SD)</i> | | <i>F</i> | <i>p</i> | <i>Eta-Squared</i> |
|-------------------------------------|--------------------|------------------------------|----------|----------|--------------------|
| | <i>Boys (N=14)</i> | <i>Girls (N=10)</i> | | | |
| ASRS Total Score | 52.93 (8.30) | 45.27 (7.40) | 5.58 | .03 | .20 |
| ASRS DSM-IV TR | 54.71 (7.77) | 46.45 (8.28) | 6.58 | .02 | .22 |
| BASC-2 Externalizing | 50.14 (8.45) | 46.20 (9.10) | 1.19 | .29 | NS |
| BASC-2 Internalizing | 50.50 (10.63) | 51.80 (14.10) | 0.07 | .80 | NS |
| SSIS Social Skills ¹ | 92.07 (17.96) | 104.70 (9.26) | 4.12 | .06 | NS |
| SSIS Problem Behaviors ¹ | 107.00 (18.31) | | 1.52 | .23 | NS |
| Total Stress ² | 51.57 (9.18) | 99.30 (8.43) 47.50 (9.32) | 1.13 | .30 | NS |

Notes. ¹Missing data for 1 control participant; ²Missing data for one 1 Autism sib participant; ³Autism Spectrum Rating Scales (ASRS); ⁴Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition-Text Revised (DSM-IV TR); ⁵Behavior Assessment System for Children, Second Edition (BASC-2); ⁶Social Skills Improvement System (SSIS).

In order to examine birth order the siblings of children with autism group was divided into younger siblings of children with autism (n = 3) and older siblings of children with autism (n = 7). Birth order of siblings of children with autism was

examined with regards to externalizing behavior problems, internalizing behaviors problems, social skills, and autism symptomology (see Table 8). It was noted that there was significant variability in the scores of younger siblings. Overall results indicated that birth order was not significantly correlated with internalizing or externalizing behavior problems as measured by the Behavior Assessment System for Children, Second Edition (Reynolds & Kamphaus, 2006). The previous result was further confirmed by the Problem Behaviors Scale on the Social Skills Improvement System (Gresham & Elliot, 2008) which also did not yield a statistically significant result. Birth order did not yield a statistically significant result when considering social skills. Finally, birth order was not found to be significantly correlated with autism symptomology as measured by the ASRS (Goldstein & Naglieri, 2009) Total Score and DSM-IV-TR score.

Table 8

Birth Order (Older/Younger) Differences by Scale (N=10)

| | <i>Mean (SD)</i> | | <i>F</i> | <i>p</i> | <i>Partial eta squared</i> |
|----------------------|--------------------|----------------------|----------|----------|----------------------------|
| | <i>Older (N=3)</i> | <i>Younger (N=7)</i> | | | |
| ASRS Total Score | 48.67 (5.03) | 54.00 (8.39) | 1.01 | .34 | NS |
| ASRS DSM-IV TR | 48.67 (8.62) | 54.43 (8.08) | 1.03 | .34 | NS |
| BASC-2 Externalizing | 53.33 (5.69) | 46.00 (6.25) | 3.03 | .12 | NS |
| BASC-2 Internalizing | 58.00 (14.11) | 46.57 (12.11) | 1.72 | .23 | NS |

Table 8 Continued

| | Mean (SD) | | <i>F</i> | <i>p</i> | <i>Partial Eta Squared</i> |
|-------------------------------------|---------------|----------------|----------|----------|----------------------------|
| | Older (N=3) | Younger (N=7) | | | |
| SSIS Social Skills ¹ | 96.00 (3.00) | 90.29 (23.05) | .17 | .69 | NS |
| SSIS Problem Behaviors ¹ | 104.67 (8.62) | 103.00 (21.70) | .02 | .90 | NS |

Notes. ¹Missing data for 1 control participant; ²Autism Spectrum Rating Scales (ASRS); ³Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition-Text Revised (DSM-IV TR); ⁴Behavior Assessment System for Children, Second Edition (BASC-2); ⁵Social Skills Improvement System (SSIS).

Predicting Outcomes

To address the various aspects of research question four, the researcher executed a series of regression analyses. The first regression analysis examined total parental stress, autism severity, total children in the family, and age of sibling as potential predictors of externalizing behavior problems in siblings of children with autism (see Table 9). The regression analysis indicated an overall R^2 of .94 and Adjusted R^2 of .94 when considering the combined influence of all factors on externalizing behavior problems for the sample. Results of the regression found F and Adjusted F scores to be 11.51. When considering each factor individually total parental stress significantly predicted externalizing behaviors in siblings of children with autism ($p = .04$). No other single factor emerged as a statistically significant factor to account for externalizing behavior problems.

The second regression considered autism severity, age of child with autism, total number of children in the family, and total parental stress as potential predictors of internalizing behavior problems (see Table 10). The regression analysis revealed R^2 and Adjusted R^2 scores of .63. F and Adjusted F scores were found to be 1.28. When considering each of the factors individually none of them significantly predicted internalizing behavior problems.

The third regression analysis examined the influences of autism severity, age of child with autism, total number of children in family, and total parental stress as predictors of social skills in siblings of children with autism (see Table 11). The regression analysis yielded R^2 and Adjusted R^2 values of .71 with F and Adjusted F scores to equal 1.81. Additionally, no single factor examined significantly accounted for social skills in siblings of children with autism.

The final regression analysis examined autism severity, age of child with autism, and total number of children in the family on predicting parental stress (see Table 12). The regression analysis yielded R^2 and Adjusted R^2 scores of .82 with F and Adjusted F score of 6.18. No single factor examined was found to predict parental stress at a statistically significant level.

Table 9

Regression for Externalizing Behavior Problems (N=10)

| <i>Variable</i> | <i>B</i> | <i>Standard Error</i> | <i>Beta</i> | <i>t</i> | <i>P</i> |
|--------------------------|----------|-----------------------|-------------|----------|----------|
| (Constant) | -9.22 | 22.18 | | -.42 | .71 |
| Severity of Autism | -.67 | .47 | -.25 | -1.42 | .25 |
| Age of child with Autism | .18 | .45 | .10 | .41 | .71 |
| Total Number of Children | 4.92 | 2.24 | .54 | 2.20 | .12 |
| Total Parent Stress | .87 | .25 | 1.19 | 3.51 | .04 |
| R ² | .94 | | | | |
| F | 11.51 | | | | |
| Δ R ² | .94 | | | | |
| Δ F | 11.51 | | | | .04 |

Table 10

Regression for Internalizing Behavior Problems (N=10)

| <i>Variable</i> | <i>B</i> | <i>Standard Error</i> | <i>Beta</i> | <i>t</i> | <i>P</i> |
|--------------------------|----------|-----------------------|-------------|----------|----------|
| (Constant) | -80.87 | 116.08 | | -.70 | .54 |
| Severity of Autism | -.76 | 2.47 | -.13 | -.31 | .78 |
| Age of child with Autism | .64 | 2.33 | .17 | .27 | .80 |

Table 10 Continued

| <i>Variable</i> | <i>B</i> | <i>Standard Error</i> | <i>Beta</i> | <i>t</i> | <i>P</i> |
|--------------------------|----------|---------------------------|-------------|----------|----------|
| Total Number of Children | 12.40 | 11.71 | .64 | 1.06 | .37 |
| Total Stress | 1.81 | 1.30 | 1.16 | 1.39 | .26 |
| R ² | .63 | | | | |
| F | 1.28 | | | | |
| Δ R ² | .63 | | | | |
| Δ F | 1.28 | | | | .44 |

Table 11
Regression for Social Skills (N=10)

| <i>Variable</i> | <i>B</i> | <i>Standard Error</i> | <i>Beta</i> | <i>t</i> | <i>P</i> |
|-----------------------------|----------|---------------------------|-------------|----------|----------|
| (Constant) | 256.47 | 108.16 | | 2.37 | .09 |
| Severity of Autism | -1.56 | 2.31 | -.26 | -.68 | .55 |
| Age of child with Autism | -3.89 | 2.17 | -.97 | -1.79 | .17 |
| Total Number of Children | -7.42 | 10.91 | -.37 | -.68 | .55 |
| Total Stress | -2.68 | 1.21 | -1.64 | -2.21 | .11 |
| R ² | .71 | | | | |

Table 11 Continued

| <i>Variable</i> | <i>B</i> | <i>Standard Error</i> | <i>Beta</i> | <i>t</i> | <i>P</i> |
|-----------------|----------|-----------------------|-------------|----------|----------|
| F | 1.81 | | | | |
| ΔR^2 | .71 | | | | |
| ΔF | 1.81 | | | | .33 |

Table 12

Regression for Parental Stress (N=10)

| <i>Variable</i> | <i>B</i> | <i>Standard Error</i> | <i>Beta</i> | <i>t</i> | <i>p</i> |
|--------------------------|----------|-----------------------|-------------|----------|----------|
| (Constant) | 87.48 | 8.497 | | 10.30 | .001 |
| Severity of Autism | -.39 | .93 | -.11 | -.42 | .70 |
| Age of child with Autism | -1.42 | .54 | .58 | -2.62 | .06 |
| Total Number of Children | -6.70 | 2.99 | -.54 | -2.24 | .09 |
| R^2 | .82 | | | | |
| F | 6.18 | | | | |
| ΔR^2 | .82 | | | | |
| ΔF | 6.18 | | | | .06 |

CHAPTER V

DISCUSSION AND SUMMARY

The purpose of this study was to gain information about behavioral and social outcomes of siblings of children with autism. Specifically, the researcher was interested in whether siblings of children with autism exhibited more externalizing behavior problems, internalizing behavior problems, subclinical symptoms of autism, and/or social skills difficulties than siblings of typically developing children in the control group. The research study also sought to investigate parent stress outcomes between the two research groups. A final purpose of the study was to gain a better understanding for how families are impacted by having a child with autism. A hypothesized integrated family systems diathesis stress model was proposed to examine overall sibling outcomes. With the small sample size, the model was not able to be tested.

Between Group Comparisons: Autistic Symptoms and Parent Stress

When comparing siblings of children with autism to siblings of typically developing children it was hypothesized that siblings of children with autism would exhibit more overall autistic behaviors than siblings in the control group. This hypothesis was not supported by data collected in the current study; a statistically significant difference in autism symptoms between the two groups was not found. This finding stands in contrast to previous work that suggests that siblings of children with autism may exhibit more autistic behaviors than siblings of typically developing children (Georgiades et al., 2013; Pickles et al., 2013; Robel et al., 2014). One explanation for the difference in research findings may be due to the small sample size in this study.

Georgiades et al. (2013) reported that their finding in this area was statistically significant, but that autistic traits were only found in approximately 19% of siblings of children with autism. The current study included only 11 siblings of children with autism making it plausible that this small but significant difference could go undetected. Another possible explanation for this hypothesis not being supported is that possible autistic traits in siblings of children with autism may have been better detected using an outcome measure other than the ASRS (Goldstein & Naglieri, 2009). In particular, Pickles et al. (2013) indicated that the autistic traits they found in first degree relatives of children with autism centered around communication and social impairments. Therefore, it is possible that implementing an outcome measure more focused on communication and social impairments as opposed to diagnostic criteria for autism may yield different results.

When considering the possible impact that having a child with autism has on a family it is important to consider the impact that this situation has on parents. It was hypothesized that parents of children in the siblings of children with autism group would report more parental stress as measured by the PSI-SF (Abidin, 2012) than parents of children in the control group. Results of the research support the current hypothesis as parents of children in the siblings of children with autism group reported greater levels of stress than parents of children in the control group. This supports previous research conducted by other teams indicating that having a child with autism leads to increased levels of stress in parents (Fisman et al., 1996; Hesse et al., 2013; Rao & Beidel, 2009; Shivers et al., 2013; Tomeny et al., 2012).

Between Group Differences: Demographics

It was hypothesized that there would be no notable differences between member of the siblings of children with autism group and the control group with regards to demographic variables, such as family size, race/ethnicity, family SES, gender of siblings, birth order and age of siblings. Results of this study were found to be consistent with the current hypothesis. No statistically significant ($p > .05$) demographic differences were found between the two groups.

Between Group Differences: Behavioral and Social Outcomes

It was hypothesized that siblings of children with autism would exhibit higher levels of externalizing behavior problems than siblings of typically developing children. This hypothesis was not supported by data in the current study; a statistically significant difference in externalizing behaviors between siblings of children with autism and siblings of the control group was not found. This finding is consistent with some previous research (Dempsey et al. 2012; Di Biasi et al., 2016; Tomeny et al. 2012) and stands in contrast to other research (Hastings, 2003a; Rodrigue et al., 1993; Verté et al., 2003). This overall finding continues to highlight the trend of inconsistent findings in this research area (Di Biasi et al., 2016; Ferraioli & Harris, 2010).

One possible reason that the hypothesis was not supported pertaining to externalizing behavior problems in this study is that studies yielding different results were working with a different sample composition than the sample in the current study. One example of this is Hastings (2003a) with an experimental group composed of siblings of children who had both autism and intellectual disability diagnoses. It is

possible that children with comorbid autism and intellectual disability exhibit more externalizing behaviors than children with only an autism diagnosis and that an increase in such behaviors might subsequently lead to an increase in externalizing behaviors among the child's siblings.

The current research study hypothesized that siblings of children of children with autism would exhibit more internalizing behavior problems than members of the control group. Results of the study found no statistically significant difference with regards to internalizing behavior between the two groups. This finding is consistent with some research (Dempsey et al., 2012; Di Biasi et al, 2016; Kaminsky & Dewey, 2002; Tomeny et al., 2012) and stands in contrast to other studies (Bägenholm & Gillberg, 1991; Pollard et al., 2013; Rodrigue et al, 1993; Ross & Cuskelly, 2006; Shivers et al., 2013). This research finding continues to highlight inconsistent findings in this area of the research (Di Biasi et al., 2016; Ferraioli & Harris, 2010).

One reason that may have led to the lack of research support for hypotheses concerning externalizing and internalizing behaviors in this study can be linked to the different ways of measuring outcomes as noted by previous research (Macks & Reeve, 2007). It appears that behaviors (both external and internal) maybe harder to detect when using a global questionnaire such as the BASC-2 which was utilized in this study. When examining previous research, several studies using a global questionnaire did not detect externalizing or internalizing behavior concerns (Dempsey et al., 2012; Kaminsky & Dewey, 2002; Tomeny et al. 2012), while studies using a questionnaire geared more

toward a certain concern such as anxiety (Gold, 1993; Pollard et al., 2013) were more likely to detect concerns.

An additional reason that the hypotheses concerning externalizing and internalizing behaviors in this study were not supported may be explained by the lack of participants in the siblings of autism group that reported severe autism symptoms in the child with autism. Only 9.09% of families with a child with autism in this study reported the child's symptoms to be severe. This is important as some research has found that siblings of children with disabilities may be at more risk for internalizing behavior problems when their sibling with a disability is exhibiting more behavioral problems (Pollard et al., 2013; Ross & Cuskelly, 2006; Shivers et al., 2013).

The current study also examined the impact that having a sibling with autism has on a child's social skills. Specifically, it was hypothesized that siblings of children with autism would exhibit lower levels of social skills than siblings in the control group as measured by the Social Skills domain on the SSIS (Gresham & Elliot, 2008). This hypothesis was not supported as results of this study did not detect statistically significant differences in social skills between siblings of children with autism and members of the control group. This finding is consistent with other research studies that have found no significant difference in social skills between siblings of children with autism and siblings of typically developing children (Kaminsky & Dewey, 2002; Smith et al., 2013; Tomeny et al., 2012). The findings are inconsistent with other previous findings indicating that siblings of children autism have increased social skills in comparison to other children (Macks & Reeve, 2007; Verté et al, 2003), or decreased

social skills in comparison to other children (Griffith et al., 2014; Hastings, 2003a; Mohapatra, 2012; Oerlemans et al., 2013).

While the research examining social skills in siblings of children with autism continues to be inconclusive, the findings of the current study tend to be consistent with other research that has looked at parent reported social skills with participants of the same age group (Kaminsky & Dewey, 2002; Smith et al., 2013; Tomeny et al., 2012). Studies that contradict the current findings had differences in their populations and the way that outcome data was being measured. For instance, certain studies focused solely on siblings of children with autism and comorbid intellectual disability (Hastings, 2003a), siblings of children with only high functioning autism (Verté et al, 2003), or siblings of children with autism between ages 4-6 years (Mohapatra, 2012). Additionally, one study detecting social skills deficits in siblings of children with autism compared to siblings of typically developing children measured auditory recognition of emotions rather than collecting parent data on child social skills (Oerlemans et al, 2013).

Subsequent to the above hypotheses, the researcher hypothesized that if siblings of children with autism exhibited differences in externalizing behavior problems, internalizing behavior problems, subthreshold levels of autism symptoms, family size, and social skills in comparison to the control group that there would be an interaction effect between parent stress and these factors. This hypothesis was not supported as siblings of children with autism did not exhibit statistically significant differences in any of the above areas when compared to siblings of typically developing children.

Demographic Effects

One objective of the study was to examine the potential impact of child gender (male vs. female) and race/ethnicity on dependent variables including externalizing behaviors, internalizing behaviors, and social skills among the participants in the siblings of children with autism group. It was hypothesized that males would experience more externalizing behavior problems and greater delays in social skills than females. The study did not detect statistically significant differences in internalizing behaviors, externalizing behaviors, or social skills among siblings of children with autism with regard to sibling gender. This finding stands in contrast to work done by Hastings, (2003a) suggesting that male siblings of children with autism experienced more externalizing behavior problems, and subsequently less prosocial behaviors. One potential reason for the divergent research findings as noted earlier is that the previous study (Hastings, 2003a) examined a slightly different sample than the one in this study, by looking at siblings of children with both autism and comorbid intellectual disability. Additionally, Hastings, (2003a) noted that it was specifically younger male siblings of children with autism that experienced greater externalizing behaviors and less prosocial behavior.

The current study also hypothesized that females would experience more internalizing behaviors than male siblings of children with autism. There were no statistically significant differences found with regards to internalizing behavior problems when comparing male and female siblings of children with autism. This stands in contrast to a previous study (Gold, 1993) that found a link between characteristics of

children with autism and the depression levels of their female siblings. The most likely reason for the inconsistency in research findings is the small sample sizes. The previous study (Gold, 1993) had a sample size that was composed of only 11 female siblings of children with autism, while the current study included only five female siblings of children with autism. It is difficult to detect statistical significance and reach definitive research conclusions when working with such small samples.

The current body of research hypothesized that there would be notable differences in externalizing behaviors, internalizing behaviors, and social skills when considering family race/ethnicity. This hypothesis could not adequately be tested due to a lack of variance in the sample with regards to race/ethnicity. The composition of the sample mainly reported being either White or biracial. The lack of adequate sample representation among Black, Latino, Native American, and Asian American groups made it impossible to draw meaningful conclusions pertaining to a possible link between race/ethnicity and behavioral and social outcomes for siblings of children with autism.

Birth Order Effects

Another objective of the current study was to investigate the potential impact of birth order of the sibling of the child with autism in relationship to externalizing behaviors, internalizing behaviors, and social skills. It was hypothesized that younger children (later in birth order) would experience more externalizing behavior problems, internalizing behavior problems and greater delayed social skills than older children (earlier birth order). The study did not detect significant differences in externalizing behaviors, internalizing behaviors, or social skills related to birth order in family.

These findings stand in contrast to the work of previous research teams who found that younger siblings of children with autism were more likely than other siblings of children with autism to exhibit greater levels of externalizing and internalizing behaviors (Hastings, 2003a; Petalas et al., 2009; Tomeny et al., 2014). One possible explanation for this research finding is the small number of younger siblings with autism ($n = 3$) utilized in the current study. An addition explanation is that one study indicated increased behavior problems displayed by the child with autism led to increased behavior problems and less prosocial behavior in the siblings of children with autism (Tomeny et al., 2014). This is an important to key for helping to explain different results between previous studies and the current study in this area. Specifically, previous studies worked with siblings of children with both comorbid autism and intellectual disability (Hastings, 2003a; Petalas et al., 2009), and it is believed that a child with comorbid autism and intellectual disability will likely display more problem behaviors than a child with autism. This combined with the fact that less than 10% of parents in the siblings of children with autism group indicated that their child with autism displayed severe symptoms further demonstrates the differences between samples and may account for the difference in findings.

Family Systems Diathesis-Stress Model (Predicting Outcomes)

Family Demographics

The researcher sought to test a family systems diathesis stress model to help predict social and behavioral outcomes for siblings of children with autism. It was hypothesized that smaller family sizes and lower family SES would predict higher levels

of externalizing behavior problems, internalizing behavior, and delayed social skills among siblings of children with autism. The hypothesis regarding smaller family sizes predicting increased behavior problems and social skills problems was not supported.

When looking at how family size may impact siblings of children with autism, the research has been inconclusive. Some research indicates that larger family sizes positively impact siblings of children with autism (Kaminsky & Dewey, 2002; McHale et al., 1986) and other research suggests that larger family size may have a negative impact on outcomes of siblings of children with autism (Pilowsky et al., 2004). The findings from the current study further contribute to inconclusiveness in the literature by indicating that family size may not impact a sibling of a child with autism at all.

The current study was not able to adequately test the hypothesis of family SES being predictive of increased behavior problems and social skills difficulties. There was not enough variance within the sample size with regards to family SES to adequately test the hypothesis. Family SES was measured by parental educational levels in the current study and these levels were not evenly distributed among the families in the siblings of children with autism group. Nearly 80% of mothers and 65% of fathers in this group indicated that they had attended at least some college. It is the opinion of the researcher that higher SES levels in families may lead the families to have more access to therapy and respite services for their child with autism. Subsequently, having the child with autism receiving such services would likely decrease parent stress. While this study was not able to effectively examine family SES in detail it remains an important demographic variable that some researchers have found to be important when

considering social and behavioral outcomes of siblings of children with autism (Hesse et al., 2013; Macks & Reeve, 2007; Walton, 2016).

Severity of Autistic Symptoms

The researcher further hypothesized that autism severity of the child with autism would predict greater externalizing behaviors, internalizing behaviors, and delayed social skills among siblings of children with autism. This hypothesis was not supported based on findings from the current study. There has been significant research conducted that suggests that the severity of the child with autism may negatively impact the typically developing siblings with regards to externalizing behaviors (Hastings, 2003a; Tomeny, 2012) and internalizing behaviors (Ross & Cuskelly, 2006; Shivers et al., 2013) and social skills (Hastings, 2003a). A possible explanation for why results of this study contradict results of other studies in this area is that the clear majority of children with autism in this study were reported to have only mild to moderate symptoms. It is possible that autism severity is more likely to predict negative social and behavioral outcomes for siblings of children with autism, their brother or sister is experiencing severe autism symptoms.

Parent Stress and Sibling Outcome

Several studies also have noted a link between parent stress levels and externalizing and internalizing behaviors in siblings of children with autism (Fisman, 1996; Hesse et al., 2013; Meyer et al., 2011; Petalas et al., 2012). Consistent with previous research (Fisman, 1996; Petalas et al., 2012) a link was found between parental stress levels and externalizing behavior problems in siblings of children with autism.

Specifically, results of the current study suggest that parental stress levels are potentially predictive of externalizing behavior problem in siblings of children with autism. This lends support to the current research hypothesis that increased levels of parent stress may predict increased externalizing behavior problems for siblings of children with autism. Since casual inferences cannot be made based on concurrent data, it is recommended that future studies employ a longitudinal research design to address this area further.

It also was hypothesized that greater parental stress levels would predict greater internalizing behavior problems and more delayed social skills in siblings of children with autism. The current study did not find a link between parent stress level, internalizing behavior problems, and social skills for siblings of children with autism. These findings stand in contrast to previous research (Fisman, 1996; Hesse et al., 2013; Meyer et al., 2011; Petalas et al., 2009). A likely reason for the differences in findings is that the current study utilized a global measure (BASC-2; Reynolds & Kamphaus, 2006) to measure internalizing behavior problems rather than a more specialized depression or anxiety instrument. Additionally, it is believed that small sample size in the current study also played a crucial role when considering the inconsistencies noted in this area.

Clinical Implications

This study found that siblings of children with autism were not more likely to exhibit higher levels of externalizing or internalizing behaviors than siblings of typically developing children. Additionally, siblings of children with autism were not more likely to experience subthreshold symptoms of autism, or have more social skills problems than siblings of typically developing children. Demographic variables such as family

size and birth order were also not found to be related to the above outcomes. Overall, results of this study indicate that siblings of children with autism are functioning equally to siblings of typically developing children, and may not need intervention.

The key finding in this study was not directly linked to the children in families at all, but rather their parents. The study found that parents of children with autism experienced elevated stress levels in comparison to parents of typically developing children. This further supports other research done in this area with similar results (Fisman et al., 1996; Hesse et al., 2013; Rao & Beidel, 2009; Shivers et al., 2013; Tomeny et al., 2012). Subsequently, results of the current study further found parent stress levels significantly predicted externalizing behavior problems in siblings of children with autism. This finding is consistent with previous research that has shown a link between parent stress and negative impacts on sibling behaviors (Fisman et al, 1996; Meyer et al., 2011; Petalas et al., 2009). Further research suggests that decreased parental stress can have positive impacts on siblings of children with autism (Hesse et al., 2013). This information combined with findings from the current research study suggest it is important for the mental health field to intervene and support parents of children with autism. It is further believed that supporting parents and decreasing stress levels will have trickle down benefits for siblings of children with autism.

Limitations

One of the most important limitations of the current was the small sample size from which data were collected. The current study included a total of only 25 participants with 11 participants in the siblings of autism group, and 14 participants in

the control group. Small sample sizes decrease statistical power in research studies making it more difficult to detect small effect sizes. Also, small sample sizes in research pertaining to siblings of children with autism has been a documented concern with several research teams using group sizes of 30 or less participants (Bägenholm & Gillberg, 1991; Di Biasi et al., 2016; Hastings, 2003a; Rodrigue et al., 1993; Verté et al., 2003). Additionally, some researchers have documented that small sample sizes may be responsible for inconsistencies in research findings in this area (Dempsey et al., 2012; Hastings, 2003a; Kaminsky & Dewey, 2002).

Another limitation of the study is that the sample collected was relatively homogenous. When considering demographic characteristics such as race/ethnicity and socio-economic status there was little variability in the study making it impossible to study these areas more extensively or reach conclusions. This limitation also has been noted by other researchers with compositions like the one in the current study that have made it difficult to examine certain demographic factors related to siblings of children with autism. For instance, several researchers have noted that samples are mainly composed of Caucasians (Meyer et al., 2011; Petalas et al., 2012; Pollard et al., 2013; Smith et al., 2013; Tomeny et al., 2012), or tend to be tilted toward families of higher socio-economic status (Rodrigue et al., 1993; Shivers et al., 2013).

The sample size and composition problems also led to restricted levels of autism being reported in the study (mild to moderate). This is noteworthy because it limits the generalizability of the study to only children with siblings who experience mild to moderate levels of autism. It is possible that children with severe levels of autism

impact their families very differently than children with mild or moderate level autism. In addition, a large percentage of families in this group reported participation in outside therapy activities. Participation in such therapies may also have important impacts of social and behavioral outcomes for siblings of children with autism. In conclusion, sample size and composition are not only limitations of the current study, but are also considered to be among the biggest limitations of studies in the literature (Dempsey et al., 2012; Hastings, 2003a; Kaminsky & Dewey, 2002). Future research should focus efforts on obtaining both larger and more diverse sample sizes moving forward.

In addition to sample size and composition, another noteworthy limitation in the current study was collecting data from a single respondent. This is important as Cuskelly (1999) has noted that it is generally best practice in research to collect data from multiple respondents. There is some research to indicate that parents of children with siblings of autism may be more likely to perceive their child's social skills and behavior in a more negative light (Macks & Reeve, 2007; Mohapatra, 2012).

Future Directions

Further research studies in this area should strive to improve both the overall sample size and heterogeneity of the sample in order to make findings more generalizable. Most studies that have been conducted in this line of research (including the current study) have not collected adequate amounts data from large sample sizes, which can be detrimental when attempting to detect statistically significant and meaningful results. This barrier can be removed if future studies are able to increase sample sizes (Dempsey et al., 2012; Hastings, 2003a; Kaminsky & Dewey, 2002). One

idea that may help increase participation numbers in future studies is to make participation in research more accessible by allowing for participation using the internet. Participation may further be increased by utilizing measurements open to a larger age range of children, and by shortening the amount of time it takes individuals to participate in a study.

Additional research in this area should attempt to not only collect data from large sample sizes, but to also collect a sample size that is heterogeneous. There are important questions concerning the role that race/ethnicity (Sage & Jegatheesan, 2010) as well as family SES (Walton, 2016) that may play a role when considering the behavior and social skills of siblings of children with autism. Future research should seek to include as much racial/ethnic and family SES diversity as possible.

It will be important for future research to also consider collecting data from multiple respondents in this area of the literature (Cuskelly, 1999; Macks & Reeve, 2007). Inclusion of a qualitative component (i.e., interviewing siblings, parents, and teacher) will further add to the current literature. Future research should also strive to include more longitudinal studies, as these designs are one of the few that can give researchers more information regarding cause and effect (Hastings, 2007).

It will be important for future research studies to continue to test family systems models to better understand how having a child with autism impacts an entire family. The current study found some evidence to support part of the proposed model, but a clear family systems model for this area of research continues to elude researchers at this point in time. Additionally, future research should attempt to focus on different

interventions and supports for parents of children with autism, as the current study clearly indicated elevated stress levels in parents of children with autism when compared to parents in the control group. It is believed that decreasing parent stress levels in these families will have a positive impact on siblings of children with autism (Hesse et al., 2013).

Conclusion

The current study did not find any differences in outcomes related to externalizing behavior problems, internalizing behavior problems, social skills, or autism symptoms between siblings of children with autism and members of the control group. The results of the current study are supported by some previous studies (Dempsey et al., 2012; Kaminsky & Dewey, 2002; Rao & Beidel, 2009; Smith et al., 2013; Tomeny et al., 2012); however, the research on sibling outcomes continues to be inconclusive. One key finding from the current study is that parents of children with autism experience greater parental stress than typical parents. This finding is consistent with other research (Fisman, 1996; Hesse et al., 2013; Shivers et al., 2013; Tomeny et al., 2012) and is generally conclusive across the literature. Further, the current research study found that parent stress levels are predictive of externalizing behavior problems in siblings of children with autism. This finding is consistent with other research that have noted similar links between parent stress and sibling behaviors (Fisman, 1996; Petalas et al., 2009). These results suggest that parents of children with autism are likely experiencing more psychological stress than siblings of children with autism. Further, this parent stress significantly accounts for externalizing behavior problems for siblings of children

with autism. Therefore, it is believed that mental health professionals should focus preventive support systems on parents of children with autism rather than siblings of children with autism. Further, it is believed that decreased parental stress levels in these parents will provide trickle down effects for siblings of children with autism, as parental stress is predictive of sibling externalizing behavior problems. Future research should focus on providing supports to parents of children with autism, as well as continuing to examine family systems models to gain a better understanding for how children with autism impact their families.

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APPENDIX A

SUMMARY OF STUDIES

| <i>Studies</i> | <i>Participants /Geographic Location/Age of Siblings</i> | <i>Measures</i> | <i>Findings</i> |
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| Bägenholm, & Gillberg, 1991 | All participants from Sweden aged 5-20 years old. 20 Participants with autistic sibling, 20 participants with MR sibling and 20 participants with sibling with no disability. | Parent Interview Child Interview Examined things such as the siblings' relationship with the disabled sibling as well as other things. | Siblings often felt lonelier and had larger peer problems and more worries about the future than siblings of non-handicapped children. These siblings often identified their disabled sibling as a burden and many did not understand why their sibling was different than a normal child. |
| Cebula, 2012 | Participants were 160 families and teachers of the family with a child with autism between the ages of 4-16 years old with at least one typically developing sibling as well. The study looked at the effects of a family employing an ABA system intervention. | All participants completed the Strengths and Difficulties Questionnaire (SDQ). Parents of typically developing siblings (9-16) completed the following: Impact Intervention Questionnaire, Demographic Questionnaire, Gilliam Autism Rating Scale, Family Support Scale, | The study found inconclusive evidence regarding the impact of ABA interventions on siblings and families of children with autism. Results did not find any statistically significant differences between ABA groups and control groups for |

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| | <p>The breakdown of groups was as follows: 45 families were currently using ABA; 26 families were not currently using ABA but had in the past and 61 families had no exposure to ABA (Control Group).</p> | <p>and Parenting Stress Index-Short Form. Measures completed only by typically developing siblings (ages 9-16) included: The Piers-Harris Children's Self-Concept Scale-Second Edition and the Social Support Scale for Children.</p> | <p>the sibling's overall quality of relationship with the sibling with autism, the typically developing sibling self-concept or the typically developing sibling's behavioral adjustment. Results of the specific Intervention Impact Questionnaire did reveal that parents reported more positive interactions between siblings with autism and their typically developing siblings with use of an ABA intervention.</p> |
| <p>Dempsey et al., (2012)</p> | <p>All participants were from the United States. The study consisted of 486 dyads of children with autism and their typically developing siblings. Children with autism ranged from 4 to 18 years old and were 86% male. Typically developing siblings ranged from 6 to 18 years of age and were 45% male.</p> | <p>Information was collected using the CBCL-Parent and Teacher, SRS Social Communication Questionnaire-Lifetime (SCQ).</p> | <p>Findings revealed that siblings of children with autism did not exhibit a disproportionate prevalence of internalizing or externalizing problems when compared to normative samples for each rating scale used.</p> |

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| Di Biasi et al., 2016 | Participants included 26 siblings of children with high functioning autism from Italy. The participants ranged in age from 4 to 12 years of age. It was also reported that 88% of the sample reported being from middle class to upper class households. The study sought to examine externalizing behaviors, internalizing behaviors, parent stress and the broad autism phenotype in siblings and families of children with autism. | The study measured externalizing behaviors and internalizing behaviors using Child Behavior Checklist (CBCL). Additionally, the study measured parent stress using the PSI-SF, third edition and the broad autism phenotype was measured using the Social Responsiveness Scale (SRS). | The study did not yield significant findings related externalizing behaviors, internalizing behaviors, broad autism phenotype, or parent stress. |
| Fisman et al., 1996 | Participants were 46 siblings of children with PDD, 45 siblings of children with Down Syndrome (DS), 46 siblings of typically developing children, their parents, and their teachers. This population was from Ontario, Canada. | The study sought to investigate differences between the three groups. The study employed all the following measures: The Normative Adaptive Behavior Checklist, The Survey Diagnostic Instrument (Like CBCL), Self-Perception Profile for Children, The Social Support Scale for | Results found that parent caretakers of children with PDD showed greater distress and reported more depression than parents of children with Down Syndrome or parents of typically developing children (Down Syndrome parents were in the |

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| | | Children, The Parenting Stress Index-Short Form, The Beck Depression Inventory, The Dyadic Adjustment Scale (measures Marital Adjustment) The Family Adaptability and Cohesion Evaluation Scale, Sibling Relationship Questionnaire-Brief Version, and a demographic questionnaire. | middle). It was also found that parent stress and depression mediated the relationship between group membership and parent reports of both internalizing and externalizing behavior problems in the typically developing sibling. |
| Georgiades et al. 2013 | The study was conducted in Canada and participants were 170 younger siblings of children with autism and 90 younger siblings of typically developing children. These children were followed between birth and age 3. | The study used the Autism Observation Scale for Infants (AOSI), The Autism Diagnostic Interview-Revised (ADI-R), The Autism Diagnostic System (ADOS), the Mullen Scales of Early Learning and the Infant-Toddler Social-Emotional Assessment (ITSEA) | The study found that there was an emergence of autistic-like traits that emerged in 19% of siblings of children with autism by 12 months of age, but that these recorded symptoms were not predictive of an autism diagnosis at three years of age. The researchers suggest that the emergence of these sub threshold autistic traits at 12 months of age may be indicative of a broader autism phenotype. |

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| <p>Gold, 1993</p> | <p>Participants were 22 siblings of boys with autism (11 males and 11 females) and 34 siblings with a typically developing brother (17 males and 17 females) and their parents. Participants were 7-17 years old. The population was also from Ontario, Canada.</p> | <p>This study aimed to investigate depression, household's duties, and social adjustment in siblings. Depression was measured using the Children's Depression Inventory (CDI), household duties were measured using a questionnaire created by the researcher. In addition, parents completed the Parent Report form of the Child Behavior Checklist (CBCL) to assess participant's social adjustment.</p> | <p>The study found that siblings of children with autism (both males and females) indicated higher levels of depression as measured by the CDI than siblings of typically developing children. While the study found no difference in overall level of depression between male and female participants, it was indicated that certain characteristics of the child with autism were significantly correlated to female's depression levels but not males. This suggests that males and females may have different causes for increased depression levels as it relates to siblings of children with autism. Participant's parents did not report any differences between siblings of children with autism and siblings of typically developing siblings</p> |
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| | | | on household chores or social adjustment. It was noted that overall females completed more household chores than males across groups. |
| Griffith et al., 2014 | The study included 168 families (most likely from the U.K.). Of these families 166 mothers and 130 fathers participated in the study. To be eligible for the study each family had to have one child with autism and at least one typically developing sibling (both the child with au and the sibling were between 4-17 years of age). This study chose the siblings closest in age to the child with autism. | The parents completed a postal survey in which they responded to demographic questions and questions about their relationship with their child with autism. The parents also completed a Strength and Difficulties Questionnaire (SDQ) for the sibling of the child with autism. | The study found that siblings of children with autism were reported to have significantly more emotional problems and lower prosocial skills than the normative population (The overall effect size was found to be small but significant). Specifically, mothers rated siblings as having more overall adjustment problems and conduct problems than the normative population. The study found a relatively small difference between mother's reports and father's reports. |

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| <p>Hastings, R. P. 2003a.</p> | <p>Participants were 22 siblings of children with comorbid autism and ID.</p> | <p>Developmental Behavior Checklist-Teacher (problem behavior of disabled child) Parent and Family Problems subscale of the Friedrich Short Form (measuring maternal stress) Strengths and Difficulties Questionnaire (sibling adjustment)</p> | <p>It was found that siblings of children with comorbid autism and ID displayed more behavior problems and fewer prosocial behaviors than a normative sample. Specifically, brothers of children with comorbid ID and autism as well as younger siblings displayed the least amount of prosocial behavior. Maternal stress and the behaviors of the disabled child were not found to be predictive of sibling's psychological adjustment.</p> |
| <p>Hastings, 2003b.</p> | <p>The participants were 78 mothers and siblings of children with autism (between 4-16 years of age) who were involved in an ABA program.</p> | <p>The study used the Autism Behavior Checklist to measure autism symptom severity, the Family Support Scale to measure social support for the family, a demographic questionnaire and the Strengths and Difficulties Questionnaire to</p> | <p>The study concluded that involvement in an intense ABA program did not negatively affect typically developing siblings or parents of the child with autism. The authors also concluded that children involved within these programs were not</p> |

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| | | measure the typically developing sibling's adjustment. | better adjusted than typically developing children from a normative sample. |
| Hastings, 2007 | Participants were 75 children ages 3-19 (mean=9.75) with a sibling with either autism (24), Down syndrome (26) and Intellectual Disorder (ID) (25). Participants were from the United Kingdom. | This study was a longitudinal study in which measurements were taken twice (2 years apart). The study included a demographic questionnaire, Vineland Adaptive Behavior Scale (VABS) (For child with disability), Strengths and Difficulties Questionnaire (SDQ), U.K. government neighborhood deprivation data was also collected (measures SES of family). | This study found that siblings of children with autism, ID and Down syndrome were not more likely than typically developing children to exhibit externalizing behavior problems. |
| Hesse, et al., 2013 | Participants were 200 parents that had both a child diagnosed with autism and a child not diagnosed with autism in the family between the ages of 4-10 years old. Additionally, 179 of the participants were from inside the | Parents were asked to complete a demographic questionnaire, Parental Involvement Questionnaire, Parental Sense of Competence (PSOC), The Parenting Stress Index-Short Form (PSI-SF) and the Strengths and Difficulties Questionnaire (SDQ) to | This study attempted to investigate predictors of sibling adjustment by examining parental variables involved with caring for the child with autism. The study found that stress levels were elevated in mothers of children with |

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| | <p>United States while 21 were from other countries.</p> | <p>help measure the adjustment of siblings.</p> | <p>autism. The study also found that parental satisfaction, gender of sibling and family income all significantly helped to predict adjustment levels in siblings of children with autism. Most notably a higher quality relationship between a parent and a child with autism often leads to the parent having a more positive perspective of the typically developing child's adjustment.</p> |
| <p>Hughes et al., 1999</p> | <p>Participants were 95 siblings of children with autism (31), developmental delay (32), and typically developing children (32). Participants lived in Paris.</p> | <p>A variety of spatial span and planning tasks were employed including The Tower of London. Manually administered verbal fluency and list recall tasks were further employed.</p> | <p>Siblings of children with autism showed superior spatial and verbal span skills compared to the other groups, but performed poorly in comparison to the other groups on tasks involving planning, set shifting and verbal fluency.</p> |

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| Kaminsky & Dewey, 2002 | Participants were from the Calgary, Canada region. There were three groups of siblings each with 30 participants (ages 8-18). There were groups of children with siblings who had Down Syndrome, Autism and who were normally developing. | The study investigated social adjustment among the three groups. It also examined feelings of loneliness, psychosocial adjustment, and social support in conjunction with gender and family size. The study employed the CBCL (parent form), Social Support for Children, Loneliness and Social Dissatisfaction Questionnaire, and Adaptive Behaviors Questionnaire. | Results indicated that children with siblings who are disabled are not at increased risk for loneliness or psychosocial adjustment problems. It was also indicated that larger family sizes may increase the likelihood of proper psychosocial adjustment. |
| Macks & Reeve, 2007 | There were a total of 86 participants between the ages of 7-17, (51 were siblings of children with autism and 35 were part of the control group). Participants were from the Maryland and Virginia. | BASC-2-PRS Child Depression Inventory-2 Piers-Harris Children's Self-Concept Scale | Results found that a child with autism can help to enhance psychosocial and emotional development when demographic risk factors are low. As demographic risk factors increase the presence of a child with autism has unfavorable impacts on non-disabled siblings. |
| McHale et al., 1986 | The study consisted of 90 participants between the ages of 6 and 15 years of age. The study consisted of 30 | Semi-structured child interviews, sibling problems questionnaire, and maternal ratings of sibling behaviors were | Results of the study indicate that there were minimal differences between sibling of typically developing children |

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| | <p>siblings of children with autism, 30 siblings of children ID and 30 siblings of typically developing children. The study was conducted in the United States.</p> | <p>used to collect data in this study.</p> | <p>and siblings of children with autism and ID. Further, it was reported that there was variability in reporting with siblings reporting positively about their relationships with their siblings and some children reporting negatively about their relationship with their sibling. Generally, the study found that siblings with who perceive their parents as responding positively to the handicapped child tend to have more positive relationships. Some children indicated that they worry about their handicapped sibling's future.</p> |
| <p>Meyer et al., 2011</p> | <p>Participants were 90 mothers that had at least one biological child with autism (aged 2-18) and at least one typically developing child</p> | <p>The study used the Autism Behavior Checklist (ABC) to measure autism severity and the Family Impact Questionnaire to measure impact on the typically developing</p> | <p>Results indicated that autism severity was not directly related to adjustment difficulties in typically developing siblings. The study found that the</p> |

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| | (aged 6-18 years of age). | sibling. The study also used the Center for Epidemiological Studies-Depression Scales (CES-D) to measure maternal stress and the Social Responsiveness Scale (SRS) to measure broader autism phenotype for typically developing sibling. The study also used the Strengths and Difficulties Questionnaire (SDQ) to measure sibling behavioral adjustment. | relation between autism severity and adjustment difficulties in typically developing siblings was fully mediated by maternal stress levels. It was also found that the relation between greater broader autism phenotype and adjustment problems in typically developing siblings was moderated by autism severity in the child with autism. |
| Mohapatra, 2012 | The study included a total of 42 participants between the ages of 4-6 years of age. 24 of the participants were younger siblings of a child with autism and 18 of the participants were younger siblings of a typically developing child. This study was conducted in the United States. | The study used the Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III), Autism Diagnostic Observation Scale, Second Edition (ADOS-2), Social Communication Questionnaire, and Child Attention Network Task. | The study found evidence to support the idea that Broader Autism Phenotype (BAP) may play an important role in the development of social skills among children with autism. Overall, the study found that parents rated siblings of children with autism lower on social skills than parents of typically developing children, but that these results were |

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| | | | not found during direct observations by the researcher. |
| Oerlemans et al., 2014 | Participants were 90 children with a diagnosis of ASD, 74 unaffected siblings of children with autism and 139 typically developing children (all were between the ages of 6-13). All siblings were of European Caucasian decent. | Participants were exposed to several different faces with various emotional expressions on them and to verbal exchanges in which different emotional tones were used. The digit span subtest from the WISC-V was also used to ensure participants had reasonable levels of verbal attention. | It was found that siblings of children with autism did better than their siblings with autism but worse than typically developing children on tasks involving the facial and auditory recognition of emotions. Specifically, siblings of children with autism evidenced difficulties in the auditory recognition of emotions such as fear, sadness, and anger. |
| Orsmond & Seltzer 2009 | Participants were 57 siblings of children with autism between the ages of 12-18 and their parents. The participants were drawn as part of the fourth wave from a larger on going longitudinal study. Also noteworthy was that 90% of the | Depressive symptoms were measured using the Center for Epidemiological Studies-Depression scale and anxiety was measured using the Revised Children's Manifest Anxiety Scale (RCMAS). Typically developing siblings also completed a life events checklist from NIMH | Results of this study indicated support for a diathesis-stress model. Brothers of siblings with autism did not report more depressive and anxiety symptoms than typically adolescents, but sisters did report higher than normal depressive and |

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| | <p>participants were younger than their sibling with autism.</p> | <p>Methods for Epidemiology of Child and Adolescent Mental Disorders. Parents answered questions about family history of autism and completed the subsection of the Development, Social Interaction, and Mood Questionnaire for both themselves and the typically developing sibling. Parents also completed the Problem Behavior Scale from the Scales of Independent Behavior-Revised (SIB-R) measuring the severity of behaviors for the child with autism.</p> | <p>anxiety symptoms. Additionally, maternal depressive symptoms were found to be associated with more overall depression and anxiety symptoms in typically developing siblings.</p> |
| <p>Petalas et al. 2012</p> | <p>160 parents representing 160 families with at least one child with autism (between 5-17 years old) with a typically developing sibling participated in this study. The study took place in England.</p> | <p>The study employed the Strengths and Difficulties Questionnaire (DSQ), Autism Spectrum Quotient (ASQ), Sibling Relationship Questionnaire-Revised, Five Minute Speech Sample, and Hospital Anxiety and Depression Scale (HADS).</p> | <p>Results of this study supported the use of a stress-diathesis model to help better explain factors related to autism and families. The study found that sibling relationships were more negative when the child with autism had more behavior problems and when there was evidence of critical emotion expressed in the family environment.</p> |

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| | | | <p>Siblings that had Broad Autism Phenotypes themselves as well as sibling with autism who exhibited behavior problems, exhibited more behavior problems themselves. Additionally, siblings with Broad Autism Phenotypes who had parents with more mental health problems reported more sibling relationship conflict.</p> |
| <p>Petalas et al., 2009</p> | <p>Participants were 49 mothers (aged 29-52 years old) of children with disabilities. The children ranged in age from 5-19 years old with 25 having a diagnosis of ID/Autism, 10 with ID alone, 7 with ID/Down Syndrome, 7 with ID/Cerebral Palsy. This study was conducted in southeast England.</p> | <p>The study sought to investigate whether autism was the cause of increased internalizing and externalizing problems or whether it was the presence of ID. Mothers completed a demographic questionnaire, phone interview, Vineland Adaptive Behavior Scale (VABS) (For child with disability) and Strengths and Difficulties Questionnaire (SDQ) for</p> | <p>The study found that siblings of children with comorbid ID and autism had more emotional problems and scored within the abnormal range on prosocial behavior problems more frequently than siblings of children with only ID. The presence of a sibling with autism appears to increase a child's risk for emotional difficulties. Three variables were</p> |

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| | | sibling of child with disability. | identified as being pertinent with regards to greater emotional problems: increasing age of the child with autism, having a brother with autism and being younger than the child with autism. |
| Pickles et al., (2013) | Participants were 726 first degree relatives (mothers, fathers, brothers, sisters) of individuals with specific language impairment (SLI) (193 people), autism (327 people), SLI and autism (73 people) and Down Syndrome (133). The participants were from England. | The study employed the ADI-R to confirm diagnoses of autism and used the ADI-R and ADOS-G to screen SLI group for autism symptomology. The study also used a modified version of the Family History Inventory (which included questions about social functioning and communication). SLI probands also completed the Clinical Evaluation of Language Fundamentals-Third Edition (CELF-3) and the WISC-III. | Results found that there was a higher than normal rate of communication difficulties in relative of SLI probands when compared to autism or Down Syndrome probands. Additionally, social deficits were found in relatives of SLI+autism and autism probands. There was a higher than normal rate of autism among siblings of SLI+autism probands suggesting that autism is genetic. |

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| Pilowsky et al., 2004. | Participants were from the Israel region. There were 88 participants across three groups (30 siblings of children with autism, 30 siblings of children with developmental language disorders and 28 siblings of children with MR) | Social and emotional adjustment was examined including risk and resilience factors due to biology and environmental factors for siblings of children with autism. | Siblings of children with autism were not at increased risk for social skills and behavioral problems when compared to siblings of children with other disorders. |
| Pollard, et al., 2013 | The study consisted of 119 typically developing adolescents with a sibling diagnosed with either ASD (81) or Down Syndrome (38). The sample was also composed of 55 boys and 74 girls between the ages of 11-17. The study was conducted in the United States. | Parents of participants were asked to complete a demographic questionnaire and the sibling portion of the Network of Relationships Inventory (NRI) to assess the quality of the sibling relationship. Participants reported anxiety by using the Multidimensional Anxiety Scale for Children (MASC). | Results of this study found that more negative interchanges within the sibling relationship created greater levels of anxiety for the sibling regardless of sibling disability. The study also found that sibling relationship quality moderated the relationship between sibling disability type and anxiety. |
| Presmanes et al., 2007 | The participants were 81 infants' ages 12-23 months old. Of the participants 46 were younger siblings of children with autism and 35 were younger | Responding to joint attention was measured by directing the child to one of eight different targets using ten combinations of verbal and nonverbal cues. | It was found that siblings of children with autism were found to have significantly lower responding to joint attention scores than |

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| | siblings of typically developing children. | | members of the control group. |
| Rao & Beidel, 2009 | Participants were parents and siblings of 15 male children with high functioning autism, and parents and siblings of 14 children with no disorder. The study took place in the United States and the majority of the sample was white. | Parental stress was measured using the Parenting Stress Index (PSI) and parental psychopathology was measured using the Symptom Checklist-90 Revised. Family functioning was measured using the Family Environment Scale (FES). Sibling adjustment and behavior problems were measured using the Pier-Harris Children's Self-Concept Scale, Second Edition and the Child Behavior Checklist (CBCL) respectively. | Results of the study found that parents of children with high functioning autism were at increased risk for parenting stress and mental health problems when compared to parents of typically developing children. The study also found elevated rates of internalizing problems among typically developing siblings of children with autism. |
| Rivard et al., 2014 | The participants were mothers and fathers from 118 families that had a child that had recently been diagnosed with autism. The participants were from Quebec, Canada. | The study used the Childhood Autism Rating Scale (CARS) to measure autism severity, Wechsler Preschool and Primary Scale of Intelligence, Third Edition (WPPSI-III), Adaptive Behavior Assessment System, Second Edition 2 (ABASS-II) and The | Results of this study found that fathers reported more overall parental stress than mothers, and that father's stress (not mother's) was predicted by severity of autistic symptoms and child gender. Stress levels of both parents were associated with their |

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| | | Parenting Stress Index-Short Form (PSI-SF). | child's age (older children equaled more stress), intellectual quotient, severity of autism and adaptive behaviors. |
| Rivers & Stoneman, 2003 | Participants were 50 triads consisting of one parent, one child with autism (4-12 years old) and one typically developing sibling (7-12 years old). The study was conducted in the United States. | The study measured sibling relationship by employing a modified version of the Satisfaction with the Sibling Relationship Scale and the Sibling Inventory of Behavior (SIB). The study measured marital stress and coping by using the Marital Strains subscale of the Family and Life Events and Changes (FILE) and Family Crisis Oriented Personal Evaluation. In addition, parents filled out a demographic questionnaire. | The study found that stress in the marital relationship among parents was associated with compromised sibling relationships. Results of the study further found that informal social support acted as a protective buffer on the effects of material distress with regards to positive but not negative aspects of sibling relationships. |
| Robel et al., 2014 | Participants in this study were 66 parents with children who had autism, 127 parents of typically developing children, 24 siblings of children with autism and 92 siblings of typically developing children. This study | The Autism Diagnostic Interview-Revised (ADI-R) and Childhood Autism Rating Scales (CARS) were used to screen for autism symptoms. The psycho-educative profile (PEP-R) or WISC & WPPSI-III were used to measure cognitive functioning. | Results found that across scores of F1 (corresponding to socialization and communication) and F2 (imagination and rigidity) that both parents and siblings of children with autism had more symptomatic scores |

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| | was conducted in Paris, France. | The French Autism Quotient (FAQ) was used to further measure autistic symptoms. | F1 domains than siblings and parents of typically developing children. Additionally, it was found that parents of children with autism, but not siblings were found to have scores distributed across different subcategories. The researchers state that this may correspond to underlying genetic mechanisms. |
| Rodrigue et al., 1993 | All participants were from the southeastern United States. There were 59 participants total with (20 siblings of kids with Down Syndrome, 20 siblings with developmentally normal siblings and 19 kids with a sibling with autism). | Child Behavior Checklist (CBCL) Perceived Competence Scale for Children Or The Pictorial Scale of Perceived Competence This study investigated children's self-competence, social competence, and internalizing/externalizing problems. | It was found that siblings of children with disabilities had more external and internal behavior problems than siblings of normally developing children. The three groups did not differ significantly on perceived self-competence or parent reported social competence. |
| Ross & Cuskelly, 2006 | Participants included 25 typically developing children and adolescents, who had a sibling with autism and their parents. The | Measures included the Gilliam Autism Rating Scale (Severity of autism), Child Behavior Checklist (CBCL, children's externalizing and internalizing | Findings revealed that siblings of children with autism had more internalizing problems than other children. |

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| | <p>typically developing siblings ranged in age from 8-15 years old with a mean age of 10.64. Also notable was that nineteen of the children in the reference group were diagnosed with Asperger Syndrome and 6 were diagnosed with autism. Participants were from Australia.</p> | <p>behaviors), Knowledge of Autism/Asperger Syndrome (KAAS) and Kidcope (Self-report of how kids cope).</p> | <p>Additionally, the study found that aggression was the most common type of stressor within the sibling relationship with 84% of children identifying it as a problem.</p> |
| <p>Sage & Jegatheesan, 2010</p> | <p>Participants were 2 children with autism (4-5 years of age) and their older male siblings (7-years old) as well as the parents from both families. One family was European American and the other family was Asian American. All participants lived in the United States.</p> | <p>Parents and typically developing siblings were interviewed regarding their roles and experiences within their family. A 30-minute home video recording of each sibling pair playing together at home was also collected.</p> | <p>Many differences were found between the European American and Asian American families in terms of how they coped with having a child with autism in their family. The European American family believed that the cause of autism was genetic while the Asian American family believed that karma and retribution for past evil deeds was the reason for having a child with a disability. Additionally, the European American</p> |

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| | | | <p>parents educated other typically developing siblings in their family about what autism was, while the Asian American parents kept it from other children in their family. The European American siblings had more warmth in their relationship and played cooperatively with one another, while the Asian American siblings preferred to play alone and had less warmth in their relationship.</p> |
| <p>Schmidt et al. 2013</p> | <p>Participants were 29 psychiatrically-referred patients with Asperger's Syndrome (26 males & 3 females). The participants had a mean age of 10.9 years (SD=3.4; Range =2.5-19.4 years of age). The participants are thought to be from the United States.</p> | <p>The study was interested in studying birth order and used a medical record review method. Information was obtained about age, sex, biological birth order and comorbid diagnoses.</p> | <p>The study found that a disproportionate amount of their participants (86%) were found to be the first born or oldest child in the family. The author suggests that factors such as birth stoppages, pre/peri-natal complications and immunological mechanisms may help to explain this important finding.</p> |

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| Shivers et al., 2013 | A sample of 1,755 siblings of children diagnosed with autism was included in this study (ages 3-18 years old). Of the sample 54.6% of participants were female and 52.1% of the populations were older than their brother or sister with autism. Participants were from the United States. | The study sought to examine anxiety in siblings of children with autism. Parents completed demographic forms with information about au severity and their own anxiety levels. Parents also completed the CBCL to examine anxiety as well as other behaviors within the proband. Intelligence was also measured for the probands by use of the Mullen Scales of Early Learning, WISC-IV, and Differential Ability Scales-Second Edition. | The study found that male siblings of children with autism between the ages of 6-11 years of age (middle childhood) were at increased risk of experiencing anxiety; however, it was noted that these children were not experiencing borderline or clinically significant levels of anxiety. Additionally, factors such as parental history of anxiety and sibling behavior problems (but not autism severity) were found predict increases in sibling anxiety. |
| Smith et al., 2013 | The study consisted of thirty mixed and same-gender siblings' dyads from the southeastern United States. The sibling pairs all consisted of an older typically developing siblings (aged 10-17) and a younger sibling with a disability (aged 6-15). Participants | Researchers collected data by observing a semi-structured videotaped interaction between the siblings. Parents completed the Vineland for children with disabilities. Children with disabilities completed The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4) and The Expressive | The study found that communication status of the child with a disability did not affect warm/closeness, rivalry, or conflict in the sibling relationship, but that siblings of independent communicators were more likely to demonstrate the |

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| | with disabilities included Down Syndrome (10), Autism (11), Cerebral Palsy (3) and Other (6). | Vocabulary Test, Second Edition (EVT-2). Typically developing siblings completed the Sibling Relationship Questionnaire-Revised (SRQ-R). | greatest amount of helping and managing behaviors. |
| Solarsh, 2016 | Participants included 53 dyads of parents and typically developing siblings of children with autism (from the tri-state New York area). The purpose of the study was to examine the relationship between adaptive and problem behaviors of children with autism, and sibling stress levels, behavior, and personal adjustment. | Behaviors were assessed using the Behavior Assessment System for Children, Second Edition (BASC-2) and Nisonger Parent Behavior Rating Form 2. Adaptive behaviors were measured using the Vineland Adaptive Behavior Scale, Second Edition. | The dissertation study found a link between stress levels of siblings with autism, and behavioral problems and impaired social skills in children with autism. Overall adaptive skills of children with autism were not linked with sibling outcomes. |
| van Steijn et al., 2014 | Participants included 174 families recruited from two autism and ADHD family genetic studies. To be included families needed to have at least one child aged 2-20 years old with autism or one child 5-19 with ADHD, at | Parental autism and ADHD were assessed using the Adult's Social Behavior Questionnaire and Conners Adult Rating Scales-Self-report: Long Version respectively. Conners' Long Version Rating Scales Revised was used to measure child ADHD while the ADI-R and | The study found that parents and specifically mothers reported more stress parenting children with autism, ADHD or combined autism and ADHD than when parenting typically developing children. The study also found that |

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| | <p>least one typically developing sibling and a parent willing to participate. Study was most likely done in the Netherlands.</p> | <p>Children’s Social Behavior Questionnaire were used to measure autism diagnosis in the children. Parent depressive symptoms were measured using the General Health Questionnaire-short version and parental stress was measured using the PSI-SF.</p> | <p>parents of children with autism were more likely to be depressed than parents of children with ADHD or typically developing children. Additionally, the study found that paternal ASD and maternal ADHD were related directly to increased parenting stress.</p> |
| <p>Tomeny, et al., 2012</p> | <p>42 parents of dyads with one sibling with autism (aged 8-18) and one typically developing sibling (aged 6-18). 42 parents of with two children (aged 6-18) who were typically developing for a total of 84 overall participants.</p> | <p>This study employed the following measures: Demographic/Diagnostic forms, Child Behavior Checklist (CBCL), Children’s Social Behavior (CSBQ) Questionnaire, Parenting Stress Index-Short Form (PSI/SF), Alabama Parenting Questionnaire (APQ)</p> | <p>Diagnostic category and autism severity were not found to be moderators of externalizing behavior or internalizing symptoms among siblings of children with autism. Having a sibling with autism is not a protective or risk factor for maladjustment beyond the relation between maladjustment and among siblings in general.</p> |

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| <p>Tomeny et al. 2014</p> | <p>42 parents of dyads with one sibling with autism (aged 8-18) and one typically developing sibling (aged 6-18). 42 parents of with two children (aged 6-18) who were typically developing for a total of 84 overall participants.</p> | <p>This study investigated birth order and employed the following measures: Demographic/Diagnostic forms, Child Behavior Checklist (CBCL), Children's Social Behavior (CSBQ) Questionnaire, Parenting Stress Index-Short Form (PSI/SF), Alabama Parenting Questionnaire (APQ)</p> | <p>Results from this study found that birth order rank of the child with autism moderated the relation between externalizing behaviors in children with autism and externalizing behaviors in their typically developing siblings. The authors noted that children with an older sibling with autism who exhibited externalizing behaviors were at greater risk of exhibiting externalizing behaviors themselves.</p> |
| <p>Verté et al., 2003</p> | <p>There were 58 total participants who were siblings of children with high-functioning autism (29 participants) and siblings of typically</p> | <p>Child Behavior Check List (CBCL) Matson Evaluation of Social Skills with Youngster (MESSY) Self-Description one and two Questionnaires</p> | <p>Children aged 6-11 years had more behavior difficulties than siblings of children who were typically developing. Also, sisters of children with autism</p> |

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| | developing children (29 participants). | | display greater self-concept and social competence than the control group. Overall, it was found that siblings of children who have autism are not more susceptible adaption problems than children with typically developing siblings. |
| Walton, 2016 | Participants were approximately 1973 siblings of children with autism (ages 4-18) and their families. The study examined risk factors for behavioral and emotional problems of siblings of children with autism. | Children with autism were only included if they had meant criteria for autism on the ADOS and ADI-R. The Child Behavior Checklist (CBCL) was used to measure behaviors. The Social Responsiveness Scale (SRS) was used to measure social behavior and test for the broader autism phenotype. | Results found six correlations. It was noted that male gender, smaller family size, lower family SES, older age of child with autism, and broader autism phenotype symptoms were associated with increased risks of externalizing and internalizing behavior problems in siblings of children with autism. |
| Yirmiya et al., 2006 | Participants were 31 siblings of a child with autism and 30 siblings of a typically developing child. Participants were from Israel. | Bayley Scales of Infant Development (4 +14 months) Infant Characteristics Questionnaire (4 +14) Early Social Communication Scales (14) | It was found that siblings of children with autism showed more neutral affect during the still face paradigm, conducted in less joint-play, were less responsive |

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| | | <p>Checklist for Autism in Toddlers (14)</p> <p>Observations of free play, response to name calling and still face paradigm.</p> | <p>to their names being called and achieved lower language skills than siblings of typically developing children at 14 months of age.</p> |
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APPENDIX B
RESEARCH FORMS

Sibling Study Demographic Questionnaire

Family Information

1. How many adults currently live in the household: _____
2. How many extended family members live in the household: _____
3. How many children currently live in the household: _____
4. Please indicate all children in the home by age and sex and **circle the “sibling”**
you will be answering questions about:

| <i>Children in the home by birth order</i> | <i>Age in years</i> | <i>Sex</i> | <i>Any diagnosis or disorder</i> |
|--|---------------------|------------|--------------------------------------|
| First born | | | |
| Second born | | | |
| Third born | | | |
| Fourth born | | | |
| Fifth born | | | |
| Sixth born | | | |
| Seventh born | | | |

Note: Please be sure to circle the “sibling” for the study

5. Race/Ethnicity (Indicate both for Mother/Father): African American: _____
Asian/Pacific Islander: _____ White: _____
Hispanic/Latino: _____ Native American _____
Biracial: _____ Other: _____

6. Is English the primary language spoken within the home: Yes _____
No _____
If no, what is the primary language spoken within the home? _____

7. Father’s Highest Level of Education: Some High School: _____
High School Diploma/GED: _____ Some College/2 Year Degree: _____
Completed 4 Year Degree: _____ Completed Graduate Degree: _____

8. Mother's Highest Level of Education: Some High School: _____
High School Diploma/GED: _____ Some College/2 Year Degree: _____
Completed 4 Year Degree: _____ Completed Graduate Degree: _____

Sibling Information: Answer these questions about the **sibling you circled** in the table above.

1. What grade is the sibling in at school? _____
2. Do you have any concerns about this sibling's development? Yes _____
No _____
3. Has this child ever been evaluated for special education services? Yes _____
No _____
4. Does this sibling receive any form of special education services? Yes _____
No _____
5. Does this sibling participate in extracurricular (after school or community-based) activities? Yes _____ No _____

Child Information-Child Diagnosed with Autism

1. Do you have a child that has been diagnosed with an autism spectrum disorder (ASD)? Yes _____ No _____

If yes, please answer the following questions pertaining to the child with autism. If no, please continue to the other questionnaires about the **sibling** you identified above.

2. What grade is the child with autism in at school? _____
3. What is your child's diagnosis? Autism _____
Asperger Syndrome _____ Pervasive Developmental Disorder (PDD) _____
4. Who diagnosed your child with ASD? _____
5. At what age was your child diagnosed with ASD? _ _____

6. How would you describe the severity of your child's ASD?
7. Mild _____ Moderate _____ Severe _____ Do you participate in a support group for parents/family members of children with autism/ASD? Yes _____ No _____
8. Does the child with autism/ASD attend public school? Yes _____
No _____
9. Does this child receive Special Education Services at school? Yes _____
No _____

a. If so, what settings does the child receive services in? _____

b. If so, what interventions are implemented? _____

10. Does your family participate in an intervention program at home? Yes ___ No

If yes does the program use Applied Behavioral Analysis techniques?

Yes ___ No _____ Don't Know _____

11. Does this child receive therapeutic services outside of the school setting (e.g., at a clinic or hospital or private setting)? Yes _____ No _____

12. Is this child on a special (restricted) diet? Yes _____ No _____

Thank you for your participation in this study.

Information Sheet

Social and Behavioral Outcomes of Siblings of Children with Autism

Basic Information:

This study will be investigating social skills and behaviors of siblings of children with autism in comparison to siblings of typically developing children. The study will further examine potential risk and resilience factors including: family demographics, parental stress and severity of autistic characteristics. Participation in this study will take approximately 1 hour and will involve parents completing questionnaires and ratings scales. This data is being collected as part of a graduate student's doctoral dissertation at Texas A&M University. If participants have questions or concerns the contact information for the researchers involved is located below.

Declaration to Participants:

Participation in this study is optional and participants have the right to refuse to answer any questions and to withdraw from the study until the submission of research materials. Submission of research materials will serve as consent to participate in the study. There are no anticipated risks associated with participating in this study above and beyond what might be encountered in everyday life. All information gathered as part of the research study will remain confidential, will be stored in a secured environment, and will only be used for research purposes. At the time of submission the participant has the option to enter a drawing for a \$50.00 gift card by completing the compensation sheet.

Contact Information

Benjamin C. Karren, M.Ed. bkarren@tamu.edu

Cynthia Riccio, Ph.D. criccio@tamu.edu

Instructions:

1. Complete the demographic questionnaire.
2. Complete the following for the 6-11 year old sibling of the child with autism:
 - a. Behavioral Assessment System for Children, Second Edition
 - b. Autism Spectrum Rating Scales (ASRS)
 - c. Social Skills Improvement System (SSIS)
3. Complete the following for the child with autism:
 - a. Autism Spectrum Rating Scales (ASRS)
4. Complete the Parenting Stress Index-Short Form (PSI-SF)
5. Optional: Complete compensation sheet
6. Place materials into prepaid business envelopes and ship.

Information Sheet

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Contact Information

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Cynthia Riccio, Ph.D. criccio@tamu.edu

Instructions:

1. Please do not put names, addresses, phone numbers or other identifying information on any forms.
2. Complete the demographic questionnaire.
3. Complete the following for the 6-11 year old child with a sibling:
 - a. Behavioral Assessment System for Children, Second Edition (BASC-2)
 - b. Autism Spectrum Rating Scales (ASRS)
 - c. Social Skills Improvement System (SSIS)
4. Complete the Parenting Stress Index-Short Form (PSI-SF)
5. Optional: Complete compensation sheet
6. Place materials into prepaid business envelopes and ship.

Compensation Sheet

If you wish to be entered into a drawing for a gift card please include this form with other materials

Name:

Mailing Address: