CHILD-RELATED FACTORS THAT INFLUENCE RESPONSIVENESS IN MOTHERS OF PRESCHOOL-AGE CHILDREN WITH AUTISM SPECTRUM DISORDERS: A MIXED-METHODS STUDY

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A Dissertation

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ABSTRACT

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There is substantial research evidence to support the positive effects of maternal responsiveness on the language, social, communicative, and cognitive development of children with autism spectrum disorders (ASD). Further, research has focused on the effects of children with ASD on maternal / caregiver mental health and family well-being. Very few investigations have explored the effects of children with autism on maternal responsiveness, an important component of mother-child interactions. This study was a preliminary attempt to understand the factors related to children with autism that influence maternal responsiveness. The study adopted a mixed-methods design. Mother-child interactions were recorded in a free play context to code for maternal responsiveness, and three child-related variables, namely children’s intentional communication, joint engagement, and temperament. Semi-structured interviews were conducted to obtain mothers’ perspectives regarding the impact of a child with autism on their daily dyadic interactions. Converging results from the quantitative and qualitative phases revealed a possible association between the proportion of time children spent in coordinated joint engagement and maternal responsiveness. Mothers reported children’s limited communication ability, restricted topics and activities of interest, the need for topic control, the inability to gain the child’s attention, and limited compliance, as reasons for perceived negative impact and challenges in their daily interactions. A unique finding from this study was the perceived positive impact of raising a child with autism.
I dedicate this document to all mothers of children with autism!

Amidst all the blur of daily life, it is your unrelenting strength and unconditional love that make your child rise above all limitations and succeed in life!

My Pranaam to you all!
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CHAPTER I

Introduction

Child development happens within the context of dyadic parent-child interactions (World Health Organization, 2004). An integral part of child development is the caring, nurturing, and meaningful interaction with parents and caregivers. Parental involvement and interactions are considered to be the most proximal factors that shape children’s overall development in general, and communication development in particular (Turnbull & Turnbull, 1997). Parent-child interactions account for more than 20% of the variance in communication, social, emotional, and cognitive development in typically developing children, and around 30% in children with developmental delays (Mahoney & Nam, 2011).

One critical aspect of parental interaction style is parental responsiveness. Parental responsiveness is a multidimensional and dynamic construct (Bornstein, 1989) that has strong positive influences on child development (Tamis-LeMonda, Bornstein, & Baumwell, 2001). Bornstein (1989) defined parental responsiveness as the contingent, prompt, and appropriate response given to children’s bids for attention or communication. Responsive parenting entails positive parental affect, contingent timing of response, flexibility of parental behavior, and engagement with the child (Warren & Brady, 2007). In addition, responsive parenting includes the provision of language input, and the ability to calm the child during times of distress (Biringen, Matheny, Bretherton, Renouf, & Sherman, 2000). This parental interaction style builds a sense of predictability among children (Ainsworth & Wittis, 1969). Predictability promotes trusting, and a secure relationship with the parent. Consequently, children begin exploring the environment around them, interacting socially with members of the family and
Running head: Child-related factors that influence maternal responsiveness in ASD
peers, and developing the essential skills required for a healthy physical, emotional, and social
life.

A large body of research reveals that responsive parenting promotes communication,
emotional and cognitive development (e.g., Aldred, Green, & Adams, 2004; Bornstein & Tamis-
LeMonda, 1989; Landry, Smith, & Swank, 2006), and social engagement (Kim & Mahoney,
2004) in children with and without disabilities. Additionally, parental responsiveness and
sensitivity are the antecedents for secure attachment relationships between parents and children
(van IJzendoorn, 1995). Nevertheless, a wide range of parent- and child-related factors could
potentially inhibit parents from displaying responsive interaction behaviors to children with
developmental delays.

Parental factors influencing responsiveness include parents’ emotional status (Field,
1992), education, cultural differences (Richman, Miller, & LeVine, 1992), depression and stress
(Hastings & Brown, 2002; Hoppes & Harris, 1990), marital status (Karst & Van Hecke, 2012),
and poor health (Murphy, Christian, Caplin, & Young, 2007). Lack of knowledge regarding child
development is another crucial factor. Parents who do not recognize the benefits of their positive
interactions for child development have difficulty demonstrating responsive and stimulating
caregiving behaviors (Reis, 1988). Support from family and professionals (Radke-Yarrow,
Cummings, Kuczynski, & Chapman, 1985), socioeconomic status, organization at home and in
the family are other factors that influence responsive parenting (Lojkasek, Goldberg, Marcovich,
& MacGregor, 1990). In addition to these factors, parents who interpret their children’s
behaviors accurately are able to reciprocate with warmth, contingency, and positive affect.
Parents who perceive their children as difficult to handle, tend to display negative affect, and
face difficulties in interacting with their children (Nover, Shore, Timberlake, & Greenspan,
Running head: Child-related factors that influence maternal responsiveness in ASD

1984). All these factors are interrelated, and are not mutually exclusive. For example, elevated levels of parental stress and anxiety are associated with fewer years of parental education, and less parental responsivity (Self, 1998). In general, a combination of one or more of these factors influences parental interactive patterns.

A number of child-related factors have been known to create an effect on parental interactive behaviors and dyadic parent-child interactions. Children’s difficult temperament, delay in acquisition of skills, presence of maladaptive behaviors, and poor health make responsive parenting highly challenging (World Health Organization, 2004). For example, mothers of children at high risk for developmental disorders displayed emotional distress and depression leading to reduced sensitive and responsive caregiving behaviors (Bennett & Slade, 1991). In families with children with disabilities, raising a child with developmental limitations can be an overwhelming experience. Parents might have to make huge adjustments and changes to their lifestyle and daily routine in order to adapt to the child’s developmental deficits and needs (Warren & Brady, 2007). Accepting the child’s diagnosis, finding an appropriate intervention program, planning and executing treatment plans, and establishing a supportive and enriching environment for the child’s development can all be a cumbersome process for parents (Ogston, Mackintosh, & Myers, 2005).

Autism spectrum disorders (ASD) are characterized by core deficits in social communication and presence of restricted and repetitive behaviors (DSM-5, 2013). Persons with ASD are likely to have limitations in the following areas: social reciprocity and engaging in joint attention (Mundy & Newell, 2007), interpreting the intentions of others (Baron-Cohen, 1985), maintaining eye-contact with the conversational partner (Mirenda, Donnellan, & Yoder, 1983), cognition, and verbal and non-verbal communication (Joseph, Tager-Flusberg, & Lord, 2002).
Additionally, children with ASD demonstrate difficult temperaments that can pose challenges for interactive parental behavior (De Pauw, Mervielde, Van Leeuwen, & De Clercq, 2011). More than 85% of individuals with ASD have a lifelong dependency on their family members, and are unable to lead an independent life (Volkmar & Pauls, 2003).

Although parents have the best intentions for their children, the pervasive and complex nature of autism can place constraints on their positive interactional behaviors. When children are socially inactive and have cognitive and communicative deficits, they evoke changes in parental responsiveness (Mahoney & Robinson, 1992). Parents of children with autism are faced with various lifestyle issues and issues related to mental health. Long before the diagnosis of ASD is made, parents begin to experience distress and anxiety (Rubens, 2009). They worry about the child’s future, parents’ death, and the child’s academic and social life (Ogston, Mackintosh, & Myers, 2005). Parents experience adverse family impact, increased financial burden, and increased amount of time spent in caregiving for the child with autism (Vohra, Madhavan, Sambamoorthi, & St. Peter, 2013). Most importantly, parents of children with ASD face higher levels of stress when compared to parents of children with other developmental disabilities (Kasari & Sigman, 1997; Sanders & Morgan, 1997). Bishop, Richler, Caln, and Lord (2007) found that the sources of stress perceived by parents of 9-year-old children with ASD were children’s high levels of restricted and repetitive behaviors, impairments in adaptive skills, and reduced availability of social supports. Even as children with ASD move into adolescence, mothers perceived a high degree of negative impact—disappointment and increased stress (Carr & Lord, 2012). In addition to the above-mentioned issues, parents of children with ASD face some unique set of challenges.
1. They have difficulty identifying if the child’s cues and bids for attention are communicative or not (Yoder & Warren, Maternal responsivity mediates the relationship between prelinguistic intentional communication and later language, 1999). This difficulty is predominantly due to the child’s impairments in communication and joint engagement.

2. If the child’s cue is not communicative, some parents might lack knowledge in determining how to have the child initiate a communicative cue or focus on the object or action. If the child exchanges a communicative cue, parents have difficulty identifying the best way to respond to this communicative cue (Hudry et al., 2013).

3. Children with autism have a predisposition to focus on objects rather than people (Kasari, Gulsrud, Wong, Kwon, & Locke, 2010). As a result, parents have difficulty trying to shift the child’s focus of attention from the object, and engage the child in a reciprocal communicative interaction.

4. Most children with autism display difficult temperaments (De Pauw, Mervielde, Van Leeuwen, & De Clercq, 2011; Hepburn & Stone, 2006). Parents are faced with challenges in child’s temperament such as lack of compliance, impulsiveness, and social withdrawal; all of which lead to interruption in everyday dyadic interactions. Therefore, parents have to compensate for their child’s developmental deficits and differences. Repeated difficulties and failures in understanding how to adapt their responsive patterns to suit their child’s developmental changes and restricted activities of interest leaves many parents of children with autism in a state of frustration (O’Connell, O’Halloran, M., & Owen, 2013). Additionally, most parents do not have access to a strong social support system to assist them in caregiving for their child with ASD (Siklos & Kerns, 2006). Owing to the stressors, lack
Running head: Child-related factors that influence maternal responsiveness in ASD
of knowledge, and challenges associated with raising and interacting with a child with autism, parents of children with ASD tend to display reduced responsiveness in their daily interactions (Marfo, 1992).

In an attempt to promote responsive parenting and active parental involvement during treatment, several intervention models such as the Hanen Program (Girolametto, Greenberg, & Manolson, 1986), and the Transactional Intervention Program (Mahoney & Powell, 1986) have been prevalent since the 1980s. During the last decade, parent-implemented and parent-mediated intervention designs (e.g. Girolametto & Weitzman, 2006; Yoder & Warren, 2002) that focus on mothers of children with ASD have become popular. With an increase in the number of children with ASD receiving a diagnosis prior to age three, best practice guidelines for intervention recommend parental involvement (National Research Council, 2001) in the form of parent-training or parent-education and parent-implemented programs. The intervention programs are based on the premise that when parental language input is sensitive and responsive, children develop the ability to differentiate linguistic and non-linguistic input, pay attention to linguistic input, and deduce the association between different components of language (Mahoney & Nam, 2011). Therefore, responsiveness training is a significant component of these interventions (Yoder & Warren, 1999, 2002). Nevertheless, investigations on parent-mediated intervention designs report mixed results in terms of responsive parenting outcomes. For example, Venker, McDuffie, Weismer, and Abbeduto (2011) reported that parents who received intervention to increase the verbal responsiveness directed to their children with autism, showed a significant increase in the use of their verbal responsive strategies. Carter, Messinger, Stone, Celimli, Nahmias, and Yoder (2011) conducted a randomized controlled trial of the Hanen “More than Words” intervention for toddlers with autism, which includes responsivity training as an
Running head: Child-related factors that influence maternal responsiveness in ASD

important component. The researchers concluded that although parents showed gains in
responsivity following intervention, their responsiveness varied based on the characteristic of the
child with autism specifically, object interest. Parents of children with autism with high object
interest required a different set of strategies or greater support to interact with their children with
autism. Another investigation in the past indicated that parental responsive behaviors change
depending on the child’s level of communicative competence (Kasari, Sigman, Mundy, &
Yirmiya, 1988). Mothers of children with autism, who initiate a large number of conversational
exchanges, were more responsive when compared to mothers of non-communicative children
with autism. In a longitudinal investigation, Siller and Sigman (2008) found similar results when
they investigated maternal synchronous language input to the child’s focus of object and action.
These findings suggest that aspects of the child with autism could potentially influence maternal
responsiveness. Further, maternal responsiveness has been found to be differential, i.e.,—some
mothers of children with autism are highly responsive, while some mothers are less responsive
(Siller & Sigman, 2002, 2008). One explanation for this differential influence could be individual
differences in parents. Alternatively, individual differences in the characteristics of children with
autism may influence parental responsiveness.

Thus far, research focusing on responsiveness of parents of children with ASD has not
taken into account the child’s effects on parental-child interactions. If we are to maximize
parental responsiveness and child’s developmental gains following intervention, it is critical to
understand how children with autism influence their dyadic interactions. To this end, research
focusing on understanding the aspects of the child with ASD that influence the way parents
interact with them is slim. Further, it is important to understand why and how some parents of
children with ASD are highly responsive while some are less responsive and more directive.
The current study unfolded from these questions. This study was a preliminary attempt to explore the influence of different factors related to children with autism on maternal responsiveness. In particular, this study investigated the contribution of children’s intentional communication, their coordinated joint engagement, and child temperament to maternal responsiveness. Additionally, the study explored mothers’ perspectives on child characteristics that may lead to difficult interactions, and how autism affected their daily interactions and lifestyle.

In summary, given that several characteristics of children with autism affect their parents’ responsive patterns, and that some parents of children with autism are more responsive than others, it is important to understand the contribution of each of these factors to maternal responsiveness. Long term influence of developmental limitations in children with autism can evoke reduced responsiveness from parents, thereby leading to sub-optimal developmental outcomes in children with autism. Therefore, research focusing on identifying aspects of the child with autism that impact maternal responsiveness is a priority need.
BACKGROUND AND REVIEW OF LITERATURE

An important theoretical framework for understanding how responsive parenting can be beneficial for children with autism, and how characteristics of children with autism can impact parental responsiveness, is provided by the transactional model of development (Sameroff & Chandler, 1975). The transactional perspective of parent-child interactions explains how children with autism and their parents are constantly influencing each other in a dynamic and ongoing manner. Parental influences on children and children’s effects on parents are explained with an emphasis on how children’s effects on parents indirectly influence their own development. The following section provides a detailed account of the theoretical framework for understanding parent-child interactions in families of children with ASD. The theoretical framework is followed by a review of literature that discusses (1) how children with developmental disabilities as those with ASD benefit from responsive parenting, and (2) how children with autism impact parents.

PARENT-CHILD INTERACTIONS – A TRANSACTIONAL PERSPECTIVE

The basic premise of the transactional model of communication development is that children’s developmental progression is a consequence of the reciprocal and bidirectional influences between parents and their children. Transaction refers to the modification in characteristics and behaviors of two individuals who are involved in an interaction (Sameroff & Chandler, 1975). In other words, when the characteristics of one individual affect the characteristics of another, or create a change in behavior in another, a transaction is said to have occurred. Throughout the course of development, transactional exchanges occur continually between the child and the parent. This transactional exchange is a dynamic one – i.e., it changes
Running head: Child-related factors that influence maternal responsiveness in ASD over time. An adaptation of Sameroff’s (2009) illustration of the transactional exchanges between parents and children that continue with time is shown in Figure 1 below. P1 and C1 indicate parental response and child’s communication at time 1 respectively, and P2 and C2 indicate parental response and child’s communication at time 2 respectively, and so on.

Figure 1. Transactional exchanges between parents and children that continues with time

More importantly, Sameroff (2009) theorized that the transactional process is a three-component chain— the child’s characteristics influence parental responses, these responses influence child behaviors, and these behaviors regulate the child’s developmental outcome. For example, when a parent is able to read and clearly interpret the child’s communicative behavior, the parent responds appropriately, promptly, and contingently. Such responses pave the way for further communicative development in the child. Figure 2 in the following page illustrates the transactional model of communication development. If the child does not create a change in the parent’s interactive style or if the parent does not create a change in the child’s behavior, a transaction has not occurred. Such situations can be observed in parents who are unresponsive to their child’s social and communicative signals or when children are unresponsive to parental initiations.

In the context of communication development, the transactional process begins as early as infancy (McCLean, 1990) and continues through school age. Even during the preintentional
period, parents respond to infants’ internal states and reflexive behaviors. Subsequently, infants reciprocate with appropriate smiles and facial expressions (Bateson, 1975). During the intentional phase, children point or direct their parent to an object of interest; the parent responds promptly by procuring the object and labeling it. This exchange facilitates comprehension of single words and expression of gestures or single words. Both the child’s own characteristics and the experience that the child derives from the environment shape each other and facilitate development (Sameroff, 2009). Therefore, early developmental abilities influence the child’s own capacity to acquire developmental skills, and regulate parental reactions and responses. Constant restructuring of this process takes place in time.

*Figure 2. The Transactional Model of Communication Development*

According to the transactional perspective, the child is an active participant in his or her own developmental process, and the environment in which the child grows is a highly plastic and ever-changing one (Dawson, Hill, Spencer, Galpert, & Watson, 1990). Therefore, any disruption that affects the child’s participation or the environmental context can impede the process of development. A child with a developmental disability faces many challenges from the
Running head: Child-related factors that influence maternal responsiveness in ASD environment in addition to his or her own developmental limitations. For example, Neece, Green, and Baker (2012) conducted a longitudinal study to understand the transactional relationship between parental stress and behavior problems in typically developing children and children with developmental disabilities. In both groups of children, behavior problems are an antecedent and a consequence of parental stress. In the context of parent-child interactions, Dawson et al. (1990) studied the interactions between children with autism and their parents. Deficiencies in social engagement observed in children with autism had an adverse effect on parental responsiveness. This negative responsiveness from parents in turn inhibited children’s language learning and affective relationships. In a review of parent-child interactions in children with congenital hearing impairments, visual impairments, Down syndrome, autism, and epilepsy, Howe (2006) reported that, parental lack of sensitivity and attachment, and presence of intrusive parenting styles could not be explained merely by the nature of children’s disability. A transactional interplay of vulnerabilities and limitations in both parents and children created this scenario. Directive parenting styles in parents of children with developmental delays is also influenced by children’s deficits in social, cognitive, and communicative functioning (Marfo, Correlates of maternal directiveness with children who are developmentally delayed, 1992). With continued exposure to directive parenting behaviors, children are conditioned to parent directiveness, and they can become highly dependent on parental prompts and commands even during simple problem solving tasks. As a result, these children can become passive communicators.

In summary, the transactional perspective of parent-child interactions proffers that the continuous and changing interactions between children with or without developmental disabilities and their parents, bidirectionally and reciprocally influences the child’s development.
The nature of these interactions is a significant factor that contributes to the level of success in the child’s developmental outcome. Many parent- and child-related factors can influence the nature of parent-child interactions in both typically developing children and children with developmental disabilities. In the following section, I discuss an important parent component, parental responsiveness, and how it supports child development.

Benefits of Responsive Parenting

Responsive parenting with typically developing children.

A cumulative view of a large body of research supports the role of responsive parenting on the overall development of children (World Health Organization, 2004). A strong association exists between: parental responsiveness in early childhood and social competence and fewer emotional and behavioral problems at four years (Goldberg, Corter, Lojkasek, & Minde, 1990) and 12 years (Beckwith, Rodning, & Cohen, 1992); cognitive competence at four-and-a-half years (Landry, Smith, Swank, Assel, & Vellet, 2001); school achievement at seven years (Bradley, 1989), and better social skills at three years (Catkins, Smith, & Gill, 1998). High levels of maternal responsiveness have also been associated with secure attachment patterns in children (Bakermans-Kranenburg, van Ijzendoorn, & Juffer, 2003). Hart and Risley (1995) noted that responsive parenting styles have the potential to promote the child’s sense of self-efficacy; children realize that parents are interested in their interests and initiations. The influence of responsive parenting on children commences as early as infancy. Responsive parenting during the early years of a child’s life is foundational to later development. For example, Bornstein and Tamis-LeMonda (1989) reported a predictive association between early maternal responsiveness and infant vocalizations, explorations, information processing, and cognitive competencies. In this study, responsive maternal behaviors included: vocalizations imitating the infant,
vocalizations in response to the infants’ communicative signals, expression of positive emotions, arousal of the child through touch and movement, physical or verbal direction of the infant toward an object or event or toward herself, and pick up, pat or feed the infant. In a later study, Landry, Smith, Swank, Assel, and Vellet (2001) were interested in determining if early responsiveness carried a special importance over consistent ongoing responsiveness. They conducted a longitudinal study with infants born in low socioeconomic backgrounds and infants born at full term and preterm. Maternal responsiveness was measured during infancy and later during toddler years. Positive cognitive outcomes were associated with consistent maternal responsiveness rather than early maternal responsiveness. In other words, slower rates of growth were observed in children whose mothers were highly responsive only during infancy compared to mothers who were consistent in their responsiveness through infancy and toddlerhood. This study reveals an important aspect of maternal responsiveness—consistency. In addition, high levels of maternal responsiveness have a causal relationship to social, emotional, communication, and cognitive development in infants born at full term and infants born at very low birth weight (Landry, Swank, & Smith, 2006).

A substantial body of research suggests that there is a moderately strong association between parental responsiveness and children’s overall rate of language development (e.g. Baldwin & Markman, 1989; Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998; Yoder & Warren, 1999). Both linguistic and non-linguistic responsiveness have the potential to support advances in language in children. When parents are linguistically responsive to the child’s focus of attention, they ease the child’s challenges in matching the linguistic symbol to the referent, and positively reinforce the social-communicative exchange, thereby supporting gains in language outcomes (Bloom, 1993). Nonlinguistic responsiveness can help promote the cognitive
Running head: Child-related factors that influence maternal responsiveness in ASD
and social foundation necessary for the development of intentional communication and language
(Yoder & Warren, 1999). MacTurk, Meadow-Orlans, Sanford, and Spencer (1993) reported that
imitation of infants’ facial expressions and vocalizations at 9 months predicted their verbal
language level at one-and-a-half years of age. On similar lines, Yoder, McCathren, Warren, and
Watson (2001) showed that non-linguistic responsiveness during the prelinguistic period is
associated with gains in later language development. Bornstein, Tamis-LeMonda, and Haynes
(1999) contended that maternal imitations, expansions, and questions predicted language
developmental outcomes until two years of age. In a longitudinal investigation, Tamis-LeMonda,
Bornstein, and Baumwell (2001) determined the association between maternal linguistic
responsiveness and the age at which typically developing children achieve their language
milestones. Maternal responsiveness was measured when children were 9 and 13 months old.
Open-ended interviews were used to garner descriptive data from the mothers regarding their
children’s language functioning. Interview data were collected longitudinally starting at 9
months until 21 months. Analysis of the data revealed that highly responsive parenting behaviors
at 9 months and 13 months, predicted children’s expression of first words and phrases, imitation
of words, production of word combinations to form sentences, and the ability to talk about past
events at 21 months. Similarly, gains in vocabulary comprehension of 14-month-olds were
associated with responsive parenting behaviors (Baumwell, Tamis-LeMonda, & Bornstein,
1997). In addition, Belsky and Fearon (2002) reported that maternal responsiveness predicted
children’s receptive and expressive language skills at three years. Language acquisition in three-
and four-year-old children, especially acquisition of phonological awareness skills, has been
shown to be associated with responsive maternal behaviors (Silven, Niemi, & Voeten, 2002).
Overall, this evidence suggests that responsive parenting is vital to the child’s general development, particularly for the development of communication and language. The effects of parental responsiveness on child development start in infancy and grow cumulatively over the child’s developing years. In addition, parental responsiveness has substantial effects when it is consistent and sustained.

Responsive parenting in children with developmental disabilities.

Similar to typically developing children, children with developmental disabilities benefit from early and consistent parental responsiveness. Several studies have examined the influence of parental responsiveness on the cognitive, social, and communication development of children with developmental disabilities. For example, Mahoney, Finger, and Powell (1985) studied the effects of maternal responsiveness in a group of 60 children with mental retardation and Down syndrome at three different ages, 12, 24, and 36 months. Across the age groups, children displayed higher levels of developmental functioning when parents were responsive and supported children’s spontaneous behaviors. The researchers noted that cognitive skill enhancing behaviors such as contingent responsiveness to the child’s communication bids, sensitivity to the child’s physical and emotional state, expression of positive affect and enjoyment during child interactions, and teaching children appropriate responses during social and communicative exchanges were beneficial to children with cognitive delays.

For children at-risk for developmental disabilities, gains in receptive language skills at two years were attributed to maternal sensitive and responsive behaviors (Cusson, 2003; Murray & Hornbaker, 1997). In a group of children with developmental disabilities, Yoder and Warren (1998) found that maternal responsiveness predicted the enhancement of intentional communication. In a subsequent study, Yoder and Warren (1999) reported that maternal
responsiveness not only predicted intentional communication, but also mediated the relationship between intentional communication and later language development. Further, linguistic mapping, an element of maternal responsiveness, facilitated vocabulary development in children with developmental disabilities (Yoder, McCathren, Warren, & Watson, 2001).

Cumulative research evidence suggests that for children with developmental disabilities such as Down syndrome and autism, the most salient features of parental responsiveness that enhance children’s language abilities include (a) the ability to focus on the child’s object of interest (Yoder, Kaiser, Alpert, & Fischer, 1993), (b) synchronized and undemanding utterances to the child’s focus of attention (Siller & Sigman, 2002), and (c) the ability to adapt the linguistic input depending on child’s current activity and cognitive and communicative levels (Ruble, McDuffie, King, & Lorrenz, 2008; Siller & Sigman, 2002).

While examining the relationship between early maternal responsiveness and later language development in children with Fragile X syndrome, Warren, Brady, Sterling, Fleming, and Marquis (2010) found that responsive parenting at 12 months facilitated the rate of acquisition of number of different words used and the rate of overall communication acquisition in children. The characteristics of children with autism are similar to those with Fragile X syndrome in that children with autism have problems with social interaction, joint attention, eye contact, and communication (Warren et al., 2010). In addition, they exhibit restricted and repetitive behaviors, idiosyncratic language, and sensory disturbances (Tager-Flusberg, 1989). In the following section, a detailed explanation of the influence of responsive parenting on children with ASD has been provided.
Responsive parenting is highly facilitative of healthy developmental outcomes in children with autism and has an additional preventive role (Aldred, Green, & Adams, 2004). For children with communication impairments such as those with ASD, sensitive and responsive parenting is especially crucial to their early development (Haebig, McDuffie, & Weismer, 2013). Siller and Sigman (2008) noted that parents who attend to the object or activity that the child focuses on during familiar routines, see greater gains in the overall language outcomes of children with autism. Siller and Sigman (2002) conducted the first longitudinal study that examined the relationship between parental responsivity and language outcomes in children with autism. These researchers focused on naturally occurring synchronizations in parental speech to children’s immediate focus of attention on an object or activity. Participants included two groups of parent-child dyads (parent-child with autism and parent-typically developing child) who engaged in a play interaction when the child was one year old. Surprisingly, parental synchronizations were similar in both the groups. When within group comparisons were made, children with autism whose parents were highly synchronous (pointing, showing, and undemanding verbalizations of objects of child’s focus) had better joint attention and expressive language abilities when measured at 1, 10, and 16 years of age than children whose parents were less synchronous. Consistent with this finding, Siller and Sigman (2008) showed that preschoolers with autism showed greater gains in language measures 9 years later when their parents displayed increased levels of responsiveness during free play interactions at preschool age. Yoder and Warren (1993) contended that contingent responsive maternal language input directed to children with autism, motivates the child to pay attention to his or her immediate environment, draws child’s attention to novel stimuli in a familiar context, facilitates the understanding of a cause-effect relationship,
Running head: Child-related factors that influence maternal responsiveness in ASD

and indicates that verbal and vocal acts have a communicative function. Similarly, Haebig, McDuffie, and Weismer (2013) reported that parents’ directives and comments following children’s focus of attention led to gains in receptive and expressive language of toddlers and preschoolers with autism. Although a large number of studies provide evidence for the relationship between parental responsiveness and developmental outcomes in children with ASD in the preschool-age, one study examined children at risk for autism who were exposed to molar-level responsive parenting behaviors at 18 months of age (Baker, Messinger, Lyons, & Grantz, 2010). Parents in this study were attuned to their children’s distress; they displayed warmth, acceptance, and emotional support, and they immediately attended to children’s needs. Children who were exposed to such high levels of responsiveness demonstrated an increase in expressive vocabulary by preschool-age. These studies indicate that when parental responsiveness is frequent, synchronous, and consistent, children with ASD demonstrate progression in their language and communicative skills.

**Responsiveness training supports child development.**

In addition to naturally occurring changes in parental responsiveness and its effects on social reciprocity and language in children with autism, a substantial support for the effects of trained parental responsiveness on children’s developmental outcomes can be garnered from intervention research. Intervention programs that target parent training such as the Hanen Program for Parents (Girolametto, Greenberg, & Manolson, 1986) and the Transactional Intervention Program (Mahoney & Powell, 1986) have been prevalent since the 1980s. These intervention programs propose that responsive parental language input facilitates language development. They are based on the premise that when parental language input is sensitive and contingent, children develop the ability to differentiate linguistic and non-linguistic input, pay
attention to linguistic input, and deduce the association between different components of language. There are two main goals for all parent intervention programs: (a) teaching contingent responsive interaction, and (b) teaching modifications in structural aspects of maternal speech. The responsivity training involves teaching parents to use prompt, contingent, and appropriate responses to children’s communicative initiations by using imitations, questions, comments, labeling, clarifications, and expansions. Exaggeration of intonation, using semantically and syntactically simple utterances, and slow rate of speech are emphasized in the structural component of the training.

Most parent-training programs teach parents to be contingent in their responses, pay attention to the child’s interests, provide language input that is appropriate for the child’s developmental level, and reduce the use of questions and redirections (e.g. Girolametto & Tannock, 1994; Yoder & Stone, 2006). In a longitudinal study of maternal responsive intervention for late-talking toddlers, Girolametto, Weitzman, Wiigs, and Pearce (1999) found that maternal imitations and expansions strongly correlated with gains in children’s expressive language. Mahoney and Perales (2005) reported that parent-training programs that focus on responsiveness promote the expression of positive affect and social-emotional functioning in children with autism. Keeping in mind the individual differences observed in children with autism, Aldred, Green, and Adams (2004) conducted a randomized controlled intervention for parents of toddlers with autism. Parents were taught to modify and match their interactive styles based on children’s unique characteristics. Children of parents who received training demonstrated better social interaction and expressive language skills. Further, they initiated more communication with their parents.
Studies focusing on training parents to be responsive to their child with ASD have also shown gains in children’s language. Ruble, McDuffie, King, and Lorenz (2008) measured parental responsiveness of toddlers and preschoolers with a diagnosis of autism during a 10-minute free play interaction. Parental responsiveness was not associated with parental and child demographics, and children’s adaptive skills. However, there was a strong association between parental responsiveness and initiation of social interactions in children with autism. McDuffie and Yoder’s (2010) intervention study using RPMT (Responsive Education and Prelinguistic Milieu Teaching) showed a predictive relationship between five different types of parental responsive behaviors and later spoken vocabulary in 32 children with ASD. After controlling for the child’s level of engagement, parent follow-in comments and follow-in directives predicted spoken vocabulary in these children. Follow-in comments and follow-in directives refer to parents’ comments and directives that are synchronous and subsequent to the child’s focus of object or action. Further, the study revealed that parent utterances that followed the child’s focus of attention and parent utterances in response to the child’s communicative acts were equally predictive of gains in vocabulary production six months after treatment. Most recently, Kaiser and Roberts (2013) compared the effects of a parent-implemented intervention (Enhanced Milieu Teaching) with an intervention that involved only therapists for children with intellectual disabilities. All children with intellectual disabilities who participated in the study benefited from the parent-implemented intervention; there was an increase in the use of target words, length of utterances, and number of different words used during play activities. This study underscored the importance of training parents to be responsive during interactions with their children. Other quasi-experimental and experimental investigations on the effects of increasing parental responsiveness through training programs, provide evidence for better social communication
In light of this evidence, it is important to understand that there are factors potentially inhibiting parents from providing this high quality consistent responsive input to their children with disabilities. These include a wide array of parent-related factors and child-related factors. When parents are faced with multiple stressors, they face difficulties in attending to the demands that their children present with. As a result, they become less sensitive to their children’s needs and signals for attention and communication (Cohn & Tronick, 1983). Marital or familial discord, work-related issues, number of members in the family, physical and mental health-related issues, lack of family support, chaotic home environments, and poor socioeconomic status combined with low levels of education are potential factors that hinder responsive parenting (e.g., Cummings & Davies, 1995; Karst, & Van Hecke, 2013; Radke-Yarrow, Cummings, Kuczynski, & Chapman, 1985; Self, 1998). In addition to parent-related factors, the nature of the child’s disability can have an impact on responsive parenting.

In summary, the research studies reviewed in this section have indicated that trained parental responsiveness can be beneficial to progression of language development in children with ASD and other developmental disabilities. These studies included children as young as 12 months of age and have followed their developmental outcomes until 16 years of age. Parental responsive behaviors ranging from imitations, expansions, descriptions, following the child’s lead, linguistic mapping, and questioning have been studied. Findings from this review of research studies overwhelmingly point to two important aspects of parental responsiveness: (1) high levels of consistent responsive input, and (2) responsive input that follows the child’s focus
of attention. These two aspects of parental responsiveness are crucial to promote children’s existing skills and maintain skills learned in intervention. Further, it is inferred that not only is responsive parenting that occurs in natural contexts beneficial for children with developmental disabilities, but trained parental responsiveness also supports developmental gains. When children have impairments that pose challenges on the parent-child dyadic interactions, parental responsiveness is affected. In the subsequent section, I discuss how children with autism impact parental behaviors and responsiveness.

**Child Effects on Parents**

Historically, prior to the 1980s, a widely accepted belief in the scientific community was that parents of children with disabilities were deficient in certain ways; parents’ interactive behaviors and quality of input did not match the developmental demands of their children (Mahoney & Seeley, 1976). Buium, Rynders, and Turnure (1974) noted that parents of children with disabilities provided less complex language input (reduced mean length of utterance, restricted range of different words, and few grammatically complex utterances) when compared to parents of typically developing children. Further, mothers of children with disabilities were considered to be more directive, restrictive, and less responsive in their parenting styles (Mahoney & Robenalt, 1986; Mahoney, Fors, & Wood, 1990; Marfo, 1992). An ongoing debate at the time was whether mothers of children with disabilities were truly deficient in their language input and responsiveness, or did they adapt their behavior to match the child’s limited developmental functioning. Despite this argument, there is no empirical evidence till date to support the notion that parents of children, especially mothers, are deficient in their parenting styles and behaviors. Further, the association between increased directiveness and gains in child development has not been reported.
A promising research finding is that children with developmental disabilities benefit from the same set of parental input and parental interactive behaviors as typically developing children (Landry, Taylor, Guttentag, & Smith, 2008). Additionally, children with developmental disabilities have the potential to influence their parents in a number of different ways. Although typically developing children present a host of challenges to parents because of their ongoing developmental changes, children with developmental disabilities place a different set of constraints on parents. For example, parents of children with ASD spend increased time and effort with the child; they face increased financial burden, and family discord when compared to families of children with other developmental disabilities (Vohra, Madhavan, Sambamoorthi, & St. Peter, 2013; Wang & Leslie, 2010). Accepting the child’s diagnosis, finding an appropriate intervention program, planning and executing treatment plans, and establishing a supportive and enriching environment for the child’s development can all be a cumbersome process for parents (Pottie & Ingram, 2008). Disability in children can have a direct effect on parents leading to increased levels of stress, psychological distress, and reduced self-efficacy (Raina, et al., 2005). Parents’ inability to cope with their child’s limited communication, adaptive, cognitive functioning, and maladaptive behaviors in addition to their own mental health related issues, lead to reduced parental responsiveness, which in turn negatively impacts child development (Self, 1998). This direction of effects, — i.e., the child’s effects on parental well-being and interactive behaviors— have received increased attention during the last two decades. Several studies have shown that children with intellectual disabilities (e.g., Al-Quaisy, 2012; Yoder, 1985), Down syndrome (e.g. Dykens & Kasari, 1997; Slonims & McConachie, 2006), and cerebral palsy (e.g., Ketelaar, Volman, Gorter, & Vermeer, 2008; Raina et al., 2005) influence parents’ mental health.
Influence of children with ASD on parents.

The nature of the disability in children with ASD, its pervasiveness and severity, presents demands that can be overwhelming for parents and the family (Ogston, Mackintosh, & Myers, 2005). Their experience raising a child with autism often involves the grieving process, which begins with denial, anger, guilt, rejection, and moves on to acceptance (Rubens, 2009). Even when parents develop a sense of acceptance, and begin to face the reality of raising a child with autism, they can experience stress and anxiety from their everyday activities and interactions with the child (Estes, Munson, Dawson, Koehler, Zhou, & Abbott, 2009). In a qualitative study exploring the hopes and worries of parents of children with autism, Ogston, Mackintosh, and Myers (2005) reported that parents were worried about finding and providing an appropriate therapy program for their child; they were uncertain about the benefits and prognosis of therapy; they were worried about the child’s future; their own death, the child’s safety and health, and the child’s academic and social functioning. A systematic review of research articles on the impact of children with autism on their families revealed that families faced various levels of discord as a result of raising a child with autism. Failures in marital relationships, increased parental stress and anxiety, and greater isolation and conflict among siblings were reported (Meadan, Halle, & Ebata, 2010). Findings from a recent study comparing the family impact of children with autism and other developmental disabilities indicate that parents of children with autism are more likely to experience employment burdens such as job loss, increased financial burden, and greater amounts of time spent in child care (Vohra, Madhavan, Sambamoorthi, & St. Peter, 2013).
**Effects of children with autism on parental stress.**

The most widely researched area with respect to the impact of children with autism on parents is parental stress. The parent-child interaction literature points to associations between different attributes of children with autism and parent stress. According to Rao and Beidel (2009), parental stress is the strain, pressure, and tension involved in responsibilities that go with parenting. Parents of children with autism experience elevated stress levels when compared to parents of typically developing children and children with other developmental disabilities (Estes, et al., 2009; Hoffman, Sweeney, Hodge, Lopez-Wagner, & Looney, 2009; Pisula & Kossakowaska, 2010). Even parents of children with high-functioning autism experience elevated levels of stress; high cognitive and verbal language abilities in these children do not compensate for parental stress (Rao & Beidel, 2009).

Potential reasons for increased levels of stress in parents of children with autism are presence of problem behaviors, deficits in social relatedness, limited communicative and adaptive functioning, cognitive impairment, non-compliance, the need for lifelong care, and learning disabilities (e.g., Dawson, Matson, & Cherry, 1998; Hall & Graff, 2011; Hastings & Brown, 2002; Lecavalier, Leone, & Wiltz, 2006, Tomanik, Harris, & Hawkins, 2004). In the earlier studies, cognitive impairment was considered to be the strongest contributor of parental stress (e.g., Bebko, Konstantareas, & Springer, 1987). Later studies have shown that the presence of problem behaviors (Estes et al., 2009) and limitations in reciprocal social skills (Davis & Carter, 2008) were significant predictors of parental stress. Davis and Carter (2008) reported that children’s reciprocal social skills were the strongest predictor of heightened stress in both mothers and fathers of children with autism. Heightened stress refers to high scores on the Parent Stress Index (PSI) (Abidin, 1990). The authors commented that a number of other variables
Running head: Child-related factors that influence maternal responsiveness in ASD

contributed to increased levels of parental stress, including children’s problem behaviors, adaptive functioning, and cognitive skills. An important finding from this study was the lack of association between parental stress and children’s language, communication, and restricted, repetitive and stereotyped behaviors, although these variables constitute the core deficits in people diagnosed with ASD.

Research on the association between child-related factors and parental stress reveal inconsistent results. For example, Koegel et al., (1992) found that maternal stress was associated with children’s cognitive development, but Hassal, Rose, and McDonald (2005) did not see such a relationship between the two variables. Another inconsistent finding is the association between children’s adaptive skills and parent stress. Hall and Graff (2011)’s correlational study on 75 parents of children with autism found a moderate relationship between low adaptive functioning and elevated levels of parent stress. These results were not in concurrence with Lecavalier, Leon, and Wiltz’s (2006) study that revealed a weak association between children’s adaptive functioning and parent stress; the best predictor of parent stress in this study was children’s externalizing behaviors. Mixed findings have also been reported for the association between parent stress and autism severity. Lyons, Leon, and Roecker Phelps (2010) reported a strong correlation between symptom severity and parental stress levels, noting that as the demands faced by parents in raising a child with autism increase, stress levels increase. Similarly, Benson (2006) found an association between stress proliferation and autism severity in a group of school-age children with autism, and found that parental stress mediated the relationship between autism severity and depressive moods in parents. Although many such studies indicate an association between autism symptom severity and parental stress, some investigations point toward a lack of association between the two variables (e.g., Schieve, Blumberg, Rice, Visser, &
McStay et al. (2013) studied parent stress and perceptions of parenting skills in a group of 150 parents of cognitively able children with autism, and found that child hyperactivity was the strongest contributor of parental stress. Factors that did not contribute to parental stress were child’s age, child’s verbal language ability, and symptom severity.

Overall, research on the effects of children with autism on parent stress indicates that a wide range of child variables factor into parental stress. A clear association between children’s cognitive deficits, problem behaviors, limited reciprocal social skills, and parent stress is evident. Inconsistent findings in terms of autism severity, adaptive skills, and lack of association between communication and parental stress could potentially be due to methodological variations or differences in the way parent stress is measured. Nevertheless, it is important to understand that when parents are faced with heightened levels of demands from the child with autism, their stress levels tend to elevate. Further, it is likely that increased stress levels make responsive parenting challenging. The lifelong and pervasive nature of autism could potentially contribute to inconsistent and/or reduced frequency of responsiveness.

**Child effects on parental responsiveness and directiveness.**

Parental responsiveness is highly dependent on the child’s developmental level and skill competency (Baumwell, Tamis-LeMonda, & Bornstein, 1997; Mahoney & Robinson, 1992). In other words, children’s inherent nature and behaviors modify parental characteristics, evoke adaptations and fine-tuning in their reactions and responses, and eventually influence children’s development. This relationship is shown in Figure 3 in the following page.
In children with typical development, different responsive behaviors rise to prominence at different developmental periods. For example, as children grow in their functional abilities, mothers shift from using a verbal description responsive strategy to verbal questioning in order to elicit more language from the child (Tamis-LeMonda, Bornstein, & Baumwell, 2001). Bornstein, Tamis-LeMonda, Hahn, and Haynes (2008) noted that when the child is around 21 months of age, increases in vocal imitations, expansions, and questions are evident. Such findings from typical development indicate that parents are influenced by their children’s developmental changes; parents constantly adapt and accommodate their responsiveness to match the child’s developmental and functional levels.

The easy readability and predictability of children’s behaviors and communication, elicit responsive parenting (Sameroff, 2009). Children with disabilities present with maladaptive behaviors, less involvement in social interaction, limitations in social cognition, lack of contingency and delay in responses to parents, hypersensitivity to sensory stimuli, and deficits in adaptive skills, all of which make readability and predictability of their behaviors challenging (Warren & Brady, 2007). Figures 4 on page 31 illustrates how child characteristics influence parental responsiveness and in turn the child’s developmental outcome.

Child effects and parental directiveness.

Directive parenting refers to the authoritative and demanding parenting style that lays emphasis on controlling behaviors over freedom to the child (Baumrind, 1991). Yoder and
Warren (1998) defined directiveness as telling the child “what to do, and what not to do.” Directive parenting style entails influencing the child’s attention to an object or action while redirecting and disrupting the overall interaction (Warren & Brady, 2007). Bell (1979) contended that two types of controlling behaviors exist in parents: *upper-control* that involves punitive and restrictive parenting, and *lower-control* that involves intrusive, directive, and demanding parenting. He reported that parents who perceived their children as hyperactive, impulsive, and high in distress exercised upper-control, while children perceived as less active, highly inhibitive, and less competent in motor, cognitive, or communicative skills faced lower-control parenting behaviors. Parents use directive behaviors to provide a verbal or non-verbal hint, request, or command to draw the child’s attention toward themselves. For example, parents use commands such as “Look here!” or “Stop that.”

Directive parenting styles can be explained by two opposing theories: child driven theory, and instructional intent theory (Hanzlik & Stevenson, 1986). According to the instructional intent theory, mothers of children with a disability are directive, because they have the intent to teach their children different ways of learning, modify their existing behaviors, and motivate them to learn advanced and relatively difficult skills that are beyond their current zone of proximal development. Parents, therefore, request and command the child to complete tasks of increased difficulty. The child driven theory proposes that the disabled child’s inability to engage in interactions, failure to show active involvement, and presence of a wide range of maladaptive behaviors contributes to the highly directive parenting style. While the former theory attributes directiveness to the nature of the mothers, the latter emphasizes the child’s effects on the mother and explains how the child can evoke directiveness from the mother.
Figure 4. Responsive parenting influences child developmental outcomes

Evidence from several research investigations indicates that limited functioning in children with developmental disabilities evokes directive parenting (e.g., Tannock, 1988; Marfo, 1992; Sterling, 2007). For example, Marfo (1992) reported that poor cognitive and play skills, and difficulty initiating interactions in children with developmental delays evoke directive
Parental responses. He contended that because mothers fear that their child with a developmental delay might not be able to complete the given task, they become intrusive and directive, and provide fewer opportunities for the child to respond (Marfo, 1990). Kim and Mahoney (2004) investigated the effects of mother’s responsiveness on the interactive engagement patterns of two groups of children, one with and the other without developmental disabilities. Mothers of children with disabilities were not as responsive as mothers of children without disabilities. Further, they displayed reduced affect and increased directiveness. Similarly, Kasari, Sigman, Mundy, and Yirmiya (1988) investigated responsivity in parents of children with autism, mental retardation, and typically developing children. Parents of children with autism used the highest frequency of directives and regulating behaviors in comparison to parents of children from the other two groups. Consistent with this finding, Siller and Sigman (2002) contended that parents of children with autism have a general tendency to display low levels of synchronicity and high levels of demanding behaviors. Self-reports of mothers of preschool-age children with developmental disabilities indicated that mothers were either coercive or inductive in their caregiving practices (Roskam & Schelstraete, 2007). In this study, coerciveness entails control, punishment, directiveness, authority and power assertion, and inductive parenting involves autonomy, stimulation, and distancing strategies. More recently, Hetzroni (2012) noted that parents, who perceived their children with ASD as less competent communicators, used more directives—increased number of knowledge-testing questions, requests and commands for attention to objects and activities. Such increased directive maternal behaviors negatively correlate with the active engagement and cognitive skill acquisition in children with mental retardation and Down syndrome (Mahoney & Robenalt, 1986; Sterling, 2007).
The above-mentioned studies are supportive of the notion that children with disabilities have the potential to evoke directive parenting behaviors. When parents demonstrate highly directive interaction styles, gains in child development are limited. With continued exposure to directive parenting behaviors, children are conditioned to parent directiveness, and they become highly dependent on parental prompts and commands in everyday tasks. As a result, their developmental outcomes are compromised. Nevertheless, it is important to understand that not all parents of children with disabilities display fewer responsive or highly directive and regulating behaviors; parents’ responsive and directive behaviors depend on the skill competency or the lack of it in children with developmental issues. For example, by virtue of the differences in cognition and social interaction skills in children with Down syndrome, their parents tend to display varied responsive behaviors (Crawley & Spiker, 1983). Similarly, Siller and Sigman (2002, 2008) noted that within the group of children with autism, some mothers are highly responsive, while some are directive. This difference was influenced by the child’s level of communicative competence. Combining this evidence, it is likely that characteristics of children with developmental disabilities such as autism have the potential to influence the responsive parenting behaviors.

*Effects of children with ASD on parental responsiveness.*

Responsive parenting is a critical component of positive parent-child interactions (Landry, Smith, Swank, Zucker, Crawford, & Solari, 2012; Mahoney & Nam, 2011). Although a large body of empirical evidence supports the benefits of positive parent-child interactions and responsive parenting on the language and social development of children with autism, research on the effects of children with autism on their dyadic interactions and parental responsiveness is by comparison very limited. Further, researchers have not investigated the associations between
specific child characteristics and responsiveness as a collective unit. Responsiveness is a multidimensional construct with several subcomponents such as parental affect, synchronicity, initiation, contingency, promptness, maintenance of interaction, and movement or participation (Ruble, McDuffie, King, & Lorenz, 2008). Although previous research has attempted to understand the relationship between several child-related variables and one or two components of responsiveness, the effect on responsiveness has not been studied cumulatively. For example, Dawson, Hill, Spencer, Galpert, and Watson (1990) noted that lack of affect expression in children with autism led to reduced parental expression of affect. Mothers of children with autism smiled less frequently in response to their children’s smiles than mothers of typically developing children did. Siller and Sigman (2008) reported that for children with autism, the inability to provide overt social and communicative cues could lead to the display of low levels of synchronous and high levels of demanding behaviors in their mothers. Additional evidence indicates that, in families of children with autism, parental responsiveness in differential—i.e., some parents of children with autism are highly responsive, while some parents are less responsive. These differences could occur as a result of differences in child characteristics. One investigation in the past indicated that parental responsive behaviors change depending on the child’s level of communicative competence (Kasari, Sigman, Mundy, & Yirmiya, 1988). Parents of children with autism who initiate a large number of conversational exchanges were more responsive when compared to parents of non-communicative children with autism. Similarly, Siller and Sigman’s (2008) longitudinal study reported that mothers’ responsiveness depended on the child’s level of communicative competence. More recently, Beurkens, Hobson, and Hobson (2013) found an inverse relationship between autism severity scores on the ADOS-2 (Autism Diagnostic Observation Schedule-2) and parent-child interactions. High scores on the
ADI-2 suggest increased autism severity. The quality of parent-child interactions was negatively affected when children demonstrated higher scores on autism severity.

Children with autism tend to evoke differences in their mother’s responsive behaviors. In an attempt to understand if mothers differed in their responsiveness due to the characteristics germane to children with autism, two investigations were conducted. Doussard-Roosevelt, Joe, Bahzenova, and Porges (2003) conducted two simultaneous investigations to understand mother-child interactions in autistic and non-autistic children. In the first study, they compared responsive interactions of mothers of children with autism and mothers of typically developing children. In the follow-up study, the interaction context involved mothers interacting with their child with autism and a sibling without autism. Mothers did not differ in the number of initiations in both the contexts although qualitative differences in interactions were observed. When mothers interacted with their child with autism, they used increased proximity and fewer social verbal approaches and higher object focused verbal approaches. The majority of the mothers also used high intensity behaviors (tickling, rough and tumble play) while interacting with their child with autism, whereas high intensity play was limited in frequency with the non-autistic child. In a similar study, mother-child interactions were observed separately when mothers played with their child with autism and with a younger typically developing sibling (Meirsschaut, Roeyes, & Warreyn, 2011). Although there were no differences in the frequency and function of social initiations that mothers used in both the contexts, overall, mothers were more active and more responsive to their child with autism than the non-autistic sibling.

These studies reveal that mothers adapt their responsive behaviors to suit the developmental differences of their child with autism. Therefore, autism has the potential to change or influence maternal responsiveness. These findings also suggest that parents of children
Running head: Child-related factors that influence maternal responsiveness in ASD

with autism are not inherently less responsive, but have a likeliness to be influenced by
children’s behaviors and tendencies; parental interactive behaviors are modified due to child
characteristics. In summary, several factors related to the child with autism such as the child’s
level of communication, especially reciprocal social communication; the child’s cognitive
ability, joint engagement skills, adaptive skills, child temperament, and the presence of problem
behaviors could influence responsive parenting. In addition, there can be differences in parental
responsiveness depending on individual child characteristics. In the subsequent sections, I
explain the associations between three selected factors related to children with ASD namely,
child’s intentional communication, joint engagement, and temperament and parental
responsiveness by providing evidence from previous research. Additionally, I provide reasons
for selecting these variables as predictors of maternal responsiveness in the current study.

**Need for Research.**

Based on the review so far, it is evidence that for children with ASD, several child-
related variables could potentially impact parent-child interactions and responsive parenting. If
we are to understand how to provide better and more effective support to parents of children with
autism, and optimize the dyadic interactions between children with autism and their parents, the
influence of each of these child-related variables on responsive parenting must be investigated.

For the purposes of the current study, three child-related variables were selected based on
evidence from previous research and their significance for clinical purposes.

**Relationship between child’s intentional communication and parental
responsiveness.**

As stated previously, adults rely on children’s display of communicative signals for
caregiving, and parental responsiveness depends on parents' ability to easily read the child’s
Running head: Child-related factors that influence maternal responsiveness in ASD communicative cues (Sameroff, 2009). Intentional communication is an easily readable communicative cue and/or initiation (Yoder & Warren, 1999) that is measured via communicative acts. A communicative act is an interactive behavior that consists of a gesture, vocalization, or verbalization that is directed toward another person (the parent) and that serves a communicative function (Wetherby & Prizant, 2002). A verbal or nonverbal communicative act indicates that the child focuses his or her attention on the parent (Keen, Woodyatt, & Sigafoos, 2002). When typically developing children begin using intentional communication by 8-9 months of age, parental responsivity is evoked (Yoder & Munson, 1995). Two types of evidence support the relationship between intentional communication and responsive parenting: (1) maternal responsiveness mediates the relationship between prelinguistic intentional communication and later language development (Yoder & Warren, 1999), and (2) increase in maternal responsiveness leads to increase in frequency of use of intentional communication (Wilcox, 1992; Yoder & Warren, 1998). Yoder and Warren (1999) conducted a longitudinal investigation in which they measured the maternal responsiveness, prelinguistic intentional communication, and language ability of 58 children with developmental disabilities. The researchers conducted follow-up measurements at 6 months and 12 months. A correlational analysis revealed that maternal responsiveness was related to both children’s intentional communication and later language. Maternal responsiveness had a moderate positive correlation with children’s prelinguistic intentional communication. In another study, Yoder and Warren (1998) investigated whether maternal responsiveness predicted intentional communication in a group of children with developmental disabilities randomly assigned to the PMT (Prelinguistic Milieu Teaching) treatment condition. Results revealed that when mothers were highly responsive to children’s communicative acts, children in the PMT condition demonstrated an
increased use of intentional communication during the generalization phase. These studies provide a strong support for the association between children’s intentional communication and parental responsiveness.

In children with ASD, it is important to study intentional communication for several reasons. Children with ASD have lower rates of development of intentional communication, and limited use of different forms and functions of both verbal and nonverbal communicative acts (Maljaars, Noens, Jansen, Scholte, & van Berckelaer-Onnes, 2011). Further, children with ASD demonstrate limited use of gestures (Camaioni, Perucchini, Muratori, & Milone, 1997; Watson, Crais, Baranek, Dykstra, & Wilson, 2013), and presence of stereotyped language and/or echolalia (Luyster, Kadlec, Carter, & Tager-Flusberg, 2008). Such developmental limitations could restrict their opportunities to elicit responsive behaviors from their parents. Additionally, parents face challenges in identifying whether a bid for an interaction is communicative or not (Iacono, Carter, & Hook, 1998). Therefore, it is important to understand how intentional communication in children with ASD contributes to maternal responsiveness.

**Relationship between child’s coordinated joint engagement and parental responsiveness.**

The second independent variable selected for investigation is coordinated joint engagement. Coordinated joint engagement occurs when a child actively and repeatedly acknowledges both the shared activity and the interaction partner (parent) through eye contact and gestures (e.g., pointing, showing or giving objects) (Adamosn, Bakeman, & Deckner, 2004). Coordinated joint engagement is child initiated, and is different from supported joint engagement in which the parent influences the child’s actions and activities. This is an important skill for the social and communication development of young children. In a coordinated joint engagement
Running head: Child-related factors that influence maternal responsiveness in ASD context, the child acknowledges the presence of a caregiver and returns to the attention to the object or activity (Richmond & Wetherby, 2010). As the focus of the current study is to understand how the child-related factors influence parental responsiveness and interactions, coordinated joint engagement (child-initiated) was selected over supported joint engagement.

Studies investigating the effects of parental responsiveness on children’s joint engagement reveal a moderately strong relationship between responsive parenting and joint engagement. Kim and Mahoney (2004) investigated the effects of mother’s responsiveness on children’s joint engagement abilities. Two groups of children, one with and the other without developmental disabilities were enrolled in the study. Children without disabilities displayed increased levels of engagement compared to the group of children with disabilities. Further, differences in levels of engagement were not only related to the presence or absence of disability, but also to parents’ responsive interactions. In a recent study, the association between child- and parent-initiated and parental interaction style was investigated in a group of toddlers with ASD (Patterson, Elder, Gulsrud, & Kasari, 2013). Results revealed that children with ASD spend two-thirds of the interaction time unengaged or object engaged. Further, parental interactional styles differ based on the amount of time children spend on coordinated or supported joint engagement. Parental responsiveness was related to the amount of the time children spent on coordinated or child-initiated joint engagement, and parental directiveness was related to the amount of time spent on supported or parent-initiated joint engagement.

For children with ASD, the amount of time spent in joint engagement carries high significance, because development of joint engagement is an indicator of later receptive and expressive language outcomes (Kasari, Gulsrud, Wong, Kwon, & Locke, 2010). Children with ASD spend lesser time in both coordinated and supported joint engagement than typically
Running head: Child-related factors that influence maternal responsiveness in ASD developing children and children with Down syndrome (Adamson, Bakeman, Deckner, & Romskl, 2009). Additionally, children with autism may refuse to participate in mothers’ bids for joint engagement (Adamson, McArthur, Markov, Dunbar, & Bakeman, 2001). Such deficits in joint engagement skills can limit the elicitation of responsive behaviors from parents and disrupt parent-child interactions. However, little is known regarding the influence of joint engagement skills in children with autism on parental responsiveness. Do children with autism who spend limited time in coordinated joint engagement evoke reduced parental responsiveness? The current study is an attempt to understand this direction of influence.

**Relationship between child temperament and parental responsiveness.**

One child-related characteristic that could possibly influence parental responsiveness and the child’s own development is child temperament. Temperament describes the initial state of a child; it indicates the relationship between the child’s behavior and his or her underlying neural networks (Rothbart, 2007). Rothbart’s (2007) classification of temperament contains three factors: negative affectivity, surgency, and effortful control. Rothbart defines negative affectivity “as the tendency to be fearful, easily frustrated, and irritable (as opposed to being laid back and adaptable)” (p.199). Surgency is defined as “the tendency to actively and energetically approach people in an emotionally positive way rather than to be shy, inhibited and withdrawn” (p.199). Effortful control refers to “the ability to sustain attention, control one’s behavior, and regulate one’s emotions (as opposed to an inability to regulate one’s arousal and to remain calm and focused)” (p.199). For the current study, the surgency factor of temperament was investigated.

The child’s temperamental profile contributes to the establishment of parent-child attachment, parental responsiveness, and child’s communication and social development (Rothbart & Bates, 1998). According to Thomas and Chess (1977), the interaction between a
child’s temperamental profile and parents’ responsiveness determines the child’s developmental outcome. Thomas, Chess, and Birch (1968) defined temperament as “the way in which an individual behaves.” (p.4). They believe that children’s temperament is an innate disposition that is biologically determined. While environmental influences on temperament have been proposed (Rothbart & Bates, 1998), the innate view continues to predominate temperament research even today. Because children have different temperamental predispositions (Davis, 1992; Goldsmith, Huss, & Lemery, 1997), they respond differently to different people and situations in the environment. For instance, some children might be highly outgoing and display extraverted affect when they are exposed to unfamiliar people or events, while some others may be shy and withdrawn.

Children’s temperamental profiles have the potential to influence parental responsiveness and parent-child interactions. Thomas and Chess (1977) explained the “goodness of fit” model of child temperament. In this model, “goodness of fit” refers to the compatibility between an infant’s temperament and a parent’s responsiveness. In other words, a difficult child might require heightened sensitivity and responsiveness from parents (Putnam, Sanson, & Rothbart, 2002). For example, a study by Peters-Martin and Wachs (1984) investigated the effects of infant temperament on mothers. Infants’ display of withdrawal behavior at 6 months and expression of negative affect at 12 months were measured. Mothers reported less maternal involvement, reduced verbal responsiveness, and more maternal restrictive behaviors when their children were 12 months of age.

Several studies reveal how children’s temperamental profiles impact responsive parenting. Crockenberg (1981) reported that increased irritability in children contributed to reduced responsiveness in mothers during their interactions. Consistent with this report, Leerkes
and Crockenberg (2002) noted that elevated distress and difficulty being comforted in six-month-old infants evoked diminished self-efficacy, and thereby reduced maternal responsivity. Because of the inability to soothe their distressed children, and free them from their state of distress, parents of children with negative temperaments feel less competent and tend to be less responsive (Gross & Tucker, 1994). More recently, Bostrom, Broberg, and Bodin (2011) explored the impact of children’s temperamental traits on their parents. Preschool children with intellectual disabilities and their parents participated in the study. Following a cluster analysis of data obtained from parent reports, children were clustered in one of the three groups: active/extraverted, passive/withdrawn, and disruptive. Children with disruptive traits had a higher negative impact on mothers, and were perceived as more “difficult” than children in the passive/withdrawn group. Nevertheless, mothers reported challenges in their daily interactions with children who are passive/withdrawn and children who demonstrate disruptive behaviors. Mothers reported positive experiences with children who were active/extraverted. This study supports the fact that children are capable of exerting both positive and negative influences on their parents.

In children with atypical development, investigations on temperament have focused on comparing subgroups of children with a specific disorder such as cerebral palsy (Chen, Lin, Lu, Chen, Liu, & Chen, 2011), intellectual disabilities (Bostrom, Broberg, & Bodin, 2011), Fragile-X syndrome and autism (Bailey, Hatton, Mesibov, Ament, & Skinner, 2000). Alternatively, research has compared temperament in typically developing and atypically developing children (e.g. Chuang, Tseng, Lu, & Shieh, 2012). Owing to limitations in cognitive abilities, social and communication skills, children with intellectual and developmental disabilities demonstrate more negative temperaments (highly disruptive and passive or withdrawn) in comparison to their
chronological age matched peers (Bostrom, Broberg, & Bodin, 2011). However, this condition is exacerbated in children on the autism spectrum; they have more difficult temperaments (high scores on negative affectivity, effortful control, and surgency) when compared to children with other developmental disabilities (De Pauw, Mervielde, Van Leeuwen, & De Clercq, 2011).

Individual differences in children with autism with respect to their social, emotional, sensory processing, and behavioral profiles can be explained in part by individual differences in their temperament patterns during early childhood (Hepburn & Stone, 2006). For example, a recent study reported that difficult temperaments predicted individual differences in sensory processing in preschool children with autism (Chuang, Tseng, Lu, & Shieh, 2012). Kasari and Sigman (1997) and Landry (2000) compared children with ASD and children with Down syndrome, and found that the former group had increased difficulty with effortful control (focusing attention, shifting attention, and inhibiting responses) and surgency (activity level, high intensity pleasure, impulsivity, and shyness/withdrawal) when compared to the latter group. Consistent with this finding, parents of preschool- and school-age children with ASD reported that their children had difficulty adapting to new events and situations, focusing attention, and difficulty being calmed while in distress (Konstantareas & Stewart, Affect regulation and temperament in children with autism spectrum disorders, 2006).

Children with ASD have distinct differences from typically developing peers in their temperament profiles. Hepburn and Stone (2006) used the Thomas and Chess (1977) classification of temperament to study children with autism, and reported that these children displayed high activity levels, increased social withdrawals, problems with goal orientation, reduced flexibility, and were difficult to be distracted. Based on Rothbart and Bates’s (1998) three dimensions (effortful control, surgency, and negative affectivity) of temperament, one
study examined the relationship between temperamental traits and symptoms in ASD (Garon et al., 2009). Affect extraversion (smiling, laughing, socializing), negative affect (sadness, anger, frustration), and effortful control were the three temperamental traits of children who were at-risk for diagnosis of ASD. Results indicated that the group of at-risk children exhibited higher negative affect, lower affect extraversion, and difficult with effortful control than the comparison group. Another study attempted to determine associations between temperament, personality, and maladaptive behaviors in children with autism researchers recruited 175 school-age children with a diagnosis of autism (De Pauw, Mervielde, Van Leeuwen, & De Clercq, 2011). These children were divided into a low-symptom and high-symptom group. Comparison of temperaments and maladaptive behaviors revealed that the high-symptom group displayed more social withdrawal, more distress, and less adaptability to novel situations than the low-symptom group. The results also supported a strong link between temperamental differences and differences in maladaptive behaviors in children with ASD. More recently, in a large-scale longitudinal study exploring the early signs and precursors of children with ASD, Bolton, Golding, Emond, & Steer (2012) found that differences in temperamental characteristics that become prominent at 24 months of age were associated with child development and diagnosis of ASD in later childhood.

Evidence from the aforementioned studies reveal that children with autism demonstrate difficult temperaments in terms of increased social withdrawal, heightened levels of activity, difficulty adapting to novel situations, and presence of negative affect. A general expectation that these negative temperaments impact parental responsiveness and dyadic parent-child interactions exists. For example, it is expected that the more flexible, sociable, and soothable the child is, responsive parenting is easier, and the more distressed, withdrawn, and impulsive the child is,
evoking responsive parenting could be difficult. However, most studies on the association between child temperament and responsive parenting focus on the negative affectivity in children. Research reveals that when children display negative affectivity, parents demonstrate reduced responsiveness (Rothbart & Derryberry, 1981). Moreover, these studies have focused on typically developing children or children with intellectual disabilities. Although temperament does not constitute the core features for the diagnosis of autism, it could likely impact parent-child interactions and the child’s own development. How children with autism influence their parents’ responsiveness and interactions has not been investigated thus far. Therefore, the current study examined child temperament in addition to the child’s intentional communication and coordinated joint engagement as factors that contribute to maternal responsiveness.

**Research Questions.**

The purpose of this exploratory study was to understand the influence of factors related to children with ASD on their mothers’ responsive interaction behaviors. Specifically, the following research questions were addressed in a group of preschoolers with autism spectrum disorders and their mothers:

1. Does a child’s intentional communication, coordinated joint engagement, and temperament significantly predict maternal responsiveness? (Quantitative phase)

2. From the perspective of mothers of children with autism, what are the characteristics of the child with autism that affect the way mothers interact and/or respond to their child? What difficulties do mothers face during these interactions? (Qualitative phase)
CHAPTER III

Method

Research Design

The current study adopts a concurrent triangulation mixed-method design (Creswell & Plano-Clark, 2007). In this design, both quantitative and qualitative phases are given equal importance; data collection for both the phases are done separately and simultaneously; during the analysis stage, both sets of data are analyzed separately, and a final meta-inference is drawn from the inferences made by the quantitative and qualitative phases independently (Onwuegbuzie & Johnson, 2006). The qualitative phase is complementary to the quantitative phase, and the results from both the analyses are corroborated to interpret the meta-inference. Figure 5 below represents the design of the study.

*Figure 5: Concurrent-triangulation mixed-method design*

The strength of this design is its complementary nature to exploit the strengths in each phase while overcoming the weaknesses, and to efficiently generate a greater understanding of the research questions (Greene, Caracelli, & Graham, 1989). A qualitative approach that involves narratives of the participants, adds to the insight and meaning that might not be obtained through a mono-method (quantitative) design. This approach enhances the knowledge to inform clinical
with respect to the current study, the quantitative phase will reveal whether the model (rate of communicative acts, proportion of coordinated joint engagement, and surgency factor of child temperament) predicts maternal responsiveness. The inclusion of a qualitative phase will provide a better understanding of the impact of a child with autism on mothers and their everyday interactions.

**Participant Recruitment**

Participants were recruited by contacting 55 centers for autism in the states of Ohio and Michigan including the Autism Society of Northwest Ohio, the Autism Society of Michigan, autism program coordinators in universities, speech language pathologists (SLPs) and program coordinators in preschools, hospitals, and centers for autism. A written information packet that included the Institutional Review Board (IRB) approval (Appendix E), a flyer that described the study, parent consent forms, and expectations for participants (study design and process, time involvement, and monetary incentive) were sent to the recruiters. The recruiters were requested to display the flyer in their respective centers, and were asked to provide the information packet to interested parents. Parents who were interested in participating in the study directly contacted the lead researcher via e-mail or phone call. During the initial conversation, the researcher explained the purpose of the study and the tasks involved in the quantitative and qualitative phases, and responded to any questions or concerns that parents had. If parents indicated willingness to participate in the study during the initial conversation, they were contacted the second time after a week to schedule the meeting for data collection. Parents were allowed a week’s time to make a final decision regarding their participation.
Participant Inclusion Criteria

The inclusion criteria for participation were: (1) chronological age of child between 3 and 5 years of age; (2) diagnosis of autism spectrum disorder (autistic disorder or Asperger syndrome) by an independent developmental pediatrician or child psychologist; (3) monolingual English-speaking backgrounds; and (4) parent availability and interest in participating in the study.

Child Participant Characteristics

Sixteen parent-child dyads participated in the study. Out of the 16 children, 12 were boys. All children were between 36 and 59 months old (mean age = 48 months), and had received a clinical diagnosis of autism spectrum disorder prior to participation in the study. All except one child were raised by their biological mothers. In one family, the grandmother was the primary caregiver of the child since his birth. However, the child addressed his grandmother as “mommy” as the biological mother did not live in the family. All children came from monolingual English-speaking families. Parents verified that all children had audiological evaluations in their early intervention or preschool programs and had normal hearing.

Parent Participant Characteristics

The mean age of participant mothers was 34.4 years. Three mothers were single parents and raised their children independently. All mothers were educated, although their levels of education were different. Two had completed high school, six of them received partial college education, five of them completed 4 years of college education, and three of them had a graduate degree. Nine mothers did not work outside the home; three of them worked part-time, and four worked full-time outside the home. Two mothers received parent training before participating in the study. One mother was trained in the Hanen “More Than Words” program, while the other
mother attended an Applied Behavioral Analysis parent training program. Tables 1 and 2 in the following page summarize the demographic information of the mother and child participants.

Table 1

*Demographic information for participant children*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>47.5 ± 6.6 (S.D.)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12 (75%)</td>
</tr>
<tr>
<td>Female</td>
<td>4 (25%)</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>10 (62.5%)</td>
</tr>
<tr>
<td>Nonverbal</td>
<td>6 (37.5%)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
</tr>
<tr>
<td>Autism</td>
<td>10 (62.5%)</td>
</tr>
<tr>
<td>Asperger syndrome</td>
<td>2 (12.5%)</td>
</tr>
<tr>
<td>Autism Spectrum Disorder</td>
<td>4 (25%)</td>
</tr>
<tr>
<td>Age of diagnosis (months)</td>
<td>28.4 ± 7.1</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>15 (93.75%)</td>
</tr>
<tr>
<td>African American</td>
<td>1 (6.25%)</td>
</tr>
</tbody>
</table>
Table 2

*Demographic information for participant mothers*

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s age (years)</td>
<td>34.25 ± 6.3 (S.D.)</td>
<td></td>
</tr>
<tr>
<td>Father’s age (years)</td>
<td>35.30 ± 4.6 (S.D.)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate</td>
<td>2 (12.5%)</td>
<td></td>
</tr>
<tr>
<td>Partial college (at least 1 year)</td>
<td>6 (37.5%)</td>
<td></td>
</tr>
<tr>
<td>4-year college graduate</td>
<td>5 (31.25%)</td>
<td></td>
</tr>
<tr>
<td>Graduate school</td>
<td>3 (18.75%)</td>
<td></td>
</tr>
<tr>
<td>Father’s Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school graduate</td>
<td>3 (18.75%)</td>
<td></td>
</tr>
<tr>
<td>Partial college (at least 1 year)</td>
<td>1 (6.25%)</td>
<td></td>
</tr>
<tr>
<td>4-year college graduate</td>
<td>6 (37.5%)</td>
<td></td>
</tr>
<tr>
<td>Graduate school</td>
<td>3 (18.75%)</td>
<td></td>
</tr>
<tr>
<td>No response</td>
<td>3 (18.75%)</td>
<td></td>
</tr>
<tr>
<td><strong>Job</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s Job</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>4 (25%)</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>3 (18.75%)</td>
<td></td>
</tr>
<tr>
<td>At home</td>
<td>9 (56.25%)</td>
<td></td>
</tr>
<tr>
<td>Father Job</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Running head: Child-related factors that influence maternal responsiveness in ASD

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<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>11 (68.75%)</td>
</tr>
<tr>
<td>Part-time</td>
<td>2 (12.5%)</td>
</tr>
<tr>
<td>No response</td>
<td>3 (18.75%)</td>
</tr>
</tbody>
</table>

Number of children 2.0 ± 1.4 (S.D.)

Parent training programs

<table>
<thead>
<tr>
<th>Attended</th>
<th>2 (12.5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not attended</td>
<td>14 (87.5%)</td>
</tr>
</tbody>
</table>

**Data Collection Process**

The figure below illustrates the process of data collection

*Figure 6: Data collection process*

- **Quantitative Phase**
  - Researcher provides instructions and clarifications
  - Autism Diagnostic Interview – Researcher interviews mother
  - 20 minute interaction between mother and child with ASD – video recorded
  - Mother responds to:
    1. Demographic Questionnaire
    2. MacArthur Bates CDI/WG & CDI/WS
    3. Children’s Behavior Questionnaire
  - Mother mails questionnaire packet to the researcher

- **Qualitative phase**
  - Mother responds to semistructured interview – Researcher interviews mother – audio recorded
  - Member checking – mothers were contacted via telephone to determine accuracy of data interpretation
Data Collection Setting

All data collection sessions were scheduled based on when and where the participants preferred the sessions to be conducted. For 14 families, data collection took place in the participants’ homes, while two participant mothers requested that data be collected outside of their homes. For these two dyads, the sessions were conducted at the university clinic room.

Materials

A digital video camcorder and tripod were used to video record the 20-minute parent-child interaction. A handheld digital audio recorder was used to audio record the qualitative interviews. A standard set of toys was used for all the participants. Toys included: a bubble gun, a pop-up toy, a wooden pizza cutting board, a farm animals set, a baby doll with a picnic basket, a wooden puzzle board, lacing beads with wooden farm animals, and two books – *Spot goes to the farm* (Hill, 2003) and *Biscuit’s picnic* (Capucilli, 1998).

Parent-child Interaction Task

The interactions occurred in a semi-structured environment in a free play context. Free-play contexts reflect natural interactive conditions (Bornstein, 1989). The low structured and unobtrusive nature of free play interaction contexts makes them suitable to elicit communication in children and assess parent-child interactions (Kasari & Sigman, 1997). Kwon, Bingham, Lewisader, Jeon, and Elicker (2013) showed that free play contexts were associated with increased play and instances for language use between the parent-child dyad. Mothers were asked to play with their children as they normally would for 20 minutes. In case the mother or the child needed a break, they were allowed to do so. Mothers were asked to play with the set of toys provided by the researcher. No specific order was specified. Further, they were not required to play with all the toys within the 20 minutes. Participants were also told that they were free to
move around the room during the interactions. Noise levels both outside and within the room were kept at a minimum. Given below are the instructions that were provided to the mothers.

“Here are some toys and books for you and (child’s name) to play with. I would like you to play with him/her for 20 minutes. You can choose any of these toys or books to play with. There is no particular order on which toy you should play with first. Feel free to move around the room if you need to. Let me know when you want to take a break. I will start the video recording a minute after you start playing, and I will let you know when we are done. Do you have any questions?”

Measures

Interview measure.

Following the parent-child free play interaction, the researcher administered the Autism Diagnostic Interview- Revised (ADI-R) (Lord, Rutter, & LeCouteur, 1994; LeCouteur, Rutter, Lord, Rios, Robertson, Holdrafer, & McLennan, 1989). The ADI-R is a parent interview used to make a diagnosis of autism. For the current study, the ADI-R was used to confirm the diagnosis of autism for all participating children. Some children received a diagnosis before a year while the others received a diagnosis before two years. Moreover, most parents were unaware of the assessment used at the time of diagnosis. Only two parents reported that the ADOS was used to make a diagnosis.

The ADI-R is a standardized, semi-structured interview. It includes 93 items divided into three domains: language/communication, reciprocal social interaction, and restricted, repetitive, and stereotyped behaviors and interests, as well as a section on regression of skills. Forty two items interview items are used for the diagnostic algorithm for autism. The ADI-R has 91% sensitivity and 83% specificity for children with ASD (Rutter, Le Couteur, & Lord, 2003). The
lead researcher independently administered and scored the ADI-R for all participants. The ADI-R algorithm suggests that scores higher than 10 for reciprocal social interaction, higher than 8 for communication, and higher than 3 for restricted and repetitive behaviors determine the diagnosis of autism. Additionally, to receive a diagnosis of autism, children should have demonstrated symptoms of autism at or before 36 months of age. Based on scores from the diagnostic algorithm, a confirmation of autism diagnosis was made for all the children. The score summary for each child is provided in Table 3 below.

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>Reciprocal Social Interaction</th>
<th>Communication</th>
<th>Restricted, repetitive, &amp; stereotyped behaviors</th>
<th>Development evident at or before 36 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>24</td>
<td>20</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>P2</td>
<td>14</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>P3(NV)</td>
<td>20</td>
<td>13</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>P4</td>
<td>10</td>
<td>19</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>P5</td>
<td>13</td>
<td>9</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>P6</td>
<td>24</td>
<td>21</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>P7</td>
<td>27</td>
<td>18</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>P8 (NV)</td>
<td>24</td>
<td>11</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>P9 (NV)</td>
<td>21</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>P10</td>
<td>12</td>
<td>16</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>P11 (NV)</td>
<td>21</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>
NV: Nonverbal children. Cut off scores: 10 (Reciprocal social interaction); 8 (Communication – Verbal children); 7 (Communication – Nonverbal children); 3 (Restricted, repetitive, & stereotyped behaviors or interests); 1 (Development evident at or before 36 months)

Table 4 below provides mean scores on the ADI-R for the children with autism who participated in the study.

Table 4

**ADI-R summary scores - Mean, standard deviation and range for children with autism**

<table>
<thead>
<tr>
<th>N</th>
<th>Reciprocal Social Interaction</th>
<th>Communication</th>
<th>Restricted, repetitive, &amp; stereotyped behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Range</td>
</tr>
<tr>
<td>16</td>
<td>18.9</td>
<td>4.8</td>
<td>10 – 27</td>
</tr>
</tbody>
</table>

**Questionnaire measures.**

Parents were asked to respond to the questionnaires and mail them to the researcher. The researcher gave each parent a self addressed stamped envelope to return the questionnaires.

1. **Demographics questionnaire.**

   A demographic questionnaire was constructed for the study. This questionnaire was used to obtain information about the participant parent and child, including the parent’s education level, parents’ job, race or ethnicity, information regarding parent training, age at which child
received ASD diagnosis, and intervention received by the child. The questionnaire can be found in Appendix A.

2. **MacArthur Bates Communicative Development Inventory (MacArthur Bates CDI).**

For the current study, both the CDI/WG (Words and Gestures) and the CDI/WS (Words and Sentences) inventories were used to determine the child’s language level. The CDI is a developmentally sensitive parent report measure of early language for typically developing children (Fenson et al., 1993). It contains two inventories: The CDI/ Words and Gestures (CDI/WG) for children between 8-16 months of age and the CDI Words and Sentences (CDI/WS) for children between 16- 30 months. The CDI/WG has two parts. Part I asks questions to the parent to know if the child has started using language; it has 28 items to assess the child’s comprehension of questions and phrases and two items for labelling and imitation. Parents are also asked to report which of the 396 vocabulary items the child comprehends and expresses. Part II of the CDI/WG asks questions about the child’s use of early and late gestures. The first part of the CDI/WS contains 680 items in eleven categories, and the parent reports if the child produces each of these items. There is no information about comprehension in this inventory. The second part of this inventory has 125 items that assess morphological and syntactic development. As this measure was developed for typically developing children between the ages of 8 – 30 months, it would be difficult to report percentiles and standard scores for the children with ASD participating in the current study. Therefore, raw scores have been reported for all children. In addition, raw scores are reported because most of the children scored at the lowest level possible for percentile and standardized scores. Tables 5 and 6 provide children’s percentage and mean of raw scores on the CDI/WG. Tables 7, 8, and 9 provide children’s percentage and mean of raw scores on the CDI/WS.
Previous research indicates that the CDI has been effective in assessing language for children with developmental delays (Heilmann, Weismer, Evans, & Hollar, 2005; Miller, Sedey, & Miolo, 1995; Thal, O'Hanlon, Clemmons, & Fralin, 1999). With respect to children with ASD, most language measures might not be appropriate because of the marked deficits in receptive and expressive language skills observed in children with autism. Owing to the tendency to use highly self-directed, less communicatively relevant, and echolalic speech, expressive language might be difficult to assess within a given time frame for children with ASD (Tager-Flusberg, 2000). Further, it is difficult to judge the receptive language because most standardized tests demand high levels of attention, and deficits in attention in children with ASD might interfere with formal testing (Condouris, Meyer, & Tager-Flusberg, 2003). As the CDI involves a parent report, it overcomes the problems with formal testing, and has been used with children with ASD to measure their language abilities (Charman, Drew, Baird, & Baird, 2003; Luyster, Qiu, Lopez, & Lord, 2007). Luyster et al. (2007) reported that the CDI is a good measure of early language abilities in preschool children with ASD because: (1) the limited communicative ability of children with ASD makes it difficult for them to perform optimally on a standardized test or observational measure during the stipulated evaluation time, and (2) the method of administration of the CDI, which involves vocabulary checklists reported by parents, improves the validity for children who have difficulties demonstrating their overall receptive and expressive language competence within a limited time frame.
Table 5

**Percentage of children producing first signs of understanding and producing language-CDI/WG**

<table>
<thead>
<tr>
<th>N</th>
<th>Responds to ‘name’ (%)</th>
<th>Responds to ‘No’ (%)</th>
<th>Responds to ‘there’s mommy/daddy’ (%)</th>
<th>Imitating (%)</th>
<th>Naming/Labelling (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>87.5</td>
<td>87.5</td>
<td>87.5</td>
<td>68.75</td>
<td>56.25</td>
</tr>
</tbody>
</table>

Table 6

**Mean of raw scores on the number of phrases understood, words comprehended and produced, total gestures produced by children - CDI/WG**

<table>
<thead>
<tr>
<th>N</th>
<th>Phrases; number understood (Out of 28) Mean (S.D.)</th>
<th>Vocabulary comprehension; number of words understood (Out of 396) Mean (S.D.)</th>
<th>Vocabulary production; number of words produced (Out of 396) Mean (S.D.)</th>
<th>Total gestures (Out of 63) Mean (S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>18.5 (8.2)</td>
<td>250.5 (151.7)</td>
<td>209 (170.4)</td>
<td>38.3 (14.3)</td>
</tr>
</tbody>
</table>

Table 7

**Percentage of children using words, sentences and grammar, and combining sentences –CDI/WS**

<table>
<thead>
<tr>
<th>N</th>
<th>Past (%)</th>
<th>Future (%)</th>
<th>Absent object (Production) (%)</th>
<th>Absent object (Comprehension) (%)</th>
<th>Absent Owner (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>62.5</td>
<td>56.25</td>
<td>56.25</td>
<td>81.25</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 8

**Percentage of children using sentence, grammar, and word combinations – CDI/WS**

<table>
<thead>
<tr>
<th>N</th>
<th>Plural (-s)</th>
<th>Possessive (‘s)</th>
<th>Progressive (-ing)</th>
<th>Past tense (-ed)</th>
<th>Combining</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>56.25</td>
<td>56.25</td>
<td>43.75</td>
<td>31.25</td>
<td>56.25</td>
</tr>
</tbody>
</table>
Table 9

Mean of raw scores on the number of words produced, number of word forms, word endings, and word complexity produced by children – CDI/WS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>341.8(278.8)</td>
<td>8.5 (9.6)</td>
<td>4.9 (5.7)</td>
<td>9.9 (13.11)</td>
</tr>
</tbody>
</table>

3. **Children’s Behavior Questionnaire (CBQ).**

This questionnaire was used to measure temperament in children with autism, a predictor variable in the quantitative phase. Scores from the CBQ were used to estimate the independent variable, child temperament. The CBQ is a parent report measure designed for children between 3 and 8 years of age, and has been used in research with typically developing children and children on the autism spectrum (Adamek, et al., 2011; Slatcher & Trentacosta, 2012). The short form of the questionnaire, which contains 94 items, was used in the study; it takes about 30 minutes to complete. Parents were required to circle a number between 1 and 7; 1 represented “extremely untrue for my child” and 7 represented “extremely true for my child”. Parents circled N/A if the item was not applicable to their child. The 94 items in the questionnaire are distributed across 15 subscales, which are again divided into three factors: surgency (Positive Anticipation, Smiling/Laughter, High Intensity Pleasure, Activity Level, Impulsivity, Shyness/withdrawal); Negative affectivity (Discomfort, Fear, Anger/Frustration, Sadness, Soothability), and effortful control (Inhibitory Control, Attentional Focusing, Low Intensity Pleasure, and Perceptual Sensitivity). Scores for each subscale were calculated independently, and factor scores are determined by obtaining the average of the subscale scores under each factor.

As the sample size (n = 16) did not allow for the inclusion of all the three temperament factors in the analysis, only one factor, namely surgency was chosen for the purposes of the
current study. There were two reasons for selecting the surgency factor of child temperament: (1) Surgency had the highest mean score of 4.89. The mean for effortful control was 4.02, and negative affectivity had a mean of 3.9 for the group of children with ASD who participated in the study; (2) Previous empirical evidence indicates that children with autism have high scores on surgency (Adamek et al., 2011), particularly for items on activity level, impulsivity, and social withdrawal. Permission to use the factor scores was obtained from the author (S. Putnam, personal communication, October 7, 2013). Internal consistency of the CBQ was reported as 0.67 to 0.92 for parent reports of children between 6 and 7 years of age (Rothbart, Ahadi, Hershey, & Fisher, 2001).

Observational measures.


Intentional communication cannot be measured directly; it must be measured indirectly through the person’s communicative behaviors and acts (Brady & Halle, 1997). Communicative acts signal the development of intentional communication (Wetherby & Prizant, 2002). The child’s use of communicative acts, the first independent variable, was coded using the 20-minute parent-child interaction. The method introduced by Wetherby and Shumway (2009) was used to measure the verbal and non-verbal communicative acts. In this method, the decision to code an act is based on three criteria: 1) the act is a gesture, vocalization or verbalization; 2) the act is directed to the parent; and 3) the act serves a communicative purpose. The number of communicative acts per minute used by each child during the interaction was determined, and the rate of communicative acts was calculated by dividing the total number of communicative acts by 20 (interaction time). A sample of the coding sheet can be seen in Appendix B.
5. **Coordinated Joint engagement state.**

Coordinated joint engagement, the second child-related variable, was coded using the coding scheme adapted from Adamson, Bakeman, and Deckner (2004). The coding scheme includes 11 mutually exclusive states. As the focus of the current study was to understand the influence of child-related factors on maternal responsiveness, only coordinated joint engagement state was coded from the dyadic interactions. In coordinated joint engagement, the child indicates his or her attention to the other person by looking at them and acknowledges their involvement in the activity (Adamson, McArthur, Markov, Dunbar, & Bakeman, 2001). This type of joint engagement is completely child-initiated, where the child directly engages with the parent while sharing his or her attention between an object or an action and a social exchange. The mother’s active involvement and direct manipulation of the activity is minimal.

The coding scheme and operational definition for coordinated joint engagement have been provided in Appendix B. Coordinated joint engagement was assessed and coded from the 20-minute video recordings of parent-child interactions by the principal investigator. Coordinated joint engagement was coded when the child actively and repeatedly acknowledged both the shared activity and the interaction partner through eye contact and gestures. Moment-by-moment coding was completed to determine the amount of time the child engaged in the joint engagement state. The total number of seconds spent in coordinated joint engagement was divided by the total duration of parent-child interaction (20 minutes) to determine the percentage of time the child spent in coordinated joint engagement. Kasari, Freeman, and Paparella (2006) reported the reliability for Adamson et al.’s (2004) joint engagement coding scheme. The intra-class correlation coefficient was 0.78 for two independent blind raters.

The scale used by Ruble, McDuffie, King and Lorenz (2008) was used in the study to measure maternal responsiveness, the dependent variable. This scale was chosen because of its frequent use in research with children with autism of preschool age. Moreover, this scale is used to measure the quality of maternal responsiveness, and not the amount of time the mother spends in responsive parenting. Permission to use the scale was obtained from the authors through email correspondence (L.A. Ruble, personal communication, October 2, 2013). The SIRS includes six items pertaining to maternal responsiveness: contingency, directiveness, initiation toward the child, movement with the child, affect, and maintenance of interaction with the child. Maternal responsiveness was coded from the videos using the SIRS by the lead researcher. The coding method did not follow a moment-by-moment format. A score is given for each item of maternal responsiveness after watching the entire duration of the video, and a total score is obtained by adding the individual item scores. A 5-point rating scale (1 to 3 in 0.5 increments) was used. A score of 1 on an item represents poor contingency, high directiveness, poor initiation, lack of movement to the child, poor level of affect, and poor maintenance of interaction. Higher total scores are indicative of greater maternal responsiveness. This scale has high internal consistency of 0.90 as reported by Ruble, McDuffie, King and Lorenz (2008). The scale can be found in Appendix C.

Data Analyses.

The first step in data analyses was coding for rate of communicative acts, proportion of coordinated joint engagement, and maternal responsiveness. Coding conventions used for each of these variables has been provided in Appendices B and C. Additionally, average factor scores for each temperament factor were determined.
Statistical Analysis

Preliminary descriptive statistics were obtained using SPSS Version 21.0. Subsequently, correlation analysis was conducted.

Qualitative Phase

Data Collection.

Data for the qualitative phase was collected from the mothers of children with autism through a semi-structured open-ended interview. The lead researcher asked the questions and mothers took about 20 minutes to respond to the questions. Parents were allowed to respond in as detailed a manner as possible. Interview questions can be found in Appendix D. The questions revolved around mothers’ perspectives regarding what characteristics of children with autism led to challenges, reasons behind these challenges, and reactions following the perceived impact of children with autism. The interviews were recorded using a portable digital voice recorder in a noise-free room. The interview responses were orthographically transcribed by the lead researcher.

Data Validity.

Member checking is a respondent validation process used in qualitative research. According to Lincoln and Guba (1985), “member-checking is the most crucial technique for establishing ‘credibility’ of qualitative data” (p.314). Member checking is done by involving participants to confirm the credibility and accuracy of the information they provided in their narratives (Miles & Huberman, 1994). In the current study, mothers of children with autism were asked to read through the transcripts to make sure their responses were accurate. The transcripts were sent via e-mail to the mothers, and they were allowed to add or edit portions of the transcripts. Additionally, the researcher contacted the mothers via telephone, and provided an
interpretation of the interview responses. Mothers were asked to verify the accuracy of the researcher’s interpretation, and were encouraged to provide additional information if the researcher’s understanding was incorrect. Thirteen out of the sixteen mothers participated in the member checking phase. Their feedback concurred with the lead researcher’s understanding and interpretation of their responses.

**Data Analyses.**

To answer the second research question, semi-structured interviews were used to collect data. The interview comprised eleven open-ended questions to encourage mothers to talk about their everyday experiences with their child with ASD. Responses to two interview questions were analyzed for the current study. The questions were as follows:

1. Please describe some interactions that are regularly/occasionally difficult with your child; why do you think they are difficult?
2. How do you think autism has affected how you interact with your child, if at all?

As a follow up to the second question, the question, “What are your reactions or how do you feel when an interaction does not happen a certain way?” was asked if mothers did not describe their feelings or reactions in response to the first part of the second question. For those mothers who described their reactions, the follow-up question was omitted. Given that the focus of the research question was to understand what impact children with autism had on the interactions with their mothers, the other interview questions that dealt with mothers’ coping strategies and available support systems were not analyzed.

Interpretive Phenomenological Analysis (IPA) of the data involves analysis of both content and frequency of responses (Smith, Flower, & Larkin, 2009). According to this method of analysis, the researcher understands the responses from the participant’s perspective, and
Running head: Child-related factors that influence maternal responsiveness in ASD combines this understanding with the researcher’s own interpretation. During the data collection phase, the researcher is encouraged to collect notes on the interpretation of the participants’ responses. Using this system of analysis, the transcribed data were coded independently by the lead researcher. Each sentence of the interview responses was given a code. Codes describing similar or related concepts were clustered under categories. Themes were generated from these categories of responses.
Reliability

Quantitative Phase

Coding reliability.

The lead researcher independently coded maternal responsiveness (outcome variable), rate of communicative acts and coordinated joint engagement (predictor variables) from the video recordings of parent-child interactions. Coding reliability was achieved by having an independent coder, a graduate student in speech-language pathology, re-code 20% (4 minutes) of the total time of parent-child interaction videos for maternal responsiveness, rate of communicative acts, and proportion of coordinated joint engagement. Random numbers were generated using Microsoft Excel 2007. These random numbers were used as the starting point of the video clip. For example, if the generated random number was 1:32, the start time in the video clip was 1:32 seconds; the end time would be 5:32 seconds. The graduate student re-coded this section of the video clip for all three observational measures. The lead researcher trained the reliability coder using practice video clips and a number of consensus discussions. In order to be reliable, the concordance between the two coders should be 80% (Yoder & Warren, 1998).

Percentage agreement is a widely used method to determine inter-rater reliability. However, there are limitations to using percentage agreement. Grayson and Rust (2001) noted that although the percentage agreement is conceptually simple and easy to compute, it is not the best measure of inter-rater reliability. When percentage agreement is used for two categories, the likelihood of random agreement is high, and the chances for overestimation of the agreement between two raters is high. The Cohen’s Kappa overcomes this limitation by taking into consideration the percentage agreement that occurs between two variables by chance. The disadvantage in using Cohen’s Kappa coefficient is that it has to be completed for each item for each pair of raters, a
time consuming process. Further, judgments about what Kappa coefficients are reliable is questionable as it lowers the estimation of agreement between two raters (McHugh, 2012). Therefore, the concordance between the two coders was calculated using Pearson correlation coefficient. The Pearson correlation coefficient is a valid measure to determine inter-rater reliability when data is presented at a time with one pair of judges (Osborne, 2008). Additionally, this method is preferred for continuous data (such as maternal responsiveness scores) and it measures within-coder consistency (Bailey, 1998). A Pearson correlation coefficient of 0.70 or more is typically accepted for high reliability. In the current study, inter-rater reliability was high for all three coded variables. Inter-rater reliability was $r = 0.94$ for the overall score on maternal responsiveness, $r = 0.87$ for rate of communicative acts, and $r = 0.89$ for proportion of coordinated joint engagement. Results reveal that the inter-rater reliability was high for all the three observational measures.

**Qualitative Phase**

**Transcription reliability.**

The total amount of time taken for each participant was noted, and 20% of the total time of the audio recordings was calculated. The reliability transcriber (a graduate student in speech-language pathology) generated a set of random numbers using Microsoft Excel 2007. Using these numbers as the starting point in the recording, the student transcribed 20% of the interview data. For example, if the starting point was at 0:48 seconds, and 20% of the total time was 2 minutes, the student transcribed the responses from 0:48 seconds to 2:48 seconds. The number of overlapping words between this portion of the transcription and the lead researcher’s transcript was then calculated. Percentage agreement was determined by dividing the number of overlapping words by the total number of words in the transcript. In order to achieve reliability,
ninety percentage of concordance between the two transcripts is required (Heilmann, et al., 2008). The mean percentage agreement between interview responses transcribed by the lead researcher and the reliability coder was 97.3% indicative of high inter-transcriber reliability.
CHAPTER IV

Results

This section consists of two parts. The first part provides results from the quantitative analysis of the data, and the second part describes results from the qualitative section.

Quantitative Results: Research Question: 1

Do the set of variables, including child’s intentional communication, child’s coordinated joint engagement, and child temperament, predict maternal responsiveness?

To answer research question 1, data collected to measure three child-related variables, namely the rate of communicative acts, proportion of coordinated joint engagement, and the surgency factor of temperament were coded from the video recordings of mother-child free play interactions. Maternal responsiveness, a parent-related variable, was measured using the Social Interaction Rating Scales (SIRS). In order to determine if the model, including the three independent variables (rate of communicative acts, proportion of coordinated joint engagement, and surgency factor) predict the dependent variable (maternal responsiveness), a linear multiple regression analysis is the statistical test recommended.

Prior to analysis, the data was screened for presence of missing data points, outliers, and normality. No missing data or outliers were found. With the exception of the proportion of coordinated joint engagement, the data was normally distributed. A square root transformation was conducted to normalize the positively skewed data for coordinated joint engagement. The primary step in a linear multiple regression analysis is to determine the relationship between the independent and dependent variables. The statistical software used for quantitative data analysis was SPSS Version 21.0 (IBM Corp., 2012). A correlation analysis was performed in order to determine this relationship. The correlation values between the independent variables and the
dependent variable determine the accuracy of the prediction model; the stronger the correlation $r$ value, the better is the prediction (Mertler & Vanatta, 2010).

Table 10 below presents descriptive statistics for rate of communicative acts, proportion of coordinated joint engagement, surgency factor scores, and total scores on maternal responsiveness.

Table 10

*Descriptive statistics for the independent and dependent variables (n = 16)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of communicative acts</td>
<td>4.1</td>
<td>2.9</td>
<td>0 – 8</td>
</tr>
<tr>
<td>Proportion (%) of coordinated joint engagement</td>
<td>16.9</td>
<td>19.0</td>
<td>0.1 – 66</td>
</tr>
<tr>
<td>Factor score for surgency</td>
<td>4.8</td>
<td>0.7</td>
<td>3.8 – 5.9</td>
</tr>
<tr>
<td>Total score on maternal responsiveness</td>
<td>12.4</td>
<td>2.3</td>
<td>8 – 17.5</td>
</tr>
</tbody>
</table>

Pearson correlation was used to determine the direction and relationship between the various independent variables and the dependent variable. Table 11 in the following page provides the correlation coefficients for all the measured variables. The results reveal a strong positive correlation between two independent variables, rate of communicative acts and proportion of coordinated joint engagement, indicative of multicollinearity. A lack of relationship between children’s rate of communicative acts and the surgency factor scores is evident. Similarly, there is no relationship between the proportion of time children engaged in coordinated joint engagement and their surgency factor scores.
Table 11

Correlation between independent and dependent variables

<table>
<thead>
<tr>
<th>Measures</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rate of communicative acts</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Proportion of coordinated joint engagement</td>
<td>.908*</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Factor scores on surgency</td>
<td>-.045</td>
<td>-.096</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4. Maternal responsiveness</td>
<td>.371</td>
<td>.472</td>
<td>-.428</td>
<td>1</td>
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*Correlations are significant at the level of 0.01 level (2-tailed)

Rate of communicative acts demonstrates a weak positive correlation, and the proportion of coordinated joint engagement correlates moderately with maternal responsiveness (the dependent variable). The surgency factor of temperament correlates negatively with maternal responsiveness; the strength of the relationship is moderate. These correlation values indicate that maternal responsiveness increases when the rate of communicative acts and proportion of time involved in coordinated joint engagement increase. A negative relationship between the surgency factor of child temperament and maternal responsiveness shows that when children have higher issues with temperament, mothers’ responsiveness reduce. Although results from the correlation analysis indicate weak to moderate relationships between the independent and dependent variables, the relationship is not strong enough to conduct a multiple regression analysis.
Qualitative Results: Research Question 2

From the mothers’ perspectives, what are the characteristics of the child with autism that affect the way mothers interact or respond to their child? What difficulties do mothers face in these interactions?

Three main or overarching themes emerged pertaining to mothers’ perceptions of challenging interactions and the influence of children with autism on their daily interactions.

1. Difficult interactions: “Everything has to be in his/her terms”
2. Parent-child interactions: Positive impact
3. Parent-child interactions: Negative impact

In addition to the three super-ordinate themes, several minor themes emerged from the participants’ responses. Excerpts from participants’ responses have been provided as examples under each theme. Children’s names have been replaced by initials to preserve confidentiality and anonymity.

Difficult interactions: ‘Everything has to be in his/her terms’

Mothers’ responses centered on several challenges they faced in their daily interactions, and why they faced these challenges. On the whole, all mothers were aware of the interaction scenarios that were highly challenging for them. Combined responses from all participating mothers revealed that interaction contexts that involved a high degree of difficulty included everyday skills such as dressing, giving a bath, eating, feeding, toileting, and bedtime routines; having the child to ask for what he/she wants, functional academic skills such as counting, coloring, and drawing; and visits to a restaurant, a friend’s home, or a grocery store. Two mothers reported that playing water games was the most difficult time of interaction with their child, and five mothers reported that play that involved anything educational, such as puzzles,
identifying colors, drawing, and naming pictures were challenging. Interactions during transition from one activity to another were a huge challenge for four participant mothers.

When asked to elaborate on why the interactions were perceived as difficult, mothers reported several reasons. A pervasive theme that emerged from the interview responses was that interactions were easier when they were child-initiated, child-directed, or left to the child’s terms. This theme was considered the super-ordinate theme because all mothers (n = 16) reported the issue, and perceived it to be the primary reason behind difficult interactions. The interactions turned out to be unmanageable when they were initiated or directed by the mother. In other words, when mothers actively participated and engaged in an activity of the child’s choice, or talked about topics within the child’s restricted areas of interests, interactions were perceived to be easy. Mother-initiated activities and interactions predominantly resulted in meltdowns or lack of child engagement. One mother of a verbal child with autism speaks to this:

Eventually, you're talking about Legos, he doesn't talk to you about anything else. Or if he does talk to you, it is constantly why why why why questions. It's never like a typical conversation. So, then that's kind of hard. Or then there are some things that I want to do with him that he doesn't want to do. You know constantly I have to use only Legos. If I try to read a book to him, he won't look through your typical story book; it's only the superhero comic book.

Similarly, a mother of a nonverbal child with autism says:

If it does not involve music, singing to her, or playing outside, then it is pretty much difficult with her. She wouldn't do the puzzles, coloring, joining the dots, anything like that with me....Sometimes, she doesn't understand what I want her to do, so she doesn’t. But for example, if I ask her to color with me, she knows how to color, but she doesn’t want to do it. She is
frustrated, and a lot of crying, and screaming, and then she can’t focus on what I am trying to want her to do.

A second theme that emerged from mothers’ responses was the inability to gain the child’s attention. A majority of the participating mothers (11 mothers) expressed issues with trying to gain the child’s attention, and trying to engage the child in an activity as highly daunting. Some strategies that mothers used to engage in an interaction with the child were: calling out the child’s name repeatedly, maintaining proximity to the child, showing the child an object or toy of interest, or coercing the interaction at times.

If it is an indoor activity, it is hard to entertain him. He wouldn’t look at me. He will be by himself lining up his toys or whatever. I go to him and turn his face to look at me. You know it’s hard, and then if he likes what I have, he will come to me for 2 seconds maybe, and then back again. I know something usually lasts for about few minutes. I know he is becoming more and more engaged now with M helping us with the strategies, but yeah, trying to keep him engaged constantly is very stressful.

Another mother reports her view on why the interaction becomes difficult.

When I think of what is difficult, the first thing that comes to my mind is K doesn’t look at me. Maybe like once or twice when I am playing outside with him, he does. But no! One time, we were at a really fun place at one of the metro parks, but because he doesn’t follow instructions and doesn’t respond to his name, we couldn’t do much. J (sibling) was so excited, but K was kind of lost the entire time. I was more worried that he would run off by himself. So, you know, it’s hard..and constantly going look look look K look! It’s frustrating!
In addition to these findings, three participant mothers stated that interactions were challenging because of the inconsistency in their child’s interests and actions. One mother speaks to this:

*I don’t know why. I am not sure. We go through these phases with everything she does where she loves it loves it, and then suddenly she absolutely doesn’t want to. I don’t know what changes her mind. Like we used to play and talk a lot during bath time at night. And then she doesn’t want to go near the bathtub now. Absolutely not going near bathtub. Eating, same thing. It’s not anything meaningful to me. So, I am not sure how you know, and why they change sometimes, and what I can or should do…*

A positive finding from the qualitative data analysis is that several participant mothers (n = 8) have an awareness and understanding of what the child comprehends or follows, and what he/she does not. An example from one mother’s response indicating her awareness of the child’s ability to comprehend is given below.

*This (the interaction) is hard because it’s one of those things where there is a limit to how much she can process that. You know you can see something sometimes visually and not get it? Blank face or whatever. So, I know I have to change how I say something to her or even show for that matter.*

Nevertheless, three mothers of non-verbal children with ASD report the issue of confusion—i.e., the inability to understand what their child does and does not comprehend. One mother reports:

*I think he does understand sometimes. I don’t know if I am trying to over discipline him. I also don’t know if he is tricking me on what he understands. I don’t want to get in his way. I think probably it is the biggest thing for me, for me to know what he does and doesn’t*
Overall, children’s restricted activities and topics of interest, the inability to gain the child’s attention, inconsistencies in child’s interests, and a lack of understanding regarding what the child’s comprehension abilities appear to be the reasons for challenges in interaction. These findings indicate that mothers have an insight into why the interactions become challenging. In addition, these findings suggest that mothers adopt several strategies to overcome these challenges, and constantly engage the child in their everyday activities and interactions; some mothers report using responsive approaches and others express confusion on how to respond.

In the following section, I explain the second and third major themes that emerged from mothers’ interview responses to the questions, “How do you think autism has affected how you interact with your child, if at all? What are your reactions or how do you feel when an interaction does not happen a certain way?”. Mothers reported both positive and negative influences. Analyses revealed two categories of responses: positive influence and negative influence, but mothers could not be grouped separately into those who perceived positive impact and those who perceived a negative impact. Many mothers who reported negative influences of autism also expressed that autism had contributed to personal growth or had modified their interactions positively. With the exception of one mother, 15 mothers reported that having a child with autism had a definite influence on how they interacted with the child. One mother expressed that although she had perceived a negative impact in the past when her child was nonverbal; she did not see autism impacting their daily interactions currently. Excerpts from mothers’ responses indicating both positive and negative influences have been given below.

All mothers were aware of the impact their child with autism had on their daily life and interactions, and had developed an acceptance for the child’s developmental skills and/or limitations. Further, many mothers believed autism was the reason for their personal growth. All mothers had developed a sense of acceptance toward the child’s diagnosis and developmental differences as revealed by their personal accounts. Reports on positive impact include: spiritual growth, becoming a better person, gaining patience, tolerance, resilience, a sense of responsibility, and viewing life optimistically.

Although factors that contribute to mothers’ perceived positive influence are not clear, a majority of the mothers (n =12) reported that raising a child with ASD impacted them in positive ways. These 12 mothers also reported negative effects of raising a child on the autism spectrum. Four mothers did not report any positive effects. The following excerpt provides evidence for personal growth in a mother, a single parent, of a nonverbal child with ASD. In response to the second question, she says,

Most definitely! Well, for one, before I had my son, I was a laid back party person. You know I had no responsibilities……It (autism) made me grow up faster than just being a mom. I feel even as a person, it has made me grow morally and spiritually, and see or to look at the world differently. Mainly because I know what it takes to be in this role of a mother of a child like O. It’s the choice I made. Yeah, it has definitely changed me to a better person a better mom, and to add to the cake more especially to autism.

In response to the follow-up question, the mother says,

And yeah, I say Hi how are you and how is your day. I just keep talking to him even if I don’t get a response. Sometimes, it gets very lonely because I don’t have any one to talk to, but
at the same time I know as long as I keep engaging him in a conversation, I am not shutting him off. I never want to ignore him and be like he doesn’t talk, so, I sulk. Because you know it’s like he picks up from things. So, I just continue to talk.

Mothers reported that they had developed positive interaction strategies such as following the child’s lead, and providing synchronous language input. These strategies were devised based on successes and failures in interactions in the past. Although two mothers reported that they had attended a formal parent training program (The Hanen More Than Words and Applied Behavioral Analyses), the other 14 mothers did not attend any formal parent education or parent training sessions. All mothers reported that they read resources on autism on the internet and books. Further, they received suggestions from their speech-language pathologist. In the following excerpt, one mother discussed her acceptance for the child’s nature and his developmental limitations. She reported that she had learned to modify her interactions to keep him engaged in the activities.

Well, I know he is not doing this because he is trying to be naughty. You know I think he is more instinctive; that is D. So, I don’t force him to do something. We’ll get to some of those skills. Maybe not today, but some day, we’ll get there. I try to talk about what he likes more when we are outside playing I explain how something works, and I do that slowly so that he can process all the information, and I try to get him to look at me. That’s something we have been working on with his speech therapist as well. If he is resistant, I start to tickle him. Laughter is huge. Because of getting him to kind of laugh and a lot of floor play, I just kind of get him to interact and play with me. I know this because that’s when he responds. I do things that I know he likes like bubbles and playing with sand and anything with water is fun for him. And he warms up to me pretty quickly. Basically just go with the flow!
Another mother, who has two children with autism, commented on the level of detail and planning that goes behind the daily interactions with her children. Her situation was unique among the group of participants as she had an older son with autism, and had more experience in raising a child with ASD.

*I am very patient and observant with her. I don’t think I would have done that if she did not have autism. And having H before C, I understand there are limitations to how they process everything. I use a lot of visual strategies. I plan each day and every activity I do with them very carefully. I have to constantly be ahead of them in the game, and repetition is key with both of them, and of course visuals too. Like my sister asks me what are all these schedules and pictures around the house....For C, I know what to do to calm her like I squeeze her arms. Pretty much everything is what they like to do. I enforce only bedtime, mealtime, and hygiene. Besides that, I do what they like to do. You know like we have rose bushes up front. She likes flowers, and when I am attending to them, I talk about their color and smell, and then she names each flower you know with her friends’ names, and we enjoy that. Yes – there are speed bumps; we go down and up and go off sometimes, but we keep going with what we have to learn...slowly and steadily.*

**Parent-child interactions: Negative impact.**

In response to second interview question, most mothers reported that they experienced sadness and frustration when their child did not respond to them when their name was called or did not show interest in interacting with them. One mother said, “*I hate it when he just wants to be in his own world, and doesn’t realize I am his mom.*” Heightened levels of stress, sadness, suicidal tendencies, emotional instability, depression, and fear of the future were negative reactions of mothers that followed constraints placed on them by their child with autism. Some
mothers reported that they did not know what to do or how to react when their child did not comply or did not communicate reciprocally.

Six mothers cried and readily discussed how having a child with autism had brought immense sorrow, stress, and anxiety in their lives. Three mothers reported episodes of loneliness, an occasional desire to end their life, and fear regarding the child’s future. Although the qualitative results were not categorized based on the child’s language levels, it is important to highlight the experiences of mothers of nonverbal children with autism. Mothers reported elevated levels of stress, anxiety, depression and suicidal tendencies when their children demonstrated no signs of functional communication and had no verbal language. This cohort of mothers reported loneliness, and lack of understanding of how to engage their child in a variety of activities. One mother’s account describes her inability to understand how to interact with her nonverbal child.

I realized a couple things. Because he has autism, I think I definitely have changed the way I interact with him...that I completely enabled his bad behavior. Like even when he took away his brother’s toy, I would take it away from J (brother) and give it to K. I have really tried to get into his world, but he doesn’t want me there. You know what I mean? I feel lonely. So, I have to force myself into his world. I kind of push him to do things because he wouldn’t. I think I have to hold him to a set of standards and expect the same from him that I expect from his brother. And pushing him to do things is the way I think because it’s scary when he is not doing anything. I am constantly next to him...do this do that.

Another mother discusses the influence of autism on her, and describes using coerciveness as a strategy to tackle her child’s restricted interests and activities.
I think it does! It is like we have a label on our child, and we want to exceed that label, and it’s not like she is going to do anything at all if I don’t constantly nag her and push her to do something. We have to! I might sound like a terrible mother, but what do you do when she wants to only watch TV, sing, and play outside. Every other play seems to stress her. So, normal happy interactions don’t happen around here!

One mother expresses her grief and negative reactions in raising a nonverbal child with autism.

That’s the hardest thing..his..I just..I have tried to stop focusing so much on why he has to talk..I so badly want him to talk because that’s what I really really want, but it’s okay if he doesn’t, but I am looking forward to a time where he can just tell us exactly what he needs and wants. (Mother cries) It’s sad more than anything. You know I wanted to end my life one day, but no! I try to buck up and there’s always somebody that has so many more things on their plate. You know I have seen so many more severe situations, but this is still my situation and it is still hard.... I wonder what will happen to C God forbid if something happens to me. And nobody is going to fight it for your kid like you do. And I think people take it for granted that their kids are just normal, functioning normally and playing with friends, and being self-sufficient and all that, like that is such a gift that I... (Mother cries)

As the above excerpts suggest, mothers who participated in the current study indicate that their interactions and view on life have been influenced by the nature and developmental limitations of their child with autism. Some mothers comment on how they learned positive, responsive strategies to keep their child engaged in the interaction. Other mothers report a lack of knowledge on how to engage the child in daily interactions; thereby, they begin using coercive and directive parenting styles. Responses reveal that some mothers, especially mothers of
Running head: Child-related factors that influence maternal responsiveness in ASD nonverbal children with autism, face immense sadness and frustration owing to their child’s lack of ability to communicate.

**Summary of results**

In summary, results from the quantitative phase reveal that one child-related variable, namely the proportion of time spent in coordinated joint engagement correlates moderately with maternal responsiveness. Qualitative results reveal that mothers experience both positive and negative impacts of raising a child on the autism spectrum. While reasons for perceived positive impact are unclear from these findings, children’s need for topic control, restricted activities of interest, inability to gain the child’s attention, reduced compliance, and limited communication were reported as reasons for difficulty in daily interactions and perceived negative impact. Further, a majority of the mothers perceived dyadic interactions to be less challenging when the activities involve the child’s attentional focus or topics of interest. In the following section, I discuss the results from the quantitative and qualitative phases separately. In addition, a discussion of integrated findings from both the phases is provided.
CHAPTER V

Discussion

Overview

One of the biggest goals of parent-mediated interventions is helping parents of children with autism understand the importance of positive dyadic interactions and their benefits for a child’s overall developmental outcome (Girolametto, Greenberg, & Manolson, 1986). In an attempt to understand how to provide better and consistent support to parents in their daily interactions with their child with autism, the current study explored three different variables and their effects on maternal responsiveness, an important aspect of parent-child interactions. Additionally, the study obtained mothers’ perspectives regarding characteristics of the child with autism that influenced their lifestyle and interactions, and reasons for successes and challenges in these interactions. This preliminary study was designed with the plan that if characteristics of children with autism that potentially influence maternal responsiveness were identified, professionals could possibly educate parents who face difficulties in their daily dyadic interactions, on the relationship between child characteristics and responsiveness. The qualitative phase of the study provided an avenue for further exploration of the issues faced by mothers. Sadness, frustration, stress, and the demand of having to manage the child’s disorder throughout the day has been highlighted.

In this mixed-methods study, two specific research questions were answered: (1) Does the set of variables, including child’s intentional communication, child’s coordinated joint engagement, and child temperament significantly predict maternal responsiveness? (Quantitative phase), and (2) from the perspective of mothers of children with autism, what are the characteristics of the child with autism that affect the way mothers interact and/or respond to
Their child? What difficulties do mothers face during these interactions? (Qualitative phase). Mother-child interactions were recorded in a free play context to measure maternal responsiveness (dependent variable) and child’s rate of communicative acts, proportion of time spent in coordinated joint engagement, and the surgency factor of child temperament (independent variables) for the quantitative phase. In the qualitative phase, mothers participated in a semi-structured interview to provide their perspectives regarding characteristics of their child with autism that appear challenging and reasons behind the perceived difficulty in their daily interactions. Quantitative results indicated a weak positive correlation between children’s rate of communicative acts and maternal responsiveness, a moderate positive correlation between children’s coordinated joint engagement and maternal responsiveness, and a weak negative correlation between children’s surgency factor scores and maternal responsiveness. Therefore, a multiple regression analysis was not performed. Results from the qualitative phase revealed that while some mothers experienced a positive impact of their child with autism, others experienced a negative impact. Additionally, mothers reported that the biggest reason for the challenges in their interactions was their child’s restricted interests in play and everyday activities, and that interactions were easier if the child was given topic control.

In the following sections, I provide a discussion of findings from the quantitative phase, and a discussion of findings from the qualitative phase. In the subsequent section, I present the limitations of the study, and describe the implications for future research and suggestions for clinicians.

**Discussion of Findings from the Quantitative Phase**

Children with autism who participated in the study demonstrated varying degrees of skills in terms of their use of communicative acts and joint engagement. Descriptive statistics reveal
the large range of variability in the number of communicative acts used per minute and proportion of time spent in coordinated joint engagement. In terms of temperament, a relatively narrow range of surgency factor scores suggests that children with autism who participated in the study, did not demonstrate high variability in terms of their temperament profiles. Statistical analysis revealed weak correlations between two of the independent variables (rate of communicative acts and surgency temperament factor) and maternal responsiveness.

**Coordinated joint engagement and maternal responsiveness.**

Episodes of coordinated joint engagement lasted for a mean duration of 3.25 minutes and a mean percentage of 16.9% of the total parent-child interaction time (20 minutes). The coding procedure was based on Adamson, Bakeman, and Deckner’s (2004) joint engagement coding system, a widely used method for coding different joint engagement states. As stated previously, this method allows the coder to record the amount of time the child spends on coordinated joint engagement, a child-initiated engagement state. Further, the coding reliability for coordinated joint engagement between the two coders was found to be 0.89, indicative of high inter-coder reliability. A moderate positive correlation between children’s proportion of time spent in coordinated joint engagement and maternal responsiveness was found following a correlation analysis. A glance at the raw scores is also suggestive of this linear relationship. For example, participant child # 5 spent a high proportion of time in coordinated joint engagement (66%) during the interaction; the corresponding maternal responsiveness score was found to be 17.5 (high). Similarly, maternal responsiveness score was 10.5 (low) when child # 3 spent only 1% of the time in coordinated joint engagement. These results suggest that when children spend longer periods of time in coordinated joint engagement, mothers tend to be more responsive. This finding concurs with the qualitative results in that mothers report dyadic interactions to be less
challenging when activities are child-initiated, and when the child and mother actively engage in the same activity. Further, within the extant research, a moderately strong relationship has been found between the amount of time children spend on coordinated joint engagement and responsive parenting (Patterson, Elder, Gulsrud, & Kasari, 2013). Intervention focusing on extending the period of time spent in coordinated joint engagement can be beneficial for children with ASD. Although a causal relationship cannot be established between the two variables, when children spend longer times in joint engagement, it is likely to evidence an increase in maternal responsiveness.

**Intentional communication and maternal responsiveness.**

A frequently used measure of intentional communication in preverbal and verbal children is the rate of communicative acts (Wetherby & Prizant, 1993). In the current study, the mean rate of communicative acts was 4.1 ranging from no communicative acts during the entire interaction to 8 communicative acts per minute. Rate of communicative acts had a weak positive correlation with maternal responsiveness. On first glance, it is difficult to parse out the reasons for a weak relationship between the two variables. A closer look at the descriptive scores reveals that even when the rates of communicative acts are higher, maternal responsiveness scores do not increase linearly. For example, the total maternal responsive score is 12 for a child who produces 7 communicative acts per minute and for a child who produces 3 acts per minute. Therefore, it is likely that in addition to child characteristics, there might be maternal characteristics that influence the quality of their responsiveness. In addition, the relatively small sample size could have led to weak correlations. The weak correlation between the two variables could also be attributed to mothers’ difficulty in interpreting the communicative acts. In children with ASD, communicative acts are produced at a lower rate; communicative acts are inconsistent,
Running head: Child-related factors that influence maternal responsiveness in ASD

idiosyncratic, and subtle in nature (Wetherby, Watt, Morgan, & Shumway, 2007). Therefore, it
might be difficult for mothers to identify and interpret their children’s communicative acts.
Yoder and Warren (1999) noted that mothers of children with autism face challenges in
interpretation of children’s communicative acts and identifying if the child’s action or behavior
is communicative or not. Other studies have shown that parents, teachers, and professionals
demonstrate inconsistency in their interpretations of communicative acts for children with
developmental disabilities (Keen, Sigafoos, & Woodyatt, 2005; Wilcox, 1990). Thus far, no
study has investigated the direct link between communicative acts or intentional communication
in children with autism and maternal responsiveness. Nevertheless, two studies reveal that
increase in maternal responsiveness leads to increase in intentional communication in children

The results of the study might vary if children with autism were categorized into verbal
and non-verbal children in order to investigate their effects of maternal responsiveness. It might
be helpful to know if the children’s nonverbal status makes it increasingly difficult for parents to
interpret their communicative acts, thereby modifying their responsiveness. Given this finding,
the relationship between use of communicative acts and responsive parenting needs further
investigation. A detailed microanalysis of each parent-child dyad will provide additional
information about the effects of the child’s communicative status on maternal responsiveness.

**Child temperament and maternal responsiveness.**

The investigation of child temperament as a possible predictor of maternal
responsiveness is a novel addition to the current study. Research in the past has not investigated
the effects of temperamental profiles of children with autism on parent-child interactions or
parental responsivity. Therefore, this study is a first attempt at exploring this relationship. The
Children’s Behavior Questionnaire used to measure children’s temperament, includes three factors, namely surgency, effortful control, and negative affectivity. The relatively small sample size (n = 16) of the current study allowed for the inclusion of only one temperament factor (surgency) in the analysis. Surgency, which includes the child’s activity level, impulsivity, high intensity pleasure seeking, and shyness or social withdrawal has been shown to be high in children with ASD (Adamek et al., 2011). Future studies investigating temperament in children with ASD could use a bigger sample size to overcome the limitation of the current study by including all three factors of child temperament.

Additionally, results indicate that the surgency factor of temperament had a weak negative correlation with maternal responsiveness. The negative correlation finding is consistent with previously published work on the association between child temperament and responsive parenting in children with developmental disabilities other than autism (Bostrom, Broberg, & Bodin, 2011; Gross & Tucker, 1994). However, reasons for lack of a strong correlation within the cohort of children with ASD in the current study are unclear. Increasing the sample size could potentially lead to differences in these findings. Alternatively, the use of a different measure of temperament could yield varying results. The Children’s Behavior Questionnaire (Rothbart, Ahadi, Hershey, & Fisher, 2001) was selected for the current study because it includes items on temperament that are relevant to the preschool aged children, and has been widely used in autism research (Adamek, et al., 2011; Slatcher & Trentacosta, 2012). The use of other measures such as the Colorado Childhood Temperament Inventory (Rowe & Plomin, 1977), the EAS Temperament Survey for Children (Buss & Plomin, 1984), the Carey temperament scale (Carey & McDevitt, 2007), or the Temperament Assessment Battery (Martin, 1999) could have resulted in differences in temperament scores and the relationship between child temperament
Running head: Child-related factors that influence maternal responsiveness in ASD and maternal responsiveness. Although previous research suggests that children with autism display increased negative temperaments with higher scores on surgency, negative affectivity, and lower scores of effortful control, when compared to children with Down syndrome (Adamek et al., 2011; Kasari & Sigman, 1997; Landry, 2000), no clear effect was demonstrated in this study. Despite the lack of effects, temperament in ASD warrants further study with larger numbers of participants and designs allowing for more temperament factors to be considered.

**Measure of maternal responsiveness.**

As the quantitative phase of the study focused on identifying if the three predictor variables predict maternal responsiveness, it is important to consider differences in the way maternal responsiveness is measured. Differences in the way we measure maternal responsiveness could be a possible reason for weak correlations between the two predictor variables and the dependent variable. The Social Interaction Rating Scale (Ruble, McDuffie, King, & Lorenz, 2008) was used to measure maternal responsiveness in the current study. This scale measured six aspects of maternal responsiveness, including level of affect, maintenance of interaction, directiveness, contingency, initiation, and level of movement. The Maternal Behavior Rating Scale (Mahoney & Powell, 1986) is another commonly used scale to measure responsiveness in parents of children with developmental disabilities including autism. This scale includes 12 items and has high reliability (Mahoney & Perales, 2003). A score of 5 is considered a high score on an item, and 1 represents a low score. Other methods use moment-by-moment coding of a short duration of video-recorded parent-child interaction (Yoder & Warren, 1998, 1999). For example, Siller and Sigman (2002) coded the percentage of language input that was synchronous to the child’s focus of object or action. Haebig, McDuffie, and Weismer (2013) coded parents’ use of verbal responsiveness, including follow-in comments, follow-in directives,
and descriptions. In addition, they coded for redirections, introductions, and other-talking as control variables. Researchers have also used self-reported measures of maternal responsiveness (e.g., Muller, 1994; Pridham, Lin, & Brown, 2001) for the infant population.

**Discussion of Findings from the Qualitative Phase**

Maternal reflections reveal mothers’ perspectives about raising a child with autism, what challenges impede their interactions, and why they believe interactions become challenging. These personal accounts also reveal how some mothers experience a personal growth following the initial years of caregiving, while some mothers report a negative impact. Overall, mothers report several activities of daily routine to be challenging due to four reasons: (1) the child’s restricted topics and activities of interest, (2) the inability to gain the child’s attention, (3) inconsistent interests in activities and objects of play, and (4) maternal lack of understanding regarding the child’s comprehension abilities. Results from the qualitative phase indicate that mothers face a wide range of difficulties in their dyadic interactions. It appears that the challenges and issues faced by mothers tend to depend on the characteristics of the child in addition to several maternal factors. Perceived challenging routines and activities were different for each mother-child dyad. For example, while three mothers perceived the child’s inconsistent interests to be a reason for challenges in their interaction, other mothers did not report such a difficulty. Additionally, the nature of the activity also seemed to influence the dyadic interaction. For instance, for one mother, interactions during feeding, dressing, and bathing were highly challenging, whereas activities that involved functional academic skills were difficult for another mother. These differences suggest that the experiences of each mother-child dyad are unique. Therefore, addressing the needs and challenges of individual mother-child dyads may be an important clinical consideration.
Similarities between findings from this study and reports of parents of children with other disabilities can be drawn (Cuskelly, Hauser-Cram, & Van Riper, 2007; Reichman, Corman, & Noonan, 2007). However, when these findings are compared to the previously published work, there is a paucity of research on parents’ perspectives on difficult interactions with children with ASD. Most qualitative studies that involve parents of children with ASD investigate what the effect is of a child with autism on the family well-being, marital relationships, finances, and parents’ work life. One study portrayed the voice of a mother of an adolescent with autism; she narrates her difficulties in coping with the interactional challenges during activities of daily routine (O'Connell, O'Halloran, M., & Owen, 2013). Knowledge regarding which interactions place more constraints on dyadic interactions will allow clinicians to address goals across various interactional contexts during intervention.

The reasons behind the difficulties faced during interactions that mothers reported, revealed several insightful responses. One notable finding from this study is the perceived difficulty in interactions when they are parent-initiated or parent-directed. Excerpts from the interviews show the struggles that mothers face while attempting to redirect the child from the object or action of focus, and engage the child in another activity. Previous research indicates that mothers of children with ASD tend to redirect their child’s attention on an object or activity in order to gain the child’s attention and engage with the child (Warren & Brady, 2007). On the one hand, it appears that mothers are not sure how to interact with the child when they are left with very few options in terms of toys or activities to engage with their child. On the other hand, when topic control is given to the child, mothers perceive the interactions to be easier. In addition to the lack of understanding on how to gain the child’s attention to focus on a different activity, mothers encounter crying, screaming, and aggressive reactions from the child.
Participant mothers report that such meltdowns make the interactions increasingly difficult. Within the extant research, no qualitative investigations have reported this finding. However, Marfo (1992) noted that responsive parenting was evoked when children were given topic control; directiveness was associated with parent-initiation and parent control. Similarly, in an intervention study, Carter, et al. (2011) showed that maternal responsiveness was lower in mothers who had children with high levels of object interest, —i.e., children were highly focused on playing with a large number of objects and spent limited instances in engaging with the parent.

In addition to the issue of topic control, some mothers express that inconsistency and unpredictability in child interests and activities challenge positive interactions. As parent-child interactions are bidirectional and reciprocal, it is highly likely that parental responsive interactions are difficult when the child displays unpredictable or inconsistent foci of interest. The results of the current study also reveal that some mothers have a sound understanding of the disorder; they are aware of the processing limitations of children with autism, and they recognize what their child understands and does not understand. However, some mothers reportedly have less knowledge regarding the nature of autism and lack insight into why their child behaves a certain way. Difficulty in interactions, and issues with coping with a child with autism due to limited knowledge and understanding of the disorder have also been reported by Luthra and Perry (2011). These results suggest that when interactions don’t happen in predicted ways, it might be helpful to provide parents with a wide array of strategies to keep the child engaged in the activities. Further, interruptions in ongoing interactions can be prevented, and gains in child developmental outcomes can be achieved.
Positive influence.

While most studies have focused on the negative attributes and effects of caregiving for a child with autism (Karst & Van Hecke, 2012; Vohra, Madhavan, Sambamoorthi, & St. Peter, 2013), few studies have reported positive influences of the child with autism on parents and the family. Findings from this study supporting a more encouraging view indicate that the negative impact caused by children with autism on their mothers is not universal. Although only two mothers had attended a formal parent training program, several mothers from the participant group reported personal growth in terms of increase in patience, tolerance, resilience, and better spiritual experiences. Mothers also expressed that they had begun to view life optimistically and had become more responsible individuals. While the reasons that factor into this positive impact is unclear, knowledge of ASD, better systems of social support (family, professional, and religious), healthy coping strategies, and increased acceptance of the child’s developmental differences could be potential contributors.

Rubens (2009) noted that during the phase of acceptance, many parents of children with disability encounter positive emotions and personal growth. As all children who participated in the study received a diagnosis of ASD either before or around 3 years of age, it is possible that many mothers have had the time to move beyond their grieving process and gain acceptance of the child’s developmental condition, thereby leading to enhanced positivity. Although research on the positive impacts of parenting a child with autism is slim, one investigation in the past revealed similar findings. Parents of children with autism become highly resilient and humble, gain an appreciation for life, develop empathy, patience, and more compassion toward others (Bayat, 2007). Marcus, Kunce, and Schopler (2005) noted that when parents have a child with autism, their sense of togetherness and sharing improves, and they begin to communicate more
and reach out to other families with children with disabilities. Johnson, O’Reilly, and Vostanis (2006) and Murphy, Christian, Caplin, and Young (2006) found that some parents of children with disabilities other than autism developed stronger relationships in their marriages or with their partners.

In addition to reports of personal growth, mothers expressed that they had devised several positive engagement strategies to keep the interactions and activities going. For example, one mother reported that she believed in ‘going with the flow’. Others emphasized doing activities that the child liked and following the child’s lead. Although all mothers reported that they read resources on autism online or from books, it is important to note a majority of the mothers (except two) did not attend any parent training programs; they had developed the strategies based on prior experience and the outcome of their everyday interactions. Mothers’ personal accounts also revealed that they had awareness and understanding of their child’s processing limitations. Therefore, they believed in modifying the interactive behaviors to adapt to the child’s developmental level or changing focus of interest. Within the extant research, language input that is synchronous to the child’s object or action of focus, and follows the child’s lead, has been found to promote language development (Haebig, McDuffie, & Weismer, 2013). Although not all participant mothers reported the use of these positive engagement strategies, the fact that some mothers have learned to use these techniques through experience is an encouraging finding.

Despite the challenges involved in raising a child with ASD, mothers reported experiencing a positive influence. It is critical to note that increased acceptance, resilience, knowledge regarding the nature of autism, increased patience, and the use of responsive interaction strategies are all mother-driven factors. Although the findings from this study cannot be generalized to the entire population of parents of children with autism, it appears that some
mothers have identified ways to interact positively with their children in order to maximize the benefits of the interaction, while others continue to experience challenges. Further, it is impossible to classify mothers as those who experience a positive impact and those who experience a negative impact, because mothers who reported positive experiences, also reported negative experiences. Nevertheless, these findings provide additional evidence to confirm that in addition to child-factors, maternal acceptance, resilience, knowledge regarding autism, and availability of supports could influence parent-child interactions (Bekhet, Johnson, & Zauszniewski, 2012; Benson, 2012; Luthra & Perry, 2011).

**Negative influence.**

Results suggested that all except one mother recognized that their child’s autism had modified their interactive patterns. Mothers readily described the negative effects of a child with autism. Sadness appeared to the immediate reaction for all mothers, followed by frustration, suicidal tendencies in a few mothers, depression, stress, fear of the future, lack of knowledge and confusion regarding how to interact with the child, and emotional instability. All mothers of nonverbal children with autism reported heightened stress and anxiety over the fact their child did not communicate or use verbal language. There is extensive evidence from previous literature indicating the association between children’s limited language and communicative skills and elevated stress and anxiety levels (Konstantareas & Homatidis, 1989; Pisula & Kossakowaska, 2010). These qualitative findings are also consistent with the literature on maternal emotional instability, depression, and fear of the future (Hoppes & Harris, 1990; McStay, Dissanayake, Scheeren, Koot, & Begeer, 2013; Ogston, Mackintosh, & Myers, 2005). Thus far, there has been no prior evidence to support the presence of suicidal tendencies and lack of knowledge regarding interactive behaviors in parents of children with autism.
In addition to the emotional and psychological negative impact, mothers of children with autism report the use of directive and coercive styles of parenting in order to gain the child’s attention, engage the child in an activity, or have the child communicate functionally. For example, one mother expressed that she would constantly keep the child engaged by asking him to do one activity followed by another. Some mothers reported repeating instructions until they achieved child compliance. A large body of evidence shows the use of directive parenting styles in parents of children with developmental delays (e.g., Mahoney, Fors, & Woods, 1990; Marfo, 1992; Murray & Hornbaker, 1997). Slow vocabulary development (Akhtar, Dunham, & Dunham, 1991), limited functional communication and cognitive abilities (Marfo, 1990), lack of social engagement and inability to attend to information (Mahoney, Fors, & Wood, 1990) were associated with maternal directiveness. These studies support the findings of the current study in that within the group of participant mothers, although some mothers have identified strategies to engage in responsive interactions, some mothers, especially mothers of children with limited communicative ability, face difficulties in being responsive. In the entire population of parents of children with ASD, it is critical to identify this latter group of parents, who face challenges with responsive parenting or practice directive parenting styles, and provide them additional avenues of support and increased opportunities to attend parent-training and parent-education programs.

Integration of Mixed-Methods Findings.

An important contribution that this study brings to the research on parent-child interactions in families of children with autism is the mixed-methods approach used to explore the child-related factors that influence maternal responsiveness. Findings from the quantitative and qualitative phases converge to provide preliminary evidence for children’s joint engagement as a potential factor that influences maternal responsiveness. However, quantitative results on the
relationship between children’s rate of communicative acts and children’s temperament scores on the surgency factor do not concur with qualitative findings. Nevertheless, one noteworthy convergence in the results is that mothers who reported that they used responsive strategies when interactions did not happen in the desired way, received optimum scores on maternal responsiveness on the SIRS. This finding is encouraging because it suggests that mothers consciously decide to use responsive strategies with their child with ASD, recognizing the benefits responsiveness has on child development.

Additionally, the qualitative phase provides novel evidence in terms of the positive impact that children with autism could have on their mothers. While most studies in the past have focused on the negative impact caused by children with autism on parents and families, this study highlighted the influence of children with autism on personal growth and positive interactions. In terms of the negative impact, lack of functional and reciprocal communication in children with autism was identified as a factor that created increased levels of stress and frustration in some mothers in addition to the confusion of not knowing how to interact with the child. This finding suggests that the choice of rate of communicative acts as a predictor variable in the quantitative phase could potentially contribute to maternal responsiveness; this lack of agreement in the findings is curious. Additionally, lack of compliance, a factor related to temperament, was also reported as a challenge for dyadic interactions. Therefore, future studies could examine the association between lack of compliance in children with autism and parental responsiveness.

Limitations of the Study

The study has several limitations. First, this study was conducted with a small sample size (n = 16) limiting the prospect to detect a potentially meaningful relationship between the
variables under investigation. A large number of participants could also allow the inclusion of all three temperament factors, namely surgency, effortful control, and negative affectivity for analysis. Although the predictor variables selected for the study emerged from previous research evidence and clinical issues, there are perhaps several other child- and parent-related variables that might influence responsive parenting, but have not been examined in this project. Children with autism have high individual variability in terms of their symptoms (Trembath & Vivanti, 2013), their sensory and temperament profiles (Hepburn & Stone, 2006), and comprehension and expressive language abilities (Tager-Flusberg, 2000). This high variability in language and communication, reciprocal social interaction, and use of restricted and repetitive and stereotyped behaviors in the group of participant children is a drawback to the study. Future studies could potentially group children with autism based on their language levels or levels of object interest.

Another limitation of the study is the possibility of a Hawthorne effect. Although mothers were asked to play with their child as they normally would, the chance of them modifying their behaviors as a result of being video recorded cannot be eliminated. Weak correlations between the predictor and predicted variables in the quantitative phase suggest that the findings from this study are not confirmatory in nature. As this study is an exploratory effort, there are potential avenues for continued research. In the qualitative phase, member-checking was completed only for 13 out of 16 participant mothers. Therefore, interview responses of three mothers were not validated. One final limitation to the study is that two mothers had participated in a formal parent training program prior to participation in the study. The mother who attended the Hanen More Than Words program received the highest total score on maternal responsiveness. This high score could be attributed to the prior training she received.
Future Directions

Despite the limitations, the current study enhances our understanding of the potential effects of children with autism on their mother-child dyadic interactions. There are several potential avenues for future research in the area of parent-child interactions in families of children with autism. Most importantly, the relationship between parent-child interactions and several child-related factors such as presence of behavioral problems, social interaction, cognitive, and adaptive skills; child compliance and child’s topic control can be examined in order to obtain a better understanding of the impact that characteristics of children with autism can create on their everyday dyadic interactions. While conducting such a study, it is important to control for parental characteristics and availability of social support. Additionally, this study included only one factor of temperament, namely surgency, in the investigation. Future research could continue investigating how other factors of temperament such as negative affectivity and effortful control affect parent-child interactions.

Longitudinal studies are required to map the trajectories of the development of parent-child with autism dyadic interactions. These studies could reveal the child-related predictors of maternal responsiveness at different stages of the child’s development. Such longitudinal investigations will provide a better understanding of the transactional and reciprocal nature of interactions between children with autism and their parents.

Although the results of the study are exploratory in nature, consistent use of measures of responsive parenting in clinical settings can be beneficial. Clinicians could obtain baseline information regarding parental responsiveness using one of the several responsiveness scales, self-report questionnaires, or semi-structured interviews. Baseline information will reveal the challenges faced by parents in their daily interactions and the stressors they experience. This
information would help clinicians design parent specific training and education activities. Most importantly, clinicians could focus on each parent-child dyad as a separate unit and address their issues, rather than adopting a ‘one strategy fits all’ method.

Another avenue for potential future investigation lies in investigating variables such as parent acceptance, resilience, and parents’ knowledge regarding the nature and interaction differences of children with autism, rather than focusing on negative influences. Such investigations will provide additional information for clinical service provision. Additionally, parents who experience a positive impact, and those who have high levels of acceptance, better social supports, and positive coping strategies can be employed as peer mentors for those parents who face heightened levels of challenges in their interactions.

The current study examined mother-child interactions in a single free play context. Future studies could extend this investigation to contexts of daily routine, especially those that have been reported by mothers as highly challenging. Considering mothers as primary caregivers of children, the current study investigated the influence of child-related factors on maternal responsiveness. Future studies could examine the impact on other members in the family, such as fathers, and siblings. In addition, replication of the current study with a larger sample size is an important next step. Previous studies have observed and coded parent-child interactions in durations of 10 to 20 minutes (e.g., Yoder & Warren, 1998; McDuffie & Yoder, 2010). Examining parent-child interactions across several different activities throughout the day might provide a more ecologically valid understanding of the relationship between the variables.

One study indicated that there is no relationship between maternal responsiveness and language abilities in children with ASD (Hutman, Siller, & Sigman, 2009). Contrastingly, the results of the current study suggest that more information is needed to comprehend the effects of
the child’s language or communicative status (nonverbal and verbal children with autism) on maternal responsiveness. Therefore, future research should compare the effects on maternal responsiveness as a function of child’s communication and language status. Finally, the current study included families from Caucasian English-speaking families. Upcoming research could incorporate parents from different cultural and linguistic backgrounds to explore if autism creates similar impacts in other cultural and linguistic populations.

**Clinical Implications**

This study has several direct and indirect clinical implications. Clinicians could interview parents regarding their available supports, coping strategies, and concerns before enrollment in intervention to address the specific needs of each parent-child dyad. Video recordings of parent-child interactions can be obtained during client intake to provide feedback and support to parents who face difficulties in their daily dyadic interactions. Parents would also benefit from consistent and active involvement during intervention. Intervention for children with ASD and other developmental disabilities emphasizes the measurement of child outcomes following intervention (Mandelberg, Frankel, Cunningham, Gorospe, & Laugeson, 2013). Parental outcomes following intervention could also be measured as it will help determine how to provide better support to parents. Child temperament does not receive much attention in clinical practice, especially for children with ASD. Incorporating assessments for temperament during evaluation such as the Carey Temperament Scale and the Children’s Behavior Questionnaire will also be helpful in designing intervention goals. Taking efforts to reduce parental stress and enhance self-efficacy by referring parents to seek support from allied professionals such as counseling psychologists is a mandatory. Further, clinicians could provide access to multiple sources of support for parents such as parent-support groups and web-based social forums. Most support
groups are accessible to middle-high income, and well educated families (Mandel & Salzer, 2007). Therefore, supports have to be made accessible to all parents irrespective of their financial or educational status.

**Conclusion**

In conclusion, this study is a preliminary step and a meaningful addition to the work on parent-child interactions in families of children with autism. In contrast to a large number of studies that examined the effects of responsive parenting in communication, language, and social development of children with ASD (Haebig, McDuffie, & Weismer, 2013; Ruble, McDuffie, King, & Lorenz, 2008; Siller & Sigman, 2002, 2008), the current study explored child effects on maternal responsiveness. Converging evidence from the quantitative and qualitative phase reveal a possible relationship between children’s coordinated joint engagement and maternal responsiveness. Further, mothers who reported using positive interactive behaviors in their interactions also obtained higher scores on maternal responsiveness. Weak correlations were found between children’s intentional communication, child temperament, and maternal responsiveness. Qualitative results indicate that all mothers recognize the impact of their child on their interactive behaviors and lifestyle. Nevertheless, all mothers do not experience the same issues; some mothers perceive more negative impact than others. Personal growth, increased patience and resilience, and a better understanding of the benefits of responsive strategies have been reported as positive effects of raising a child with autism. Sadness, frustration, lack of understanding regarding how to cope with difficult interactions, and directive and/or coercive parenting styles appear to be the negative effects on mothers. Children’s limited communication ability, inability to gain the child’s attention, restricted topics and activities of interest, need for topic control, and limited compliance were reported as reasons for perceived negative impact and
Running head: Child-related factors that influence maternal responsiveness in ASD challenges in daily interactions in this group of mothers. Despite the lack of confirmatory evidence, this study indicates that mothers of children with ASD are a vulnerable population that may require specialized attention, assistance, and training in addition to the supports they receive in current day clinical practice. Increased parental support might in turn benefit developmental outcomes for children with autism spectrum disorders.
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APPENDIX A

Demographics Questionnaire

Date: _________
Participant Number: ______

1. Do you have a 3-5 year old child with autism?       Yes   No

2. What is his/her date of birth? ____________________________________________________

3. What is your age? ______________ Your spouse’s age? ______________

4. Do you speak any languages other than English at home? Yes  No
   If yes, what are they ____________________________________________________________

5. Number of children in the family living with you ____________________________________

6. Other persons living in the home and relation to the family____________________________
   ______________________________________________________________________________
   b. Do they help raise your children? Yes   No

7. What type of job do you do? ____________________________________________________
   a. Do you work full-time? Yes   No

8. If you have a husband/wife/partner living with you, what do they do? ______________
   a. Do they work full-time? Yes   No

9. What was your last completed year of schooling? (circle one)
   Less than 7th grade     8th or 9th grade
   10th or 11th grade      High school graduate
   Partial college (at least 1 year) Technical school/Specialized Training
   4-year college graduate Graduate professional training/graduate school

10. If you currently have a husband/wife/partner, what was their last completed year of schooling? (circle one)
    Less than 7th grade     8th or 9th grade
    10th or 11th grade      High school graduate
    Partial college (at least 1 year) Technical school/Specialized Training
11. What was the age at which you noticed concerns in your child? _______________________

12. What was your child’s age at the time of diagnosis? _______________________________

13. Who made the diagnosis (e.g., family physician; developmental pediatrician; psychiatrist; speech language pathologist; neuropsychologist)?

14. What diagnosis was given (e.g., autism; autism spectrum; PDDNOS; Asperger syndrome…)?

15. If you know what assessment your child received, please list it here (e.g., ADOS, ADI-R):

16. Describe concerns you have about your child’s development, if any:

17. Do you have concerns regarding your child’s hearing or visual abilities? Yes No

18. Has your child ever received speech-language therapy or other therapy for a developmental problem? Yes No
19. What kinds of intervention and/or educational supports has your child received? (For example, Help Me Grow, ABA program, Inclusion in Preschool)

______________________________________________________________________________

20. Have you ever taken a parent-training program?  

Yes  
No

If yes, please provide details about the training

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

21. What is your race? (circle one)

   American Indian or Alaska Native
   Black or African American
   Native Hawaiian/Other Pacific Islander
   Caucasian/White
   Asian

22. What is your ethnicity? (circle one)

   Hispanic or Latino
   Not Hispanic or Latino
Coding Communicative Acts

Definitions and coding conventions are adapted from Wetherby and Prizant (2002) and Shumway and Wetherby (2009).

Definition

A communicative act is an interactive behavior that consists of a gesture, vocalization, or verbalization that is directed toward another person (the parent) and that serves a communicative function. The decision to code an act is based on three criteria: (a) the act was a gesture, vocalization, or verbalization; (b) the act was directed toward another person; and (c) the act served a communicative purpose (function). When the child looks at the parent (eye gaze), touches the parent, moves toward the parent, uses a gesture or shows something to the parent, the act is considered to be directed to the parent.

Coding

Code the number of communicative acts for every second in the sample. Coders can use the coding chart provided. Note the time at which each communicative act occurred. Rate of communicative acts is determined by the number of communicative acts (gestures, vocalization, verbalization) per minute. The mean rate of communicative acts will then be calculated for each child who participated in the study. A sample of the coding sheet is given below.

<table>
<thead>
<tr>
<th>Time</th>
<th>Gesture</th>
<th>Gesture + Vocalization</th>
<th>Vowel</th>
<th>Consonant + Vowel</th>
<th>Imitated Word</th>
<th>Spontaneous Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:38</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Coding Coordinated Joint Engagement

**Definition**

An engagement state is defined as a period of at least 3 s that is characterized by the child's active interest in people and in objects and events (Adamsn, Bakeman, & Deckner, 2004). Two coders view the recordings of each scene and identify seams or breakpoints in the stream of behavior between different engagement states, using the coding scheme. The codes are mutually exclusive. So, the amount of time that the child spends in each state is obtained to determine a proportion score. The engagement states coded in the current study were coordinated joint and coordinated joint engagement with symbols.

<table>
<thead>
<tr>
<th>Engagement states</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinated joint</td>
<td>The child actively and repeatedly acknowledges both the shared activity and the interaction partner through eye contact and gestures (e.g. Pointing, showing or giving objects).</td>
</tr>
<tr>
<td>Coordinated joint with symbols</td>
<td>The child actively and repeatedly acknowledges both the shared activity and the interaction partner through eye contact and gestures (e.g. Pointing, showing or giving objects). Additionally, the child responds to or uses language in reference to the shared activity.</td>
</tr>
</tbody>
</table>
Coding Maternal Responsiveness

The Social Interaction Rating Scale (SIRS) consists of six aspects of responsiveness. These aspects were selected based on clinical observations and previous research on parent-child interactions, joint engagement, and developmental approaches for intervention (Ruble, McDuffie, King, & Lorenz, 2008). The SIRS is scored by watching the overall video, and not coded moment-by-moment. Hints are provided along with the scale to help score each aspect. Please follow the hints while you score the video. A score sheet and the scale with the hints are provided to help score the videos. The SIRS scale can be found in the following page.
Social Interaction Rating Scale (Ruble, McDuffie, King, & Lorenz, 2008)

<table>
<thead>
<tr>
<th>Level of Affect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Facial expression shows no emotion during the child’s activities. Praise/feedback and attention are absent. Attentive body language is present.</td>
</tr>
<tr>
<td>1.5</td>
<td>Limited emotion is shown. Very little verbal praise/feedback or attention is given. Attentive body language is minimal.</td>
</tr>
<tr>
<td>2</td>
<td>Attentive and expressive at times, and/or may give some verbal praise/feedback. Exhibits some attentive body language.</td>
</tr>
<tr>
<td>2.5</td>
<td>Frequently attentive and expressive, giving frequent verbal praise/feedback. Exhibiting positive/attentive body language majority of the time.</td>
</tr>
<tr>
<td>3</td>
<td>Positive praise/feedback and/or instruction is given in a calm or enthusiastic tone of voice. There are several instances of observable enjoyment with the child through positive attention and emotional facial expression. Attentive body language is continually used.</td>
</tr>
</tbody>
</table>

Observations/Comments:

<table>
<thead>
<tr>
<th>Maintenance of interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

Observations/Comments:

Total Score | Poor Interaction | Optimum Interaction |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18</td>
<td></td>
</tr>
</tbody>
</table>

Child’s identification #_____________                         Observation Date:____________
Observer:__________________________                     Caregiver’s identification #:_______________
Caregiver’s relationship to child: ___________
**Directiveness**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Repeatedly and intensely attempts to direct the child’s immediate attention and/or behavior.</td>
</tr>
<tr>
<td>1.5</td>
<td>Frequently attempts to direct the child’s immediate attention and/or behavior.</td>
</tr>
<tr>
<td>2</td>
<td>Makes some attempts to direct the child’s attention and/or behavior.</td>
</tr>
<tr>
<td>2.5</td>
<td>Maintains child’s interest by directing the child’s attention and/or behavior on a limited basis.</td>
</tr>
<tr>
<td>3</td>
<td>Tailors directiveness based on the child’s behavior throughout by allowing adequate response time and/or independence.</td>
</tr>
</tbody>
</table>

Observations/Comments:

**Contingency**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Does not respond to the child’s initiations, behavior, body language, and requests.</td>
</tr>
<tr>
<td>1.5</td>
<td>Shows limited or inconsistent responses to the child’s behavior, body language, and requests.</td>
</tr>
<tr>
<td>2</td>
<td>Is somewhat responsive to the child’s initiations, behavior, body language, and requests in several instances. May have a neutral response to the child.</td>
</tr>
<tr>
<td>2.5</td>
<td>Frequently and positively responds to the child’s initiations, behavior, body language and requests.</td>
</tr>
<tr>
<td>3</td>
<td>Responds consistently and positively to the child’s initiations, behavior, body language and requests.</td>
</tr>
</tbody>
</table>

Observations/Comments:

**Total Score**

| Poor Interaction | 6 | 6.5 | 7 | 7.5 | 8 | 8.5 | 9 | 9.5 | 10 | 10.5 | 11 | 11.5 | 12 | 12.5 | 13 | 13.5 | 14 | 14.5 | 15 | 15.5 | 16 | 16.5 | 17 | 17.5 | 18 |
|------------------|---|-----|---|-----|---|-----|---|-----|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| Optimum Interaction |   |     |   |     |   |     |   |     |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |

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Running head: Child-related factors that influence maternal responsiveness in ASD
### Initiation

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is <em>apathetic and does not</em> attempt to direct the child’s attention and/or behavior.</td>
</tr>
<tr>
<td>1.5</td>
<td>Is <em>passive</em> but makes a limited attempt to initiate with the child.</td>
</tr>
<tr>
<td>2</td>
<td>Initiates <em>some</em> of the time with the child.</td>
</tr>
<tr>
<td>2.5</td>
<td>Initiates positively with the child <em>frequently</em>.</td>
</tr>
<tr>
<td>3</td>
<td>Initiates positively with the child <em>throughout</em>.</td>
</tr>
</tbody>
</table>

Observations/Comments:

### Level of Movement/Participation

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Does not</em> move with the child and his/her activities and does not participate with the child.</td>
</tr>
<tr>
<td>1.5</td>
<td>Makes <em>limited</em> movements with the child and makes few attempts to participate with the child.</td>
</tr>
<tr>
<td>2</td>
<td><em>Somewhat</em> moves with the child and participates some of the time.</td>
</tr>
<tr>
<td>2.5</td>
<td><em>Frequently</em> moves with the child and frequently participates with the child.</td>
</tr>
<tr>
<td>3</td>
<td>Moves with the child and his/her activities and encourages participation <em>throughout</em>.</td>
</tr>
</tbody>
</table>

Observations/Comments:

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Poor Interaction</th>
<th>Optimum Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14 14.5 15 15.5 16 16.5 17 17.5 18</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D

Qualitative Interview Questions

1. Please describe your typical day.

2. Please describe some activities that you enjoy doing with your child.

3. Please describe some interactions that are regularly / occasionally difficult with your child.

4. Why do you think they are difficult?

5. What supports do you have caring for your child? Supports can be from family, professionals, and/or friends.

6. What forms of training have you received to work with your child?

7. How do you think autism has affected how you interact with your child, if at all?

8. What are some of your reactions or how do you feel when interactions do not happen in a certain way or the way you expect them to be?

9. There might be times when you want to talk to your child or want to play with him/her, but he/she does not respond to you. What are some strategies you use to handle these situations?

10. Do these strategies work?

11. How do you cope when these interactions do not happen as you expected them to be?
DATE: April 5, 2013

TO: Siva priya Santhanam
FROM: Bowling Green State University Human Subjects Review Board

PROJECT TITLE: [438365-2] Parent Child Interactions and Autism Spectrum Disorders
SUBMISSION TYPE: Revision

ACTION: APPROVED
APPROVAL DATE: April 5, 2013
EXPIRATION DATE: March 12, 2014
REVIEW TYPE: Expedited Review
REVIEW CATEGORY: Full Board review category

Thank you for your submission of Revision materials for this project. The Bowling Green State University Human Subjects Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

The final approved version of the consent document(s) is available as a published Board Document in the Review Details page. You must use the approved version of the consent document when obtaining consent from participants. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Comments:

- You may want to remove the comma after "I" in first sentence of the consent document.

- In the consent document you mention that graduate and undergraduate students in the speech-language pathology may have access to confidential information. Note that students must be added to the HSRB protocol before being given access to data.

Please note that you are responsible to conduct the study as approved by the HSRB. If you seek to make any changes in your project activities or procedures, those modifications must be approved by this committee prior to initiation. Please use the modification request form for this procedure.

You have been approved to enroll 15 parent-child dyads participants. If you wish to enroll additional participants you must seek approval from the HSRB.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. All NON-COMPLIANCE issues or COMPLAINTS regarding this project must also be reported promptly to this office.

This approval expires on March 12, 2014. You will receive a continuing review notice before your project expires. If you wish to continue your work after the expiration date, your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date.
Good luck with your work. If you have any questions, please contact the Office of Research Compliance at 419-372-7716 or hsrb@bgsu.edu. Please include your project title and reference number in all correspondence regarding this project.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Bowling Green State University Human Subjects Review Board's records.