

Parent Behaviors and Children's Interest in Play:  
Examining Behavioral Contingencies for Children with and without Autism

by

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## ABSTRACT

The present study examined the behaviors of parents and children during a free play interaction in 20 children with high-functioning autism (HFA) and 20 matched, typically developing children. Observational coding was used to measure sensitive versus controlling parenting behaviors as well as children's responsivity and interest and investment in play. The study also documented whether the child or the parent primarily directed the play interaction. Finally, the study examined the influence of parenting stress on parents' behaviors during play. Group differences in behaviors were assessed along with associations between parent and child behaviors. Further, sequential analyses were conducted to identify whether parent behaviors temporally facilitated children's responses and interest during a play interaction. Results demonstrated group differences in parental sensitivity, parenting stress, child responsivity, and proportion of child-directed play. Parental sensitivity was also associated with child interest and investment as well as the proportion of child-directed play. Finally, sequential analyses demonstrated a temporal association between completely child-directed play and child interest and investment, and between parental sensitivity and child responsivity. These results extend the existing literature on the behaviors of children with autism and those of their parents within play settings, and have important implications for parent-focused play interventions.

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## TABLE OF CONTENTS

	Page
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
INTRODUCTION.....	1
LITERATURE REVIEW.....	11
Conceptual Framework.....	11
The Importance of Play for Children’s Development.....	14
Defining Play.....	15
Play Interactions in Children with Autism.....	16
Parent-Child Play.....	19
Parent-Directed Play.....	20
Child-Directed Play.....	22
Parent Behaviors in the Context of Play.....	26
Parental Sensitivity.....	28
Parental Intrusion and Control.....	30
Parent Behaviors and Autism.....	31
Parenting Stress and Autism.....	33
THE CURRENT STUDY.....	39
Hypotheses.....	39
Hypothesis 1: Observed Child Behaviors.....	39
Hypothesis 2: Observed Parent Behaviors.....	40

	Page
Hypothesis 3: Impact of Parenting Stress on Parent-Child Interaction.....	40
Hypothesis 4: Associations Between Parent and Child Behaviors.....	42
Hypothesis 5: Parent-Child Temporal Contingencies.....	43
METHOD.....	45
Participants.....	45
Children.....	45
Parents.....	46
Procedure.....	46
Measures.....	47
Autism Diagnostic Interview, Revised (ADI-R).....	47
Differential Abilities Scales-II (DAS-II).....	48
Preschool Language Scale, Fourth Edition (PLS-4).....	48
Parenting Stress Index-Short Form (PSI-SF).....	48
Parent Child Interaction.....	49
Coded Parent Behaviors.....	49
Parent Variables Used in Analyses.....	51
Coded Child Behaviors.....	51
Child Variables Used in Analyses.....	53
RESULTS.....	55
Hypothesis 1: Observed Child Behaviors.....	57

	Page
Hypothesis 2: Observed Parent Behaviors.....	58
Hypothesis 3: Impact of Parenting Stress on Parent-Child Interaction.....	60
Hypothesis 4: Associations Between Parent and Child Behaviors.....	62
Hypothesis 5: Parent-Child Temporal Contingencies.....	64
Hypothesis 5a.....	65
Hypothesis 5b.....	66
Hypothesis 5c.....	67
Hypothesis 5d.....	68
Post Hoc Exploratory Analyses.....	69
DISCUSSION.....	71
Behaviors of Parents of Children with and without Autism in a Play Setting.....	72
Behaviors of Children with and without Autism in a Play Setting.....	78
Associations Between Parent and Child Behaviors.....	81
Implications for Intervention.....	87
Study Limitations and Directions for Future Research.....	90
REFERENCES.....	96
APPENDIX	
A HUMAN SUBJECTS INSTITUTIONAL REVIEW BOARD APPROVAL.....	109
B TABLE ONE: CODING DEFINITIONS AND COHEN’S KAPPAS.....	111

C TABLE 7: MEANS, STAND DEVIATIONS, GROUP  
DIFFERENCES FROM ZERO, AND GROUP DIFFERENCE  
COMPARISONS FOR CONTINGENCY ANALYSES.....114

## LIST OF TABLES

Table	Page
1. Coding Definitions and Cohen's Kappas.....	112
2. Developmental Characteristics of Study Participants by Group.....	117
3. Means, Standard Deviations, Ranges, Group Difference Comparison and Effect Sizes for all Child Study Variables.....	118
4. Means, Standard Deviations, Ranges, Group Difference Comparisons, and Effect Sizes for all Parent Study Variables.....	119
5. Bivariate Partial Correlations among Study Variables (Full Sample).....	120
6. Bivariate Partial Correlations among Study Variables (Within Group).....	121
7. Means, Standard Deviations, Group Differences from Zero, and Group Difference Comparisons for Contingency Analyses.....	115



## LIST OF FIGURES

Figure	Page
1. Yule's Q Contingency Table Representing all Possible Combinations of Parent and Child Behaviors.....	123

## **Introduction**

Play is often regarded as a primary context and source of development in early childhood as it contributes to social, cognitive, emotional, and motor development (Hughes, 1999; Hurwitz, 2002; Jordan, 2003; Pellegrini & Smith, 1998; Piaget, 1962; Restall & Magill-Evans, 1994; Rubin, Fein, & Vandenberg, 1983; Vygotsky, 1966). Previous research has found qualitative differences in the play behaviors of typically developing children and children with autism (Holmes & Willoughby, 2005; Jordan, 2003; Restal & Magill-Evans, 1994; Toth, Munson, Meltzoff, & Dawson, 2006; Watson, Baranek, & DiLavore, 2003; Williams, Costall, & Reddy, 1999; Williams, Reddy, & Costall, 2001). These differences include reduced elaboration, increased repetition, and stereotyped play that does not appeal to peers among children with autism. As a consequence of these differences, children with autism may become excluded from activities with similar-aged peers, which may further limit their exposure to the experiences and knowledge they require regarding adequate participation in developmentally appropriate play activities (Williams et al., 1999; Williams et al., 2001). As play skills develop early in childhood, caregivers play a primary role in teaching and developing children's play skills (Shonkoff & Phillips, 2000). For children with autism, it is important to understand the types of behaviors caregivers use that support or undermine children's continued engagement in play.

Several theoretical frameworks guide the proposed study. The study was guided by the transactional model, which is a developmental framework that is based on continuous, bidirectional processes that occur during interactions between the child and their environment (Sameroff, 1975). In addition, the current study is in line with a social

interactionist perspective (Bruner, 1974), which claims that development occurs within the context of meaningful social interactions between children and their caregivers. Meaningful social interactions are centered upon the child's focus of attention and are contingent on the responsiveness of the caregiver as well as their ability to accurately and appropriately interpret the child's cues (Bruner, 1981). Finally, the present study's focus on factors that promote children's *interest* within social interactions is guided by the notion set forth by scholars in the field of autism, which claims that one component of the social delays associated with autism is a reduced motivation on the part of the child to engage in social interactions (Koegel & Koegel, 2006; Koegel & Mentis, 1985). Because reduced motivation may ultimately inhibit social gains and hinder opportunities to practice, strengthen, and generalize new or preexisting skills including language, it may be particularly important to facilitate interest in order to help children with autism to maintain states of positive engagement with social partners.

Early dyadic interactions provide opportunities to influence the development of social competence and other skills in children with developmental disabilities (Jordan, 2003). The role of parents versus children with autism in *driving* play interactions has long been debated. On one side of the debate, researchers hypothesize that parent-directed play is the most constructive approach in assisting play development (Boucher, 1999; Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998). Parent-directed play interactions are generally driven by the parent's agenda and support the parent's play goals, which are typically focused on teaching rather than playing (Hodapp, 2002). Children engaged in parent-driven interactions may be reluctant to violate the established social order of their dyad, and are therefore forced to comply with their parents' requests

regardless of their investment in the activity. Over time, the play session may either become hectic and fast paced, leaving the child distracted and unable to focus on the established play objective or it may become rigid, constraining the child and eventually forcing them to passively submit to the parent, which limits the child's opportunities for growth (Fogel, de Koeyer, Bellagamba, & Bell, 2002).

On the other side of the debate, researchers hypothesize that child-directed play is the most beneficial form of play as it promotes the child's interests (Haring, 1992; Jordan, 2003). Child-directed play occurs when the child is able to develop his or her own play session as well as define how and when he or she would like to proceed. The child is developing the play session while enhancing their development and acting as an active play agent in a leadership role. The child has the opportunity to make play-related suggestions or proposals and elaborate on ideas that the parent may fabricate. Together the parent and the child are co-creating play and adapting to their partners' perspective (Fogel et al., 2002).

Researchers advocating for parent-directed play hypothesize that teaching autistic children appropriate play strategies will provide them with a *sense of mastery* that will intensify child interest in future play, which is believed to subsequently increase the child's motivation to engage with peers, allowing them to develop social competence (Boucher, 1999; Mahoney et al., 1998). Other researchers argue that this is an ineffective technique because the parent typically promotes routine-like play that lacks creativity and leadership—two fundamental characteristics of play (Pellegrini & Smith, 1998; Stahmer, 1999; Watson et al., 2003; Williams et al., 2001). Fogel and colleagues (2002) claim that this rigid style of play limits the child's self development because the child is restricted

by their play partner and is therefore unable to actively create. Additionally, some researchers argue that the behaviors that these children exhibit during these situations are “trained” (Jordan, 2003, p. 355), and the child will be unable to generalize these skill sets to unfamiliar social contexts (Arthur, Bochner, & Butterfield, 1999; Haring, 1992).

Child-directed play, on the other hand, is thought to be a more effective means of facilitating play as it results in improved language and communication development as well as social competence (Sigman, Mundy, Sherman, & Ungerer, 1986; Tomasello, 1995). Furthermore, child-directed play increases the responsiveness and engagement of the child, and encourages the development of creativity and leadership (El-Ghoroury & Romanczyk, 1999; Ginsberg, 2007). It is important to note that research examining the role of parental facilitation is largely theoretical, and few studies have actually examined the benefits of parent versus child-directed play. To this end, the first goal of the proposed study is to examine whether children’s interest and investment in play is contingently linked to moments when the child drives the play versus when the parent drives the play.

Parents’ discrete behaviors in play interactions can also have important consequences for children’s interest and responsive behaviors. There are several essential parenting behaviors that play a vital role in the facilitation of positive dyadic interactions, including consistent, sensitive parental support (i.e., Sameroff, 1975; Spinrad & Stifter, 2002); contingent responses to the child’s bids for attention (i.e., Brunner, 1974); and external motivators that increase child interest (i.e., Koegel & Koegel, 2006; Koegel & Mentis, 1985). A sensitive caregiver accurately reads their child’s signals and is receptive to even the subtlest cues that may go unseen by an

outsider. Additionally, the parent's behavior is highly flexible to the changing demands of the interaction, and the parent displays positive affect in the form of sincere, genuine, and congruent interest, as well as satisfaction, joy, and amusement in the child. Parental sensitivity has largely been associated with improvements in social, emotional, and regulatory outcomes in typically developing children (Eisenberg, Cumberland, & Spinrad, 1998; Spinrad & Stifter, 2002).

In contrast to sensitive behaviors, those considered controlling or intrusive are marked by overly strict enforcement, punitive control techniques, establishment of firm limits on the child's behavior, and frequent use of prohibitions. Parents who use more controlling behaviors typically inhibit undesirable behaviors through the use of negative feedback and reprimands. Controlling or intrusive parenting behaviors are linked with child passivity and dependence, decreased assertiveness and resilience, and can ultimately inhibit the child's creativity and imaginative behaviors (Baumrind, 1966). Children who find it difficult to engage in proper play behaviors, including children with autism, may particularly benefit from a parent or a play partner who is highly responsive, sensitive, and able to activate and sustain play while still attending to the child's interests and attention (Kopp, 1982). Due to the fact that children with autism inherently demonstrate reduced responsiveness and tend to have more fleeting interests, positive parenting strategies may be especially important during play interactions. Positive parenting behaviors may also have a disproportionately large effect on children with autism because these children may necessitate or rely on additional support from parents (Laundry, Smith, & Swank, 2006). Appropriate parenting behaviors can potentially have

positive, long-term effects on the child's developmental trajectory, and could possibly even buffer many of the negative consequences of autism (Jordan, 2003).

Sensitive behaviors may be somewhat restricted in parents of children with autism because these parents may struggle to interpret their child's unclear or less explicit signals (van Ijzendoorn et al., 2007). In addition, due to the difficulties parents of children with autism experience *engaging* their child in play, they may need to rely on strategies to maintain engagement (e.g., control or behavior regulation) that undermine the goal of facilitating their child's interest in the play itself. Caregivers who demonstrate less sensitivity may be (even inadvertently) attending to inappropriate aspects of the play interaction and, therefore, inadequately responding to the child's focus of attention. One can speculate that such interactions may reduce children's interest in the play interaction. Parents of children with delays may exhibit elevated levels of intrusiveness, persistence, and directiveness in their interactions with their children (Floyd, Harter, & Costigan, 2004). These less sensitive parenting behaviors may be associated with unresponsive child behaviors, which are characterized by a general lack of regard for the parent or engagement in isolated play. Children who are unresponsive may also appear to be unfocused, undifferentiated, or overly mellow. Controlling and intrusive parenting behaviors may be more intuitive in parents of children with autism; however, these children may benefit more from sensitive parenting techniques, which are likely to result in increased levels of responsivity and interest. Thus, the second goal of the proposed study is to assess whether parents of children with autism differed from parent with typically developing children in their use of sensitive and controlling behaviors. Additionally, this study sought to examine whether sensitive behaviors were

contingently (temporally) linked to children's interest in play, and whether sensitive parenting behaviors were contingently associated with an increase in child responsivity. Further, group differences in the association between parent behaviors and child behaviors will be explored.

In order to fully understand the parenting behaviors of parents of children with autism, researchers must also acknowledge how the parent perceives the challenges of his or her parenting role. For example, researchers have found that the primary deficits associated with autism, including deficits in social functioning, unresponsive behaviors or limited communication abilities, and repetitive or stereotypical behaviors are predictive of elevated stress levels in parents (Ornstein Davis & Carter, 2008). Researchers have also come to the consensus that parents of children with autism experience significantly higher levels of stress when compared to parents of typically developing children and children with other developmental disabilities (Dumas, Wolf, Fisman, & Culligan, 1991; Erickson Warfield, 2005; Ornstein Davis & Carter, 2008).

Research on typical populations has examined the influence of parent stress on the parent-child relationship (Crnic & Greenberg, 1990; Crnic & Low, 2002). It has consistently been shown that elevated levels of parent stress are associated with less optimal parent and family functioning, less optimal parent-child interactions, and lower child developmental competence (Crnic & Greenberg, 1990). While a considerable amount of research has examined both the impact of child behaviors on parent stress and mental health as well as parent stress on future child outcomes, few studies have examined the direct effect of stress on parents' behaviors during parent-child interactions in children with autism. In one study, Benson and Karlof (2008) examined the influence



of stress proliferation as a contributor to anger and depression in parents of children with autism spectrum disorders (ASD). Stress proliferation describes the process of an initial stressor or stressors transforming into additional stressors that eventually extend and impact multiple aspects of an individual's life, resulting in an increase in overall distress (Pearlin, Aneshensel, & LeBlanc, 1997). Research has demonstrated that this phenomenon mediates child symptom severity and parent anger and depression in parents of children with autism (Benson, 2006; Benson & Karlof, 2008). This research suggests that parent stress is likely to influence the nature of these parents' behaviors with their children.

Additionally, Orsmond, Seltzer, Greenberg, and Krauss (2006) examined expressed emotion in a sample of mothers of children with autism, and found that a large portion of mothers demonstrated high levels of expressed emotion (defined as excessive hostility, criticism, and over-involvement), which previous research has linked to increased family stress as well as more negative outcomes in vulnerable individuals such as children with autism (Hooley & Gotlib, 2000). Similarly, in a typical sample, Wahler and Dumas (1989) found that parents of children who were labeled as "problematic" (p. 120) became less proactive and more reactive while relying on more punitive strategies of child management when their parenting stress was elevated.

Together, this research suggests that the symptoms associated with autism may increase the likelihood and intensity of parenting stress, which is expected to negatively impact the nature of the social interactions between the parent and the child, resulting in more negative outcomes for the child. To our knowledge, no study has directly examined the influence of parenting stress on observations of the discrete parenting behaviors used

by parents of children with autism in play interactions. In the present study, we will examine whether parents with higher levels of stress demonstrate fewer sensitive behaviors while engaging with their child. Moreover, given that the unresponsive behaviors of children with autism are thought to be perceived as particularly stressful by parents (Ornstein Davis & Carter, 2008), we will examine whether these child behaviors tend to be significantly contingently linked to subsequent intrusive and controlling parenting behaviors. This would suggest that the child's behavior influences the parent's behavior.

Currently, there is limited research observing and examining the connection between the behaviors of children with autism and the behaviors of their parents. Much of the research on parent-child play in autism has been correlational in nature (i.e., assessing overall associations between a parent behavior and a child behavior). These approaches are limited, as they fail to inform us about what occurs from moment to moment, that is, the temporally linked contingencies between discrete parent and child behaviors during an interaction. There is a need for such an approach in order to identify, for example, specific parenting behaviors that reliably elicit child interest and investment during play, which will assist the dyad in sustaining longer intervals of play. Identifying such behaviors can inform and improve parenting interventions.

In the present study, we observed and coded parent and child behaviors in discrete intervals for up to seven minutes during a free play session in order to capture and quantify sensitive (versus controlling) parenting behaviors, unresponsive child behaviors, and the child's interest and investment during play. Additionally, we documented who was primarily directing the play interaction (child versus parent) within each coding

interval. The present study will extend the current literature by examining sequential contingencies between parent and child behaviors. Additionally, we will examine the contingency between unresponsive child behaviors and parent behaviors during play at the precise moment that the child is unresponsive. In doing so, we seek to better explain the process by which child behaviors influence parenting behaviors and vice versa.

Given the critical importance of early experiences with parents for children with autism as well as the emphasis on caregiver-mediated interventions for this population, a better understanding of factors that contribute to more positive and sustained parent-child play will shed light on the nature of the dynamics of parent-child interactions and will permit the refinement of parent-mediated play interventions that target play and many other behaviors.

## **Literature Review**

### **Conceptual Framework**

Several theoretical perspectives on children's development and the development of children with autism, in particular, have informed the proposed study. These theories propose that child development occurs through the process of continuous interactions between children and their environments (i.e., Sameroff, 1975); that the social behaviors within these interactions in particular have meaningful consequences on children's development (i.e., Bruner, 1974); and due to possible delays associated with social motivation, behaviors that facilitate children's interest might be particularly important to target in the interactions of children with autism (i.e., Koegel & Koegel, 2006; Koegel & Mentis, 1985).

The first theoretical perspective that broadly guides the current study is the transactional model, which considers child development to be a bidirectional, causal process within interactions with the environment (Sameroff, 1975). The foundation of this model is social development, occurring through a process of continuous interactions between a child and their family environment. Both the individual and the environmental context (e.g., parenting behaviors) influence developmental outcomes. Within this model, child outcomes cannot be reduced to the specific behaviors of the parent, the child's temperament, or either's perceptions of the given context. Rather, outcomes correspond to parent-child interactions over time, which continuously transform as each member of the dyad responds to the emerging traits of the other. Essentially, aspects of the child's behavior are associated with specific responses from the parent, which then prompt more complex responses from the child that alter subsequent parent behaviors. It

is important to note that these changes occur over long periods of time. More specifically, minor changes accumulate, resulting in qualitative changes that alter a child's perception of the environment. As Sameroff (1975) claims, "the child alters his environment and in turn is altered by the changed world he has created" (p. 281).

In the transactional model, environmental influences can be categorized into two groups: proximal and distal influences. Proximal influences directly impact the child, while distal influences indirectly influence the child (Sameroff, 1993). For example, proximal influences are comprised of parenting behaviors and family structure, while distal influences consist of family income, social support, and local policy. The proposed study will examine the impact of proximal influences on parent-child interactions. More specifically, sensitive parenting behaviors, parent stress, and the child's level of responsiveness will be analyzed as factors that directly affect parent-child interactions.

A social interactionist perspective (Bruner, 1974) guides the current study's focus on the types of social behaviors particularly salient to facilitating play behaviors in parent-child interactions. According to this perspective, development occurs within the context of meaningful social interactions between children and their caregivers. Meaningful social interactions are centered upon the child's focus of attention and are contingent on the responsiveness of the caregiver as well as their ability to accurately and appropriately interpret the child's cues (Bruner, 1981). Within the social interactionist perspective, the child is presumed to be an active participant during parent-child interactions. The child's perception and analysis of the environmental context drives the integration of reality and novel forms of development. For example, the modeling of language that the child is exposed to within the context of dyadic interactions and the

child's attentional focus during these interactions facilitate the convergence of the child's underlying knowledge and the intention of their spoken communication. This provides the child with new, more complex forms of language that further drive the acquisition of new meanings and forms of language.

The social interactionist perspective asserts that innate tendencies drive children to collaborate and connect with others. The child's behavior is critical, as it is the antecedent event that generates parent responses and provides the parent with the opportunity to accurately interpret the child's intentions, which will maintain child interest and investment during social interactions. Therefore, social development is dependent on the caregiver's ability to motivate the child to remain engaged in social interactions.

Motivational aspects of social interactions are particularly critical when studying the interactions of children with autism. Scholars have proposed that one component associated with the social delays of autism is a reduced motivation to engage in social interactions (Koegel & Koegel, 2006; Koegel & Mentis, 1985). Reduced motivation may ultimately inhibit social gains and hinder opportunities to practice, strengthen, and generalize new or preexisting skills, including language. For example, a strong body of research suggests that the motivation to engage in social interactions increases the rate of acquisition of language and improves the generalizability of skills (Koegel & Mentis, 1985). This suggests that children with autism may require additional incentives to increase the motivation to initiate interactions (Koegel & Koegel, 2006; Koegel & Mentis, 1985). This is especially important considering the importance of initiations for children with autism, such that Koegel, Koegel, and Brookman (2003) found that the rate

of linguistic initiations made during an interaction was predictive of verbal communication abilities in children with autism.

As the development of children's early skill sets is facilitated by the primary caregivers (Shonkoff & Phillips, 2000), caregivers must be proficient at reading their child's cues and motivating their child by increasing interest in social interactions. The proposed study will examine how discrete parenting behaviors (i.e., sensitivity, control, and intrusion) are linked to children's interest in play. Additionally, we will examine whether the child or the parent drives play acts during the interaction, and whether this impacts the child's interest and investment in the overall play session. Finally, the study will examine the role of stress in explaining parenting behaviors and the contingency between parent and child behaviors.

### **The Importance of Play for Children's Development**

Play is often regarded as a primary context and source of development in early childhood (Pellegrini & Smith, 1998; Piaget, 1962; Vygotsky, 1966). Within the context of play, skills are developed that extend beyond the boundaries of youth and into adulthood. Broadly speaking, play contributes to social, cognitive, emotional, and motor development (Hughes, 1999; Hurwitz, 2002; Jordan, 2003; Pellegrini & Smith, 1998; Restall & Magill-Evans, 1994; Rubin et al., 1983). Additionally, normal play development has been linked to improved language and communication abilities (e.g., Holmes & Willoughby, 2005; Toth et al., 2006), intellectual and academic success (e.g., Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Rubin & Coplan, 1998), and regulatory development (e.g., Rubin et al., 1983; Vygotsky, 1966). Play provides children with the opportunity to socialize with peers, experiment with social roles, and

test and establish rules and boundaries. It also helps to interests in specific activities, utilize creativity while developing new meanings within imaginary situations, and display and improve willpower over impulse (Neville, Kielhofner, & Royeen, 1985; Pellegrini & Smith, 1998; Piaget, 1962; Restall & Magill-Evans, 1994; Vygotsky, 1966). Overall, play provides children with the opportunity to learn and practice the skills necessary to manage and control their immediate environment.

**Defining play.** Play is a difficult concept to define since those who partake in the activity characterize the purpose and function of the play itself (Pellegrini & Smith, 1998). The behaviors that create play are diverse and often fail to have meaning outside of the context of the play. Rubin and colleagues (1983) proposed that the purpose is only distinguishable within the process, rather than in the outcome of the activity; that is, that children are more concerned with the progression of play rather than the end results.

Though the definition of play is ambiguous, researchers have come to a consensus on a number of the core characteristics of play (Jordan, 2003). First and foremost, play must be pleasurable and enjoyable for those involved. It must be voluntary and spontaneous with no goals imposed from the outside. This allows for flexibility and change throughout the play process. Additionally, play requires the active engagement of all individuals involved (Garvey, 1977; Jordan, 2003; Pellegrini & Smith, 1998; Rubin et al., 1983). These characteristics are often difficult to differentiate because they are interconnected within the process of play—the presence of one ensures the presence of another.

Throughout infancy and into late childhood, the development of play is evident as the purpose and functionality transforms with age (Rubin et al., 1983; Vygotsky, 1966).



Sensory motor play provides young infants with the opportunity to explore their bodies and their immediate environments. Manipulative and exploratory play supplies older infants with the opportunity to influence and alter the world around them. Functional or pre-symbolic play emerges during the first year, and is believed to be the gateway into future forms of play (Piaget, 1962). Into toddlerhood, rough-and-tumble play and active physical play allow children to develop gross motor skills while teaching them how to engage and interact with peers. Social play creates a situation where children learn how to properly socialize with others, which provides them with the opportunity to develop an understanding of social and cultural norms (Jordan, 2003; Vygotsky, 1966). Finally, make-believe play develops children's cognitive abilities as they create abstract thoughts through the use of imagination and symbolism (Boucher, 1999; Pellegrini & Smith, 1998; Piaget, 1962; Vygotsky, 1966). As children mature and subsequent styles of play emerge, deficits in social, cognitive, and emotional development can be easily distinguished within the context of play and play style (Arthur et al., 1999; Boucher, 1999; Jordan, 2003; Restall & Magill-Evans, 1994; Toth et al., 2006). In the present study, play is considered the foundation of early social development.

### **Play Interactions in Children with Autism**

A core feature of autism spectrum disorders (ASD) is “a lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level” (American Psychiatric Association, 2000, p. 69). Children with ASD often experience difficulties engaging in social interactions with peers because their ability to communicate is impaired (Sigman, 1998). Additionally, autistic children's interests are limited, which results in restricted play behaviors and a lack of imaginative activities

(Kaplan & Sadock, 1991; Koegel & Mentis, 1985; Restall & Magill-Evans, 1994; Watson et al., 2003). Previous research has found qualitative differences in the play behaviors of children with ASD and their typically developing peers (e.g., Holmes & Willoughby, 2005; Jordan, 2003; Restal & Magill-Evans, 1994; Toth et al., 2006; Watson et al., 2003; Williams et al., 1999; Williams et al., 2001). These differences can be classified into three broad categories including deficits in *social processes*, *complexity of play*, and *social status* (White, 2002).

Successful play typically requires *social interaction*, and it is common for children with ASD to possess language delays, which often result in impaired communication and difficulties engaging with peers (Sigman, 1998; Toth et al., 2006; Watson et al., 2003; Williams et al., 2001). Autistic children are often rated as less concerned with the presence of others; however, it is unclear whether this is due to a lack of interest in social interactions or to their inability to properly interact and connect with peers (Koegel & Mentis, 1985; Restal & Magill-Evans, 1994). Autistic children also demonstrate delays in social competence, specifically in areas of shared attention, symbolic representations of social situations, and attending to the faces of others. These differences have been investigated in verbal and high functioning individuals, and similar trends have emerged (Yirmiya, Sigman, Kasari, & Mundy, 1992).

Children with autism also struggle with initiating play with peers, which is thought to be caused by deficits in planning and relating to others (Lord, 1984; Williams et al., 1999). In addition to difficulties initiating play, children with autism experience difficulties attending to others, which this can make it difficult for the child to recognize, understand, and respond to a peer's bid for attention (Lord, 1984; Sigman, 1998;

Williams et al., 1999). Although it is clear that children with autism experience deficits in social competence, it is unclear whether these deficits result in difficulties engaging with peers, whether the inability to properly engage with peers results in deficits in social competence, or whether it is a combination of both (Wolfberg, 1999).

Research has reported differences in the *complexity* of play by children with autism when compared to typically developing children (White, 2002). These differences are often categorized into three main areas: social play, imaginative play, and variety of play (Restall & Magill-Evans, 1994). Autistic children are more frequently observed engaged in parallel and solitary play (Holmes & Willoughby, 2005; McHale, 1983; Watson et al., 2003). Additionally, autistic children have been found to demonstrate deficits in imaginative play (Sigman, 1998; Sigman & Ungerer, 1984). Researchers have speculated that differences in imaginative play are the result of social impairments as well as difficulties with perspective taking (Baron-Cohen, Leslie, & Firth, 1985). Williams et al. (2001) examined differences in functional play in a sample of typically developing children, autistic children, and children with Down syndrome. Children with autism were at a lower level of development in play and exhibited less diversity and elaboration. These findings have been supported by a number of researchers who have found that these children typically engage in less elaborate, more repetitive, and more stereotyped play behaviors (Hughes, 1998; Williams et al., 2001).

Finally, with respect to the *social status* associated with play behaviors, peers often perceive the play behaviors of autistic children to be different than that of their typically developing peers. Research has shown that the typically passive play style of children with autism is unlikely to attract the attention or interest of peers (Williams et

al., 2001). This play style tends to be a routine-like event rather than a playful or spontaneous experience, and it often prevents peers from engaging with the child. Children with autism experience increased isolation during play, which is perpetuated as the child fails to attract playmates and is unable to effectively engage with similar-aged peers (Stahmer, 1999). The child may ultimately become frustrated and lose any motivation to connect with peers. Indeed, children with autism often become immersed in a cycle of seclusion, which is perpetuated over time.

In summary, normal development centers on the child's ability to engage with peers within the context of play. However, children with autism often lack the skills necessary to employ age-appropriate play behaviors, which makes it difficult for them to gain the social, emotional, and cultural experiences necessary for normal development (Jordan & Libby, 1997). Children with autism show difficulty with multiple dimensions of play, including social interaction, complexity, and social status. As autistic children fail to properly engage with peers, they are further excluded from the knowledge and understanding of how to correctly participate in developmentally appropriate activities (Williams et al., 1999). Thus, there is a clear need to identify the discrete behaviors that aid in the facilitation and maintenance of play activities for children with autism and their play partners. As parents are children's primary play partners in early development, it is critical to understand what behaviors are important to the play interactions of parents of children with autism.

### **Parent-Child Play**

Early development occurs within the context of the parent-child relationship (Shonkoff & Phillips, 2000), and it is within these early interactions that children develop

the initial skills necessary to effectively engage with others. Caregivers often serve a primary and central role in teaching and developing children's early skill sets (Bruner, 1974), and the importance of developing high quality, early play skills for future social development cannot be overstated. Primary skill patterns are the basis of all future development, and children may continue on the path that is initially created in early childhood (Jordan, 2003; McCoy, 2007; Shonkoff & Phillips, 2000). This notion is typically referred to as a developmental cascade, which is the cumulative effect of the many interactions and transactions across time. Competence in one domain at one time point influences the future development of competence in newly emerging domains. Early success fosters the development of subsequent competence (Masten & Cicchetti, 2010). The development of early play competence with a parent will influence future peer play as well as social development more broadly.

**Parent-directed play.** Researchers have long debated the role of parents in facilitating play for children with developmental disabilities. On one side, researchers hypothesize that parent-directed play is the most constructive approach in assisting play development (Boucher, 1999; Mahoney et al., 1998). Parent-directed play interactions are generally driven by the parent's agenda and support the parent's play goals, which are typically focused on teaching rather than playing (Hodapp, 2002). The child's behavior in these play settings is consistent with the parent's directions or requests, even if the behaviors conflict with the child's wishes or goals. Additionally, these children may display submissive, overly compliant behaviors, and continue to play even when they have lost interest in the play session. Children engaged in parent-driven interactions may be reluctant to violate the established social order of their dyad, and are therefore forced

to comply with their parents' requests. Over time, the play session may either become hectic and fast paced leaving the child distracted and unable to focus on the play objective or it may become rigid, constraining the child and eventually forcing them to passively submit to the parent, limiting the child's opportunities for growth (Fogel et al., 2002).

Researchers speculate that parent-directed play offers the structure necessary to guide and train the child in effective ways to elicit play with peers (Boucher, 1999; Mahoney et al., 1998); the argument being that by guiding play, the parent is teaching the child appropriate and effective play strategies, which provide them with a sense of mastery. In turn, this is believed to intensify pleasure and give the child the motivation to engage in social play in the future. As the child develops the skill sets necessary to play with peers, the likelihood of social isolation decreases and the child will appear to be a more attractive play partner. As subsequent peer play increases, the child develops social competence, which will transfer to future interactions, thus terminating the cycle of social isolation (Boucher, 1999).

However, research findings do not support this argument for a number of reasons. Haring (1992) found that children with developmental disabilities possess the skills necessary to interact and engage successfully with peers; however, they are unable to generalize these skills to unfamiliar social contexts. Furthermore, Haring (1992) speculated that social competence within play is not just a collection of skills; rather, social competence involves a dynamic relationship between the child's behavior, their motivation to interact with others, and the social framework in which the potential interaction takes place. Many researchers also question whether the behavior exhibited

and developed within parent-directed interactions is actually “play” or simply a “trained behavior” (Jordan, 2003, p. 355). Such a notion is consistent with Fogel and colleague’s (2002) concept of a “rigid frame”. These authors suggest that parent-child play typically evolves into stable patterns known as “frames” (Fogel et al., 2002, p. 192). Frames are recurring routines of coordinated activity that can be described as interaction rituals. When frames become relatively similar and unchanging over repeated instances, they can be described as “rigid” (p. 193). Parent-directed play is likely to take on a course of rigidity over time (Pellegrini & Smith, 1998; Stahmer, 1999; Watson et al., 2003; Williams et al., 2001). Rigid frames constrain individuals and limit opportunities for growth. As the parent coerces the child during play, the child takes on the role of passively submitting and fails to creatively engage in the play. Contrarily, “creative frames” allow the parent and the child to mutually develop the play session by working through disagreements and bonding during emotional highs. Fogel and colleagues (2002) suggest that creative frames “are the locus of self developmental change” (p. 193).

**Child-directed play.** On the other side of the spectrum, child-directed play is thought to be a more effective means of facilitating subsequent play development. Child-directed play occurs when the child is able to develop their own play session and define how and when they would like to proceed with events during play. The child has many choices within the play session, and will also have the ability to limit the parent’s options or offer consequences for the choices that the parent makes. In this context, the child is highly assertive and is constantly expressing his or her desires. The child will have the opportunity to make play-related decisions, suggest play proposals, and elaborate on ideas that the parent may fabricate. Additionally, the child has the ability to make self-

assertions, which include instances when the child indicates an unwillingness to do what the parent wants. Overall, the child demonstrates ownership of the play session.

Research has indicated that child-directed play activities increase motivation in autistic children, resulting in increased generalization and maintenance of learned behaviors (Koegel & Mentis, 1985). For example, Bernad-Opitz (1982) found that children with autism were more likely to initiate conversation when the parent allowed the child to have increased control in the interaction. Additionally, Dyer, Bell, and Koegel (1983) found that when autistic children engaged in child-preferred activities, higher rates of interest and involvement were observed, resulting in an increase in motivation to engage in future play interactions. Child-directed play is thought to increase motivation, which increases the likelihood of subsequent play interactions with peers.

This process may be occurring for a number of reasons. First, child-focused interactions improve language development because the child's attentional lead is appropriately followed and attended to (Bruner, 1974; Bruner, 1981). The child will then be given the opportunity to make the proper linguistic connections. Additionally, appropriate language directives from parents increase child comprehension and future language abilities (Siller & Sigman, 2008; Tomasello, 1995). This is particularly relevant to children with autism and their parents due to the difficulty both have establishing and maintaining joint attention (Sigman et al., 1986). For example, in a study of mother-child dyads during free play, Watson (1998) found that mothers of children with autism were more likely to direct the child's attention away from what the child was already attending to. Watson (1998) speculated that this was occurring because the mother found it



difficult to track the child's attention, which resulted in more inappropriate comments and directives. This is further supported by research suggesting that children with autism demonstrate less frequent joint attention behaviors, including gestures as a means of directing attention, eye contact, and referential looking (Sigman et al., 1986; Watson, 1998). By correctly following the child's lead, language development and communication abilities will improve (Bruner, 1981; Siller & Sigman, 2008).

Child-directed play may also be particularly important for children with autism as research suggests that children with autism are more responsive to play overtures when elicited in a less intrusive manner. El-Ghoroury and Romanczyk (1999) examined the dyadic interactions of children with autism when engaged with a parent or a sibling during free play. While the parents were more likely to direct and control the play interaction, the siblings were more likely to allow the autistic child to contribute to the development of the play. This resulted in an increase in responsive behaviors and a highly engaged play interaction.

Finally, the play style of children with autism has a quality of passivity. This is reflected in the routine-like manner of play and lack of spontaneity that is commonly observed in this population (Stahmer, 1999; Watson et al., 2003; Williams et al., 2001). Parent-directed play styles promote this limited style of play rather than encouraging creativity, leadership, and the execution of a common goal (Ginsberg, 2007). In some situations, parent-directed play may be the easiest way to engage with autistic children; however, this creates a cycle that inevitably results in executive functioning deficits and delayed social competence because the child is unable to demonstrate creativity and leadership (Arthur et al., 1999).

Nevertheless, research suggests that parent-driven scaffolding is most common in parents with developmentally delayed children (Kasari, Sigman, Mundy, & Yirmiya, 1988; Kim & Mahoney, 2004). In one study, Kim and Mahoney (2004) found that children who were deemed to be more difficult elicited higher levels of directiveness from parents in the form of increased ordering, requesting, and regulation of the pace of the interaction. Additionally, Kasari and colleagues (1988) found that parents of autistic children more often utilized control strategies as well as physical control to hold their children on task during play. However, it seems that social play is more complex than a simple sequence of entrained behaviors, and the control strategies that are commonly utilized are ineffective in the long-term.

In summary, it is necessary to aid the play development of autistic children. Previous work suggests that the most effective strategy appears to be allowing the child to direct the course of the play. This approach results in improved language development and communication abilities, which allows for more effective engagement with peers during play, increases in social competence, and improved developmental outcomes in the future. Additionally, it seems that child-directed play increases the responsiveness and engagement of the child, and encourages the development of creativity and leadership.

While it appears that differences exist in the rates of parent versus child-directed play in children with autism and typically developing children, few studies have examined group differences in high functioning children with autism who did not differ significantly in expressive or receptive language from the typical comparison group. The current study will address this research gap by examining differences in parent- versus

child-directed play in children with autism and typically developing children who have been matched based on gender and language skills. Additionally, while research has attempted to examine the influence that parent- versus child-directed play has on engagement in children with autism (e.g., Haring, 1992; Restal & Magill-Evans, 1993), the majority of the research is theoretical and has provided contrasting and inconclusive results. Our study will extend the extant research, which has yet to examine the temporal contingency between parent versus child-directed play and children's interest and responsivity.

### **Parent Behaviors in the Context of Play**

It is important to understand the role of parents in developing early play skill patterns, as this information may help interventionists identify specific parent behaviors on which to target their efforts. In the context of autism, the importance of appropriate caregiver responsivity cannot be understated. Early dyadic interactions provide the opportunities necessary to influence the development of social competence and other skills. These opportunities must be centered on the child's focus of attention and are contingent on the responsiveness of the caregiver as well as their ability to accurately and appropriately interpret the child's bids for attention (Bruner, 1981). Children who find it difficult to engage in proper play behaviors, including children with autism, require a parent who is highly responsive and sensitive, and who is able to activate and sustain play while still attending to the child's interests and attention (Kopp, 1982). In order to be successful, these parents must be flexible in their interactions; they must be able to appropriately alter and transform their behavior in response to the unique characteristics of their child, while also being highly responsive to their child's needs (Elder, 1991).

Due to the fact that children with autism inherently demonstrate reduced responsiveness and a difficulty sustaining joint engagement with social partners in general (e.g., Adamson, Bakeman, Deckner, & Ronski, 2009), positive parenting strategies may be especially important for these children during play interactions. Positive parenting behaviors may also have a disproportionately large effect on children with autism because these children may necessitate additional support from parents (Laundry et al., 2006). The social limitations experienced by these children impact the nature of the parent-child relationship; however, successful parents are able to overcome these inborn restrictions and properly facilitate play. Research has capitalized on the fact that a primary role of the caregiver is to aid the child in proper play development (Arthur et al., 1999). In fact, early interactions with the caregiver appear to predict children's subsequent interactions with peers, as typically developing children who were more regularly engaged with a parent in play were better able to both understand the intentions of peers as well as express their own intentions more affectively (Parke, Burks, Carson, Neville, & Boyum, 1992). Similarly, in a sample of autistic children, Meek, Robinson, and Jahromi (2012) found that joint engagement with parents was predicative of future social competence with peers. It may be that successful interactions and play with peers are contingent on the quality of early play interactions with parents.

Research has shown that parenting behaviors have long-term effects on children's future developmental outcomes (Eisenberg et al., 1998; Kochanska, Murray, & Harlan, 2000; Smith et al., 2007; Spinrad & Stifter, 2002; Spinrad, Stifter, Donelan-McCall, & Turner, 2004; Thompson, 2006). Though the symptoms of autism potentially act to inhibit development, proper caregiving behaviors can overcome these processes and act

to buffer the child against the degenerate affects of the disorder (Siller & Sigman, 2002; 2008). One of the primary parenting behaviors that is highly predictive of future outcomes is *parental sensitivity*.

**Parental sensitivity.** The notion of parental sensitivity was first introduced in Bowlby's (1969) groundbreaking work on the parent-child attachment relationship. In this work, Bowlby (1969) suggested that the primary factor contributing to the development of a secure attachment relationship is the attachment figure's sensitivity in responding to the child's signals. Ainsworth and colleagues (1978) further extended and refined Bowlby's work when they examined the security of attachment and parental behaviors within the context of the home environment (Ainsworth, Blehar, Waters, & Wall, 1978). While the construct of parental sensitivity was primarily developed by Ainsworth and colleagues (1978), this definition has been broadened over the last few decades to incorporate the influence of the child and to develop a more dynamic definition of the construct. The current definition of parental sensitivity is based on a parent's ability to accurately perceive and interpret a child's signals, and then adequately and appropriately respond to them. More specifically, parental sensitivity is comprised of a number of parenting behaviors including: accuracy in reading child signals and responsiveness to such signals, displaying positive affect, awareness of timing, diversity and creativity in play, and demonstrating flexibility in conflict situations (Ainsworth et al., 1978; Biringen, Robinson, & Emde, 2000; Spinrad & Stifter, 2002).

A sensitive caregiver accurately reads their child's signals and is receptive to even the subtlest cues that may go unseen by an outsider. The caregiver will immediately react by attempting to explore the reason for the child's prompt and will attempt to sooth the

child by appropriately attending to their needs. In order for this to occur, the verbal and visual communication between the parent and the child must be constant and consistent (Ainsworth et al., 1978; Spinrad & Stifter, 2002). The parent's behavior must be highly flexible and adapt to the changing demands of the interaction. Additionally, the parent must display positive affect in the form of sincere, genuine, and congruent interest, as well as satisfaction, joy, and amusement in the child. The parent will make comments to the child that are affirmative and accepting as opposed to hostile, prohibitive, or cynical (Spinrad & Stifter, 2002). The parent must also have an acute sense of timing and rhythmicity during interactions (Ainsworth et al., 1978). This is clearly observable when the transition between activities is effortless rather than forced or unexpected. Conflicts within the dyad do not create long-term issues and are handled successfully and efficiently (Biringen et al., 2000). Furthermore, if the interaction revolves around play, the event is creative, diverse, and pleasurable for both individuals involved. Overall, a sensitive parent-child interaction is often described as having "a special, dancelike quality," which is often recognizable to observers (Biringen et al., 2000, p. 258).

Parental sensitivity has been linked to a number of positive developmental outcomes. The most widely researched outcome of sensitive parenting is a secure attachment relationship (Ainsworth et al., 1978). Additionally, sensitive parenting has been associated with improvements in social, emotional, and regulatory outcomes including improved emotional reactivity (e.g., Spinrad & Stifter, 2002); improved emotion regulation (e.g., Eisenberg et al., 1998; Spinrad et al., 2004); reduced negative emotions (e.g., Fish, Stifter, & Belsky, 1991); increased empathy (e.g., Zhou et al., 2002); increased social functioning and competence (e.g., Zhou et al., 2002); self-regulation

(e.g., Kopp, 1982); effortful control (e.g., Kochanska et al., 2000; Spinrad et al., 2007); and increased inhibitory and attentional control resulting in fewer behavioral problems (e.g., Spinrad et al., 2007). Caregiver responsiveness and sensitivity to a child's display of emotion influences how the child learns to regulate and express internal states. When mothers are responsive to changes in an infant's emotional state, the child is less likely to react negatively and more likely to utilize regulatory behaviors (Gable & Isabella, 1992; Stifter & Moyer, 1991). Thus, positive parenting behaviors result in positive child outcomes.

**Parental intrusion and control.** On the opposite side of the spectrum are parenting behaviors during play that are viewed as controlling and intrusive. These behaviors include the use of control to restrict behavior, frequent use of prohibitions, and negative feedback and reprimands. Additionally, controlling parents will seldom allow their children the opportunity to make their own play-related decisions or permit independence (Baumrind, 1966; Janssens & Dekovic, 1997). The combination of these parenting behaviors during play will likely result in parent-driven play interactions as well as restricted play for children, which will fail to provide the child with the opportunity to express their independence, resulting in stunted social and emotional development (Baumrind, 1966; Janssens & Dekovic, 1997; Smith, Calkins, Kean, Anastopoulos, & Shelton, 2004). Research has also found that controlling parenting behaviors can result in passivity, dependence, and a reduction in self-assertiveness during play. Additionally, controlling behaviors inhibit the child's creativity and restrict resourceful or imaginative behaviors, which can be especially detrimental during play (Baumrind, 1966). Mothers of children with behavioral problems more often engage in

adult-focused activities and display higher levels of control and domination, which are likely to occur during play (Gardner, 1994).

In summary, the behaviors of the caregiver play a vital role in the early stages of a child's life. Sensitive parenting behaviors are crucial to the development of positive social, emotional, and regulatory outcomes. In the present study, parent behaviors were coded as sensitive when the parent was appropriately attentive, contingently responsive, or demonstrated positive affect in reference to the child. Parental control and intrusion has been linked to negative outcomes for children including decreased autonomy and a lack of creativity and imagination (Baumrind, 1966; Fogel et al., 2002; Janssens & Dekovic, 1997). In the present study, parent behaviors were coded as intrusive and controlling when the parent over-stimulated or over-controlled the child. This included instances of physical control and manipulation, restriction, or rejection. The present study will measure these behaviors in the context of a parent-child play interaction to assess whether there are group differences between parents of typically developing and autistic children in sensitive versus controlling behaviors, and how these parenting behaviors are temporally linked to children's interest and motivation to maintain the play interaction.

### **Parent Behaviors and Autism**

Although the relationship between parenting behaviors and future outcomes is well defined in typically developing populations, the same cannot be said for children with developmental delays such as autism. Although it is clear that parenting practices affect child behavior as well as future developmental outcomes, it may be that the disorder also impacts a parent's ability to properly execute the ideal behaviors.



Flexibility is the key to sensitive parenting behaviors for children with autism. As with typical parent-child dyads, parents of children with autism engage their children in play routines where the interaction is based on communication that is contingent on the parent correctly interpreting the child's focus of attention (Bruner, 1981; Collis, 1977). In one study, Bakeman and Adamson (1984) found that parents of typically developing children who were sensitive to their child's interests and correctly coordinated their attention to their child's activity in play increased the child's ability to actively participate in the management of their own interest. Appropriate understanding of children's interest is crucial when attempting to engage with them in play. Since language and communication impairments are a core feature of autism, these children do not always express their needs in explicit ways (van Ijzendoorn et al., 2007). As a result, this may impair a parent's ability to correctly read and adequately respond to their children's signals and needs (Sigman, 1998; Toth et al., 2006; Watson et al., 2003), underscoring the importance of highly sensitive and responsive parenting behaviors for these dyads. In order to appropriately respond, parents of children with autism require higher levels of attunement and more carefully organized responses. Sensitivity to the child's preferred style of interaction within the context of play and verbal communications, as well as following the child's attentional focus, is crucial to language acquisition and the development of control (Kopp, 1982). Caregivers who demonstrate less sensitivity attend to inappropriate aspects of the play interaction, and therefore, respond inadequately to the child's focus of attention.

While previous research clearly demonstrates that parental sensitivity is important to children's healthy development, there is limited work that has examined the

contingency between parental sensitivity and child behaviors within the context of a play interaction for children with autism and their parents. Sequential analysis is an analytical technique that assesses the temporal contingency between behaviors. That is, whether one behavior increases or decreases the probability of another behavior occurring thereafter, within a specified amount of time (Bakeman & Gottman, 1997). Recently, researchers have utilized sequential analysis to determine whether parenting behaviors are contingently associated with changes in child behavior in typically developing children. However, this research primarily examined infant reactivity in distressing contexts (i.e., Crockenberg & Leerkes, 2004; Jahromi, Putnam, & Stifter, 2004). The limited work on children with autism utilizing sequential analysis has focused on the development of language and communication in the context of parent-child interactions (i.e., Bainbridge Brigham, Yoder, Jarzynka, & Tapp, 2010; Yoder, Davies, & Bishop, 1994). To address this gap as well as inform parenting interventions aimed at instructing parents of children with autism effective play behaviors, the present study will examine whether sensitive (versus controlling) parenting behaviors are contingently linked to children's interest and investment in a play interactions.

### **Parenting Stress and Autism**

Stress is an individual's emotional, behavioral, and physiological response to an unpleasant event(s) that, in general, negatively affects the individual's subsequent behavior and functioning (Crnic & Low, 2002). Understanding stress is essential in understanding parenting because the daily challenges and responsibilities associated with the caregiving role are very demanding of individuals and have the potential to influence their behavior. Low levels of parent stress are crucial to positive parent, child, and family

outcomes. Additionally, parents' experience with and evaluation of stress can influence their behaviors towards their children (Deater-Deckard, 1998).

The present study is guided by a transactional framework for children's development (Sameroff, 1975), which states that aspects of the child's behavior are associated with specific responses from the parent, which then prompt more complex responses from the child that alter subsequent parent behaviors. The challenges of raising a child with autism can have a profound effect on parents and the larger family system. Researchers have come to the consensus that parents of children with autism have significantly elevated levels of stress when compared to parents of typically developing children and children with other developmental disabilities (Dumas et al., 1991; Erickson Warfield, 2005; Ornstein Davis & Carter, 2008). Though a number of factors, including factors inherent to the parent, play a role in the level of stress experienced by parents, research suggests that the primary and secondary symptoms of autism are major sources of stress for these parents (Dumas et al., 1991; Erickson Warfield, 2005; Ornstein Davis & Carter, 2008; Singer, Ethridge, & Aldana, 2007; Tomanik, Harris, & Hawkins, 2004).

Researchers have focused on the primary behaviors of autism, including deficits in social functioning, unresponsive behaviors, and repetitive or stereotypical behaviors, and found that these characteristics are predictive of elevated stress levels in parents (Ornstein Davis & Carter, 2008). Additionally, the severity of the disorder is also predictive of increased stress in parents (Singer et al., 2007). In one study, Bebkö, Konstantareas, and Springer (1987) found that impairments in communication, problems in social relations, and delayed cognitive abilities resulted in the highest levels of stress for mothers and fathers. Additionally, numerous studies have found that the children

who display the highest levels of unresponsivity in parent-child interactions had caregivers with elevated levels of stress (Donenberg & Baker, 1993; Hastings & Johnson, 2001; Kasari & Sigman, 1997). The secondary symptoms of autism that result in increased experienced stress consist of difficult temperamental characteristics including: increased reactivity to frustration, activity level, and consolability (e.g., Donenberg & Baker, 1993); externalizing behavioral problems (e.g., Lecavalier, Leone, & Wiltz, 2006); demonstrating delays and deficits in social skills (e.g., Ornstein Davis & Carter, 2008); and the presence of regulatory problems (e.g., DeGangi, Berinbauer, Roosevelt, Porges, & Greenspan, 2000). Additionally, it is important to note that this relationship is bi-directional—child characteristics influence the level of stress experienced by parents, and the cumulative effects of stress for parents negatively affect child behavior (Crnic, Gaze, & Hoffman, 2005).

Although the relationship between child characteristics and parent stress is well documented in the literature, few studies have examined the effects of experienced stress on parent mental health and well-being. Parents of children with autism who experience high levels of stress are at an elevated risk for mental health disorders including depression and anxiety (Singer, 2006; Webster-Stratton & Hammond, 1988). Depression has been associated with disrupted parent-child interactions. Negative outcomes of depression include fewer overall interactions, less contingent responding to the child, increased irritability, increased negative affect, more explosive disciplinary practices, and increased criticality (Downey & Coyne, 1990; Forehand, Lautenschlager, Faust, & Graziano, 1986; Webster-Stratton & Hammond, 1988). Furthermore, depression has

been indirectly related to child maladjustment and noncompliance, as well as the incidence of behavioral problems (Forehand & Brody, 1985; Forehand et al., 1986).

Similarly, research suggests that stress negatively impacts parenting behaviors. Research on typical populations has examined the influence of parent stress on the parent-child relationship (Crnic & Greenberg, 1990; Crnic & Low, 2002). It has consistently been shown that elevated levels of parent stress are associated with less optimal parent and family functioning, less optimal parent-child interactions, and lower child developmental competence (Crnic & Greenberg, 1990). Specifically, Crnic and Greenberg (1990) found that on days where mothers of typically developing children reported additional stressors, they were more likely to exhibit increased irritability with their children. On these days, the mothers reported an increase in aggressive behavior by their children (Crnic & Greenberg, 1990). The authors suggest that stress is inversely related to parental satisfaction as well as positive family functioning because “less functional family units may promote conditions under which parenting is appraised to be a hassle” (p. 1635). These families perpetually create parental distress and family dysfunction, which disrupts child development.

Furthermore, Benson and Karlof (2008) examined the influence of stress proliferation as a contributor to anger and depression in parents of children with ASD. Stress proliferation describes the process of an initial stressor or stressors transforming into additional stressors, which will eventually extend and impact multiple aspects of an individual’s life and result in an increase in overall distress (Pearlin et al., 1997). Research has demonstrated that this phenomenon mediates child symptom severity as well as parent anger and depression in parents of children with autism (Benson, 2006;

Benson & Karlof, 2008). This suggests that parent stress likely to influences the nature of parenting behaviors. Additionally, Orsmond and colleagues (2006) examined expressed emotion in a sample of mothers of children with autism, and found that a large portion of mothers demonstrated high levels of expressed emotion (defined as excessive hostility, criticism, and over-involvement). Moreover, previous research has revealed that high levels of expressed emotions are linked to increased family stress as well as more negative outcomes in vulnerable individuals, such as children with autism (Hooley & Gotlib, 2000). Additionally, in a typical sample, Wahler and Dumas (1989) found that parents of children who were labeled as “problematic” (p. 120) became less proactive and more reactive, while relying on more punitive strategies of child management when parent stress was elevated.

While this research suggests that the symptoms associated with autism increase the likelihood and intensity of parent stress, which is expected to negatively impact the nature of the social interactions between the parent and child resulting in more negative outcomes for the child, no study, to our knowledge, has directly examined the influence of parenting stress on parenting behaviors. Additionally, as depression is not always present in parents who experience stress, research examining the role of stress on parenting behaviors is desperately needed. In order to address this issue, the current study will examine whether the rate of sensitive behaviors in a parent-child play interaction is inversely related to parenting stress. Additionally, because research has demonstrated a link between child responsivity and parent stress, and because of our hypothesized link between parent’s stress and reduced sensitivity, we will also test whether there is a negative contingency between child unresponsivity and sensitive

parent behaviors. That is, due to the stress associated with having an unresponsive child, are the unresponsive behaviors of children in a play session significantly less likely to be followed by sensitive behaviors on the part of the parent?

## The Current Study

The proposed study aims to extend the current state of the field in a number of ways. The first goal of the present study is to examine whether parent-directed or child-directed play is temporally linked to children's interest and investment in play. The second goal is to expand understanding of the impact of parental sensitivity versus control in facilitating the interest and investment of children with autism when engaged in play; such information can inform parenting and play-based interventions. The third goal of the study is to examine whether parents who score high in parenting stress show more or less sensitive behaviors than those who do not report high levels of parenting stress. Following this goal, the aim was to understand whether children's unresponsive behaviors, which have been shown in previous research to significantly predict parenting stress, are less likely to be linked to subsequent sensitive parenting behaviors.

### Hypotheses

The following hypotheses were tested in the present study. Variable names are reported within parenthesis to elucidate the precise study variable(s) tested as part of each hypothesis.

**Hypothesis 1: Observed child behaviors.** There will be differences in child behaviors based on developmental group. *Hypothesis 1a* states that children with autism will display lower levels of responsivity (*intensity of responsive child behaviors*) than typically developing children. This hypothesis is consistent with the current understanding that a core feature of autism is an increase in the presence of unresponsive behaviors (Donenberg & Baker, 1993). *Hypothesis 1b* states that there will be a lower proportion of intervals with child-directed play (*proportion of child-directed play*) in



children with autism. This hypothesis is consistent with research that has found that it is parents of children with autism, and not the children themselves, who are more likely to organize and regulate the pace of interactions (Kim & Mahoney, 2004), and to utilize control strategies when attempting to engage their children (Kasari et al., 1988).

**Hypothesis 2: Observed parent behaviors.** There will be differences in parent behaviors as a function of diagnostic group. More specifically, *Hypothesis 2a* states that due to difficulties interpreting the cues of children with autism, parents of children with autism will, on average, display fewer behaviors traditionally regarded as “sensitive parenting behaviors” (*duration of parental sensitivity*) across the entire play interaction than parents of typically developing children. *Hypothesis 2b* states that parents of children with autism will, on average, display more intrusive and controlling behaviors (*duration of parental control/intrusion*) than parents of typically developing children. Finally, *Hypothesis 2c* states that parents of typically developing children will exhibit more intense (higher levels of) sensitive parenting behaviors (*intensity of sensitive parental behaviors*) while the parents of autistic children will exhibit higher levels of intense controlling/intrusive behaviors. These hypotheses are consistent with a theoretical viewpoint that suggests that the deficits in the social behaviors of children with autism limit parents’ ability to decipher their children’s signals because they are not expressed in an explicit manner (van Ijzendoorn et al., 2007), and that these children are more likely to display dysregulated or disruptive behaviors that may require parents to provide external control (Kasari et al., 1988; Kim & Mahoney, 2004).

**Hypothesis 3: Impact of parenting stress on parent-child interaction.**  
Hypothesis 3 focuses on the impact of parenting stress on aspects of the parent-child

interaction. All stress-related hypotheses will be tested using the Parent Stress Index (PSI) *total stress* score as well as the three PSI subscales: *parental distress*, *parent-child-dysfunctional interaction*, and *difficult child*. Hypothesis 3a states that parents of children with autism will experience elevated levels of stress (*PSI*) compared to parents in the typically developing group. This is consistent with the current knowledge that parents of children with autism experience higher levels of stress than parents of typically developing children and children with other developmental disabilities (Erickson Warfield, 2005; Tomanik et al., 2004). Hypothesis 3b states that parents who have high levels of stress (*PSI*) will be less sensitive and more controlling/intrusive during the parent-child play interaction (*duration of parent sensitivity/duration of parental control/intrusion, intensity of sensitive parental behaviors*). This is consistent with a meta-analysis by Singer and colleagues (2007) on stress-related depression that found that mothers of children with disabilities, both with and without depression were less responsive to, and exhibited more negative affect with, their children. This hypothesis is also consistent with work by Benson and Karlof (2008), who found elevated levels of anger and depression in mothers of child with autism, as well as work by Orsmond and colleagues (2006), which demonstrated increased hostility, criticism and over-involvement in parents of children with autism. Hypothesis 3c states that, on average, children who are less responsive during play (*intensity of responsive child behaviors*) will have parents who experience elevated levels of stress (*PSI*). This is consistent with research by Kasari and Sigman (1997), who found that children who were unresponsive during interactions with experimenters had caregivers who reported the highest levels of parenting stress. This hypothesis is also supported by Donenberg and Baker's (1993)

finding that reduced child responsiveness was predictive of increased stress in parents, and by the work of Ornstein Davis and Carter (2008), which suggests the most consistent predictor of parent stress for mothers and fathers was deficits in social skills.

**Hypothesis 4: Associations between parent and child behaviors.** *Hypothesis 4a* states that on average, more sensitive parenting behaviors (*duration of parent sensitivity, intensity of sensitive parental behaviors*) will be associated with more child responsiveness (*intensity of responsive child behaviors*). *Hypothesis 4b* states that parental sensitivity will be associated with child-directed play. This hypothesis is based on research that suggests that highly sensitive parents attend to appropriate aspects of the child's play, resulting in increased mutual engagement (Bakeman & Adamson, 1984; Kopp, 1982). *Hypothesis 4c* states that sensitive parenting behaviors (*intensity of sensitive parental behaviors*) will be associated with higher levels of child interest and investment (*intensity of child interest/investment*). This hypothesis is based on research that has shown that controlling parenting behaviors typically marginalize the child's role in play, specifically for children with autism who are less likely to make their interests explicit (Kasari et al., 1988; Restal & Magill-Evans, 1993). Parents who are highly sensitive are more likely to synchronize their behaviors to the child's than parents who are not sensitive, resulting in play that is more closely coordinated to the activity that the child is currently demonstrating interest in (Bakeman & Adamson, 1984; Kopp, 1982). *Hypothesis 4d* states that for each of the aforementioned associations, the autism group will demonstrate stronger associations than the typically developing group. It is expected that these associations will be stronger in children with autism because of the passive nature of their play style (Stahmer, 1999; Watson et al., 2003; Williams et al., 2001).

Due to the fact that the play activities exhibited by autistic children are more likely to be marginalized by their play partners, these children may be forced to engage in play that does not interest them. Thus, positive parenting behaviors that are sensitive to the child's interests may have a more influential affect on children with autism because their interests may be more fleeting and they typically demonstrate reduced responsiveness and engagement with social partners. Children with autism may require a level of support from their parents to maintain high levels of interest and responsivity that is not required of typically developing children (Laundry et al., 2006). Consequently, the association between responsiveness and interest may not be as parent-dependent for typically developing children because these children may be better skilled at maintaining their own interest, and therefore their behaviors may be less contingent on the parent's behavior.

**Hypothesis 5: Parent-child temporal contingencies.** There will be a significant temporal contingency between discrete parent behaviors and child behaviors. *Hypothesis 5a* states that sensitive parenting behaviors will be contingently associated with an increase or maintenance of child interest and investment during play. This hypothesis is consistent with research that suggests that parents who are sensitive to their child's interests, who correctly coordinate their attention to their child's activity, and who focus on improving their child's ability to effectively engage in play are more likely to increase the child's interest and investment in what they are doing (Bakeman & Adamson, 1984; Koegel & Mentis, 1985). *Hypothesis 5b* states that parental sensitivity will be contingently linked to child-directed play. This hypothesis is consistent with research that suggests that parents who demonstrate sensitivity during play interactions with their

children are likely to coordinate their attention to their child's activity (Bakeman & Adamson, 1984). Hypothesis 5c states that child-directed play will be contingently associated with an increase or maintenance of child interest and investment. This hypothesis is consistent with research suggesting that children who have the ability to take a more active role in play development display higher levels interest in play (Bakeman & Adamson, 1984). Finally, Hypothesis 5d states that child unresponsive behaviors will be significantly less likely to be contingently linked to parent sensitivity. This hypothesis is consistent with research that has demonstrated a link between unresponsive child behaviors and parent stress (Ornstein Davis & Carter, 2008), and with our assertion that parents' stress will be linked to reduced sensitivity.

## Method

### Participants

**Children.** Fifty-two children were initially recruited to participate in the study (twenty-five in the autism group and twenty-seven in the typically developing group). Children with autism were required to have had a clinical diagnosis of autism, which was confirmed prior to data collection using the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994). The children with autism were considered high functioning with respect to language age, measured with the preschool language scale, fourth edition (PLS-4; Zimmerman, Steiner, & Pond, 2002), and mental age, measured with the Differential Abilities Scales-II (DAS-II; Elliot, 2007). One child was excluded from the study because he did not meet diagnostic criteria for autism. Two children were excluded from the study because their cognitive and language performance was significantly delayed, and they were not functioning at a level consistent with the remainder of the sample. Additionally, two children in the autism group and seven children in the typically developing group were excluded from analyses because they could not be matched based on gender and language age.

The final sample consisted of twenty high-functioning autistic children and twenty typically developing children matched on gender and language age. Children with autism had a mean chronological age of 58.95 months ( $SD = 11.50$ ), and the typically developing children had a mean chronological age of 50.20 months ( $SD = 11.12$ ). No significant differences were found between the matched groups in mental age, receptive language, or expressive language (see Table 2 for descriptive statistics on all developmental data).

**Parents.** The demographic information available for parents includes ethnicity, parent age, family income, and parent education level. Thirty-six mothers and four fathers participated in the study. 77.5% of the mothers were White, 10.0% were Hispanic/Latino, and 7.5% were of Asian origin. 82.5% of the fathers were White, 7.5% were of Asian origin, 2.5% were Hispanic/Latino, and 5.0% were biracial or other. The mean age of mothers was 35.85 years ( $SD = 4.57$ ), and the mean age of fathers was 37.18 years ( $SD = 5.60$ ). 97.5% of the parents were married and 2.5% had never been married. Parental self-report of income indicated that 25% of families made less than \$60,000 a year, 35% made between \$60,000 and \$100,000 a year, 30% made over \$100,000, and 10% chose not to report income. Concerning maternal education, 5% of mothers had a high school diploma, 8% completed a 2-year degree, 45% completed a 4-year degree, 29% obtained a master's degree, and 13% obtained a doctoral degree. With respect to paternal education, 5% of fathers had a high school diploma, 11% completed a 2-year degree, 37% completed a 4-year degree, 37% obtained a master's degree, and 10% obtained a doctoral degree. A variable known as *interactive parent education* was created and examined as a potential demographic covariate. This variable reflects the education level of the parent who engaged in the free play session with the child.

### **Procedure**

Children with autism were recruited through a resource center for families of children with autism in Phoenix, Arizona (Southwest Autism Research and Resource Center; SARRC), and typically developing children were recruited through Arizona State University preschools. The study took place over the course of two visits to either the resource center or the university. During the first visit, children participated in two

developmental assessments (DAS-II, PLS-4), and parents completed the ADI-R. Approximately two weeks following the initial visit, children and their parents participated in a number of lab activities, which ended in a free play session. While the children were engaged in the lab activities, parents filled out the Parenting Stress Index-Short Form (PSI-SF; Abidin, 1995). Prior to the free play session, the parent and the child were given a basket of toys and were instructed to play with whatever toys they wanted. The basket of toys included two baby dolls, a dishware set, two toy racecars, two puzzles, a doctor set, and a family of miniature dolls. The dyad was then left alone for approximately five minutes. Following the free play session, parents were instructed to have the child clean up the toys. Only behaviors that occurred in the free play session (prior to clean-up) were included in the present study.

## **Measures**

**Autism Diagnostic Interview, Revised (ADI-R).** The Autism Diagnostic Interview, Revised is a comprehensive interview that is utilized to assess individuals who are suspected of having autism or other autism spectrum disorders (Lord et al., 1994). The ADI-R is composed of ninety-three items that evaluate three functional domains: language and communication, reciprocal social interactions, and restricted, repetitive, and stereotyped behaviors and interests. The ADI-R has been proven to be highly effective in diagnosing autism as well as distinguishing autism from other developmental disorders. Additionally, it has been utilized extensively worldwide resulting in high reliability and validity in its results. The ADI-R took approximately two-hours to complete and was administered to parents by a trained interviewer.



**Differential Abilities Scales-II (DAS-II).** The Differential Ability Scales-Second Edition is a comprehensive assessment tool used to obtain an in-depth understanding of a child's cognitive abilities for learning as well as their capacity for intervention (Elliot, 2007). The DAS-II measures the following domains: verbal and nonverbal reasoning, spatial abilities, working memory, processing speed, and school readiness. Additionally, it is a reliable and valid measure for children with developmental disabilities. The measure yields a General Conceptual Ability (GCA) score from which a mental age score was derived for each child. The DAS-II was administered to each child individually by a trained interviewer.

**Preschool Language Scale, Fourth Edition (PLS-4).** The Preschool Language Scale, Fourth Edition is an instrument that is utilized to assess language skills in children from birth to six years and eleven months of age (Zimmerman et al., 2002). The PLS-4 identifies comprehension and expressive language skills as well as change in language over time. The PLS-4 measures preverbal behaviors and various linguistic skills including semantics, morphology, syntax, integrative language skills, and preliteracy skills. Extensive research has shown that it is a highly reliable and valid measure for children with developmental disabilities. Children's expressive and receptive language age were derived from the measure. The assessment was administered to each child by a trained interviewer.

**Parenting Stress Index-Short Form (PSI-SF).** The Parenting Stress Index-Short Form is designed to identify parent and family characteristics that fail to promote healthy development and functioning in children as young as one-month of age (Abidin, 1995). The PSI-SF is a self-report questionnaire composed of thirty-six Likert-type items that

assess *total stress* (i.e., the overall amount of parenting stress), as well as three subscales: *parental distress* (i.e., a damaged sense of competence as a parent, a lack of social support, depression, role-restriction, and conflict with spouse), *parent-child dysfunctional interaction* (i.e., the child's failure to meet the parent's expectations and a lack of reinforcing interactions with the child), and *difficult child* (i.e., characteristics of the child that make them easy or difficult to manage). The PSI-SF is a valid measure that takes approximately ten-minutes for parents to complete. Scores at or above the ninetieth percentile indicate that the parent is experiencing clinical levels of stress.

Test-retest reliability of the PSI-SF has been found to be as high as 0.84 for total stress, 0.85 for parental distress, 0.68 for parent-child dysfunctional interaction, and 0.78 for the difficult child subscale. Additionally, internal reliability alpha for total stress has been reported at 0.91, 0.87 for parental distress, 0.80 for parent-child dysfunctional interaction, and 0.85 for the difficult child subscale (Abidin, 1995). Internal reliability for the present study will be assessed.

**Parent-child interaction.** Children and their parents were observed and videotaped for up to seven-minutes during a free play session prior to being instructed to clean up. An effort was made to keep both the parent and the child in full view of the camcorder throughout the entire procedure. Video files were subsequently saved to DVD files and coded independently for parent and child variables. Parent and child behaviors were coded in ten-second intervals for a total of up to forty-two intervals. During intervals where two distinct behaviors occurred, the predominant behavior was coded.

**Coded parent behaviors.** The parent's behavior was coded from the free play parent-child interaction. Parents were rated on a seven-point Likert-type scale ranging

from (1) *high control/intrusion* to (7) *high sensitivity* every ten seconds.

*Control/intrusion* included instances when parents over-stimulated or over-controlled the child. This included instances when the parent physically manipulated or restricted the child's movements, gave unnecessary commands without an explanation, prevented play with specific toys, or completely rejected the child's bids for attention. *Sensitivity* was based on observations of parenting behaviors where there was evidence that the parent was very aware of the child, was appropriately attentive, and was contingently responsive to his/her interests and affect while displaying good timing. Additionally, the parents' observed tone and affect were taken into account when assigning the score. This scale was adapted from the parenting portion of the Emotional Availability Scales, Third Edition developed by Biringen and colleagues (2000), which examines the intrusive, controlling, and sensitivity behaviors of parents within play interactions as well as the Functional Emotional Assessment Scale created by Greenspan, DeGangi, and Wieder (2001).

A score of 1 was given if there was evidence of extreme levels of control/intrusion, a score of 2 if there were moderate levels of control/intrusion, a score of 3 if low levels of control/intrusion were observed, a score of 4 was given if there were no observed sensitive or controlling/intrusive behaviors, a score of 5 if low levels of sensitivity were observed, a score of 6 if there were moderate levels of sensitivity, and a score of 7 if extreme levels of sensitivity were observed. Two independent coders were trained until appropriate agreement (Cohen's kappa > 0.65) was achieved. Ten percent of all observations were coded to assess coder drift reliability, and the mean interrater reliability for parental behaviors was 0.88 (Cohen's kappa).

*Parent variables used in analyses.* The following variables will be used in study analyses to reflect parent behavior. Data in its raw form (i.e., temporal, interval-by-interval data) will be used to conduct contingency analyses. In addition, summary variables will be created to reflect overall levels of parent behavior across the entire play session. Specifically, the *duration of parental sensitivity* will reflect a count of all instances of sensitive parenting behaviors (scores of 5, 6, or 7) divided by the total number of intervals coded across the play session for that parent, and the *duration of parental control/intrusion* will reflect a count of all instances of intrusive parenting behaviors (scores of 1, 2, or 3) divided by total intervals coded. A high score on the *duration of parental sensitivity* will reflect a parent who is consistently sensitive, while a low score will be indicative of a parent who is rarely sensitive. Likewise, a high score on the *duration of parental control/intrusion* will signify a parent who is consistently intrusive and controlling, while a low score will be a sign of a parent who is rarely controlling or intrusive. The *intensity of sensitive parental behaviors* will reflect the sum of each parenting score divided by the total number of intervals coded. A high score on the *intensity of sensitive parental behaviors* will be indicative of a parent who engages in high levels of sensitivity, while a low score will reflect high levels of intrusive and controlling behaviors.

*Coded child behaviors.* Several dimensions of child behaviors were coded during the free-play interaction. With respect to **child interest/investment in play**, the overall level of the child's interest and investment in play was coded from the free play parent-child interaction. Children were rated on a five-point Likert-type scale ranging from (1) *high disinterest* to (5) *high interest/investment* every ten seconds. *High disinterest* was

evident when the child displayed a lack of liveliness and involvement, actively resisted parents' bids, or seemed indifferent or unconcerned. *High interest/investment* was apparent when the child exhibited instructive, directive, or initiative behaviors, elaborations, or amusement. This scale was adapted from a coding system developed by Baldwin and Ward (1973) known as Interactional Language, which is used to describe the interaction patterns of a parent-child dyad.

A score of 1 was given if the child displayed extreme disinterest, a score of 2 if there were low to moderate levels of disinterest, a score of 3 if there were no observable indicators of interest or disinterest, a score of 4 if there were low to moderate levels of interest and investment, and a score of 5 if extreme levels of interest and investment were observed. Two independent coders were trained until acceptable agreement (Cohen's kappa > 0.75) was achieved. Ten percent of all observations were coded to assess coder drift reliability, and the mean interrater reliability for child interest and investment in play was 0.84 (Cohen's kappa).

With respect to **child responsivity**, the child's level of responsivity was coded from the free play parent-child interaction. Children were rated on a three-point Likert-type scale ranging from (1) *highly unresponsive* to (3) *highly responsive* every ten seconds. *Highly unresponsive* behaviors were evident when the child completely ignored the parent or failed to acknowledge the parent's bids or directives. *Highly responsive* behaviors were apparent when the child immediately acknowledged and responded to the parent's bids or directives.

A score of 0 was given if there was nothing for the child to respond to, a score of 1 was given if the child was highly unresponsive, a score of 2 was given if the child

displayed low to moderate levels of responsiveness, and a score of 3 was given if the child was highly responsive. Two independent coders were trained until acceptable agreement (Cohen's kappa > 0.75) was achieved. Ten percent of all observations were coded to assess coder drift reliability, and the mean interrater reliability for child interest and investment in play was 0.91 (Cohen's kappa).

Finally, **parent versus child-directed interactions** were coded from the free play parent-child interaction. The dyad was rated on a four-point Likert-type scale ranging from (1) *completely parent-directed interaction* to (4) *completely child-directed interaction*. *Completely parent-directed interactions* were evident when the parent chose the course and direction of the play without incorporating the child's ideas. *Completely child-directed interactions* were apparent when the child chose the direction and course of play without incorporating any of the parent's ideas.

A score of 1 is given if the play interaction is completely parent-directed, a score of 2 is given if the play interaction is mutually-directed and the parent and child are balanced in creativity and direction, a score of 3 is given if it is a child-directed interaction, but the parent is able to contribute and elaborate on the play within the parameters that the child has set, and a score of 4 is given if the play is completely child-directed. Two independent coders were trained until acceptable agreement (Cohen's kappa > 0.75) was achieved. Ten percent of all observations were coded to assess coder drift reliability, and the mean interrater reliability for child interest and investment in play was 0.97 (Cohen's kappa).

***Child variables used in analyses.*** The following variables will be used in study analyses to reflect child behavior. Data in its raw form (i.e., temporal interval-by-interval

data) will be used to conduct contingency analyses. Additionally, summary variables will be created to reflect overall levels of child behavior across the entire play session. The *intensity of child interest/investment* will reflect the mean level of children's interest/investment. This variable will be computed by summing all of the interest/investment scores and dividing by the total number of intervals coded. A high score on the *intensity of child interest/investment* will be indicative of a child who displays high levels of interest and investment, while a low score will be a sign of low levels of interest and investment. Additionally, the *intensity of responsive child behaviors* will reflect the mean level of children's responsivity. This variable will be computed by summing all of the child responsivity scores and dividing by the total number of intervals coded. A high score on the *intensity of responsive child behaviors* will reveal a child who displays high levels of responsive behaviors, while a low score will be indicative of a child who displays low levels of responsiveness. Finally, the *proportion of child-directed play* will reflect a count of all instances where the child directed the play session (scores of 2 or 3) divided by the total number of intervals coded across the play session for the child. A high score on the *proportion of child-directed play* will be indicative of a dyad that is primarily directed by the child, while a low score will be a sign of a dyad that is most frequently directed by the parent.

## Results

Prior to completing the proposed analyses, diagnostic analyses were conducted to examine whether there were violations to normality (i.e., skewness) in any of the study variables' distributions. In order to test for significant skew, the standard error of skewness was calculated using the formula  $\sqrt{(6/n)}$ . A standard error of .39 was found, thus any variable with a skewness statistic over two standard errors (.78) was considered significantly skewed. *Duration of parental sensitivity, intensity of child interest/investment, intensity of responsive child behaviors, and proportion of child-directed play* were identified as negatively skewed variables, while *duration of parental control/intrusion* was identified as positively skewed.

As recommended by Tabachnick and Fidell (2001), a square root transformation was initially utilized in an attempt to normalize the distribution of each variable. This transformation was effective in eliminating the positive skew for the *duration of parental control/intrusion*. For the negatively skewed variables, reflection was used prior to performing any transformations (Tabachnick & Fidell, 2001). Scores were subtracted from the constant so that each variable with a negative skew was positively skewed. After this, a log transformation was used on all of the negatively skewed variables. The log transformation was effective in normalizing *duration of parental sensitivity, intensity of child interest/investment, intensity of responsive child behaviors, and proportion of child-directed play*.

Tabachnick and Fidell (2001) recommend that transformations made to variables to normalize skew must be *vital* to the analyses as these procedures alter results limiting the interpretability of the findings. Considering this, all study analyses were conducted



using both the original variables as well as the transformed variables in order to determine the necessity of the transformation procedures. No differences emerged in the significance levels of any of the study findings. Thus, in order to preserve the interpretability of results, subsequent findings are reported on the original variables rather than the transformed variables.

Following the initial diagnostic analyses, potential covariates among the developmental functioning variables were identified by conducting bivariate correlations between all study variables and developmental scores (mental age, expressive language, and receptive language). Mental age, receptive language age, and expressive language age all emerged as significantly related to *intensity of child interest and investment* ( $r$ s ranged from .33 to .39, all  $ps < .05$ ). Additionally, expressive language age was significantly correlated with several parenting variables including the *duration of parental control/intrusion* ( $r = -.37, p < .05$ ) and *intensity of sensitive parenting behaviors* ( $r = .43, p < .05$ ). Finally, expressive language age was also related to PSI parent-child dysfunctional interaction ( $r = -.30, p < .05$ ). Because expressive language age emerged as the developmental variable that was most consistently related to several study variables, and given the high intercorrelations among the three developmental variables ( $r$ s ranged from .71 to .91, all  $ps < .001$ ), expressive language age was utilized as the covariate in all subsequent analyses.

Additionally, we explored demographic variables, specifically parent education and family income, to identify potential covariates. These analyses revealed a number of significant correlations. Household income was significantly related to *intensity of responsive child behaviors* ( $r = .50, p = .003$ ). Additionally, parent education emerged as

related to a number of PSI variables including PSI parent-child dysfunctional interaction ( $r = -.44, p = .005$ ), PSI difficult child ( $r = -.46, p = .004$ ), and PSI total stress ( $r = -.50, p = .002$ ). As a result of these analyses, household income was used as a covariate in all analyses pertaining to *intensity of responsive child behaviors* and parent education was utilized as a covariate for all analyses utilizing PSI variables.

### **Hypothesis 1: Observed Child Behaviors**

To assess whether children with autism displayed lower levels of responsivity than typically developing children, an ANCOVA was conducted with *intensity of responsive child behaviors* as the dependent variable, diagnostic group as the between groups factor (autism, typical), and expressive language age and household income as the covariates. For these and all mean difference analyses, Cohen's  $d$  effect sizes were calculated (Group 1 Mean – Group 2 Mean/pooled SD). According to Rosenthal, Rosnow, and Rubin (2000), the conventions for effect size magnitude are:  $d = .2$  (small effect);  $d = .5$  (medium effect); and  $d = .8$  (large effect). In accordance with the hypothesized group difference, the results revealed a significant difference in child responsivity by group,  $F(1, 30) = 5.03, p = .006$ , Cohen's  $d$  effect size = .32. More specifically, on average, children in the typically developing group demonstrated higher responsivity ( $M = 2.36, SD = .39$ ) than the children with autism ( $M = 2.21, SD = .52$ ) while controlling for expressive language age and household income. See Table 3 for descriptive statistics and group differences for all child study variables.

To assess whether there was a lower proportion of child-directed play in children with autism, an ANCOVA was conducted with *proportion of child-directed play* as the dependent variable, diagnostic group as the between groups factor (autism, typical) and

expressive language age as a covariate. For this analysis, both forms of child-directed play were considered, that is, mutually-directed play (i.e., the parent and the child are balanced in developing play) and completely child-directed play (i.e., the child single-handedly develops and defines the play while the parent is able to contribute within the parameters that the child has set). The results demonstrated that there were significant group differences in *proportion of child-directed play*,  $F(1, 36) = 4.36, p < .05$ , Cohen's  $d$  effect size = .82. More specifically, the typically developing group engaged in child-directed play for a greater proportion of time ( $M = .88, SD = .15$ ) than did children with autism ( $M = .75, SD = .17$ ). In order to further explore this difference, we also examined group differences in the individual types of play that constituted child-directed play. The results demonstrated that typically developing children engaged in completely child-directed play ( $M = .79, SD = .18$ ) for significantly greater proportions of time than children with autism,  $F(1, 36) = 7.84, p = .001$ , Cohen's  $d$  effect size = 1.25, ( $M = .55, SD = .20$ ). However, there were no significant group differences in mutually directed play,  $F(1, 36) = 2.70, p = .08$ , Cohen's  $d$  effect size = .73.

## **Hypothesis 2: Observed Parent Behaviors**

To assess whether parents of children with autism displayed fewer sensitive parenting behaviors on average across the entire play interaction than parents of typically developing children, an ANCOVA was conducted with *duration of parental sensitivity* as the dependent variable, diagnostic group as a between groups factor (autism, typical), and expressive language age as a covariate. For this analysis, all levels of sensitive parenting behaviors were considered (i.e., a score of 5, 6, or 7). In accordance with the hypothesized group difference, the results revealed a significant difference in sensitive

parenting behaviors by group,  $F(1, 37) = 4.15, p = .02$ , Cohen's  $d$  effect size = 1.12, with the parents in the typically developing group ( $M = .85, SD = .16$ ) engaging in more sensitive parenting behaviors over the course of the entire play session than the parents in the autistic group ( $M = .64, SD = .22$ ). See Table 4 for descriptive statistics and group differences for all parent study variables.

To assess whether parents of children with autism displayed more intrusive and controlling behaviors than parents of typically developing children, an ANCOVA was conducted with duration of *parental intrusive/controlling behaviors* as the dependent variable, diagnostic groups as a between groups factor (autism, typical), and expressive language age as a covariate. For this analysis, all levels of intrusive/controlling parenting behaviors were considered (i.e., a score of 1, 2, or 3). In accordance with the hypothesized group difference, the results revealed a highly significant difference in intrusive/controlling parenting behaviors by group,  $F(1, 37) = 7.77, p = .002$ , Cohen's  $d$  effect size = .89, with the parents in the typically developing group ( $M = .11, SD = .14$ ) engaging in less intrusive/controlling parenting behaviors over the course of the entire play session than the parents in the autistic group ( $M = .26, SD = .19$ ).

Finally, to assess whether parents of typically developing children exhibit more intense (higher levels of) sensitive parenting behaviors than the parents of autistic children, an ANCOVA was conducted with *intensity of sensitive parental behaviors* as the dependent variable, diagnostic group as a between groups factor (autism, typical), and expressive language age as a covariate. Consistent with the hypothesized group difference, the results revealed a significant difference in intensity of sensitive parenting behaviors by group,  $F(1, 36) = 10.32, p < .001$ , Cohen's  $d$  effect size = 1.03, with the

parents in the typically developing group ( $M = 5.25, SD = .67$ ) engaging in more intense sensitive parenting behaviors over the course of the entire play session than the parents in the autistic group ( $M = 4.55, SD = .68$ ).

### **Hypothesis 3: Impact of Parenting Stress on Parent-Child Interaction**

To assess whether parents of children with autism experienced higher levels of stress compared to parents in the typically developing group, an ANCOVA was conducted with the PSI total stress as the dependent variable, diagnostic group as the between groups factor (autism, typical), and expressive language age and parent education as the covariates. Consistent with the hypothesized group difference, the results revealed a significant difference in parent stress by group,  $F(1, 31) = 6.66, p = .001$ , Cohen's  $d$  effect size = 1.33, with the parents in the typically developing group ( $M = 68.39, SD = 15.31$ ) displaying lower levels of stress than the parents in the autistic group ( $M = 90.44, SD = 17.87$ ).

To assess whether parents who reported high levels of stress were less sensitive and more controlling/intrusive during the parent-child play interaction, bivariate partial correlations were conducted utilizing *duration of parent sensitivity*, *duration of parent control/intrusion*, *intensity of sensitive parental behaviors*, and the PSI total stress, controlling for children's expressive language age and parent education. Contrary to the hypothesized relations, no significant association emerged between *duration of parental sensitivity* and PSI total stress ( $r = -.151, p = .43$ ), *between duration of parental control/intrusion* and PSI total stress ( $r = .097, p = .61$ ) or between *intensity of sensitive parental behaviors* and PSI total stress ( $r = -.203, p = .28$ ). See Table 5 for correlations

among all study variables for the entire sample. In addition, Table 6 presents correlations among all study variables within the autism and typical groups.

To assess whether, on average, children who are less responsive during play have parents who experience higher levels of stress, bivariate partial correlations were conducted on *intensity of child responsive behaviors* and PSI total stress controlling for children's expressive language age, parent education, and household income. Contrary to the hypothesized association, *intensity of responsive child behaviors* was not significantly related to the PSI total stress ( $r = -.246, p = .208$ ). In order to further explore this association, we also examined the association between *high* child responsiveness (i.e., proportion of intervals in which the child was coded with a score of 3) and all PSI variables. A marginal negative association emerged between the proportion of *high* child responsiveness and PSI difficult child ( $r = -.378, p = .078$ ), meaning that parents who reported that they perceive their children as less difficult have children who displayed more *high* responsive behavior. Additionally, we examined the between *low* child responsiveness (i.e., proportion of intervals in which the child was coded with a score of 1) and all PSI variables, and a number of associations emerged. Specifically, the results revealed a marginal correlation between low child responsiveness and PSI total stress ( $r = .360, p = .06$ ), indicating that parents who reported higher total stress had children who displayed low levels of child responsiveness for a greater proportion of time. Further, PSI difficult child was strongly associated with low child responsiveness ( $r = .488, p = .008$ ), meaning that children who displayed low levels of child responsiveness for a greater proportion of time had parents who perceived them as more difficult.

#### **Hypothesis 4: Associations Between Parent and Child Behaviors**

Analyses were next conducted at the group level to examine associations between parent and child behavior. For each hypothesized association, we first explored bivariate partial correlations, controlling for necessary covariates. Because we hypothesized that these associations would be stronger for parent-child dyads in the autism group (*Hypothesis 4d*), we also assessed whether the strength of the association varied by group using regression analyses with tests of each variable\*group interaction. None of the interaction terms were found to be significant at the  $p < .05$  level, indicating that the strength of the associations were not significantly different between the two groups (i.e., diagnostic group did not operate as a moderator of these associations).

To assess whether, on average, more sensitive parenting behaviors were associated with more child responsiveness, bivariate partial correlations were conducted, utilizing *duration of parental sensitivity*, *intensity of sensitive parental behaviors*, and *intensity of responsive child behaviors* controlling for child's expressive language and household income. Contrary to the hypothesized relations, a significant association did not emerge between *duration of parental sensitivity* and *intensity of responsive child behaviors* ( $r = .171, p = .35$ ) or between *intensity of sensitive parental behaviors* and *intensity of responsive child behaviors* ( $r = .059, p = .748$ ). In order to further explore this association, we also examined the correlation between *high* child responsivity (coded score of 3) and *duration of parental sensitivity*, and a marginal association emerged ( $r = .312, p = .082$ ). This demonstrates that children who displayed more *high* levels of responsivity had parents who engaged in more parent sensitivity. Further tests of

moderation revealed no significant group\**duration of parental sensitivity* interactions in predicating the *intensity of responsive child behaviors*.

To assess whether parental sensitivity was positively associated with child-directed play, bivariate partial correlations were conducted, utilizing *duration of parental sensitivity*, *intensity of sensitive parental behaviors*, and *proportion of child-directed play* controlling for child's expressive language. Consistent with the hypothesized relation, *duration of parental sensitivity* was significantly related to *proportion of child-directed play* ( $r = .625, p < .001$ ). Additionally, *intensity of sensitive parental behaviors* was significantly related to *proportion of child-directed play* ( $r = .684, r < .001$ ). To further explore these associations, analyses were conducted examining the association between parenting behaviors and mutually directed play versus completely child-directed play, and the results revealed significant associations between *duration of parental sensitivity* and completely child-directed play ( $r = .329, p = .004$ ), but not mutually directed play ( $r = .185, r = .267$ ). Similarly, a significant relationship was found between *intensity of sensitive parental behaviors* and completely child-directed play ( $r = .435, p = .006$ ), but not with mutually directed play ( $r = .098, p = .559$ ). Tests of moderation revealed no significant group\**duration of parental sensitivity* interactions in predicating the *proportion of child-directed play*.

To assess whether sensitive parenting behaviors were associated with more child interest and investment, bivariate partial correlations were conducted, utilizing *intensity of sensitive parental behaviors* and *intensity of child interest/investment* controlling for child's expressive language. In accordance with the hypothesized relations, *intensity of sensitive parental behaviors* was significantly related to *intensity of child interest and*



*investment* ( $r = .682, p < .001$ ). However, tests of moderation revealed no significant group\**intensity of sensitive parental behaviors* interactions in predicating the *intensity of child interest and investment*.

### **Hypothesis 5: Parent-Child Temporal Contingencies**

To examine the temporal association between the parent and child behaviors, contingency analyses were used to identify every lag-1 association between a specific parent behavior and the subsequent child behavior (i.e., when the antecedent behavior occurred in a given interval and the contingent behavior occurred in the subsequent interval). A composite Yule's Q score was then created by summing the 2 x 2 contingency tables for all behaviors. The Yule's Q score is an odds ratio that ranges from -1 to +1, indicating the strength of the contingency between behaviors. An important feature of Yule's Q, and one that is particularly relevant to the study of children with autism, is that the statistic controls for the base rate of behaviors, thus controlling for the fact that a given behavior may occur at different frequencies for different children and parents (Bakeman & Gottman, 1997). Thus, for example, in the context of hypothesis 5a, which states that sensitive parenting behaviors will be contingently associated with an increase or maintenance of child interest and investment during play, rows reflected the presence or absence of parental sensitivity in a given interval and columns represented the presence or absence of an increase or maintenance of interest in the next interval (Lag-1). Increases could occur for any level of interest (e.g., from a coded score of 1 to a coded score of 4), while maintenance indicates the level of interest is consistent across the two intervals (e.g., from a coded score of 4 to a coded score of 4). To create the composite Yule's Q value for each dyad (across all possible combinations of behaviors),

cell components of the table for each individual behavior were summed (see Figure 1). For example, each dyad had a 2 x 2 Yule's Q contingency table, with rows reflecting the presence or absence of parental sensitivity. Therefore, the top left cell of each of these tables consisted of the number of times sensitive parenting behaviors were contingently associated with an increase or maintenance in child interest and investment (see "Cell a" in Figure 1). Next, the value in the top right cell (i.e., the number of times parental sensitivity was not followed by an increase or maintenance in child interest and investment) were calculated to create the top right cell of the dyad's composite Yule's Q table (see "Cell b" in Figure 1), and this process was repeated across all four cells of the table. See Table 7 for the means and standard deviations of the Yule's Q variables for each contingency tested. Following the creation of the Yule's Q variables, one sample t-tests were conducted to assess whether the mean values (across the entire sample) were significantly different than zero (Sutherland, Wehby, & Yoder, 2002). Additionally, one sample t-tests were conducted separately for each group to assess whether mean Yule's Q contingencies were significantly different than zero within each group. Finally, ANOVAs were conducted to determine whether there were significant group differences in Yule's Q contingency scores. It should be noted that the sample size for individual analyses will vary due to individual dyads not showing a particular contingency. Analyses with low sample sizes should be interpreted with caution.

**Hypothesis 5a.** To assess whether sensitive parenting behaviors were contingently associated with an increase or maintenance of child interest and investment during play, one sample t-tests were conducted across the entire sample to assess whether mean values were significantly different than zero. The results revealed that the Yule's Q

for the contingency between parental sensitivity and child interest and investment was marginally different from zero,  $t(33) = -1.83, p = .077, (M = -.22, SD = .70)$ . However, contrary to the expected direction of this association, the negative Yule's Q value indicated that parental sensitivity was marginally *less likely* than chance to be temporally associated with a maintenance or increase in child interest. Additionally, one sample t-tests were conducted separately for each group; however, the results failed to reveal a significant difference from zero for the autism group  $t(14) = .66, p = .52, (M = .09, SD = .55)$  or for the typically developing group,  $t(11) = -.81, p = .44, (M = -.18, SD = .78)$ . Finally, ANOVAs were conducted to determine whether there were significant group differences in Yule's Q contingency scores. Again, the results failed to reveal any significant group differences,  $F(1, 32) = 1.16, p = .293$ .

**Hypothesis 5b.** To assess whether parental sensitivity was contingently linked to child-directed play, one sample t-tests were conducted across the entire sample to assess whether mean values were significantly different from zero. The mean Yule's Q value of the contingency between parental sensitivity and child-directed play was not significantly different from zero,  $t(27) = -1.03, p = .314$ . Additionally, one sample t-tests were conducted separately for each group; however, the results failed to reveal a significant difference from zero for the autism group  $t(14) = -.29, p = .777, (M = -.06, SD = .75)$  or for the typically developing group,  $t(12) = -1.14, p = .278, (M = -.26, SD = .82)$ . Finally, ANOVAs were conducted to determine whether there were significant group differences in Yule's Q contingency scores. Again, the results failed to reveal any significant group differences,  $F(1, 32) = .47, p = .497$ .

**Hypothesis 5c.** To assess whether child-directed play was contingently associated with an increase or maintenance of child interest and investment, one sample t-tests were conducted across the entire sample to assess whether mean values were significantly different from zero. The mean Yule's Q value of the contingency between child-directed play and child interest was marginally significant,  $t(24) = -1.85, p = .077$ , ( $M = -.28, SD = .75$ ). However, contrary to the expected direction of this association, the negative Yule's Q value indicated that child-directed play was significantly *less likely* than chance to be temporally associated with a maintenance or increase in child interest and investment for the entire sample. To further explore this association, one sample t-tests were conducted separately for each group. The mean value of the Yule's Q score for the contingency between child-directed play and child interest and investment for the typically developing group was significantly different from zero,  $t(9) = -2.53, p = .032$ , ( $M = -.63, SD = .79$ ). However, the negative Yule's Q value indicates that child-directed play is significantly *less likely* than chance to be temporally associated with a maintenance or increase in child interest for the typically developing group. No significant association emerged for the autism group. To further explore this association and because child-directed play was coded at different levels, we examined the contingency between completely child-directed play (i.e., a coded score of 3) and child interest and investment. These analyses revealed that the mean Yule's Q for the contingency between completely child-directed play and child interest and investment was marginally different from zero for the autism group,  $t(15) = 2.00, p = .064$ , ( $M = .26, SD = .53$ ), indicating a trend for completely child-directed play to be temporally associated with an increase or maintenance of child interest and investment. Finally, to

examine whether the Yule's Q contingencies were significantly different for dyads in the autism versus typical groups, ANOVAs were conducted. Marginal differences emerged in the contingency between child-directed play (i.e., a coded score of 2 or 3) and child interest by group,  $F(1, 23) = 4.10, p = .055$ , with the typical group demonstrating a stronger negative contingency ( $M = -.63, SD = .79$ ) than the autism group ( $M = -.04, SD = .65$ ). Thus, for the typical group, there was a trend for child-directed play to be *less likely* than chance to be related to increases of child interest and investment.

**Hypothesis 5d.** To assess whether child responsivity was contingently associated with parent sensitivity, one sample t-tests were conducted across the entire sample to assess whether mean values were significantly different from zero. The results revealed that the mean value of the contingency between parental sensitivity and child responsivity was marginally different from zero,  $t(24) = -2.06, p = .051, (M = -.19, SD = .47)$ .

However, once again, contrary to the expected direction of this association, the negative Yule's Q value indicated that parental sensitivity was significantly *less likely* than chance to be temporally associated with an increase in child responsivity. Because parental sensitivity was coded at different levels (i.e., low to high), we further explored this variable as an antecedent of child responsivity by examining the contingency between various levels of parental sensitivity with child responsivity. These analyses revealed that the mean Yule's Q for the contingency between *high* parent sensitivity (i.e., a coded score of 7) and child responsivity was positive and significantly different than zero,  $t(16) = 4.44, p < .001, (M = .71, SD = .64)$ . Thus, in the overall sample, children were significantly more likely than chance to display responsive behaviors in those intervals immediately following parents' displays of *high* sensitivity. To examine whether the

mean Yule's Q values were significantly different than zero within groups, one sample t-tests were conducted separately for each group. These analyses revealed that the mean Yule's Q contingency for the autism group was significantly different from zero,  $t(16) = -2.32, p = .034, (M = -.23, SD = .42)$ . No significant association emerged for the typically developing group. In order to further explore this relationship, we examined the contingency between various levels of parental sensitivity and child responsiveness. For the autism group, the mean value of the Yule's Q score for high levels of parental sensitivity (a coded score of 6 or 7) and child responsiveness was marginally different from zero,  $t(17) = 1.96, p = .066, (M = .28, SD = .60)$ , meaning that, once again, there was a trend for high levels of parental sensitivity to be followed by child responsiveness for children in the autism group. Finally, to examine whether the Yule's Q contingencies were significantly different for dyads in the autism versus typical groups, ANOVAs were conducted. No significant group differences emerged.

### **Post Hoc Exploratory Analyses**

Following the completion of the proposed analyses, additional analyses were conducted examining the correlations between the parent-child temporal contingencies and parent stress. To assess whether the contingencies between parent and child behaviors were associated with parent stress, bivariate partial correlations were conducted, utilizing the composite Yule's Q scores and the PSI total stress. While the low occurrence of some contingencies made the sample size for some of these analyses too low to generate meaningful results, significant correlations revealed a pattern with respect to parent sensitivity and child responsiveness. When accounting for moderate and high levels of child responsiveness (i.e., a coded score of 2 or 3) and an increase of

maintenance of parent sensitivity, a significant correlation emerged ( $r = .51, p = .021$ ). Thus, the strength of the contingency between children's responsivity and parents' contingent sensitivity was higher for parents who reported higher stress. Similarly, when accounting for the highest level of child responsivity (i.e., a coded score of 3) and an increase or maintenance of parent sensitivity, another significant correlation emerged ( $r = .46, p = .042$ ). However, caution must be exercised when interpreting these findings as the low power may have negatively affected these and other associations.

## Discussion

The present study examined the behaviors of parents and their children with and without autism during a free play interaction. The study consisted of observations and interval-based coding of sensitive versus controlling parenting behaviors, as well as children's responsivity and interest and investment in play, in an effort to understand whether parents' behaviors facilitated children's responses and interest during the interaction. The study also documented which participant (child or parent) primarily directed the play interaction in order to understand whether this factor was temporally linked to children's interest and investment in play. Finally, the study examined the influence of parent stress on parents' behaviors during the play interaction.

The results indicated that, on average, parents of children with autism demonstrated fewer sensitive behaviors and were more likely to interact with their children in an intrusive and controlling manner. Parental sensitivity was also associated with a number of child behaviors including child interest and investment as well as the proportion of child-directed play. Additionally, on average, children with autism demonstrated fewer responsive behaviors and were less likely to engage in completely child-directed play when compared to their typically developing peers. Parents of children with autism reported higher levels of stress, which was associated with lower levels of child responsivity. Finally, sequential analyses revealed mixed findings. Completely child-directed play was associated with an increase in child interest and investment. With respect to temporal contingencies between parental sensitivity and child responsivity, high levels of parental sensitivity were associated with an increase of child responsivity. On the other hand, several trends appeared in the opposite direction



than that which was hypothesized, and parental sensitivity was not temporally associated with child interest and investment or with child-directed play.

Our findings extend the field in a number of ways. Currently, there is limited observational work on the connection between the behaviors of children with autism and those of their parents within play settings. Play is regarded as a primary context of learning and development in early childhood (e.g., Pellegrini & Smith, 1998), and can have important long-term consequences for children's future social interactions. For children who have difficulty staying engaged in interactions, caregivers must be proficient at reading their child's cues and motivating their child by increasing their interest in the interaction. There is, therefore, a need to better understand which parenting behaviors reliably increase a child's motivation to engage in play by eliciting children's interest and investment. Such behaviors will ultimately assist the dyad in sustaining longer intervals of play and increase children's learning opportunities.

### **Behaviors of Parents of Children with and without Autism in a Play Setting**

An important goal of the current study was to increase our understanding of the impact of parental sensitivity on children's behaviors while engaged in play. Parents were coded as sensitive if they were very aware of the child, appropriately attentive, and contingently responsive to his/her interests and affect while displaying good timing. On the other hand, parents' behaviors were coded as controlling and intrusive when the parent physically manipulated or restricted the child's movements, gave unnecessary commands without an explanation, prevented play with specific toys, or completely rejected the child's bids for attention. Overall, parents of children with autism displayed fewer sensitive behaviors and more intrusive and controlling behaviors when compared

to parents of typically developing children who also exhibited *more intense* sensitive parenting behaviors across the entire play interaction. These findings are generally consistent with previous research, as discussed below, but an important contribution of the present findings is the fact that these differences were observed in the behaviors of parents of *high-functioning* autistic children, who had been matched with their typical peers on mental age and expressive and receptive language. Thus, the observed differences in parent behaviors cannot be attributed solely to children's language or cognitive delays.

Previous research examining behavioral differences in parents of typically developing children and children with developmental delays has consistently found that parents of developmentally delayed children utilize more directive and controlling behaviors (Cunningham, Reuler, Blackwell, & Deck, 1981; Eheart, 1982; Jones, 1977). Kasari and colleagues (1988) found that, despite similarities in parenting styles between groups, the parents of children with autism demonstrated more directive and controlling behaviors and were more likely to utilize physical control techniques to hold their children on task. Similarly, when observing mothers of preschool children with autism, Doussard-Roosevelt, Joe, Bazhenova, and Porges (2003) found that those parents did not differ in the quantity of parental initiatives, but did differ in the quality of the initiatives by demonstrating more intense behaviors while utilizing more physical contact and fewer verbal engagement techniques. However, in contrast to the abovementioned findings, van Ijzendoorn and colleagues (2007) found that parents of children with ASD did not differ significantly from parents of typically developing children in the expression of sensitive behaviors. The discrepancy in the results of the latter study may be due to the

fact that sensitivity was coded on a scale ranging from highly insensitive to highly sensitive, and the study may have restricted the range of possible observed behaviors by not examining intrusive and controlling parenting techniques, which was a feature of the other studies.

Parents of children with autism may demonstrate fewer sensitive behaviors and more intrusive and controlling behaviors for a number of reasons. Research has shown that children with autism are more likely to display dysregulated or disruptive behaviors that may require parents to provide external control (Kasari et al., 1988; Kim & Mahoney, 2004). Additionally, Siller and Sigman (2002) suggested that such parent behaviors may be influenced by the structure of some parent-focused interventions, which generally instruct caregivers to make their expectations of their child's behavior explicit at the start of the interaction and to always follow through on these expectations during the interaction. For example, Stahmer (1999) describes a highly structured, behavioral therapy method known as Pivotal Response Training. During this therapy, parents are instructed to direct their child's behavior, so that the child knows exactly what to do and how to do it. Parents are instructed to "follow-through" to ensure that their child behaves in the previously specified manner that they desire. Ultimately, such strategies may limit parents' flexibility and set firm, predesigned limits on the child's behavior during play interactions.

It may also be the case that the construct of parental sensitivity, as it currently stands, is not entirely valid for parents of children with autism because it cannot be appropriately measured in this population (van Ijzendoorn et al., 2007). The deficits in the social behaviors of children with autism may limit parents' ability to decipher their

children's signals because they are not expressed in an explicit manner. Moreover, children with autism may require and elicit parent behaviors that have a stronger emphasis on nonverbal input, which may appear to be more controlling and intrusive. While these behaviors may be appropriate for children with autism, they are coded and classified as insensitive according to "conventional criteria for the patterning and timing of parental responses to children's signals" (van Ijzendoorn et al., 2007, p. 605).

In order to fully understand the parenting behaviors of parents of children with autism, it is important to also acknowledge how the parent perceives the challenges of his or her parenting role. Previous research has found that parents of children with autism have significantly elevated levels of stress when compared to parents of typically developing children and children with other developmental disabilities (Dumas et al., 1991; Erickson Warfield, 2005; Ornstein Davis & Carter, 2008). Consistent with previous work, the results of our study revealed that parents in the autism group demonstrated significantly higher levels of total stress, rated their children as significantly more difficult, and reported significantly higher parent-child dysfunctional interaction than did parents in the typically developing group. Moreover, parents in the autism group had an average total stress score of 90.4 (compared to parents in the typically developing group who had a mean score of 68.4), which places them slightly above the cutoff for clinically significant levels of stress (i.e., total scores of 90 or above; Abidin, 1995). Ten of the 19 parents in the autism sample met this criterion, compared to 1 of the 20 parents in the typical sample.

On the other hand, parents in the autism group did not rate themselves as significantly more distressed on the PSI. The parental distress subscale of the PSI

evaluates the stress a parent is experiencing within his or her role, and it has been associated with an impaired sense of parenting competence, stress due to other life roles, conflict with the child's other parent, lack of social support, and depression (Abidin, 1995). This suggests that while the parents of children with autism in our sample experienced increased stress associated specifically with their child (i.e., elevated scores of the difficult child and parent-child dysfunctional interaction domains), they may not differ with respect to their overall sense of parenting competence, within their relationships with others, or with respect to their perceived social support.

Compared to several other studies of similarly aged children on the autism spectrum, the parents in our sample had a lower average total PSI score. For example, Tomanik and colleagues (2004) reported a mean total stress score of 97 for their sample of 60 mothers of children with a pervasive developmental disorder ranging in age from two to seven years old (mean = 5.05 years). Similarly, Zaidman-Zait and colleagues (2010) reported an average total PSI score of 95.9 in their sample of 141 parents of children diagnosed with ASD ranging in age from 20 months to 72 months (mean = 46.6). On the other hand, Ornstein Davis and Carter (2008) reported a mean PSI total stress score of 81.9 (i.e., lower than the mean in the present study) for their sample of 54 mother and 54 fathers of younger children with autism (mean = 23.7 months). The variation in these scores could be due to the age of the child, severity of the autism diagnosis of the sample, the parent surveyed (mother versus father), demographic characteristics of the sample, or the newness of the child's autism diagnosis. Together with the findings from previous research, our study provides further insight into parenting stress in parents of children with high-functioning autism.

Some researchers have speculated that parents of children with autism may experience elevated levels of stress largely due to their children's language deficits (Dumas et al., 1991; Erickson Warfield, 2005; Ornstein Davis & Carter, 2008). However, the autistic children in our sample were all relatively high functioning with respect to language performance and were matched with the control group based on both mental and language skills, which indicates that something more than language contributes to their parents' stress. One argument is that parents are particularly stressed because their children with autism are inconsistent in their responses to others. Gray (1997) speculated that inconsistencies in the social reciprocity of children with autism results in elevated stress for parents because the parent does not receive consistent verbal feedback from their child. Although our study, which failed to reveal an association between parent stress and child responsivity, does not directly support this theory, our results did demonstrate a negative association between *high* child responsivity and parents' reports of a difficult child on the PSI, suggesting that children who displayed the lowest levels of child responsivity for a greater proportion of time had parents who perceived them as more difficult.

Interestingly, our study did not find an association between parenting stress and parents' sensitivity. It may have been that our measure of parenting behaviors in a play setting did not reveal meaningful individual differences in the types of negative parenting behaviors that previous research has linked to stress (Orsmond et al., 2006; Singer et al., 2007). Our lack of findings may have also been due to the fact that we studied a relatively low-risk sample in terms of participants' demographics. That is, the majority of parents in our sample were married and had a combined annual income over \$60,000.

Research has shown that family income and social support moderate the effects of stress (Billings & Moos, 1981; Bradley & Corwyn, 2002). Thus, the demographic characteristics of the parents in our sample may have reduced the negative influence that stress generally has on parenting behaviors.

### **Behaviors of Children with and without Autism in a Play Setting**

Children with autism in our study displayed significantly lower levels of responsiveness than typically developing children. These findings are consistent with previous research, which has found that a core feature of autism is an increase in the presence of unresponsive behaviors (Donenberg & Baker, 1993; Lovaas, Koegel, & Schreibman, 1979; Ornstein Davis & Carter, 2008). Importantly, the present results extended previous literature by identifying these differences, even among high-functioning autistic children. One proposed explanation for a lack of responsiveness in this population is that children with autism demonstrate “stimulus overselectivity” (e.g., Lovaas et al., 1979, p. 1237), also referred to as sensory overload (e.g., DeGangi & Greenspan, 1989), meaning that they can respond to only a limited number of cues in their environment at any given time. These children may become overburdened with sensory information and may only react to a portion of the relevant information, while failing to recognize or respond to the remainder. It has been hypothesized that this overselectivity is not an issue of quality of stimuli but quantity, meaning that autistic children have a difficult time differentiating and discriminating between various simultaneous sensory stimuli. An additional explanation is that children with autism have difficulties with executive functioning, which limit their ability to plan and execute responses (Corbett, Constantine, Hendren, Rocke, & Ozonoff, 2009). The child may

recognize the parent's bid, but be unable to mentally organize a response and, therefore, appear to be unresponsive. According to this interpretation, the child's inability to respond is not selective. Rather, the child is unable to *activate* the response. A final, related, interpretation may be that due to the attentional dimensions of executive function, children with autism demonstrate fewer responsive behaviors because they have difficulty *disengaging* from their previous focus of attention in order to shift attention to their social partner when a response is called for. Such an interpretation would be in line with work suggesting that children with autism show impaired attentional control and attention shifting skills (e.g., Landry & Bryson, 2004).

Children with autism in our study also showed less child-directed play than typically developing children. More specifically, children with autism engaged in a lower proportion of *completely* child-directed play; however, there were no group differences in mutually directed play. These findings are consistent with previous research examining the engagement strategies of parents of children with developmental delays, which found that those parents were more directive in their play styles and spent more time attempting to elicit specific behaviors from their children (Cunningham et al., 1981; Eheart, 1982; Jones, 1977; Kasari et al., 1988). Additionally, research has found that parents of children with autism, and not the children themselves, are more likely to organize and regulate the pace of interactions (Kim & Mahoney, 2004), but that these dyads do not differ in their levels of mutually sustained play (Kasari et al., 1988).

Parents of children with autism may attempt to direct play interactions more than parents of typically developing children for a number of reasons. Kasari and colleagues (1988) speculate that parents of children with autism are attempting to compensate for



their child's insufficient behavior by utilizing control strategies that elicit desired child responses to a level more consistent with their mental age. Given the results of their study, which seem to demonstrate the success of these strategies in creating mutually directed play in children with autism, the authors suggest that directive techniques are successful for this population. However, the correlational nature of their study makes it difficult to interpret the direction of influence, as the child's interest or ability to engage with the parent may be responsible for the success of the parents' engagement techniques.

An additional explanation is provided by Kim and Mahoney (2004) who claim that early intervention practices and training techniques support the use of parental directiveness in promoting child engagement and participation in play, meaning that the majority of families that have participated in interventions would have received training in directive play techniques. This is consistent with Siller and Sigman's (2002) claim that directive parent behaviors may be influenced by the structure of some parent-focused interventions. Perhaps these parents are not inherently different in their interaction techniques with their children. Rather, the current state of the field vouches for this specific parenting practice resulting in observed group level differences in behavior. Future work should aim to document parents' history of exposure to such intervention techniques to better understand the origin of such behaviors.

In summary, the present study extends our knowledge of the behaviors of high functioning children with autism and their matched peers in a parent-child play interactions. Parents of children with autism displayed fewer sensitive behaviors and more intrusive and controlling behaviors, and children with autism displayed

significantly lower levels of responsivity and significantly less completely child-directed play than their typically developing counterparts.

### **Associations Between Parent and Child Behaviors**

One goal of the current study was to expand our understanding of the impact of parental sensitivity versus control in increasing the responsivity, child-directed play, and interest during play for children with autism. In our study, parental sensitivity was not associated with child responsivity. However, there was a positive association between parental sensitivity and both the proportion of child-directed play and child interest and investment.

Our finding that child responsivity was *not* associated with parental sensitivity was inconsistent with a number of previous studies. However, study methodology may have influenced these findings. Previous research has used highly heterogeneous samples of autistic children, whereas our sample was a highly homogenous group of high-functioning autistic children who were rigorously matched based on mental and language skills to typically developing peers. Children with more pronounced communication deficits are unable to respond because of language delays and are more likely to have parents who are forced to utilize more directive and controlling techniques to elicit desirable child behaviors, because they are unable to use language to successfully reason with them. However, when receptive and expressive language is controlled for, as was the case in our study, this association may disappear because a different mechanism is at work.

Interestingly, a marginal association between parental sensitivity and *high* child responsivity did emerge in our study. Although we cannot assess the direction of this

association, one interpretation is that *the child* is the driving force within the interaction, and, therefore, high levels of child responsivity resulted in an increase in sensitive parent behaviors. This justification is consistent with the theory presented by Shapiro, Frosch, and Arnold (1987) that claims that the synchrony of the dyad is contingent on the child's level of responsivity, meaning that *high* levels of child responsivity allow the parent to generate a more synchronous interaction between the two. An alternative explanation, with *the parent* as the driving force of the interaction, is that increased parental sensitivity resulted in an increase in child responsivity. This is an argument that is consistent with previous research that suggests that high levels of parental sensitivity (in the form of high parent responsiveness and attentiveness) provides the child with adequate opportunities to be responsive, thus increasing the association between the two constructs (Konstantareas, Zajdeman, Homatidis, & McCabe, 1988).

Indeed, when examining the contingency between the *highest* levels of parental sensitivity and child responsivity, results of the sequential analyses revealed that the contingency was significantly different from zero, meaning that in the overall sample, children were significantly more likely than chance to display responsive behaviors in those intervals *immediately following* parents' displays of high sensitivity. These findings provide some initial support for the notion that parental sensitivity is the driving force influencing child responsivity. Moreover, the contingency between high parental sensitivity and child responsivity was significantly different from zero for the autism group, but not for the typically developing group. Based on previous research, the fact that children with autism only demonstrated elevated levels of responsiveness when engaged with only the most sensitive parent is not all that surprising. In one study,

Gervais and colleagues (2004) found that when compared with matched controls, adults with autism demonstrated abnormal cortical voice processing, suggesting that these individuals may have disruptions in social processing, which may result in insensitivities to aspects of social stimulation. For example, when interacting with a caregiver, the individual may be unable to perceive moderate levels of sensitivity. However, at more extreme levels, the child is actually able to detect aspects the caregiver's sensitive behavior, allowing them to experience the benefits of sensitivity as their typically developing peers would. Additionally, Baron-Cohen (2000) found that children with autism have deficits in theory of mind, which may affect their ability to internalize their parent's less intrusive verbal stimulation. This may result in a failure to respond, which will force the parent to utilize more obvious and invasive techniques to acquire their child's attention. Utilizing sequential analyses allowed us to examine the moment-to-moment influence of specific levels of parental sensitivity, providing more insight into the success of specific parent behaviors for children with autism.

Our finding that parental sensitivity was associated with child-directed play was consistent with previous research that suggests that highly sensitive parents attend to appropriate aspects of the child's play resulting in increased mutual engagement (Bakeman & Adamson, 1984; Kopp, 1982). However, when this association was explored further, a significant association emerged only between parental sensitivity and *completely* child-directed play, and not between parental sensitivity and *mutually* directed play. One possible explanation for these findings is that children with autism have a difficult time engaging in mutually directed play because of the social deficits associated with the disorder. For example, Mundy, Sigman, Ungerer, and Sherman (1987) found

that children with autism were less likely to initiate joint engagement than children with other developmental disorders, signifying either deficits in social orienting or a general lack of interest in social engagement. Moreover, Dewey, Lord, and Magill (1988) found that dyads with an autistic child demonstrated less social complexity than dyads with a typically developing child. This suggests that children with autism are unable to synchronize their goals with their play partners, resulting in play that is more independently created and driven. Given that the inherent structure of mutually directed play entails input from both the parent as well as the child, successful mutually directed play might require *more* directive behaviors forcing the parent to rely on more intrusive and controlling techniques to participate in play. As Dewey and colleagues (1988) suggested, this may occur because children with autism have limited social complexity and are, therefore, unable to merge their play goals with their partner's play goals.

In addition to examining the association between parental sensitivity and child-directed play in the overall sample, we also examined group differences in the overall association between these behaviors to test whether diagnostic group operated as a moderator. Findings did not reveal significant moderation, suggesting that the strength of the association was not significantly different between the two groups. While these results are inconsistent with the expected outcomes, study methodology may have influenced the lack of findings. Our sample was comprised of a homogenous group of high-functioning autistic children matched with the control group based on language abilities. Previous research suggests that restrictions in the play style of children with autism may be associated with the severity of the child's cognitive deficit (Wing, 1988). Wing (1988) speculated that the discrepancies in play associated with autism were related

to the level of impairment, which influenced specific play behaviors. Additionally, children with more severe cognitive impairments are limited in their ability to engage in social interactions (Sigman, 1998). A stronger association may have emerged with a more heterogeneous sample that included lower functioning children because lower functioning autistic children may engage in more isolated play, which would force the parent to utilize more intrusive behaviors. Perhaps, when compared to typically developing children, high-functioning autistic children engage in play that requires lower levels of parent control and intrusion.

Completely child-directed play was also temporally associated with child interest for the autism group, meaning that children with autism were significantly more likely than chance to display interest in those intervals immediately following completely child-directed play. While no study, to our knowledge, has directly examined the association between these behaviors, previous research provides support for this finding. For example, Toth and colleagues (2006) found that when a parent followed the child's attentional lead during play, the child possessed a more active interest in the activity, which also resulted in more successful parent-child play interactions. Additionally, Bakeman and Adamson (1984) found that when parents gave infants more control during play, the child was able coordinate their interests more successfully. Further, Tomasello (1995) found that when mothers modified their behavior to their child's interest during play, joint attention followed. By allowing children with autism to completely direct the course of play, parents are increasing their interest in the activity while increasing their motivation to engage with others.

Parental sensitivity was also positively associated with child interest and investment. While no study, to our knowledge, has directly examined the association between these behaviors, previous research has provided support for this finding. For example, Escalona (1968) found that caregiver responsiveness was important for “apathetic or highly inactive infants who need prodding to activate and sustain activities” (as cited in Kopp, 1982, p. 203-204). This could potentially include children with autism who both struggle engaging in social interactions and have restricted interests in specific activities (Restall & Magill-Evans, 1993). Similarly, Kopp (1982) speculated that children who find it difficult to engage in proper play behaviors because of developmental delays benefit from a parent or a play partner who is highly sensitive and attends to the child’s interests and attention.

These findings have important applied implications. A common goal for parents of children with autism is to increase interest in social interactions in order to increase the child’s motivation to engage with others, as that will provide the child with opportunities to practice, strengthen, and generalize new or preexisting skills (Koegel & Koegel, 2006; Koegel & Mentis, 1985). Due to the fact that parental sensitivity was associated with child interest, parental sensitivity may increase children’s motivation to engage in play interactions with others. Taken with our finding that completely child-direct play was temporally associated with an increase in child interest, it would appear that play interactions high in parental sensitivity that are completely child-directed will result in motivation for children with autism to engage in play.

## **Implications for Intervention**

The results of the current study demonstrate an association between parental sensitivity and child responsiveness, child interest and investment, and child-directed play. These results provide evidence in support of several core principles of intervention. First, future interventions should target parenting behaviors in addition to child behaviors. Numerous interventions have encouraged parents to employ and uphold intervention principles in the home, but there is a need for more research on the programs that provide the parents with instruction on how to improve their style of interacting with their children (Mahoney et al., 1998). While past intervention efforts have been focused on targeting child behaviors (e.g., Mahoney et al., 1998; Stahmer, 1999), our results suggest that future interventions should also focus on the encouragement of parental sensitivity, as it is associated with an increase in children's engagement behaviors during play interactions.

Second, future interventions should promote child-directed play in a developmentally sensitive manner. In addition to being primarily child-focused, past intervention principles have had a strong concentration on the direction and teaching of desired skill sets using behavioral techniques (Mahoney et al., 1998; Stahmer, 1999). Our results suggest that play interventions for children with autism must occur within meaningful interactions centered upon the child's focus of attention, as these interactions result in elevated child interest and investment during play. Our results also demonstrate an association between parental sensitivity and child interest, suggesting that parental sensitivity to the child's preferred interests during play may be a catalyst that facilitates child growth by providing them with a sense of control over the play interaction. A more



developmentally sensitive focus on the expansion of these skills through child-lead interactions may be more appropriate for future interventions and yield superior results.

While the role of caregivers in facilitating play for children with autism is highly contested within the field, our results suggest that there may be benefits of child-directed play in increasing child interest and investment. These findings are important for a number of reasons. Previous research suggests that improvements in children's developmental functioning during interactions with caregivers were mediated by the child's engagement in the activity (Kim & Mahoney, 2004). The results of the current study show that child-directed play was associated with increased child interest and investment as well as increased child responsivity, signifying elevated levels of child engagement during the play interaction. Child-directed play increases child engagement, which is essential for the development of joint attention and results in increases in child cooperation and persistence while aiding in language development (Adamson et al., 2009; Kim & Mahoney, 2004; Meek et al., 2012; Tomasello, 1995; Toth et al., 2006).

More recently, a number of interventions are taking a more developmentally sensitive approach that captures some of what we found to be the core elements of intervention. For example, Kasari, Gulsrud, Wong, Kwon, and Locke (2010) conducted a caregiver-mediated intervention intended to increase joint engagement within the context of play interactions for children with autism. While the parent and interventionist collaborated to establish predesigned play routines, the intervention principles did include following the child's lead and interests, talking about the child's actions while repeating and expanding on what the child said, providing appropriate feedback, and sitting close to the child while maintaining eye contact (p. 1051). The results indicated that caregivers

were able to successfully implement and uphold the principles of the intervention, while helping their children increase the diversity of their play style and improve joint engagement behaviors during play.

Further, Greenspan (1992) developed a relationship-based intervention known as the floor time model, which is primarily focused on the child's developmental level as well as their individual differences in sensory and motor processing. This model is based in play and utilizes the child's developmental capacity in order to create cognitive growth. More specifically, the floor time model is comprised of intensive floor time work, has a home component, includes work with several types of therapists (i.e., occupational, physical, speech, and language), and has additional early education and special education services. Programs like the floor time model show promise for the field, and future research should aim to understand the critical components of such approaches, and how these components can be applied to other interventions to improve children's outcomes.

Finally, future intervention efforts may also benefit from incorporating measures of parenting stress as well as the use of stress-management techniques for parents of children with autism, as well as other family members. In conjunction with previous research, the results of the current study demonstrated that parents of children with autism have elevated levels of stress when compared to parents of typically developing children. While the current study failed to show an association between parenting stress and parental sensitivity, there was an association between low child responsivity and parents' reports of a difficult child. These findings are critical as a parent's perception of their child has important consequences for how they interact with them. In order to

maximize the benefits of future interventions, it is essential to improve parents' perceptions of their efficacy with their children, so that they feel more empowered in their parenting role.

### **Study Limitations and Directions for Future Research**

Our study had several limitations that point to important directions for future research. First, because our sample was comprised of high-functioning autistic children, our findings cannot be generalized to all children along the autism spectrum. Research has shown significant variation among children with autism who vary in severity, with respect to their interactions with their caregivers. For example, Konstantareas and colleagues (1988) examined differences in the interaction behaviors of high-functioning autistic children and their mothers versus lower functioning autistic children and their mothers. Differences emerged between the two groups with mothers in the high-functioning group demonstrating more responsive engagement behaviors, which allowed for more appropriate responsiveness from their children; mothers in the lower functioning group relied on more directive behavior to enforce desirable child behaviors. These findings demonstrate variability in the behaviors of parents of child on the autism spectrum. Future research should examine these constructs in a larger sample with a wider range of children with ASD in order to improve power to detect associations and increase the generalizability of the results.

Second, our approach to studying parental sensitivity during play interactions may have been limited both from a conceptual and methodological perspective. First, in the present study we did not assess the degree to which parents' behaviors may have been a function of their previous involvement in caregiver-based interventions. It will be

important for future research on parental sensitivity to better understand the degree to which such programs may have influenced the behaviors that parents use with their children.

It may also be that the current conceptualization of parental sensitivity in our field is limited and needs to be adjusted for the study of children with autism, for whom sensitivity may be expressed differently based on the goal of the interaction (van Ijzendoorn et al., 2007). Perhaps the study of sensitivity for parents of children with autism will benefit from a more dynamic definition consistent with the transactional model. For example, for autistic populations, parental sensitivity may be defined as a dyadic construct rather than a parent construct.

When reconceptualizing this construct, future research may initially benefit from the isolation of specific behaviors. This may provide insight into the success (or failure) that specific parenting techniques have at eliciting specific child responses. For example, Bell (1979) found that certain child behaviors increased the likelihood that parents responded with specific positive behaviors (as cited in Kim & Mahoney, 2004). This will allow researchers to develop a more refined definition of parental sensitivity for parents of children with autism. Researchers can then determine what combinations of parent-child behaviors increase the frequency and intensity of desirable dyadic processes such as joint attention and persistence (given the goal of the interaction). This is especially advantageous when attempting to develop intervention objectives as Kim and Mahoney (2004) found that parents' interaction strategies during intervention improved when the objectives were described in terms of engagement rather than by distinct child skills or competencies.

Context may be particularly relevant when examining the behaviors that parents of children with autism employ to achieve goals within the interaction, and future research should aim to study these interactions in varied contexts. While parents of typically developing children may successfully utilize the same strategies across many contexts, parents of children with autism may need to employ different tactics to successfully achieve the goals in different contexts, depending on the child's level of engagement within that context. While the traditional construct of parental sensitivity implies flexibility to the demands of the child, for parents of children with autism, parental sensitivity may imply flexibility to the demands of both the child as well as the specific context of the interaction.

Third, while we attempted to define the nature of the parent-child interaction using the transactional model, the limitations of our own study did not allow us to fully capture this framework. In order to fully capture the nature of the parents' behavior, we would be required to examine a number of other dimensions of parenting. For example, aspects of the parental history and the parents' internal working model may have impacted their representations of their children, therefore, altering their behaviors towards their children (Bretherton & Munholland, 2008). On the other hand, it may also be essential to understand how the nature of parent-child interactions become coordinated over time and how the synchronization of individual behaviors create an overall behavioral pattern. This is consistent with Fogel and colleague's (2002) concept of interaction frames, which are recurring routines of coordinated activity that can be described as interaction rituals. Thus, in order to fully capture the meaning of the parent-child interaction over time using the transactional model, it is crucial to understand the

parents' representations of the child as well as pattern of synchronization that behaviors have taken over time.

Fourth, our coding paradigm was validated using normative samples, as it was primarily based on previous research on the behaviors of typically developing preschoolers during play. Due to the fact that we applied our coding scheme to both normative and nonnormative samples and specifically to children who often demonstrate stereotypical behaviors, the meaning behind some behaviors may not be the uniform across both groups. Future research should work towards validating observational coding schemes to better account for the idiosyncratic behaviors of children with autism.

The study was unique in its use of sequential analyses to probe associations between parent and child behaviors, and while the results of the sequential analyses were limited, they did extend the results of the correlational analyses providing more depth to our findings. Much of the previous research on parent-child play in autism has been correlational in nature (i.e., assessing overall associations between a parent behavior and a child behavior). These approaches are limited, as they fail to inform us about what occurs from moment to moment, that is, the temporally linked contingencies between discrete parent and child behaviors during an interaction. Thus, an important strength of the present results is that they extended previous research by examining sequential contingencies between parent and child behaviors, and specifically the behaviors of children with autism. However, although findings from the contingency analyses provide insight regarding the moment-to-moment directionality of parent and child behaviors during play, there are limitations to the conclusions that can be drawn.

A limitation of sequential analyses is that the success of the analyses is contingent on the appropriateness of the codes at defining the interaction. In the present study, several key variables may have been missing from our coding scheme that could have better explained the contingencies (or lack thereof) between variables. Perhaps child affect was the driving force within the interaction. For example, if the child was frustrated and demonstrating very negative affect (which our coding system failed to identify), the parent may have responded in an extremely sensitive matter in an attempt to counter the child's behavior, and the child could have nevertheless continued to express negativity in the following interval. Within the confines of our coding system, the parent is demonstrating sensitivity while the child appears to be unresponsive or uninterested. In essence, the codes failed to capture an extremely important feature of the interaction while providing information that does not accurately define the interaction.

Finally, longitudinal work that examines the benefits of these specific parenting behaviors during play for children with autism is necessary. While our study provides insight on the success of parental sensitivity at eliciting desirable child behaviors within a play interaction, future research must examine the long-term benefits of these behaviors on children's language development and social functioning. Taken together, this information can improve play interventions for autistic children and their parents.

In conclusion, the present study adds to the existing literature on parent-child play interactions for children with autism, and has important implications for play interventions. Specifically, given the consistency in the results of the current study between sensitive parenting behaviors and child responsivity, child interest, and child-directed play, an increased focus on interventions that promote sensitive parenting

behaviors and child-directed play is essential, as it appears that these behavior may increase the developmental benefits of play by increasing the child's engagement in the activity. Additionally, because previous research has demonstrated that parent-mediated interventions can be successfully implemented for children with autism (i.e., Kasari et al., 2010), future interventions should be developed specifically for the parents as well as their children with autism. Caregivers play a primary role in the development of children's early play skills, which makes it essential to provide them with more effective engagement techniques.



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APPENDIX A

HUMAN SUBJECTS INSTITUTIONAL REVIEW BOARD APPROVAL



APPENDIX B

TABLE ONE: CODING DEFINITIONS AND COHEN'S KAPPAS



Table 1

*Coding Definitions and Cohen's Kappas*

Type of Behavior	Coding Definition	Example of Behavior
<b>Parent Behaviors</b> ( $K = .88$ )		
Intrusive/Controlling	Interferes with child's goals and desires; imposes high levels of structure on child's play; utilizes control strategies to influence child's behavior; conveys negative affect; ignores the child's input; utilizes acts of physical intervention to disrupt child's behavior.	<ul style="list-style-type: none"> <li>▪ Physically manipulates the child's movements.</li> <li>▪ Interrupts the child when they are speaking.</li> <li>▪ Keeps toys of interest away from the child.</li> <li>▪ Confiscates the child's toy to get their attention.</li> <li>▪ Completely rejects a child's bid or directive.</li> </ul>
Sensitive	Ability to adapt behavior to child's needs; encourages child to direct play session; accurately reads and interprets child's signals; synchronizes behavior with the child's; highly responsive to child's needs; plays with the child at the developmentally appropriate level; highly consistent.	<ul style="list-style-type: none"> <li>▪ Allows the child to drive the interaction while still exhibiting interest and engagement.</li> <li>▪ Models innovative methods to play with a toy that the child is displaying interest in.</li> <li>▪ Demonstrates patience.</li> <li>▪ Parent follows the child's directives.</li> <li>▪ Parent demonstrates positive affect.</li> </ul>
<b>Child Interest/Investment</b> ( $K = .84$ )		
Disinterest	The child is unconcerned and indifferent; blindly follows parent's lead; offers no opinions about the direction of play; lack of liveliness and involvement.	<ul style="list-style-type: none"> <li>▪ The child may become absorbed in a limited set of repetitive behaviors.</li> <li>▪ Moves from activity to activity after short intervals of play.</li> </ul>
Interest/Investment	Provides the parent with instructive directions; elaborates on play; initiation of a play sequence; displays a high level of amusement.	<ul style="list-style-type: none"> <li>▪ The child displays excitement with laughter, smiling, and expressive language.</li> <li>▪ The elaboration of one activity for a long period of time.</li> </ul>
<b>Child Responsive Behaviors</b> ( $K = .91$ )		

Unresponsive	Displays a general lack of interest in the parent; ignores parent's directives or play bids; engaged in isolated play; may appear unfocused or overly mellow.	<ul style="list-style-type: none"> <li>▪ The child completely ignores the parent or fails to acknowledge the parent's bids or directives.</li> </ul>
Responsive	Reacts quickly to parent's bids; expresses interest or concerns in the direction of the play.	<ul style="list-style-type: none"> <li>▪ The child immediately responds to the parent with a vocalization, shrug, head shake, or toy manipulation.</li> </ul>
<b>Parent vs. Child-Directed Interaction (<math>K = .97</math>)</b>		
Parent-Directed	Driven by the parent's agenda and supports the parent's play goals; children are compliant even after they have lost interest in the play session; child is submissive or overly compliant; the child is reluctant to violate the established social order of the dyad.	<ul style="list-style-type: none"> <li>▪ Parent asks the child leading questions.</li> <li>▪ Parent is highly elaborative and controls the direction of the play session.</li> </ul>
Child-Directed	The child develops the play session; is assertive and expresses play desires; displays ownership of the play.	<ul style="list-style-type: none"> <li>▪ Parents may contribute to the play session, but within the parameters of the child's direction.</li> <li>▪ The parent offers the optimal degree of scaffolding.</li> </ul>

APPENDIX C

TABLE 7: MEANS, STAND DEVIATIONS, GROUP DIFFERENCES FROM ZERO, AND  
GROUP DIFFERENCE COMPARISONS FOR CONTINGENCY ANALYSES

Table 7

*Means, Standard Deviations, Group Differences from Zero, and Group Difference Comparisons for Contingency Analyses***Parent Demonstrates Sensitivity Followed by a Maintenance or Increase in Child Interest/Investment**

Variable	Total Sample		Autism Sample		Typical Sample		Group Comparison	
	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>F</i>	<i>p</i>
Sensitivity (5, 6, 7)	-.22 (.70)	-1.83†	.09 (.55)	.66	-.18 (.78)	-.81	1.16	.293
Sensitivity (6, 7)	-.19 (.76)	-1.46	.15 (.68)	.85	-.15 (.75)	-.65	1.11	.302
Sensitivity (5)	-.09 (.75)	-.64	.22 (.53)	1.60	-.10 (.88)	-.39	1.34	.258
Sensitivity (6)	-.14 (.79)	-.98	.17 (.68)	.98	.00 (.83)	-.02	.36	.557
Sensitivity (7)	-.09 (.93)	-.36	.15 (.99)	.37	.17 (.89)	.44	.00	.964

**Parent Demonstrates Control/Intrusion Followed by a Decrease in Child Interest/Investment**

Variable	Total Sample		Autism Sample		Typical Sample		Group Comparison	
	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>F</i>	<i>p</i>
Control/Intrusion (1, 2, 3)	-.23 (.71)	-1.86†	.01 (.57)	.11	-.53 (.77)	-2.68*	5.66	.024
Control/Intrusion (1)	-.29 (.82)	-1.22	-.29 (.86)	-1.13	--	--	--	--
Control/Intrusion (2)	-.28 (.78)	-1.73†	.03 (.69)	.20	-.76 (.64)	-4.56**	10.26	.003
Control/Intrusion (3)	-.36 (.74)	-2.76*	-.02 (.66)	-.10	-.76 (.64)	-4.56**	11.19	.002

**Parent Demonstrates Sensitivity Followed by a Maintenance or Increase in Child-Directed Play**

Variable	Total Sample		Autism Sample		Typical Sample		Group Comparison	
	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>F</i>	<i>p</i>
Sensitivity (5, 6, 7)	-.15 (.77)	-1.03	-.06 (.75)	-.29	-.26 (.82)	-1.14	.47	.497

**Child-Directed Play Followed by a Maintenance or Increase in Child Interest/Investment**

Variable	Total Sample		Autism Sample		Typical Sample		Group Comparison	
	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>F</i>	<i>p</i>
Child-Directed Play (2, 3)	-.28 (.75)	-1.85†	-.04 (.65)	-.26	-.63 (.79)	-2.53*	4.10	.055
Child-Directed Play (3)	.22 (.70)	1.60	.26 (.53)	2.00†	.15 (.93)	.53	.18	.680

**Parent Demonstrates Sensitivity Followed by a Maintenance of Increase in Child Responsivity**

Variable	Total Sample		Autism Sample		Typical Sample		Group Comparison	
	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>F</i>	<i>p</i>
Sensitivity (5, 6, 7)	-.19 (.47)	-2.06†	-.23 (.42)	-2.32*	-.10 (.58)	-.50	.41	.526
Sensitivity (6, 7)	.19 (.66)	1.58	.28 (.60)	1.96†	.06 (.74)	.31	.78	.385
Sensitivity (5)	.20 (.81)	1.28	.17 (.74)	.96	.26 (.97)	.80	.07	.802
Sensitivity (6)	.23 (.85)	1.44	.33 (.79)	1.74	.07 (.95)	.22	.62	.440
Sensitivity (7)	.71 (.64)	4.44**	.42 (.83)	1.44	--	--	--	--

**Parent Demonstrates Control/Intrusion Followed by a Decrease in Child Responsivity**

Variable	Total Sample		Autism Sample		Typical Sample		Group Comparison	
	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>M (SD)</i>	<i>t(0)</i>	<i>F</i>	<i>p</i>
Control/Intrusion (1, 2, 3)	.07 (.82)	.473	.18 (.73)	.96	.17 (.85)	.58	.001	.980
Control/Intrusion (1)	.09 (1.00)	.27	-.02 (1.00)	-.05	--	--	--	--
Control/Intrusion (2)	-.34 (.83)	-1.87†	-.39 (.78)	-1.86†	-.23 (.96)	-.64	.16	.695
Control/Intrusion (3)	-.05 (.83)	-.28	-.03 (.80)	-.13	-.08 (.94)	-.27	.03	.869

*Note.* \*\* Correlation is significant at the 0.01 level (2-tailed), \*Correlation is significant at the 0.05 level (2-tailed), †Correlation is significant at the 0.10 level (2-tailed).

*Note.* Missing data occurs in the above table when there were not enough cases necessary to create a Yule's Q value (i.e., a low frequency of a particular contingency).

Table 2

*Developmental Characteristics of Study Participants by Group*

Characteristic	Autism			Typically Developing			<i>p</i>
	Mean	<i>SD</i>	Range	Mean	<i>SD</i>	Range	
Chronological Age	58.95	11.50	40-77	50.20	11.12	33-78	.038
Mental Age	57.79	16.80	32-94	52.95	13.66	29-86	.643
Receptive Language Age	60.20	13.53	39-81	58.05	11.63	45-81	.740
Expressive Language Age	56.70	12.36	32-83	58.05	12.01	37-81	.229

*Note. n = 39 (19 autism, 20 typical)*

Table 3

*Means, Standard Deviations, Ranges, Group Difference Comparison and Effect Sizes for all Child Study Variables*

Variable	Total Sample			Autism Sample			Typical Sample			<i>F</i>	<i>p</i>	<i>d</i>
	<i>M (SD)</i>	<i>Min</i>	<i>Max</i>	<i>M (SD)</i>	<i>Min</i>	<i>Max</i>	<i>M (SD)</i>	<i>Min</i>	<i>Max</i>			
Intensity of Child Interest/ Investment	3.97 (.35)	2.88	4.43	3.89 (.37)	3.16	4.43	4.04 (.33)	2.88	4.41	4.00	.027 <sup>a</sup>	.44
Intensity of Responsive Child Behaviors	2.29 (.46)	.45	2.97	2.21 (.52)	.45	2.78	2.36 (.39)	1.44	2.97	5.03	.006 <sup>b</sup>	.32
Proportion of Child-Directed Play	.82 (.17)	.36	1.00	.75 (.17)	.36	1.00	.88 (.15)	.38	1.00	4.36	.020 <sup>a</sup>	.82
Completely Child-Directed Play	.67 (.23)	.26	1.00	.55 (.20)	.26	1.00	.79 (.18)	.38	1.00	7.84	.001 <sup>a</sup>	1.25
Mutually Directed Play	.15 (.16)	.00	.69	.20 (.19)	.00	.69	.09 (.11)	.00	.37	2.70	.080 <sup>a</sup>	.73

*Note. n = 39 (19 autism, 20 typical)*

<sup>a</sup> *Control for Expressive Language Age* <sup>b</sup> *Control for Expressive Language Age and Household Income*

Table 4

*Means, Standard Deviations, Ranges, Group Difference Comparisons, and Effect Sizes for all Parent Study Variables*

Variable	Total Sample			Autism Sample			Typical Sample			<i>F</i>	<i>p</i>	<i>d</i>
	<i>M (SD)</i>	<i>Min</i>	<i>Max</i>	<i>M (SD)</i>	<i>Min</i>	<i>Max</i>	<i>M (SD)</i>	<i>Min</i>	<i>Max</i>			
Duration of Parental Sensitivity	.75 (.21)	.26	1.00	.64 (.22)	.26	.95	.85 (.16)	.29	1.00	4.15	.02 <sup>a</sup>	1.12
Duration of Parental Control/Intrusion	.18 (.18)	.00	.69	.26 (.19)	.05	.69	.11 (.14)	.00	.63	7.77	.002 <sup>a</sup>	.89
Intensity of Sensitive Parental Behaviors	4.91 (.75)	3.13	6.13	4.55 (.68)	3.22	5.56	5.25 (.67)	3.13	6.13	10.32	<.001 <sup>a</sup>	1.03
Parent Stress Index Total	78.76 (19.76)	42	111	90.44 (17.87)	49	111	68.39 (15.31)	42	108	6.66	.001 <sup>b</sup>	1.33
PSI Parental Distress	27.15 (8.71)	14	48	30.95 (9.84)	18	48	23.55 (5.64)	14	34	2.42	.084 <sup>b</sup>	.51
PSI Parent-Child Dysfunctional Interaction	21.58 (6.74)	12	38	25.15 (6.71)	12	38	18.00 (4.61)	12	30	5.79	.003 <sup>b</sup>	1.24
PSI Difficult Child	29.89 (8.87)	15	47	33.76 (7.64)	19	47	26.22 (8.56)	15	47	3.88	.018 <sup>b</sup>	.93

Note. *n* = 39 (19 autism, 20 typical)

<sup>a</sup> Controlling for Expressive Language Age <sup>b</sup> Controlling for Expressive Language Age and Parent Education



Table 5

*Bivariate Partial Correlations among Study Variables (Full Sample)*

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Duration of Parental Sensitivity	1	-.798** <sup>a</sup>	.899** <sup>a</sup>	.171 <sup>b</sup>	.625** <sup>a</sup>	.524** <sup>a</sup>	-.151 <sup>c</sup>	-.039 <sup>c</sup>	-.282 <sup>c</sup>	-.090 <sup>c</sup>
2. Duration of Parental Control/Intrusion		1	-.875** <sup>a</sup>	.231 <sup>b</sup>	-.843** <sup>a</sup>	-.714** <sup>a</sup>	.097 <sup>c</sup>	-.038 <sup>c</sup>	.083 <sup>c</sup>	.188 <sup>c</sup>
3. Intensity of Sensitive Parental Behaviors			1	.059 <sup>b</sup>	.684** <sup>a</sup>	.682** <sup>a</sup>	-.203 <sup>c</sup>	-.027 <sup>c</sup>	-.211 <sup>c</sup>	-.263 <sup>c</sup>
4. Intensity of Child Responsive Behaviors				1	-.302 <sup>b</sup>	-.212 <sup>b</sup>	-.246 <sup>d</sup>	-.144 <sup>d</sup>	-.191 <sup>d</sup>	-.249 <sup>d</sup>
5. Proportion of Child-Directed Play					1	.609** <sup>a</sup>	-.108 <sup>c</sup>	-.029 <sup>c</sup>	-.046 <sup>c</sup>	-.169 <sup>c</sup>
6. Intensity of Child Interest/Investment						1	.033 <sup>c</sup>	.155 <sup>c</sup>	.024 <sup>c</sup>	-.104 <sup>c</sup>
7. Parent Stress Index Total							1	.794** <sup>c</sup>	.747** <sup>c</sup>	.810** <sup>c</sup>
8. PSI Parental Distress								1	.413* <sup>c</sup>	.389* <sup>c</sup>
9. PSI Parent-Child Dysfunctional Interaction									1	.486** <sup>c</sup>
10. PSI Difficult Child										1

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ignificant at the 0.01 level (2-tailed), \*Correlation is significant at the 0.05 level (2-tailed).<sup>a</sup> *Controlling for Expressive Language* <sup>b</sup> *Controlling for Expressive Language and Household Income* <sup>c</sup> *Controlling for Expressive Language and Parent Education* <sup>d</sup> *Controlling for Expressive Language, Parent Education, and Household Income*

Table 6

*Bivariate Partial Correlations among Study Variables (Within Group)*

Variables	1	2	3	4	5	6	7	8	9	10
1. Duration of Parental Sensitivity	1	-.611** <sup>a</sup>	.865** <sup>a</sup>	.224 <sup>b</sup>	.400 <sup>†</sup> <sup>a</sup>	.255 <sup>a</sup>	-.007 <sup>c</sup>	.191 <sup>c</sup>	-.262 <sup>c</sup>	-.091 <sup>c</sup>
2. Duration of Parental Control/Intrusion	-.949** <sup>a</sup>	1	-.866** <sup>a</sup>	.410 <sup>b</sup>	-.813** <sup>a</sup>	-.684** <sup>a</sup>	-.080 <sup>c</sup>	-.240 <sup>c</sup>	-.233 <sup>c</sup>	.304 <sup>c</sup>
3. Intensity of Sensitive Parenting Behaviors	.893** <sup>a</sup>	-.857** <sup>a</sup>	1	-.072 <sup>b</sup>	.586* <sup>a</sup>	.523* <sup>a</sup>	-.079 <sup>c</sup>	.148 <sup>c</sup>	-.091 <sup>c</sup>	-.301 <sup>c</sup>
4. Intensity of Child Responsive Behaviors	-.101 <sup>b</sup>	.175 <sup>b</sup>	.093 <sup>b</sup>	1	-.393 <sup>b</sup>	-.541* <sup>b</sup>	-.167 <sup>d</sup>	-.005 <sup>d</sup>	-.268 <sup>d</sup>	-.186 <sup>d</sup>
5. Proportion of Child-Directed Play	.777** <sup>a</sup>	-.856** <sup>a</sup>	.688** <sup>a</sup>	-.404 <sup>b</sup>	1	.528* <sup>a</sup>	.092 <sup>c</sup>	.136 <sup>c</sup>	.422 <sup>c</sup>	-.267 <sup>c</sup>
6. Intensity of Child Interest/Investment	.778** <sup>a</sup>	-.738** <sup>a</sup>	.810** <sup>a</sup>	.150 <sup>b</sup>	.678** <sup>a</sup>	1	.179 <sup>c</sup>	.287 <sup>c</sup>	.337 <sup>c</sup>	-.226 <sup>c</sup>
7. Parent Stress Index Total	.031 <sup>c</sup>	.054 <sup>c</sup>	-.164 <sup>c</sup>	-.171 <sup>d</sup>	-.109 <sup>c</sup>	-.104 <sup>c</sup>	1	.814** <sup>c</sup>	.481 <sup>c</sup>	.712** <sup>c</sup>
8. PSI Parental Distress	.197 <sup>c</sup>	-.146 <sup>c</sup>	.164 <sup>c</sup>	-.025 <sup>d</sup>	.011 <sup>c</sup>	.012 <sup>c</sup>	.715** <sup>c</sup>	1	.144 <sup>c</sup>	.302 <sup>c</sup>
9. PSI Parent-Child Dysfunctional Interaction	-.288 <sup>c</sup>	.352 <sup>c</sup>	-.402 <sup>c</sup>	.063 <sup>d</sup>	-.387 <sup>c</sup>	-.285 <sup>c</sup>	.836** <sup>c</sup>	.454 <sup>†</sup> <sup>c</sup>	1	.155 <sup>c</sup>
10. PSI Difficult Child	.094 <sup>c</sup>	-.008 <sup>c</sup>	-.179 <sup>c</sup>	-.321 <sup>d</sup>	.013 <sup>c</sup>	-.036 <sup>c</sup>	.897** <sup>c</sup>	.408 <sup>c</sup>	.670** <sup>c</sup>	1

Note. \*\* Correlation is significant at the 0.01 level (2-tailed), \*Correlation is significant at the 0.05 level (2-tailed),

†Correlation is significant at the 0.10 level (2-tailed).

Note. Values above the diagonal reflect the autism group; values below the diagonal reflect the typical group.

*<sup>a</sup> Controlling for Expressive Language <sup>b</sup> Controlling for Expressive Language and Household Income <sup>c</sup> Controlling for Expressive Language and Parent Education <sup>d</sup> Controlling for Expressive Language, Parent Education, and Household Income.*

		Child Interest and Investment (t+1)	
		Increase or Maintenance	Decrease
Parental Sensitivity (t)	Presence	A	B
	Absence	C	D

*Figure 1.* Yule's Q contingency table representing all possible combinations of parent and child behaviors.