2010-12-16

Caregiver Behaviors as Moderators of the Relation between Children's Joint Attention Skills and Subsequent Language in an At-risk Sample

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By

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A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

December 2010

UNIVERSITY OF MIAMI

A dissertation submitted in partial fulfillment of
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Caregiver Behaviors as Moderators of the Relation between Joint Attention Skills and Subsequent Language in an At-risk Sample (December 2010)

Abstract of a dissertation at the University of Miami.

Dissertation supervised by Research Associate Professor Marygrace Yale Kaiser.
No. of pages in text. (93)

The positive link between children's joint attention skills and subsequent language outcomes is well established. There is also abundant evidence that responsive caregiver behaviors lead to optimal language outcomes. Though directive behaviors are generally considered detrimental to children's growth, specific types of directive behaviors which extend or build upon a child's behavior are thought to promote children's learning. No study has examined how caregiver behaviors interact with children's joint attention skills to affect subsequent language. Therefore, the objective of the present study was to examine how three different caregiver behaviors (Responsiveness, Supportiveness, and Intrusiveness) measured at 18 months moderated the relation between joint attention (also measured at 18 months) and language in two separate samples (a 24-month and a 36-month outcome sample). Intrusiveness was a significant moderator of the relation between RJA and 24-month language. RJA was a significant predictor of 24-month receptive and expressive language only in children whose caregivers had a low to moderate level of intrusiveness. Understanding the child and caregiver factors that promote or hinder children's language outcomes in children at risk for delay may help inform and target interventions that will help improve children's school readiness outcomes.

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Background

While the link between joint attention skills and subsequent language development is well known (e.g., Adamson, Bakeman, & Dekner, 2004; Charman et al., 2003; Dawson et al., 2004; Delgado et al., 2002; Harris, Kasari, & Sigman, 1996; Markus, Mundy, Morales, Delgado, & Yale, 2000; Morales, Mundy, & Rojas, 1998; Mundy et al., 2007; Mundy & Gomes, 1998; Rudd, Cain, & Saxon, 2008; Sigman & McGovern, 2005; Smith & Ulvund, 2003; Watt, Wetherby, & Shumway, 2006), there is less research on how responsive or directive caregiver behaviors may influence this relation. The objective of this study was to examine whether the relation between joint attention behaviors and language ability in children at risk for language delay was affected by caregiver behaviors. Exploring this association in a sample of at-risk children may aid in the development of appropriate interventions for both children and caregivers.

Research suggests that responsive caregiving is generally associated with optimal development (Bornstein & Tamis-Lemonda, 1989; Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998), while directiveness is typically associated with poor outcomes (Mahoney & Neville-Smith, 1996). However, some researchers propose that responsiveness and directiveness are not necessarily mutually exclusive and not all directive behaviors are intrusive or disruptive (Crawley & Spiker, 1983; Marfo, 1992). Certain directive behaviors can actually support or facilitate the development of children's premature skills by extending or building upon the child's s behaviors (Crawley & Spiker, 1983; Marfo, 1992; Masur, Flynn, & Eichorst, 2005). Therefore it has been suggested that a distinction be made between directive behaviors that are

intrusive, because they disrupt the interaction, and those that are supportive, because they build on or extend upon a child's behavior (Masur et al., 2005). The current study built on this assertion by examining the unique impact of different kinds of directive caregiver behaviors on the relation between joint attention and language in a high risk sample.

To address these issues with an at-risk sample, the following aims were proposed: (1) to replicate existing evidence about the positive relation between children's joint attention skills and subsequent language, (2) to examine the impact of caregivers' responsive and directive behaviors on children's language, and (3) to examine whether caregiver behaviors moderate the impact of joint attention skills on language development.

The Importance of Joint Attention Skills for Language

Overview of joint attention. Joint attention (JA) emerges during the first year of life and refers to the capacity to coordinate attention with another person in relation to an object or an event (Bakeman & Adamson, 1984). The development of this skill is significant because it has been associated with a number of outcomes, such as social emotional development (Sheinkopf, Mundy, Claussen, & Willoughby, 2004), cognition (Neal, 2002), and language (Delgado et al., 2002; Morales et al., 1998; Mundy et al., 2007; Slaughter & McConnell, 2003; Ulvund & Smith, 1996). Joint attention is not just the sharing of an experience, but a mutual awareness between play partners that something is being shared (see Tomasello & Carpenter, 2007). It has been referred to as a "common psychological ground" between play partners (Tomasello & Carpenter, 2007) and a source for future learning and further sharing of more complex psychological states (Corkum & Moore, 1998).

Joint attention is a well-established positive correlate of language (e.g., Adamson et al., 2004; Delgado et al., 2002; Dunham, Dunham, & Curwin, 1993; Markus et al. 2000; Morales et al., 1998; Mundy et al. 2007; Shumway & Wetherby, 2009; Tomasello, 1988; Ulvund & Smith, 1996). Akhtar and colleagues (1991) suggest joint attention episodes facilitate language because they represent periods in which the child's attention and motivation are at their highest, thus allowing for effective assimilation of the play partner's speech. Instances of joint attention may also represent optimal opportunities for word-object mapping (Morales et al., 2000). In coordinated attention states, children reduce the chances of committing mapping errors or labeling a referent incorrectly because they are focusing on the correct object or event the play partner is concurrently labeling. In other words, joint attention may help build a child's vocabulary by simply minimizing *mapping errors* or the chances of making inaccurate mental connections between referents and their labels. Finally, instances of joint attention are also thought to scaffold language development by helping children build knowledge about their world through the guidance of a more expert play partner (Tomasello & Farrar, 1986). During instances of shared attention, the more expert play partner also provides opportunities for guided problem solving (Adamson & Bakeman, 1991).

Much of this research has focused on the pivotal role of such episodes during child-caregiver interactions (Mundy & Gomes, 1998). For instance, the frequency of maternal utterances about objects occupying the child's focus of attention has been positively associated with later language (Dunham & Dunham, 1992; Tomasello & Farrar, 1986). The extent to which mothers' commands (Akhtar et al., 1991) or descriptions (Dunham et al., 1993) follow into the child's focus of attention during play

dyads has also been positively associated with language outcomes. These studies are consistent with Tomasello's *attentional mapping hypothesis*, which states that a child's probability of learning correct word-object names is enhanced when play partners reduce demands on the child's attentional systems by capitalizing on the joint attention episode (Tomasello & Farrar, 1986).

Apart from the elements of the child-caregiver joint attention episode, the relation between individual differences in the child's capacity for joint attention and the child's language outcomes has also been examined extensively (Adamson et al., 2004; Dawson et al., 2004; Delgado et al., 2002; Markus et al., 2000; Morales et al., 2000; Mundy & Gomes, 1998; Smith & Ulvund, 2003). Children use these joint attention skills to contribute to mutual social engagement, and those individual differences are positively related to language development (Laakso, Poikkeus, Katajamaki, & Lyytinen, 1999; Morales et al., 2000; Mundy & Gomes, 1998). Children's ability to initiate social sharing or follow another's focus of attention may help them make sense of language and communication by helping them establish common ground with their interaction partners (Vismara & Lyons, 2007). Children's joint attention skills might also facilitate language because such skills reflect the presence of important social, cognitive, and self-regulatory skills which are fundamental to the language development process (Mundy & Gomes, 1998).

Responding to joint attention. One way of examining individual differences in children's capacity for joint attention is to measure the child's ability to follow the direction of gaze and gesture of the play partner. Responding to joint attention (RJA; Seibert, Hogan, & Mundy, 1982) involves the child's capacity to correctly respond to the

joint attention bid of a play partner for the purpose of sharing that experience. RJA is thought to facilitate referential understanding, thus enabling the child to build a lexical inventory of their environment (Baldwin, 1993). Initially, infants can only respond to joint attention bids within their visual field; between 12 and 18 months they show increased sophistication in this ability, gradually being able to respond more consistently to targets outside their visual field toward the end of this period (Deak, Flom, & Pick, 2000; Delgado et al., 2002).

Several studies have examined the relation between RJA and language outcomes. Findings from Mundy and Gomes (1998) revealed that RJA made unique contributions to subsequent receptive language ability after controlling for other nonverbal communication gestures, concurrent cognition and for the variance explained by initial receptive language. Delgado et al. (2002) found a significant relation between the infant's ability to respond to joint attention bids outside the visual field at 15-months and expressive language at age two. In a low-birth-weight sample, Ulvund and Smith (1996) reported that RJA measured at 13 months was positively associated with language scores at age two. In a sample of three to five-year-old children with Autism, the ability to respond to the examiner's joint attention bid was positively correlated with the children's receptive language scores and their mean length of utterance (Murray et al., 2008). All these studies point to a consistent positive association between RJA and language ability.

Initiating joint attention. In the first year of life, children also develop the ability to initiate joint attention (IJA, Seibert et al., 1982). There is some evidence that IJA and RJA may represent two unique aspects of joint attention with different underlying developmental processes and distinct developmental trajectories (Mundy et al., 2007).

Individual differences in IJA have also been linked to language outcomes. Mundy and Gomes (1998) found that a child's IJA ability at 14 months was associated with expressive language measured four months later, accounting for initial expressive language and RJA ability. Ulvund and Smith (1996) found that IJA measured at 13 months was positively correlated with language competence at ages two through five, after partialling out the variance explained by other nonverbal communication skills and the child's motor skills. Shumway and Wetherby (2009) found that individual differences in a child's ability to initiate joint attention in the second year of life predicted verbal outcomes at age three in a mixed sample of typically and atypically developing children. IJA at 18 months made a significant and unique contribution to the prediction of 24-month receptive language scores in a mixed sample of typically developing and at-risk children, after accounting for the role of RJA and cognition scores (Mundy et al., 2007). While IJA and RJA may share certain developmental processes, these studies suggest that each skill represents different dimensions of joint attention ability that can uniquely impact observed variance in language outcomes. Therefore, it is important to consider the individual contributions of RJA and IJA to language development.

Caregiver Contributions to Language Development

Caregiver responsive behaviors. The impact of caregivers' behaviors on children's developmental outcomes has been researched extensively (Masur et al., 2005). Behaviors that are responsive or sensitive to the child's interests and needs are considered favorable for promoting children's successful learning experiences (Landry, Smith,

Swank, Assel, & Vellet, 2001). Alternatively, caregiver interactions that are intrusive and interfering are generally associated with poor developmental outcomes (Ainsworth, Blehar, Waters, & Wall, 1978; Egeland, Pianta, & O'Brien, 1993).

A responsive caregiver interaction style is typically defined as one that is sensitive and appropriately responsive to a child's needs, interests, or behaviors (Baldwin, 1955; Schaefer, 1959). Such behaviors generally lack negativity (e.g., harshness of vocal tone and intrusiveness of manner); are predictable, prompt, and contingent on children's signals; and as such convey the caregiver's interest, attunement with, and acceptance of the child (Landry, Smith, & Swank, 2006). These behaviors are considered beneficial to development as they are thought to promote children's sense of security and self-efficacy (Bornstein, Tamis-Lemonda, & Haynes, 1999), to facilitate the internalization of important self-regulatory skills, and to encourage the child to continue to engage in and explore his/her environment (Landry et al., 2006).

The positive link between caregiver responsiveness and child language competency has been reported for diverse samples of caregivers and children (Mahoney & Perales, 2003). For instance, MacTurk, Meadow-Orlans, Sanford, and Spencer (1993) found a positive relation between mothers' imitations of their 9-month-old infants' behaviors and infants' frequency of spoken phrases at 18 months. Beckwith and Cohen (1989) reported that maternal responsive behaviors at one month of age were positively associated with larger receptive vocabularies nearly two years later. Infants whose mothers were more verbally responsive experienced the onset of their first fifty words at earlier ages (Hoff & Naigles, 2002).

Maternal responsiveness during the prelinguistic period has also been linked to greater nonverbal communication development (Girolametto, 1988), greater acts of intentional communication in infants (Yoder, McCathren, Warren, & Watson, 2001), and greater capacity for joint attention behaviors (Hobson, Patrick, Crandell, Garcia Perez, & Lee, 2004). In a randomized intervention study about children with developmental disabilities, Girolametto (1988) taught parents in the experimental condition to be more responsive to their children's prelinguistic communication signals. Children in this condition exhibited significantly greater acts of verbal and nonverbal intentional communication than children in the control condition. Yoder and colleagues (2001) found that a higher frequency of maternal nonlinguistic responses (which involved responsive behaviors such as compliance and imitation) to children's intentional communication was positively associated with children's subsequent intentional communication behaviors. Finally, Hobson and colleagues (2004) found a specific link between maternal sensitivity and an infant's ability for triadic interactions at 12 months. In other words, an infant's propensity to relate to another regarding an object or event was positively related to the level of sensitivity the mother displayed toward the infant.

Responsive caregivers may facilitate their children's language development in several ways. A responsive interaction style may promote the child's efficacy and competence in communicative interactions (Murray & Hornbaker, 1997). As a result, the child is positively reinforced to engage in acts of communication, and is exposed to more interaction and greater linguistic input (Masur et al., 2005), a well established positive correlate of vocabulary growth (Hart and Risley, 1995). Caregivers who are responsive may also be less likely to redirect their children's focus during play and instead capitalize

on the benefits of joint engagement (with their children) by providing linguistic input that describes objects or events already capturing the child's focus of attention (Tomasello & Farrar, 1986).

Caregiver directive behaviors. A number of scholars have found evidence that directive behaviors are generally detrimental to development including language outcomes (Harris, Jones, Brookes, & Grant, 1986; Landry, Smith, Miller-Loncar, & Swank, 1997; Nelson, 1973; Prizant, Wetherby, & Roberts, 1993; Tomasello & Todd, 1983). For instance, Landry and colleagues (1997) found that higher proportions of restrictive behaviors that were not sensitive to children's focus of interest were negatively associated with cognitive, language and social skills' rates of growth. Caregivers exhibit a directive behavior style when they choose topics of play or conversation, when they utilize commands or imperatives frequently, or when they use behavioral or linguistic prompts to regulate the child's behavior (Murray & Hornbaker, 1997). These directive behaviors are believed to impact language outcomes via their effect on children's attentional and motivational systems.

Behaviors that redirect a child's focus of attention are considered intrusive to the child's ongoing behavior because such behaviors place unnecessary demands on a child's attentional system, thereby making word learning more difficult for the child (Tomasello, 1988; 1992). Researchers have also suggested that high proportions of controlling and restrictive behaviors may have a harmful influence on children's cognition and language because they negatively impact children's motivation and initiative for reciprocal social interaction which constitutes an important foundation for further development to take place (Landry et al., 1997).

Some researchers have suggested that it may not be helpful to conclude that caregiver directiveness is absolutely harmful, when some level of directiveness may actually be beneficial especially for children with developmental delays (e.g., Marfo, 1992). Marfo has proposed that caregivers need to provide some level of direction, structure and support to facilitate these children's interactions with their environments. Consistent with this notion, some studies have provided evidence that caregiver directiveness can positively impact child language outcomes so long as these directive behaviors match the child's ongoing behavior (e.g. Akhtar et al., 1991). Additionally, some scholars have suggested separating directive behaviors into categories that may reflect either supportive or intrusive aspects of the construct, as this may be helpful in figuring out the unique impact of different kinds of directiveness (Masur et al., 2005). For instance, commands that verbally follow the child's actions (e.g. telling the child to pet the teddy bear as he is about to) or those that promote the development of cognitive and motor skills (e.g. counting numbers) can be considered a supportive form of directiveness, which may favor optimal development. Masur and colleagues (2005) found that such supportive directive behaviors were indeed positive predictors of child language at 21 months.

Consistent with the notion that not all directive behaviors are detrimental to language outcomes, Akhtar and colleagues (1991) also found that caregivers' follow commands were positively correlated with children's expressive vocabulary. Building on Tomasello's attentional mapping hypothesis, Akhtar and colleagues' findings suggest that commands that follow into the child's focus of attention are beneficial to language development because they are less burdensome on the child's attentional system

compared to commands that attempt to redistribute the child's focus of attention. When caregiver directive behaviors work with children's ongoing attention, they free up children's cognitive resources for more effective learning.

Culture and Caregiver Practices

Psychologists and anthropologists have found that culture influences parents' views of their children, and these beliefs are reflected in day to day interactions (Whiteside-Mansell, Bradley, & McKelvey, 2008). Cultures differ in their beliefs about the status of children, the importance of talk, disciplinary strategies, and the importance of parental teaching (as cited in Johnston and Wong, 2002). For instance, in cultural systems where obedience is more valued than self esteem and self awareness, parents may be less likely to follow the child's conversational lead and may be more likely to use directive strategies during their interactions with their children. As a result, caregiver directive behaviors may be more prominent in some cultures.

Most theories of parenting promote a parental style characterized by high sensitivity and responsiveness, and discourage the use of parental control behaviors. Diana Baumrind's *authoritative parenting style* best summarizes the global set of parenting practices and behaviors that have been consistently linked to positive child outcomes in studies with North American, Caucasian parents and children. Not surprisingly, some researchers interested in cultural differences in parenting practices and behaviors have questioned the generalizability of this broad literature which is primarily based on conceptual frameworks, measurement tools, and data from studies with Western middle class parents of European descent (e.g., Tamis-Lamonda, Briggs, McClowry, &

Snow, 2009). Cross-cultural research showing some beneficial effects associated with authoritarian parental practices in certain ethnic-minority groups has also added to the controversial topic about the effects of directive parenting.

While the authoritarian or controlling style of parenting has consistently been associated with poor developmental outcomes in European American children, this has not always held true in other cultures – particularly racial and ethnic minorities. This style of parenting and interaction may be more common in cultures that value respect and obedience and believe that children are more likely to learn from instruction than from play (Johnston and Wong, 2002). Halgunseth and colleagues (2006) found that the use of intrusive parenting behaviors was associated with positive child developmental outcomes in Hispanic children, especially when these behaviors stemmed from an effort to instruct children to act in accordance with cultural norms. Lansford and colleagues (2004) found that greater use of physical disciplinary strategies by parents was associated with less externalizing behaviors in African-American children but greater behavior problems in European American children. Chinese caregivers have also been found to give more directives during parent-child interactions compared to Western parents, but these directives tend to occur during episodes of joint attention and have not been linked with poor language development (Tsang, 1998).

Nevertheless, unlike the cross-cultural findings about the positive effects of parental sensitivity, the research with respect to the effects of parental control is mixed at best (Tamis-Lamonda, Briggs, McClowry, & Snow, 2009). Some studies have found a positive relation between parental use of control and intrusiveness and children's behavior problems in both European and African American samples (e.g. Whiteside-

Mansell et al, 2003). Tamis-Lamonda and colleagues (2009) have suggested that the differences in findings among these cross-cultural studies may stem from differences in the way parental control strategies were defined and whether caregivers' responsiveness levels were simultaneously considered. They suggest that researchers studying cross-cultural differences should strive to measure parental directiveness and sensitivity concurrently to help clarify whether the negative effects of parental control are mitigated by parental responsiveness universally.

The findings from cross-cultural studies on parenting practices have important implications for language interventionists who typically work with children and families from diverse backgrounds. Interventionists generally offer parents recommendations about specific strategies and forms of communication that have been typically found to facilitate language growth in Western cultures, but these kinds of language promoting strategies may reflect cultural biases and may not be culturally sensitive to ethnic and racial minority caregivers (Johnston & Wong, 2002). Understanding the impact of culture on parenting beliefs and behaviors, and the specific factors that may be most helpful to language development in different ethnic and racial minority groups are primary steps in the process of successfully engaging diverse families into parent-child interaction intervention programs (McCollum & Yates, 2001).

Prenatal Cocaine Exposure

Cocaine exposure and language outcomes. Though prenatal cocaine exposure (PCE) is generally viewed as a mild teratogen (Messinger & Lester, 2007), several researchers have emphasized a specific cocaine effect on developmental outcomes including language (Bandstra et al., 2002; Morrow et al., 2004). Bandstra and colleagues

(2002) found a stable cocaine effect on language functioning between 3 and 7 years, after controlling for potential confounders such as child sex, prenatal exposure to other substances, and important medical and socio-demographic characteristics. Similarly, Morrow et al. (2004) found a significant association between the severity of cocaine use and decrement of children's expressive language scores at age three, controlling for maternal age and prenatal drug use of other substances. These results were independent of the effect of prenatal cocaine use on fetal growth, gestational age, and cognitive functioning. Though both of these studies found specific effects attributable to cocaine exposure, the effect sizes were small – approximately 1/5 of a standard deviation. However, these researchers suggest that even subtle findings may have significant ramifications for society, as it gathers up costly resources to adequately address the language deficits of this population.

Considering the type of high risk environment typically associated with the prenatal cocaine user can help illustrate a portrait of the many factors that are likely to compound even subtle biological effects of prenatal cocaine exposure. It is easier to conceptualize the PCE label as a red flag for a high-risk environment associated with violence, poverty, low maternal education, high custody changes, and caregiver psychopathology among other factors known to influence all kinds of child outcomes (see Bono, Sheinberg, Scott, & Claussen, 2007). These scholars have suggested that children reared in such environments are at a developmental disadvantage because multiple stressors tend to have an overwhelming impact on the quantity and quality of child-

caregiver interactions necessary for fostering optimal language development; and as caregivers in these environments struggle to meet more basic needs, facilitating their children's language learning becomes a lower priority goal.

Evidence of the moderating impact of the environment has also been corroborated by some studies which have concurrently examined the teratogenic effects of cocaine, while accounting for quality of the home environment (Lewis et al., 2004; Singer et al., 2004). Prenatally cocaine exposed children placed in foster care outperformed their comparison peer group who remained in the care of their biological mothers (Lewis et al., 2004). The foster care environments in these studies received superior ratings on a measure of quality of the caregiving environment. Similarly Singer and colleagues (2004) found that cocaine exposed children in non-biological maternal care lived in environments that were more stimulating. These children also had higher vocabulary scores than their cocaine-exposed peers who remained in biological maternal care. This evidence suggests that the quality of the environment can influence the impact of cocaine exposure on language development in more or less optimal ways.

Cocaine exposure and caregiver behaviors. The findings regarding the association between drug-using mothers and their interaction styles appear to be mixed. Some studies have found that the mothers of prenatally cocaine exposed children tend to be more intrusive and hostile (Johnson et al., 2002). Evidence from a few other studies suggests that drug-using mothers are generally less responsive, emotionally expressive, and engaged with their children during interactions (Burns, Chethik, Burns, & Clark,

1991; LaGasse et al., 2003). Others have found no links between cocaine exposure and maternal interaction during early childhood (Neuspiel, Hamel, Hochberg, Green & Campbell, 1991).

Uhlhorn, Messinger, and Bauer (2004) also found little evidence of cocaine-specific effects on child-caregiver interactions when they compared two demographically similar groups of child-caregiver dyads whose only difference was whether or not caregivers were cocaine users while pregnant. According to this group, the failure to find differences might have resulted from the fact that both samples were characterized by high-risk factors – low maternal education, poverty, low birth weight – variables known to have negative impacts on the child-caregiver interaction and child outcomes. Though the findings are inconclusive regarding the links between cocaine exposure and a specific caregiver interaction style, this literature appears to support a conclusion similar to that from the language research. It appears that the compounded effects of environmental risk factors have an important impact on the quality of caregiver-child interactions regardless of any potential specific cocaine effect. Therefore, it is important to continue to study this population to really understand how child-level and caregiver variables may interact to make development more or less favorable.

Current Study Objective

The main objective of this study was to examine the impact of caregiver behaviors on the association between children's joint attention skills and subsequent language outcomes. To this end, a coding system which describes global aspects of caregiver styles of interacting with their children was used. Additionally, two types of directive behaviors – intrusive and supportive – were examined separately based on the

work of several scholars who have warned the research and intervention community against clumping all directive behaviors into the same negative category. Understanding this distinction may be especially important when offering guidance to the caregivers of children with developmental delays, as these children may benefit from interactions that are sensitive yet directive in supportive ways (Crawley & Spiker, 1983; Marfo, 1992).

Hypotheses

Several hypotheses were examined. Consistent with a large body of work on joint attention and language, I expected joint attention skills to positively predict language. Additionally, I expected caregiver behaviors to moderate the effect of joint attention (both RJA and IJA) on subsequent language. Specifically, I expected the following: (1) the magnitude of the relation between joint attention skills and language would be stronger for children whose caregivers were very high on measures of responsiveness compared to children whose caregivers were very low on measures of responsiveness, (2) the magnitude of the relation between joint attention skills and language would be stronger for children whose caregivers were very high on measures of supportiveness compared to children whose caregivers were very low on measures of supportiveness, and (3) the magnitude of the relation between joint attention skills and language would be stronger for children whose caregivers were very low on measures of intrusiveness compared to children whose caregivers were very high on measures of intrusiveness.

Methods Chapter 2

Participants

The study sample was obtained from a larger population of children enrolled in the Linda Ray Intervention Program. Children prenatally exposed to cocaine were referred to the center through drug treatment programs, the courts, or the Department of Children and Families. These children were randomly assigned to one of three levels of intervention: (1) Center-based, receiving early intervention services at the center for five hours a day, from Monday to Friday, (2) Home-based, receiving early intervention services at home twice a week for 1 ½ hours each day, (3) Primary care, receiving basic medical attention.

Children who met the following criteria were selected for the study: (1) child's primary caregiver at 18 and 24 months was the same, (2) the child had an 18-month play assessment and an 18-month Early Social Communication Scale assessment, (3) the primary caregiver spoke English during the play session at 18 months, and (4) the child had a 24-month language outcome.

At the start, 126 Center-based children with a 24-month outcome were identified. This sample was further reduced to 55 children for the following reasons: (1) 49 children did not have the same caregiver across the 18-24 month time frame, (2) 21 children had play or ESCS sessions that were missing or damaged, and (3) 1 child had an 18-month play session in Spanish. A minimum sample of 66 was required to obtain power of 0.81 with a three-predictor model and small effect size ($R^2 = 0.15$). Based on this power analysis, I decided to add children from the Home-based condition. Fifty-nine children who had a 24-month language outcome were identified. However, this sample was

reduced to 28 children for the following reasons: (1) 11 children did not have the same caregiver across the 18-24 month time frame, (2) 18 children had play or ESCS sessions that were missing or damaged, and (3) 2 children had play sessions in Spanish. The final sample consisted of 83 children from both the Center and Home-based conditions.

Procedure

To assess the impact of caregiver behaviors on the relation between children's joint attention and language skills, the following measures were obtained for the sample and are explained in detail below:

Child joint attention skills. Child joint attention behaviors (RJA and IJA) at 18 months were coded in the context of the Early Social Communication Scales (ESCS; Mundy et al., 2003). The ESCS is a twenty minute, semi-structured play paradigm for assessing various nonverbal communication behaviors.

During the assessment, the child and examiner sat across from each other at a table with an array of active wind-up and hand-operated toys which were visible but out of reach to the child. The examiner presented the child one toy at a time, by activating the toy and placing it within the child's reach. Each toy was presented a minimum of three and maximum of five times during the assessment.

The IJA score was coded (throughout the entire assessment) as a frequency measure, or the number of times the child initiated social attention with the examiner by: (1) gazing at the examiner while manipulating the toy and (2) alternating gaze between the active mechanical toy and the examiner. As some ESCS sessions ran longer than

others, each IJA total score was divided by duration of the assessment to create a rate per minute (rpm) for each child. Inter-rater reliability, based on the intra-class correlation, was 0.88.

The RJA score represented a percentage, or the total number of times a child responded correctly to the examiner's joint attention bid over total number of trials administered. RJA was coded during two different segments of the ESCS. During the RJA task, the child was required to respond to the joint attention bid of the examiner regarding three posters, two of which were located 90 degrees to the left and to the right of the child, and one of which was located directly behind the child.

At the beginning of the task, the examiner sang a song and then tickled the child to engage the child's attention at midline. Then the examiner pointed and looked at the poster that was to her left (or the child's right), calling the child's name three times. If the child's first gaze was in the same direction as that of the examiner, the trial was scored as correct or 1; otherwise the trial was scored as incorrect or 0. The examiner repeated this process with the other posters. Toward the end of the ESCS, the examiner performed another round of left, right, and back RJA trials, so that each poster was referred to twice (for a total of 6 trials). In a few cases, the second set of trials was not administered either because the examiner forgot or the last minutes of the session were cut. Therefore, the RJA score consisted of the total number of correct trials (those receiving a score of 1) over total number of trials administered in the entire ESCS. The reliability scores, based on Cohen's Kappas, were 0.88 to 0.90.

Caregiver behaviors. Child-caregiver play interactions were videotaped when the child was 18 months of age. The brief play interaction was broken into approximately

two 3-minute play sessions. In each, the dyad was provided two sets of toys by the examiner (for e.g., a shape sorter, school bus, stacking ring tower, a telephone, dump truck) and caregivers were simply instructed to play with their children as they normally would.

To assess caregivers' responses, I adapted the coding system used by Masur and colleagues (2005), a group of researchers who examined the predictive relation between various caregiver behaviors and children's language outcomes in the 12 to 21-month age range. Masur and colleagues (2005) found significant predictive relations between their measures of responsiveness and supportiveness measures and the children's subsequent language ability. Although the researchers did not find significant associations between their intrusiveness measure and subsequent language, it seemed appropriate to include this construct in this study to distinguish supportive directive behaviors from the more general forms of directiveness.

Caregivers' behaviors were measured with a combination of rating scales from the Maternal Behavior Rating Scale (MBRS; Mahoney, 1992). The MBRS has been used to assess caregiver behaviors in diverse samples including those at risk and developmentally delayed (Mahoney, 1998). Previous research indicates this instrument's scales have moderate to high correlations with similar scale constructs from other parenting behavior assessments (Boyce et al., 1995), and the scales sensitively capture caregiver behaviors that are statistically associated with children's developmental outcomes (Mahoney et al., 1995). The scales also demonstrate reliability (Mahoney et al., 1986) with inter-rater reliability generally ranging between 60% and 100% agreement for all scales (Kim & Mahoney, 2004; Mahoney & Perales, 2003).

Behaviors were rated on a 5-point scale, with a lower score indicating lower occurrence of the behaviors associated with the construct. In line with Masur's work, I used three global scales from the MBRS – Responsiveness, Supportiveness, and Intrusiveness.

The general Responsiveness scale consisted of mean ratings of *Sensitivity* to the child's interest or the "extent to which the caregiver seemed aware of and understood the child's activity or play interests," *Responsivity* or "…the appropriateness and consistency of…responses to the child's behaviors…and intentions", and his/her *Effectiveness* in "…understanding the child's interests…and…engaging in the child's choice of activity." The Supportiveness scale consisted of mean ratings of the *Achievement Orientation* and *Praise* subscales, which represented the degree of "…encouragement of sensorimotor or cognitive achievement…amount of stimulation orientation…overtly directed toward promoting child's developmental progress…" and the extent to which the caregiver praised the child, respectively. The Intrusiveness scale consisted of mean ratings of *Directiveness*, which assessed "the frequency with which the parent requested, commanded, hinted, or attempted in other manners to direct the child's immediate behavior" and *Pace* or the caregiver's "…rate of behavior."

Child language. Children's language at 24 months was measured with the Receptive Expressive Emergent Language (REEL-2; Bzoch & League, 1971), which consisted of teacher reports of children's receptive and expressive vocabulary. The REEL yields standardized scores ($M = 100$, $SD = 15$), and it has test-retest reliability estimates that range from .71-.80 (Hohm, Jennen Steinmetz, Schmidt, & Laucht, 2007).

Additionally, this assessment has been used in previous research with at-risk and delayed samples (Bono et al., 2007; Harty, Alant, & Uys, 2006; Mattia & DeRegnier, 1998).

Children's language at 36 months was measured with the Reynell Developmental Language Scales (RDLS; Reynell & Huntley, 1987). The RDLS is a direct observation measure administered by a trained research associated. The RDLS yields standardized scores (M = 100, SD = 15) of both receptive and expressive language providing information about children's language performance relative to his or her peers. Reliability estimates range from .80 to .93 for the current age group.

Control Variables

The inconsistency in previous results about caregiver contributions to children's language outcomes may be partly due to the presence or absence of certain control variables (Masur et al., 2005). Masur and colleagues suggested that it is scientifically prudent to control for children's initial language capacity as well as for the caregiver's language input, both of which have been correlated with subsequent language outcomes in many studies. In line with this recommendation, REEL measures of children's language at 18 months were obtained. Given the link between caregiver lexical richness and children's linguistic development (Hoff, 2003; Hoff & Naigles, 2002), the number of different words the caregiver produced during the free-play assessment was also measured. To adjust for the varying length of time of the free-play assessment (given that some play sessions lasted longer than others), *number of different words per minute* was used instead.

Coding and Reliability of Caregiver Behaviors

Ten percent of all child-caregiver play dyads in the current sample were randomly selected for inter-rater reliability checks and thus coded by a trained research assistant blind to the treatment groups.

The primary author coded the original 83 play sessions. Nine play sessions (10% of the sample) were selected with the help of a random number generator and were coded by both the primary author and a graduate student volunteer to assess inter-rater reliability for the MBRS scales. Both raters provided three different scores for each play session – one for the first 3 minutes of play, one for the second 3 minutes, and one global score for the entire play session.

Previous studies have used several methods to calculate inter-rater reliability for the MBRS scales. Masur and colleagues (2005) calculated Cohen's Kappas for ratings that were within a 1-point range difference and obtained scores of .79 and .77 for the Directiveness and Praise scales, respectively; all other scale ratings achieved Kappa scores of 1.00 within a 1-point range difference. Using the formula {[agreements/agreement + disagreements] X 100}, Kim and Mahoney (2005) obtained a mean reliability score of 86.6%. For studies using this formula to calculate inter-rater reliability, stated acceptable scores have ranged between 60 to 80% for exact agreement, and 99 to 100% for agreements that are within a 1-point difference (e.g. Crawley & Spiker, 1983; Mahoney & Perales, 2003, Kim & Mahoney, 2004). These studies serve as benchmarks for calculating acceptable levels of inter-rater reliability in the current study.

Several approaches suggested by this literature were used to assess inter-rater reliability. First, kappas were conducted for full agreement. The kappas for global score

ratings of all seven subscales were as follow: Sensitivity (0.85), Responsivity (0.82), and Effectiveness (0.68); Achievement (0.67) and Praise (0.61); Directiveness (0.67) and Pace (1). The kappas based on ratings of each three-minute half of play were as follow: Sensitivity (0.92), Responsivity (0.68), and Effectiveness (0.75); Achievement (0.82) and Praise (1); Directiveness (0.75) and Pace (0.86).

Inter-rater reliability was also calculated using the formula {[agreements/agreement + disagreements] X 100} for the global scores. Percent agreement scores were as follow: Sensitivity (89%), Responsivity (89%), and Effectiveness (78%); Achievement (78%) and Praise (89%); Directiveness (78%) and Pace (100%). When discrepancies occurred between raters, they never exceeded a 1-point difference for both the global score ratings and for the two three-minute half ratings. Previous studies suggest that this is an acceptable benchmark for inter-rater reliability (Crawley & Spiker, 1983; Mahoney & Perales, 2003, Kim & Mahoney, 2004).

The most optimal inter-rater reliability was obtained by splitting the entire play session into two three-minute halves. For this reason, I calculated a composite score for each subscale from the average of the first and second three-minute halves, instead of using the subscale's global score (for e.g., sensitivity composite score = [sensitivity1 + sensitivity2]/2). These subscale composite scores were then added and divided by the number of scales corresponding to the moderator to establish a final score on the major construct (for e.g., Responsiveness = [sensitivity composite + responsivity composite + effectiveness composite]/3).

Results Chapter 3

Sample 1: Children with 24-month Language Outcomes

Descriptives. All analyses were conducted in SPSS 18. Fifty children who had REEL receptive and expressive scores at 24 months, but no scores at 36 months were identified from the original sample of 83. Sixty percent (n = 30) of this sample participated in the Center-based condition and 40% (n = 20) participated in the Home-based condition. All demographic information is presented on Table 3.1 for each treatment group. Sixty percent (n = 30) of the sample were boys and 40% (n = 20) were girls. Seventy-eight percent (n = 39) of the sample was African American, 10% (n = 5) was Hispanic, 6% (n = 3) was White, and another 6% (n = 3) was classified as other. There were no differences between the treatment groups based on ethnicity, $\chi^2(4, N = 50) = 3.80$, p =.434. Birth weight data was available for 42 of the 50 children in this sample. Twenty-one percent (n = 9) of these children had low birth weight (weighed less than 2500 grams).

Eight different types of caregivers were identified. Fifty percent (n = 15) of the caregiver sample were mothers, 2% (n = 1) were fathers, 16% (n = 8) were maternal grandmothers, 2% (n = 1) were paternal grandmothers, 16% (n = 8) were foster mothers, 4% (n = 2) were foster fathers, 8% (n = 4) were aunts, and 2% (n = 1) were cousins. Eighty-six percent (n = 43) of the sample received some form of public aid.

The range, means and standard deviations for all major variables are reported on Table 3.2. The 24-month outcome consisted of receptive (M = 85.80, SD = 15.34) and expressive (M = 75.56, SD = 18.66) language scores. The joint attention variables consisted of the initiating joint attention rate per minute (IJA, M = 0.85, SD = 0.49) and

responding to joint attention (RJA, $M = 56.80$, $SD = 31.25$). The means and standard deviations for all the subscales which correspond to the Responsiveness ($M = 2.32$, $SD = 0.89$), Supportiveness ($M = 1.64$, $SD = 0.55$) and Intrusiveness ($M = 3.17$, $SD = 0.67$) constructs are also listed on Table 3.2. No data transformations were required as all predictor and outcome variables met the skewness (±3) and kurtosis criteria (±10) for robustness of test statistics (Kline, 2005).

Additional descriptive data is presented on Table 3.7. Children in the Home-based condition had significantly more IJA behaviors compared to children in the Center-based condition, $F(1, 47) = 5.87$, $p = .019$. Also, the caregivers of children in the Home-based condition were significantly less intrusive than the caregivers of children in the Center-based condition, $F(1, 48) = 6.50$, $p = .014$.

Correlations among all variables. All correlations for the 24-month outcome sample are listed on Tables 3.3 to 3.5. The 24-month receptive and expressive language scores were positively correlated to each other ($r = .79$, $p < .001$). RJA was significantly correlated with the with 24-month teacher reports of expressive language ($r = .44$, $p = .002$). There was also a trend for the correlation between RJA and 24-month teacher reports of receptive language ($r = .28$, $p = .050$). From the caregiver behaviors, only Intrusiveness was positively correlated with the receptive outcome ($r = .30$, $p = .037$).

IJA and RJA were not correlated ($r = -.02$, $p = .898$). IJA was negatively correlated with the Intrusiveness construct ($r = -.29$, $p = -.288$). No other significant correlations were found for the joint attention variables (see Table 3.4).

All three Responsiveness subscales (Sensitivity, Responsivity, and Effectiveness) were positively correlated with each other (see Table 3.4). The two Supportiveness

subscales (Achievement and Praise) were also correlated with each other (r = .30, p = .033). Finally the two Intrusiveness subscales (Directiveness and Pace) were correlated with each other (r = .70, p < .001). All subscales were positively correlated with their corresponding constructs (see Table 3.4). The Responsiveness and Supportiveness constructs were correlated (r = .61, p < .001), while the Intrusiveness construct was not significantly correlated with the Responsiveness (r = -.07, p = .641) or with the Supportiveness (r = .24, p = .087) constructs.

Caregiver behavior subscales were also significantly correlated across the three major constructs (see Table 3.4). All three Responsiveness subscales were positively correlated with the Achievement subscale as follows: Sensitivity (r = .59, p < .001), Responsivity (r = .69, p < .001), and Effectiveness (r = .61, p < .001). Of the three Responsiveness subscales, only Effectiveness was positively correlated with the Praise subscale (r =.28, p = .048). Additionally, all three Responsiveness subscales were positively correlated to the Supportiveness construct as follows: Sensitivity (r = .59, p < .001), Responsivity (r =.60, p < .001), and Effectiveness (r = .58, p < .001). The Achievement subscale was also positively correlated with the Responsiveness construct (r = .67, p < .001), the Directiveness subscale (r = .29, p = .043), and the Intrusiveness construct (r = .30, p = .033).

Control Variables

Correlations. Correlation analyses were conducted to determine whether child's initial language (18-month REEL composite), caregiver's linguistic richness (number of different words per minute) as measured on the 18-month play session, and birth weight needed to be controlled for in moderation analyses. Initial language scores and birth

weight were not significantly correlated with the 24-month REEL language outcomes (see Table 3.5). Only the linguistic richness measure was positively correlated with the receptive outcome (r =.30, p = .035). As a result, only caregiver linguistic richness was used as a control variable accordingly in the moderation analyses.

Group differences. The language outcomes were examined for group differences based on gender and treatment group. The results of these analyses are presented on Tables 3.6 and 3.7. Gender and treatment group were not significantly associated with differences on the language outcomes. Therefore, gender and treatment group were not treated as control variables.

Since primary caregivers in the present sample varied among the children, analyses were conducted to determine if caregiver type had any impact on any outcome variable. Some of the caregiver groups had fewer than two cases (for e.g., father); therefore standard deviations are not available for all caregiver types. This is a recurring problem with this population of children and caregivers, and it should be explored further with larger sample sizes. Only the omnibus test results are listed on Table 3.8. None of these analyses were significant. Thus, caregiver type was not used as a control variable in any of the moderation analyses.

Moderations Analyses

Moderation analyses were used to examine the possible interaction of the joint attention measures with three separate caregiver behaviors (Responsiveness, Supportiveness, and Instrusiveness) with respect to subsequent language. To this end several models were tested using 24-month receptive and expressive language as the

outcomes (see Figures 3.1 to 3.3). IJA and RJA constituted the predictors; Responsiveness, Supportiveness, and Intrusiveness constituted the moderators.

To prepare the variables for the moderation analyses, IJA and RJA were centered by subtracting the mean of each from its corresponding individual joint attention score. This resulted in two new centered joint attention predictors. The continuous moderator variables (Responsiveness, Supportiveness, and Intrusiveness) were converted into quartile groups, which identified caregivers by four increasing levels of proportion on each moderator. In other words caregivers scoring in the bottom 25^{th} percentile of each construct were assigned to group 1 and were considered very low on the construct. Caregivers scoring above the 75^{th} percentile were assigned to group 4 and were considered very high on the construct. Caregivers scoring in the second (between the 25^{th} and 50^{th} percentile) and third quartiles (between the 50^{th} and 75^{th} percentile) of the construct were assigned to Groups 2 and 3 and were considered low and moderate on the construct, respectively. Once these quartile groups were created for each construct, these variables were dummy coded for the moderation analyses. To test the moderation, cross product (or interaction) terms were then created by multiplying the centered joint attention predictors with the dummy coded caregiver behavior variables.

The steps of the moderation analyses for each model included the following: (1) the 24-month outcomes were regressed on both the joint attention and caregiver behavior moderator in simultaneous regression, (2) the interaction term was added in a sequential step, and (3) the ΔR^2 pertaining to the interaction term was examined. If the change in ΔR^2 was significant at the specified .05 level, the effects of the moderation were decomposed by examining separate regressions for each level of the moderator. This

helped determine the unique impact of each level of the moderator on the relation between the joint attention and language. If the interaction term was not significant, the main effects of joint attention and caregiver behaviors (before the addition of the interaction term) were examined. Linguistic richness was used as a control variable in the models examining the moderation with respect to 24-month receptive language. In these models, linguistic richness was entered first in the regression model (before step 1). The steps of each of the moderation analyses are listed on Tables 3.9 and 10.

Caregiver behaviors as moderators of the IJA-language relation. Responsiveness, Supportiveness, and Intrusiveness did not significantly moderate the relation between IJA and receptive and expressive language at 24 months (see Table 3.9). Additionally no significant main effects were found for any of these models (see Table 3.11). These results indicated that IJA and the caregiver behaviors (Responsiveness and Supportiveness) were not significant predictors of the 24-month outcomes on their own.

Caregiver behaviors as moderators of the RJA-language relation. Responsiveness and Supportiveness did not individually moderate the relation between RJA and 24-month language (see Table 3.10). However, there were significant main effects in both models. The regression with RJA and Responsiveness as predictors of expressive language accounted for approximately 22% of the variance in expressive language, R^2 = 0.22, $F(4, 45) = 3.22$, $p = .021$. RJA was a significant predictor of the 24-month expressive outcome [$b = .27$, $SE = .081$, $p = .002$], accounting for 19% of the variance in expressive language after controlling for Responsiveness. Every standard deviation increase in RJA led to a 0.45 standard deviation increase in the 24-month expressive outcome.

Similarly the regression with RJA and Supportiveness as predictors of expressive language accounted for 25% of the variance in the outcome, $R^2 = 0.25$, $F(4, 45) = 3.82$, $p < .05$. RJA was a significant predictor of expressive language [$b = 26$, $SE = .077$, $p = .002$], accounting for 19% of the variance after controlling for Supportiveness. Every standard deviation unit increase in RJA led to a 0.44 standard deviation increase in expressive language.

The regression of 24-month receptive language on RJA, Intrusiveness, and their interaction terms was statistically significant, $R^2 = 0.40$, $F(9, 40) = 2.95$, $p = .006$. The sequential addition of the interaction terms resulted in a statistically significant increase in variance explained in 24-month teacher reports of receptive language, $\Delta R^2 = 0.21$, $F(3, 40) = 4.67$, $p = .007$. In other words, Intrusiveness significantly moderated the relation between RJA and 24-month receptive language. The interaction term explained an additional 21% of the variance in the 24-month receptive outcome.

The regression with RJA, Intrusiveness, and their interaction terms, significantly predicted expressive language, $R^2 = 0.51$, $F(9, 40) = 4.61$, $p < .001$. The sequential addition of the interaction term resulted in a statistically significant increase in the variance explained in 24-month expressive language, $\Delta R^2 = 0.24$, $F(3, 42) = 6.11$, $p = .002$. Intrusiveness significantly moderated the relation between RJA and 24-month expressive language. The interaction explained an additional 24% of the variance in 24-month expressive language.

Examining the significant interactions. To examine the differential impact of RJA on the language outcomes, the effects of the significant interaction were decomposed by examining separate regressions for each Intrusiveness quartile group, and

the results were graphed (see Figures 3.4 and 3.5). RJA did not significantly predict the 24-month receptive [R^2= 0.26, $F(1,8) = 2.87$, $p = 0.129$], or expressive outcome [R^2 = 0.14, $F(1,8) = 1.34$, $p = 0.280$] for children whose caregivers fell in the bottom 25th percentile of the Intrusiveness construct (group 1,n = 10). RJA also did not significantly predict the 24-month receptive [R^2= 0.29, $F(1,6) = 2.45$, $p = 0.168$] or expressive outcome [R^2 = 0.44, $F(1,6) = 4.64$, $p = 0.075$] for children whose caregivers fell above the 75th percentile on the Intrusiveness construct (group 4, n = 8).

RJA was a significant predictor of 24-month expressive language for children whose caregivers displayed low levels of Intrusiveness (or those who fell between the 25th and 50th percentile on the Intrusiveness construct, n = 11), [R^2= 0.40, $F(1,9) = 6.02$, $p = 0.037$]. Each additional standard deviation in RJA resulted in a 0.63 standard deviation increase in expressive language for children whose parents displayed low levels of Intrusiveness. In this same group, RJA was not a significant predictor of 24-month receptive language [R^2= 0.13, $F(1,9) = 1.30$, $p = 0.283$]. For children whose caregivers fell between the 50th and 75th percentile on the Intrusiveness construct, or who displayed moderate levels of Intrusiveness (n = 21), RJA was a significant predictor of 24-month receptive [R^2= 0.39, $F(1,19) = 12.18$, $p = 0.002$] and expressive language [R^2= 0.47, $F(1,19) = 16.91$, $p = 0.001$]. Each additional standard deviation in RJA resulted in a 0.63 standard deviation increase in receptive language and a 0.69 standard deviation increase in expressive language for children whose caregivers displayed moderate levels of Intrusiveness.

For the children whose caregiver behaviors changed the joint attention –language relation, chi-square tests were performed to examine how caregivers who displayed low

(group 2) and moderate (group 3) levels of Intrusiveness were like in terms of Responsiveness and Supportiveness. The result of the first analysis was significant, $\chi^2(9, N = 50) = 18.86$, $p = .026$ indicating that caregivers who displayed low levels of Intrusiveness (group 2) were more likely to display moderate (group 3, $n = 4$) and high (group, $n = 4$) levels of Responsiveness. Additionally, caregivers who displayed moderate levels of Intrusiveness (group 3) were more likely to display low (groups 2, $n = 6$) and moderate (group 3, $n = 8$) levels of Responsiveness. The chi-square analysis for the Supportiveness construct was not significant, $\chi^2((9, N = 50) = 8.99$, $p = .438$, meaning caregivers who displayed low and moderate levels of Intrusiveness (groups 2 and 3) were not likely to display one particular pattern of Supportive behavior.

Sample 2: Children with 36-month Language Outcomes

Descriptives. Sixty-seven children had 36-month RDLS receptive and expressive language scores. These children were derived from the original sample of 83. This sample of 67 had 38 children in common with the 24-month outcome sample.

Sixty-six percent ($n = 44$) of this sample participated in the Center-based condition and 34% ($n = 23$) participated in the Center-based condition. All demographic data for the 36-month outcome sample is presented on Table 3.12. Additional descriptive data such as the range mean, and standard deviations of all major variables including the 36-month receptive and expressive outcomes is listed on Table 3.13. Approximately forty-eight percent ($n = 32$) of the sample were boys and 52% ($n = 35$) were girls. Seventy-nine percent ($n = 53$) of the sample was African American, 9% ($n = 6$) was Hispanic, 3% ($n = 2$) was Haitian, 3% ($n = 2$) was White, and 6% ($n = 4$) was classified as other. There were no differences between the treatment groups based on ethnicity,

$\chi^2(5, N = 67) = 4.29, p = .508$. Birth weight data was available for 57 of the 67 children in this sample. Approximately 18% of these children ($n = 10$) had low birth weight.

Approximately forty-six percent of the caregiver sample ($n = 31$) were mothers, 6% ($n = 4$) were fathers, 19% ($n = 13$) were maternal grandmothers, 6% ($n = 4$) were paternal grandmothers, 12% ($n = 8$) were foster mothers, 2% ($n = 1$) were foster fathers, 8% ($n = 5$) were aunts, and 2% ($n = 1$) were cousins. Eighty-five percent ($n = 57$) of the sample received some form of public aid.

Similar to the 24-month outcome sample, there were significant differences on IJA [$F (1, 65) = 5.67, p = .020$] and on the Directiveness subscale [$F (1, 65) = 7.21, p = .009$] based on treatment group. Children in the Home-based treatment group had higher IJA scores than children in the Center-based condition. Also, the caregivers of children in the Home-based treatment group had significantly lower scores on the Directiveness subscale compared to the caregivers of children in the Center-based group (see Table 3.18).

There were group differences on Responsivity [$F (7, 59) = 2.72, p = .016$], Achievement [$F (7, 59) = 4.18, p = .001$], and on Supportiveness [$F (7, 59) = 3.09, p = .008$] based on caregiver type. Descriptive data is not available for these results as post hoc tests could not be performed for any of these variables because at least one of the caregiver types had fewer than two cases. The results of the omnibus tests for all the major variables are presented on Table 3.19.

Correlations among all variables. Correlations for the 36-month outcome sample are listed on Tables 3.14 to 3.16. The 36-month receptive and expressive language measures were positively correlated to each other ($r = .62, p < .001$). RJA percent was

positively correlated with the receptive (r = .387, p = .001) and expressive outcomes (r = .258, p = .035). None of the caregiver behaviors were significantly correlated with the 36-month receptive and expressive outcomes (see Table 3.14).

IJA was not significantly correlated to RJA (r = -.09, p = .485). None of the joint attention predictors were significantly correlated with any of the caregiver behaviors (see Table 3.15). All three Responsiveness subscales were positively correlated with each other (see Table 3.15). The Supportiveness subscales were positively correlated (r = .32, p =.009). Furthermore, the Intrusiveness subscales were positively correlated (r = .68, p < .001). All subscales were positively correlated with their corresponding constructs (see Table 3.15).

Caregiver behavior subscales were significantly correlated across the three major constructs (see Table 3.15). Sensitivity (r = .65, p < .001), Responsivity (r = .79, p < .001), Effectiveness (r = .60, p < .001), Directiveness (r = .40, p = .001), and Pace (r = .33, p = .007) were positively correlated with the Achievement subscale. Effectiveness and Praise were positively correlated (r = .27, p = .026). Sensitivity (r = .57, p < .001), Responsivity (r = .68, p < .001), and Effectiveness (r = .58, p < .001) were also positively correlated with the Supportiveness construct. Achievement was positively correlated with the Responsiveness (r = .73, p < .001) and Intrusiveness (r = .40, p =.001) constructs. Directiveness (r = .36, p = .003) and Pace (r = .29, p = .017) were positively correlated with the Supportiveness construct. Supportiveness was positively correlated with the Responsiveness (r = .65, p < .001) and Instrusiveness (r = .36, p = .003) constructs. However, Responsiveness and Instrusiveness were not significantly correlated (r = .11, p = .383).

Control Variables

Correlations. The purpose of this set of analyses was to identify control variables by examining relations between the 36-month language outcomes and child language, caregiver linguistic richness, and birth weight. Child's initial language (18-month REEL) was significantly correlated with the expressive (r = .28, p = .026) but not the receptive outcome (r = .22, p = .089). Linguistic richness was positively correlated with 36-month receptive language (r = .25, p = 0.042). Birth weight was not correlated with the 36-month outcomes (see Table 3.16). Based on the results obtained from these correlation analyses, the 18-month REEL was used as a control variable with the 36-month expressive language outcome, and linguistic richness was used as a control variable with the 36-month receptive outcome.

Group differences. The language outcomes were examined for group differences based on gender and treatment group. There were significant differences on both the 36-month receptive [F (1, 65) = 4.13, p = .046] and expressive outcomes [F (1, 65) = 7.31, p = .009] based on gender. Overall girls scored significantly higher than boys on both of these measures (see Table 3.17). As a result gender was used as a control variable in all the moderation analyses. Treatment group did not lead to any significant differences on the 36-month outcomes (see Table 3.18). Therefore, it was not used as control variable.

The language outcomes were also examined for group differences based on caregiver type (see Table 3.19). There were only group differences on 36-month receptive language [F (7, 59) = 2.77, p = .015]. Post hoc tests could not be performed

because at least one of the caregiver groups had fewer than two cases. Nevertheless, caregiver type was used as a control variable when receptive language was the outcome of the analyses.

Moderations Analyses

Caregiver behaviors as moderators of the IJA-language relation. Responsiveness, Supportiveness, and Intrusiveness individually did not significantly moderate the relation between IJA and 36-month language (see Table 3.20). Additionally, there were no significant main effects in any of these three models. The results of the overall regressions (before the addition of the interaction term) for each model are listed on Table 3.22. After accounting for the variance explained by the control variables, IJA and the caregiver behaviors did not significantly predict the receptive or expressive language.

Caregiver behaviors as moderators of the RJA-language relation. Responsiveness, Supportiveness, and Intrusiveness individually did not significantly moderate the relation between RJA and 36-month language. No main effects were found for receptive and expressive language in any of the moderation models (see Table 3.22). After accounting for the variance explained by the control variables, RJA and the caregiver behaviors did not significantly predict any of the 36-month language outcomes.

Discussion Chapter 4

The purpose of this study was to examine the moderation of the joint attention and language relation by three different caregiver behaviors. To this end several moderation models were proposed and examined in two separate outcome samples. The one caregiver behavior that appeared to moderate the relation between child joint attention and subsequent language was Intrusiveness.

The Moderating Effects of Intrusiveness

I hypothesized that the joint attention, both IJA and RJA, would positively predict language, and those associations would be stronger in magnitude for children whose caregivers were very low on intrusiveness compared to children whose caregivers were very high on intrusiveness. Finding evidence for this hypothesis would have suggested that the effect of joint attention on language was strongest for children whose caregivers engaged in few restricting or directing behaviors. In essence, this would have meant that an infrequent use of commands and prompts provided the most favorable language learning context for this high risk sample.

Intrusiveness did moderate the relation between responding to joint attention and language, such that the impact of this skill on subsequent language depended on the extent to which caregivers commanded, requested, hinted, or prompted the children's immediate behaviors. However, for children whose caregivers were very low on intrusiveness, responding to joint attention did not predict language as hypothesized. The same was true for children whose caregivers were very high on intrusiveness. However, this joint attention skill had a positive effect on 24-month language in children whose caregivers used a low to moderate level of commands, requests, prompts or any other

directive behavior during play. These results were not found in the 36-month sample, suggesting that the second year of life may be a sensitive period for capturing the combined influence of responding to joint attention and appropriate caregiver directive behaviors on the emergence of language in developmentally delayed children.

Several explanations have been offered to describe how high-frequency caregiver intrusiveness can hinder language growth. Tomasello (1988, 1992) suggested that one possibility is that caregivers who are highly directive and restrictive continuously place a tremendous burden on children's attentional systems by constantly redirecting their attentions during interactions. By failing to work with children's attention, caregivers make children's learning of new information a challenge. The other possibility is that highly directive behaviors reinforce more passive child responses via children's motivation for engaging in reciprocal social interactions. As a result, children may be less proactive during these exchanges, thereby limiting their opportunities for socially embedded learning experiences.

Some researchers have also argued that the other extreme, a very low level of directiveness, is also not helpful particularly in developmentally delayed children who may show less initiative during social interactions (see Murray & Hornbaker, 1997). In such cases, moderate levels of caregiver directiveness may provide a structure from which important social exchanges (leading to learning) can occur. To the extent that directive behaviors are appropriately administered and extend or build upon the child's attention and behaviors, a moderate level of directiveness may facilitate the development of important skills including language in children who need relatively more prompting and guidance during social interactions.

The findings about the moderating effect of directiveness in this predominantly African-American sample are also consistent with the cross-cultural research regarding the differential influence of caregiver interaction styles on children's outcomes across ethnic and racial groups (e.g., Lansford et al., 2004). Some of this research indicates that more restrictive and directive forms of parenting in ethnic minorities are not negative correlates of children's outcomes. Within certain minority groups, including African American samples, higher forms of directive behaviors have been found to have a beneficial role and at times even a protective influence with respect to these children's developmental outcomes. More research will be needed to determine whether the current findings hold true in at-risk children from other ethnic groups.

The Moderating Effects of Responsiveness

I also hypothesized that the positive effect of joint attention on language would be stronger in magnitude for children whose caregivers were high on responsiveness compared to children whose caregivers were low on responsiveness. Finding evidence for the hypothesized association would indicate that the relation between these prelinguistic skills and later language really depended on the extent to which the caregiver interaction was sensitive to the child's interests, appropriately responsive to the child's developmental needs, and effective in engaging the child in reciprocal play.

Contrary to my expectations, responsiveness did not have any moderating effect either in the 24-month outcome sample or in the 36-month outcome sample. In other words, the effect of joint attention on future language did not depend on the extent to which caregivers were responsive in their interactions. Additionally, Responsiveness did not predict subsequent language in any of the two language outcome samples. However,

given all the evidence supporting the positive impact of responsive interactions on language development, I would hesitate to conclude that the lack of significant findings indicates that responsive interactions do not matter for language development in the current sample. One factor to consider is the size of the samples, especially the 24-month outcome sample which did not meet the sample size requirements (a minimum of 66 children) based on initial power analyses conducted.

Another issue to consider is the way responsiveness was defined and measured in the present study – as a more behavioral rather than verbal construct. In their study, Masur and colleagues (2005) differentiated between behavioral and verbal forms of caregiver responsiveness, and found evidence that each form of responsiveness measured made unique contributions to language development in a typically developing sample during different periods of development. Specifically, verbal forms of caregiver responsiveness (and not behavioral forms) predicted language during the 13 to 17-month period of development, while both forms of responsiveness predicted language between the 17 and 21-month period of development. However, the factors that may be most influential and supportive of language development in the typically developing sample may be slightly different from those that may matter most in at risk sample. While the study by Masur provides evidence that both behavioral and verbal responsiveness uniquely contribute to language development in normal children during the second year of life, a more verbal form of responsiveness (not captured by the caregiver measures in the present study) may make more of difference in the language development of a high risk sample.

Yet another factor to consider is the consistency of responsive behaviors over time in the present sample. In other words, are caregivers who are highly responsive during the early toddler years more likely to be highly responsive in the later preschool years? The important role of consistency of responsive interaction styles across early childhood has been demonstrated (Landry, Smith, Swank, & Guttentag, 2008). This research has shown that the children of caregivers who were only responsive during infancy had similar outcomes to those of caregivers who had poor quality parenting interaction styles during infancy.

Being consistently responsive across different periods of early childhood also requires having the understanding and knowledge about children's changing developmental needs, and data suggest that this may be a particularly daunting task for high-risk demographic samples. Specifically, only 25% of mothers in a low SES sample showed consistently high responsive behaviors from infancy to the later preschool years (Landry et al., 2001). As I did not obtain multiple time point measures of any caregiver behavior, it is hard to say whether responsive interactions were fairly stable across time compared to other kinds of caregiver behaviors. Given the support for the pivotal role of consistency in responsive caregiver interactions, the current findings raise a question about whether high scores on the Responsiveness scale at one point in development reliably reflect appropriately adapting responsive behaviors across early childhood.

The Moderating Effects of Supportiveness

I also hypothesized that the positive effect of joint attention on language would be stronger in magnitude for children whose caregivers were high on supportive behaviors compared to children whose caregivers were low on supportive behaviors. Finding

evidence for this hypothesis would have indicated that the positive relation between these joint attention skills and later language was influenced by the degree to which caregivers engaged in achievement scaffolding and other facilitative behaviors. Indicating that the relation between joint attention and language was different for children whose caregivers engaged relatively more in specific forms of directive behaviors geared toward promoting children's learning would have weakened the argument that all forms of directive behaviors are detrimental to children's developmental outcomes. In the present study, I found no evidence that the effect of joint attention on language development depended on the extent to which caregivers engaged in achievement promoting activities and praised their children during play. Additionally, caregiver supportiveness did not predict any of the language outcomes.

While previous studies have found evidence that certain directive behaviors may facilitate the development of important skills, the current study may have been limited in finding a similar effect for several reasons. First, the Achievement and Praise subscales did not exhibit as much variability as the other subscales, and as such did not provide a wide range of behavior from which to predict to the outcome. For the most part, caregivers in the current sample used praises very infrequently, with nearly 80% of caregivers in both samples providing no praise during the entire play session. The limited variability in the Achievement subscale is partly related to how the subscale was defined. Achievement was defined as the extent to which a caregiver encouraged sensorimotor or cognitive achievement activities toward the purpose of promoting the child's development progress. Achievement oriented activities were characterized by play that was intended to instruct or teach the child, and not by "play for the sake of play" –

qualities that were quite difficult to tease apart in the coding process. And while caregivers engaged in some notable cognitive enhancing activities (such as counting numbers, saying the alphabet, labeling objects), most of the caregivers followed a similar script during play. The smaller range on the Achievement subscale compared to other subscales may thus reflect that caregivers in the present sample did not vary greatly in their learning promoting behaviors.

Other factors may have also limited the variability of the Supportiveness construct. Scores 1 to 3 on the Achievement subscale distinguished the extent to which the caregiver used achievement related behaviors, while scores 4 and 5 were used to judge caregivers not only on the degree to which they engaged in achievement related activities but also on the extent to which they exerted pressure on the child while using achievement orientation, suggesting intrusiveness for scores 4 and 5. As the purpose of this scale was to judge caregivers on supportive behaviors alone, the highest score typically received by a caregiver who continually used achievement oriented behaviors was a 3. This may have resulted in a more limited range of scores on this subscale compared to other subscales.

Relations among the Caregiver Behaviors

Interestingly, caregiver directiveness was not negatively correlated with responsiveness in the both samples, suggesting that directive and responsive behaviors were not mutually exclusive. Additionally, there was some evidence for the co-occurrence of low-moderate directive behaviors with moderate-high responsive behaviors. This may represent a facilitative interaction style that may combine elements of directiveness with sensitivity and responsivity.

Another interesting finding was that caregivers who engaged in higher frequencies of achievement oriented behaviors also tended to be more responsive and more directive. This suggests that supportive behaviors are not independent of responsive or directive behaviors. It may also point to two different interaction styles – one which combines components of contingent responsiveness and sensitivity with supportiveness and one which combines directiveness with achievement oriented behaviors. An extension of this work may include studying the impact of different caregiver behavior profiles on children's language outcomes. Creating behavior profiles which consist of different levels of the constructs (e.g., high responsiveness and low supportiveness) will help point to the degree and combinations of behaviors most beneficial to language development in these populations.

Lastly, caregivers' frequency of praise and their effectiveness in maintaining a balanced and reciprocal interaction with their children were associated with each other. No causality can be implied from this relation. Nevertheless, one can hypothesize that praising a child frequently can stimulate interactive sequences characterized by balanced turn taking via children's motivation for engaging in social interaction. Alternatively, caregivers who are more effective in facilitating balanced interactions may also be producing more opportunities where the child can receive praise. The different ways in which these factors affect each other will need to be explored further.

Main Effects of Joint Attention

After accounting for caregiver responsive and supportive behaviors, a child's ability to respond to the joint attention bid of an adult examiner was a significant predictor of 24-month expressive language. This prediction was consistent with theory

and research supporting this skill's value to the language development process. While this was not a surprising finding, the fact that responding to joint attention was not a significant predictor of the 36-month language outcomes was not expected. One possibility may be that the strength of this skill's effect on subsequent language may diminish with time, while other factors may become more salient to the language development process.

Another possibility for the lack of effect may be related to the fact that two separate measures were used at 24 and 36 months. While both measured receptive and expressive language skills, the RDLS (36-month measure) assessed syntactical aspects of language development in addition to lexical development, and the REEL (the 24-month measure) was primarily a measure of vocabulary development. Responding to joint attention is thought to help build a lexicon by reducing mapping errors, but its relation to other components of language development such as grammatical structure is not known. Perhaps, responding to joint attention would have significantly predicted the 36 month outcome had it been a pure measure of vocabulary development.

A child's ability to initiate joint attention, however, did not predict any of the language outcomes. There has been evidence that both responding to joint attention and initiating joint attention reflect different skills with unique paths of association to subsequent language (Mundy et al, 2007). The fact that both skills have different developmental trajectories may also suggest that the prime periods for measuring the individual differences that are most predictive of future language may differ across the two capacities. From this conceptual framework, concurrent measures of responding to joint attention and initiating joint attention are not expected to share the same relation

with a future language measure. In the present high risk sample, responding to joint attention may simply be a better predictor of subsequent language growth.

An unanticipated descriptive finding was that children in the Home-based treatment group had significantly more initiating joint attention behaviors than children in the Center-based condition. This may have been an unintended consequence of the Home-based intervention. Perhaps these children spent more time one-on-one with a caregiver because they were at home, giving them better access to the type of feedback that would support IJA. This should be explored in future studies.

Children's Joint Attention Skills and Caregiver Behaviors

The relation between children's joint attention skills and caregiver behaviors may be transactional in nature (Yoder and Warren, 1993). In other words, these joint attention skills may elicit maternal responsive behaviors, which in turn foster language development. Supporting this transactional model, there is evidence that maternal responsivity mediated the link between the child's joint attention and subsequent language (Yoder & Warren, 1999).

Caregivers can also influence children's choice of communication behaviors by differentially fulfilling clear acts of communication (Bruner 1975; Harding, 1983). Children then gain awareness that certain behaviors are more effective than others in meeting their communication needs. In this way caregivers' reactions toward children's behaviors determines what kinds of behaviors children will continue to display in future interactions. Thus, certain acts of communication might be reinforced simply by the kinds of responses children receive from their caregiver. This view was supported by evidence that maternal responses to children's intentional communication, but not to pre-

intentional communication (e.g. reach to an object without joint attention), were positively related to children's intentional communication rate six months later (Yoder et al., 2001).

Another possibility explored in the present study was the goodness-of-fit between children's capacity for joint attention and the caregiver's interaction style. A child may possess a certain capacity for joint attention that may foster language development in the context of a responsive caregiver, who is able to capitalize on the joint attention episode by using prompt, contingent, and appropriate linguistic scaffolding strategies; however, the same capacity for joint attention in the context of an unresponsive caregiver may not be sufficient to facilitate language development to the same potential. Children's joint attention skills can therefore be construed of as prelinguistic skills that make children ready for language learning; but only when caregivers are responsive and sensitive to children's readiness cues and to the strategies that help teach children new language skills can this language learning process happen optimally. Then, one can argue that the impact of children's joint attention skills on their language outcomes really does depend on the kind of caregiver responses they are receiving.

The present study found evidence for the goodness of fit hypothesis, which is the idea that joint attention skills and caregiver behaviors interact to impact language development. While no evidence was found for the moderating effect of responsive or supportive caregiver behaviors, the findings did show that a moderate level of directiveness was the ideal situation fostering a positive relation between responding to joint attention and language. This finding is consistent with two lines of research – the literature which suggests that higher levels of directive and restrictive behaviors are

detrimental to development (Landry et al., 1997) and that which indicates that some degree of directiveness is necessary for facilitating development particularly in developmentally delayed samples (e.g. Marfo, 1992).

In summary, responding to joint attention had a positive impact on children's language, but this impact depended on the extent of directiveness the caregiver used during play. In this study, it was not just the child's responding to joint attention skill but a combination of child and caregiver factors that ultimately determined future language. Consistent with a goodness-of-fit model, this suggests that caregivers can use certain behaviors to tap into a child's potential. In this at-risk sample caregivers who were low to moderately directive seemed to capitalize on children's joint attention or language learning potential, and this resulted in the most favorable language outcomes.

Limitations

The present study makes a contribution to the joint attention and caregiver literature by providing evidence of the moderating effects of a specific caregiver behavior on the relation between joint attention and language. Nevertheless, the study does not remain without limitations that are worth mentioning.

First, the sample size in both outcome samples might not have been large enough to detect most moderating effects. Though the sample size could have been maximized by using the original 83 children with age equivalents as outcomes, I opted not to do this, as there was insufficient evidence to suggest that age scores obtained from two different language measures were truly comparable. The result was the creation of two smaller

samples and a considerable reduction in power. Also, I may have had more power to find significance had I left the caregiver behaviors as continuous variables, as typically done. However I was interested in the extreme groups and therefore decided to use quartiles. In future studies, exploring the moderation both ways might reveal different findings.

Another issue related to the methodology needs to be considered. Coding caregiver behaviors in the present high risk sample with the MBRS was a challenging task particularly when assessing the supportive directive behaviors. Though the reliability and validity of MBRS scales has been well established in multiple studies with diverse samples of children and adult caregivers, the definitions of the scales proved too general or too restricting at times for classifying the range of behaviors observed. Despite much consultation between the coders about how to best use the scales to capture all range of behavior (in this high risk sample) while staying true to the definition of each score, some of the scales still did not adequately capture what the coders actually observed. As mentioned earlier, coding the range of achievement oriented behaviors was limited by this scale's definition, and caregivers who exhibited moderate to high levels of achievement promoting behaviors generally did not receive a score higher than a 3 unless they exerted some amount of pressure on the child. In this sample, the co-occurrence of high achievement with pressure was not very common. The result may be that the obtained scores on this scale did not represent the true range of scores.

We also used a very strict definition of praise such that only explicit forms of praise (e.g. "good boy", "that's a girl", "good job") were given credit. Claps, smiles, hugs, and any other form of behavioral approval were not recognized as praise unless these were accompanied by verbal forms of praise. The presence of low frequency praises

may not only suggest these behaviors were infrequent but may also mean that caregivers in the present sample may have expressed praise in ways the current scale did not recognize.

Another limitation is related to the ecological validity of play assessments to everyday life. One question researchers ask is whether caregiver behaviors measured during a play assessment reflect the reality of caregiver-child interactions at home. For instance, are caregivers who are judged as highly responsive during a brief play assessment, more sensitive and responsive outside the assessment room compared to caregivers who are rated low on the construct? An interesting finding in the parent-child literature has been that one-time observations of caregivers' interactive style (often as brief as five minutes), predict children's current and subsequent levels of developmental functioning (see Mahoney et. al., 1998). This may suggest that caregivers' interactive behaviors (as measured in the play session) may not only be consistent over time but may also reflect the basic habits governing their interactions with their children. Nevertheless, more evidence is needed to support the notion that caregiver behaviors captured during a 6 to 8 minute play paradigm are consistent over time and generalizable across setting; therefore using other kinds of measurement tools such as self-reports, standardized tools, and even multiple time points of play may constitute alternate ways of reliably capturing such caregiver behaviors.

Finally, the generalizability of findings based on a predominantly African American sample needs to be considered. Future directions may include examining the

influence of varying degrees of directiveness and other caregiver behaviors on the language skills of other cultural groups, in particular other ethnic minorities such as Hispanics.

Additionally, the range of caregiver behavior scores and the resulting quartile groups also needs to be interpreted cautiously, with the consideration that these were relative scores based on this sample alone. It is important to remember that caregivers in each quartile group were assigned to each level based on how they compared (in intrusiveness) to other caregivers on the construct in this sample. Caregivers were not identified on the percentile groups based on how they compared to other high-risk or non high risk groups. Therefore, very low and high levels of intrusiveness as rated in the present high-risk sample may not mean the same in a different demographic sample. The same can be said about the low and moderate levels of intrusiveness. When interpreting these findings, it is therefore important to remember that the ratings were relative and may only be useful for comparing caregiver behaviors within the present sample – not for making general implications about the levels of directiveness that may be beneficial in other populations of caregivers and children.

Implications

The results obtained in the present study demonstrated that the benefits of children's joint attention skills on subsequent language were most prominent in children whose caregivers exhibited a low to moderate level of directiveness during adult-child play interactions. Further analyses revealed that caregivers in the low and moderate directiveness groups were also more likely to belong to the moderate to high responsiveness groups. In other words, they were more likely to combine a judicious

level of directiveness with an above average level of responsiveness. Some researchers (Marfo, 1992; Crawley & Spiker, 1983) have suggested that combination of these two caregiver characteristics is ideal for children who are developmentally delayed.

More broadly these findings are consistent with social interactionist theories that explain the development of children's language ability within the helpful framework of adult-child interactions. During adult-child interactions, both partners observe, engage in play, and share information. Social interactionist models suggest that such exchanges are important because they afford children natural learning opportunities for acquiring communicative competencies (see Girolametto, Weitzman, & Greenberg, 2006). Adult verbal and behavioral responses that are congruent with the child's ongoing behavior and attention smooth the progress of learning, by heightening the relevance of labels, increasing the child's motivation to participate in social interaction with the adult, and by keeping the child from rerouting his cognitive resources elsewhere.

This study is a clear reminder that caregivers can use certain interaction styles to support the growth children's immature language skills. While a child's capacity for joint attention is known to play a tremendous role in the language acquisition process, in this study this skill's potential appeared to be maximized in the context of a moderately directive caregiving framework. There was also some evidence that caregivers who used a moderate level of directiveness were also more likely to engage in above average levels of responsive interactions. More research will be needed to determine how these combined factors impact the development of children's language competencies in other racial and ethnic groups.

Children's early language skills are fundamental as they are associated with later achievement (e.g., Craig, Connor, & Washington, 2003). Implementing early language intervention programs aimed at improving the school readiness skills of at-risk children should be therefore be an important goal. Additionally there is much evidence that caregivers can be supported through interventions to increase specific aspects of supportive parenting that may in turn facilitate children's language outcomes.

An interesting finding in this study was that caregivers of children in the Home-based condition had significantly less directive behaviors than caregivers of children in the Center-based condition, who were never required to attend the center while the intervention was taking place. Perhaps mere exposure to the intervention in the home produced an unintended effect on caregivers' interaction styles and may speak volumes of effect of early interventions on both children and caregivers' outcomes. While no recommendations can be made for intervention purposes based on the data obtained, understanding the specific caregiver factors helping children's outcomes should continue to be an important research goal with follow-up studies that will eventually inform successful interventions. Creating the most helpful intervention strategies in these at-risk populations will also depend on the extent to which interventionists and researchers work closely with caregivers of diverse demographic backgrounds to further understand the factors that are most influential for the development of children's language competencies.

Conclusion

The findings in the present study support the claim that caregiver directive behaviors influenced the relation between children's ability to respond to joint attention

and future language outcomes. Children's capacity to respond to joint attention only positively predicted the future language outcomes of children whose caregivers exhibited low and moderate levels of directiveness, while the relation was nonexistent in children whose caregivers were at both extreme of directiveness. That the relation between responding to joint attention and language depended on the caregiver's behavior highlights the crucial role caregivers played in facilitating young children's language skills and calls for more intervention research with high risk samples of caregivers and children from diverse cultural backgrounds.

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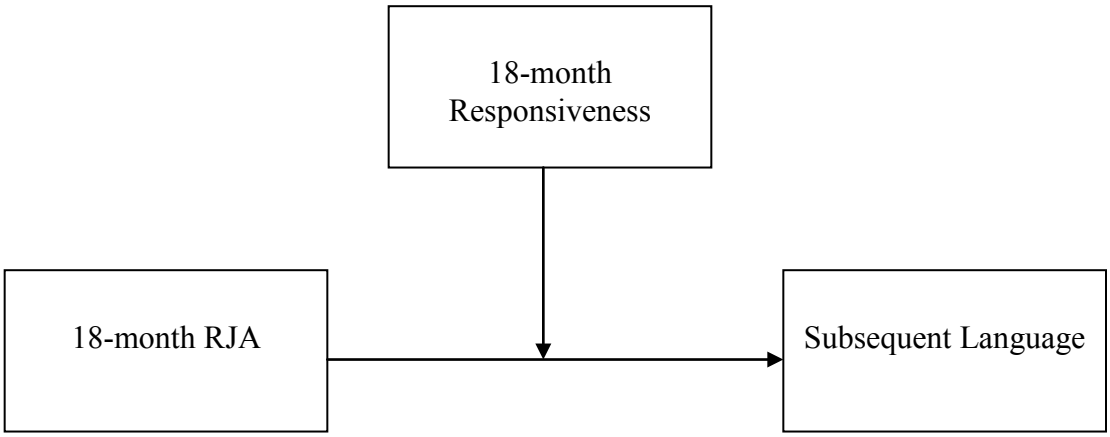
Appendix

The Original Plan

I originally proposed to use age equivalents (as the outcome measure) at 24 months for the sample of 83 children. Using age scores would have helped maintain the sample size by establishing a common measure between children who only had a RDLS (n = 33) and those who only had a REEL (n = 50) score as the 24-month language measure. The creation of one outcome variable based on two separate language measures that may or may not be comparable in the first place raised concerns that needed to be addressed statistically. Only four participants had both a RDLS and a REEL score at 24 months in the original sample which made it impossible to correlate the two scores. Additionally, the literature provides little evidence of the concurrent validity of the RDLS to the REEL. Given these limitations, it did not seem prudent to use a sample in which the outcome was not the same for all children. For these reasons, I decided to use the smaller group of children who had the same outcome. From the final sample of 83, 50 children had a 24-month REEL score, and 67 children had a 36-month RDLS score. The moderation analyses were conducted and reported on both samples separately.

Figures

Figure 3.1 *Responsiveness as a Moderator of the Joint Attention-Language Relation*



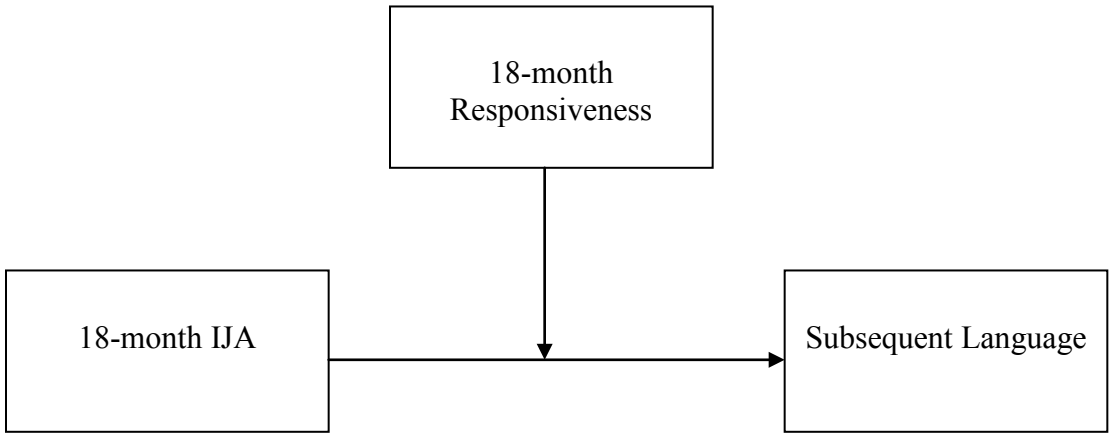


Figure 3.2 *Supportiveness as a Moderator of the Joint Attention-Language Relation*

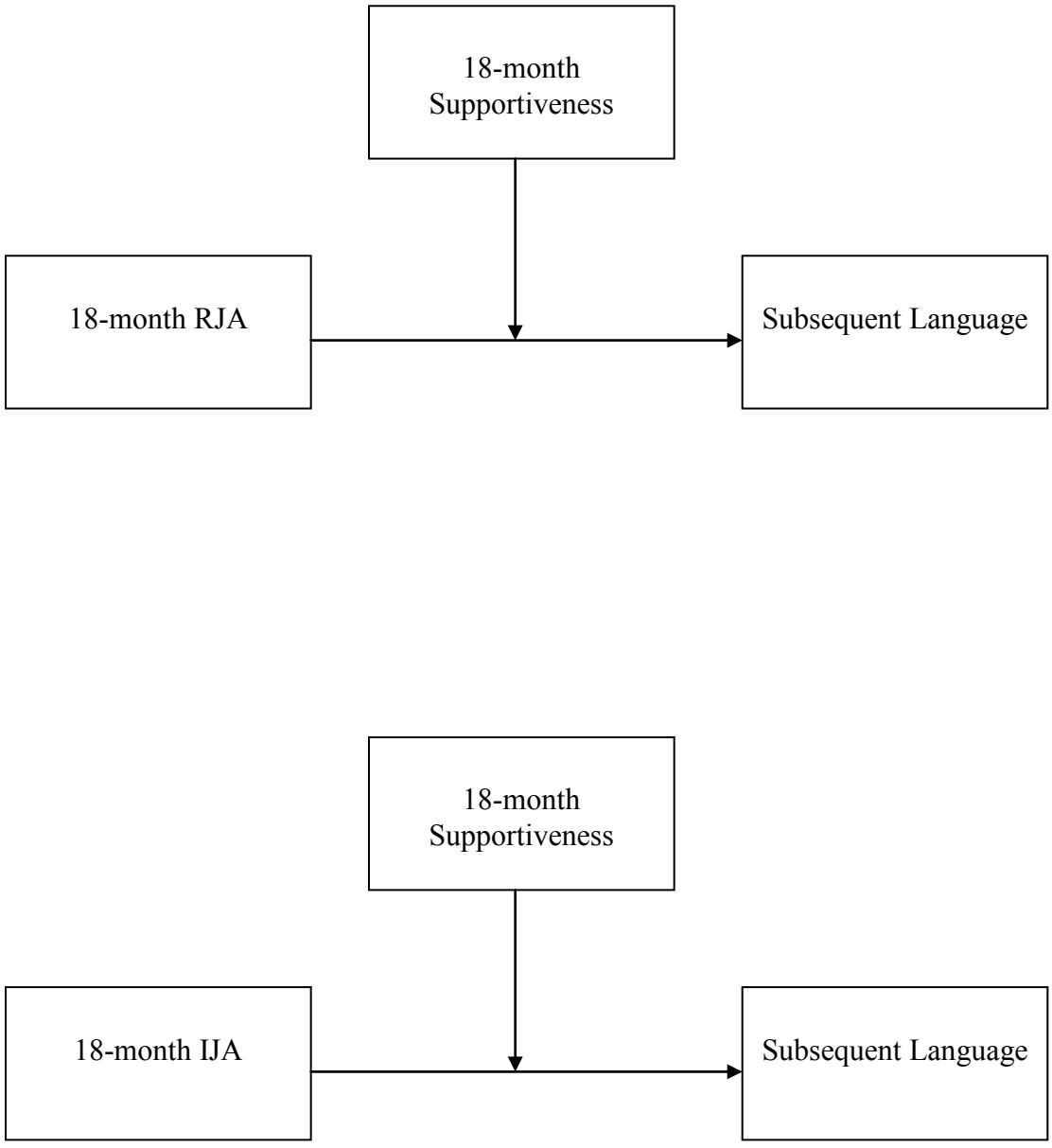
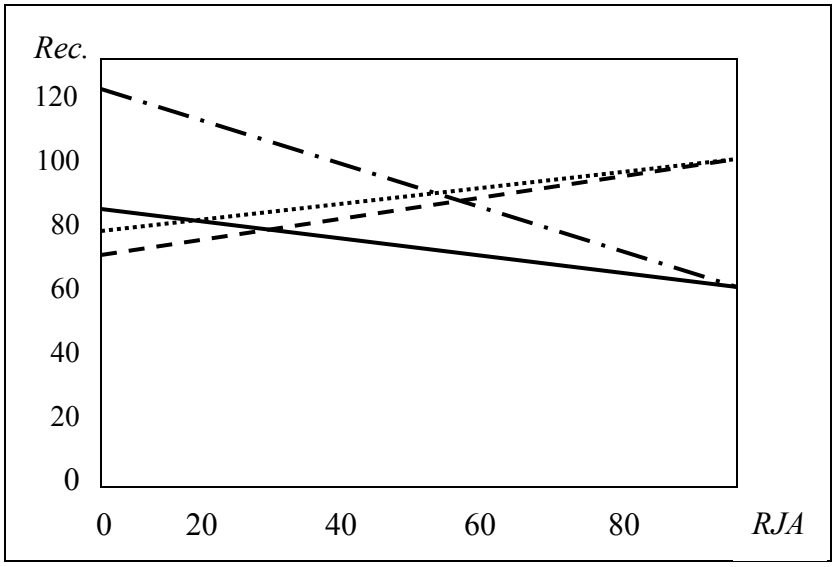


Figure 3.3 *Intrusiveness as a Moderator of the Joint Attention-Language Relation*

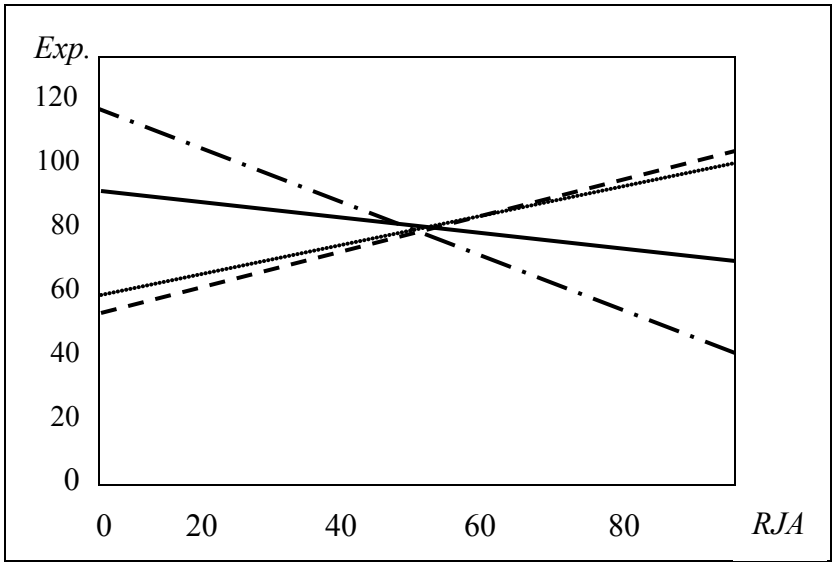
Figure 3.4 *Graph of Intrusiveness-RJA interaction for Receptive Language*



Intrusiveness Groups
Group 1 =
Group 2 =
*Group 3 =
Group 4 =

Note. The regression equation was $Y = 89.20 - 22.16X_1 - 9.04X_2 - 10.52X_3 - 0.88X_4 + 0.67X_5 + .0.98X_6 + 1.10X_6$. The predicted receptive scores for children who scored at the RJA mean for groups 1 to 4 were 67.04, 80.16, 78.68, and 89.20, respectively.

Figure 3.5 *Graph of Intrusiveness-RJA interaction for Expressive Language*



Note. The regression equation was $Y = 96.76 - 29.81X_1 - 20.08X_2 - 21.39X_3 - 1.03X_4 + 0.86X_5 + 1.35X_6 + 1.42X_6$. The predicted receptive scores for children who scored at the RJA mean for groups 1 to 4 were 67.05, 78.68, 75.37 and 96.76, respectively.

Table 3.1
Demographics for 24-month Outcome Sample

	Center-based *n/(%)*	Home-based *n(%)*	Total *n(%)*
Gender			
Boys	15(30.0)	15(30.0)	30(60.0)
Girls	15(30.0)	5(10.0)	20(40.0)
Ethnicity			
African American	23(46.0)	16(32.0)	39(78.0)
Hispanics	2(4.0)	3(6.0)	5(10.0)
White	2(4.0)	1(2.0)	3(6.0)
Other	3(6.0)	0(0.0)	3(6.0)
Birthweight			
<2500g	7(16.7)	2(4.8)	9(21.4)
2500g- 4310	17(40.5)	16(38.1)	33(78.6)
Caregiver Type			
Mother	19(38.0)	6(12.0)	25(50.0)
Father	1(2.0)	0(0.0)	1(2.0)
Mat. Grandmother	4(8.0)	4(8.0)	8(16.0)
Pat. Grandmother	1(2.0)	0(0.0)	1(2.0)
Foster Mother	1(2.0)	7(14.0)	8(16.0)
Foster Father	1(2.0)	1(2.0)	2(4.0)
Aunt	3(6.0)	1(2.0)	4(8.0)
Cousin	0(0.0)	1(2.0)	1(2.0)
Public Aid			
Yes	27(54.0)	16(32.0)	43(86.0)
No	3(6.0)	4(8.0)	7(14.0)

Note. Descriptive data pertains to the 24-month outcome sample

Table 3.2
Minimum, Maximum, Mean, Standard Deviation

Variable	Min.	Max.	Mean	SD
Assessment time (minutes)				
ESCSTime	13.03	34.83	18.30	4.99
MBRSTime	2.15	8.63	6.42	0.89
24 Month Outcome				
Receptive	50.00	113.00	85.80	15.34
Expressive	42.00	117.00	75.56	18.66
Predictors				
IJA(rpm)	0.00	2.32	0.85	0.50
RJA percent	0.00	100.00	56.60	31.53
Moderators				
Average sensitivity	1.00	5.00	2.52	1.12
Average responsivity	1.00	4.00	2.40	0.88
Average effectiveness	1.00	4.00	2.05	0.85
Responsiveness	1.00	4.00	2.32	0.89
Average achievement	1.00	3.50	2.01	0.77
Average praise	1.00	3.50	1.26	0.58
Supportiveness	1.00	3.00	1.64	0.55
Average directiveness	1.00	5.00	3.39	0.91
Average pace	1.50	4.00	2.95	0.55
Intrusiveness	1.25	4.50	3.17	0.67
Control variables				
NDWperMinute	3.69	26.05	13.58	4.09
18 REEL composite	55.00	118.00	79.77	14.09

Note. Descriptive data pertains to the 24-month outcome sample. The moderator constructs are listed in bold.

Table 3.3
Correlations between Predictors and 24-month Language

	Receptive	Expressive
IJA(rpm)	-.007	-.012
RJA percent	.278	.435**
Sensitivity	-.039	-.065
Responsivity	.118	.128
Effectiveness	.094	.133
Responsiveness	**.053**	**.058**
Achievement	.013	.057
Praise	.146	.185
Supportiveness	**.087**	**.138**
Directiveness	.266	.273
Pace	.286	.234
Intrusiveness	**.295***	**.279**

*p<.05. **p<.01.

Table 3.4
Correlations among Predictor Variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
IJA	1											
RJA	-.019	1										
Sens.	-.102	-.264	1									
Resp.	-.087	-.130	.888***	1								
Effe.	.034	-.139	.722***	.795***	1							
RESP.	**-.061**	**-.198**	**.946*** **	**.960*** **	**.887*** **	**1**						
Ach.	-.116	-.161	.592***	.690***	.609***	.673***	1					
Praise	-.133	.077	.218	.221	.282*	.255	.303*	1				
SUP.	**-.153**	**-.071**	**.531*** **	**.601*** **	**.576*** **	**.607*** **	**.862*** **	**.745*** **	**1**			
Dir.	-.275	.054	-.267	-.039	.073	-.102	.287*	.036	.220	1		
Pace	-.252	.124	-.098	.042	.093	.003	.269	.090	.237	.696***	1	
INTR.	**-.288**	**.087**	**-.220**	**-.009**	**.087**	**-.068**	**.303***	**.061**	**.244**	**.957*** **	**.875*** **	**1**

*p<.05. **p<.01. ***p<.001.

Table 3.5
Correlations with Initial Language, Linguistic Richness, and Birth Weight

	18 REEL	NDW Per Minute	Birth weight
24 Receptive	.257	.299*	.110
24 Expressive	.198	.066	.147
IJA(rpm)	-.076	-.153	.178
RJA percent	-.042	.369**	.064
Sensitivity	.181	.057	-.020
Responsivity	.210	.249	.040
Effectiveness	.307*	.053	.165
Responsiveness	**.242**	**.125**	**.057**
Achievement	.360*	.296*	.054
Praise	.359*	.151	-.013
Supportiveness	**.442****	**.288***	**.031**
Directiveness	.010	.310*	.225
Pace	-.013	.358*	.044
Intrusiveness	**.001**	**.354***	**.165**

*p<.05. **p<.01.

Table 3.6
Group Differences by Gender

	Gender		
	Boys *M(SD)*	Girls *M(SD)*	*F*
24 Month Outcome			
Receptive	84.93(17.65)	87.10(11.35)	0.24
Expressive	74.93(19.33)	76.50(18.07)	0.08
Predictors			
IJA(rpm)	0.76(0.48)	0.99(0.50)	2.51
RJA percent	57.78(29.51)	53.33(34.88)	0.35
Moderators			
Sensitivity	2.50(1.14)	2.55(1.13)	0.23
Responsivity	2.42(0.88)	2.38(0.90)	0.03
Effectiveness	2.03(0.79)	2.08(0.96)	0.03
Responsiveness	**2.32(0.89)**	**2.33(0.92)**	**0.00**
Achievement	2.00(0.74)	2.02(0.82)	0.01
Praise	1.20(0.47)	1.35(0.73)	0.79
Supportiveness	**1.60(0.49)**	**1.69(0.63)**	**0.30**
Directiveness	3.37(0.10)	3.43(0.78)	0.05
Pace	2.93(0.63)	2.98(0.41)	0.07
Intrusiveness	**3.15(0.75)**	**3.20(0.55)**	**0.07**

Note. There were no differences any of these variables based on gender.

Table 3.7
Group Differences by Treatment Group

	Treatment Group		
	Center	Home	
	M(SD)	*M(SD)*	*F*
24 Month Outcome			
Receptive	86.10(14.99)	85.35(16.24)	0.03
Expressive	74.43(20.79)	77.25(15.28)	0.27
Predictors			
IJA(rpm)	0.71(0.49)	1.05(0.45)	5.87*
RJA percent	58.33(31.49)	54.00(32.24)	0.22
Moderators			
Sensitivity	2.37(0.98)	2.75(1.30)	1.41
Responsivity	2.30(0.75)	2.55(1.05)	0.97
Effectiveness	2.03(0.80)	2.08(0.95)	0.03
Responsiveness	**2.23(0.77)**	**2.46(1.05)**	**0.77**
Achievement	1.90(0.72)	2.18(0.82)	1.57
Praise	1.20(0.53)	1.35(0.65)	0.79
Supportiveness	**1.55(0.48)**	**1.76(0.62)**	**1.84**
Directiveness	3.65(0.77)	3.00(0.99)	6.84*
Pace	3.07(0.39)	2.78(0.70)	3.60
Intrusiveness	**3.36(0.54)**	**2.89(0.77)**	**6.50***

*$p < .05$

Table 3.8
Group Differences by Caregiver Type

	F	*p*
24 Month Outcome		
Receptive	0.84	0.56
Expressive	0.82	0.58
Predictors		
IJA(rpm)	0.93	0.49
RJA percent	1.78	0.12
Moderators		
Sensitivity	1.36	0.25
Responsivity	1.42	0.22
Effectiveness	0.90	0.51
Responsiveness	**1.23**	**0.31**
Achievement	1.33	0.26
Praise	0.57	0.78
Supportiveness	**0.65**	**0.72**
Directiveness	1.89	0.10
Pace	1.76	0.12
Intrusiveness		

Note. Means and standard deviations are not provided as several groups had fewer than two cases. There were no differences on any of these variables based on caregiver type.

Table 3.9
Sequential Steps of the IJA Moderation Analyses

Predictor	24-Receptive ΔR^2	β	24-Expressive ΔR^2	β
Step 1	.090			
Control variables				
Step 2	.011		.038	
IJA		0.066		-0.074
Responsiveness		0.074		-0.005
		0.119		-0.180
		0.101		-0.173
Step 3	.093		.146	
IJA X RESP.		-0.526		-0.424
		-0.361		-0.471
		-0.366		-0.133
Total R^2	.194		.184	
Step 1	.090			
Control variables				
Step 2	.030		.069	
IJA		0.038		0.027
Supportiveness		0.010		-0.173
		0.058		0.008
		-0.142		-0.233
Step 3	.046		.102	
IJA X SUP.		-0.117		-0.246
		0.092		-0.087
		0.172		0.241
Total R^2	.166		.170	
Step 1	.090			
Control variables				
Step 2	.074		.086	
IJA		0.119		0.088
Intrusiveness		-0.298		-0.388
		0.048		-0.146
		-0.051		-0.310
Step 3	.036		.028	
IJA X INTR.		0.310		0.053
		0.127		0.225
		0.394		0.300
Total R^2	.201		.114	

Note. Betas are listed for joint attention variables, the three dummy variables describing the caregiver behavior quartile groups, and the three corresponding interaction terms.

Table 3.10
Sequential Steps of the RJA Moderation Analyses

Predictor	24-Receptive ΔR^2	24-Receptive β	24-Expressive ΔR^2	24-Expressive β
Step 1	.089			
Control variables				
Step 2	.038		.222*	
RJA		0.200		0.453
Responsiveness		0.007		-0.156
		0.064		-0.177
		0.064		-0.219
Step 3	.057		.044	
RJA X RESP.		-0.132		-0.223
		-0.261		-0.106
		0.053		0.061
Total R^2	.184		.266	
Step 1	.089*			
Control variables				
Step 2	.057		.253*	
RJA		0.191		0.437
Supportiveness		-0.044		-0.219
		0.038		-0.028
		-0.141		-0.206
Step 3	.008		.044	
RJA X SUP.		-0.079		-0.075
		-0.105		-0.174
		-0.090		-0.240
Total R^2	.154		.297	
Step 1	.089			
Control variables				
Step 2	.092		.226*	
RJA		0.190		0.393
Intrusiveness		-0.241		-0.256
		0.055		-0.114
		-0.005		-0.198
Step 3	.205**		.235**	
RJA X INTR.		0.578		0.610
		1.062		1.202
		1.596		1.679
Total R^2	.399		.461	

*p<.05. **p<.01.

Table 3.11
Main Effects of Joint Attention and Caregiver Behaviors

	24-Receptive			24-Expressive		
	df	*F* Δ	*p*	*df*	*F* Δ	*p*
IJA RESP.	4,43	0.14	.969	4,44	0.44	.780
IJA SUP.	4,43	0.36	.833	4,44	0.81	.525
IJA INTR.	4,43	0.95	.445	4, 44	1.03	.401
RJA RESP.	4,44	.48	.753	4,45	3.22	.021*
RJA SUP.	4,44	0.74	.569	4,45	3.82	.009**
RJA INTR.	4,44	1.23	.311	4, 45	3.29	.019*

*p<.05. **p<.01.

Table 3.12
Demographics for 36-month Outcome Sample

	Center-based *n/(%)*	Home-based *n(%)*	Total *n(%)*
Gender			
Boys	18(26.9)	14(20.9)	32(47.8)
Girls	26(38.8)	9(13.4)	35(52.2)
Ethnicity			
African American	34(50.7)	19(28.4)	53(79.1)
Hispanics	3(4.5)	3(4.5)	6(9.0)
Haitian	2(3.0)	0(0.0)	2(3.0)
White	2(3.0)	0(0.0)	2(3.0)
Other	3(4.5)	1(1.5)	4(6.0)
Birthweight			
<2500g	6(10.5)	4(7.0)	10(17.5)
2500g- 4310	30(52.6)	17(29.8)	47(82.5)
Caregiver Type			
Mother	24(35.8)	7(10.4)	31(46.3)
Father	3(4.5)	1(1.5)	4(6.0)
Mat. Grandmother	8(11.9)	5(7.5)	13(19.4)
Pat. Grandmother	3(4.5)	1(1.5)	4(6.0)
Foster Mother	2(3.0)	6(9.0)	8(11.9)
Foster Father	1(1.5)	0(0.0)	1(1.5)
Aunt	3(4.5)	2(3.0)	5(7.5)
Cousin	0(0.0)	1(1.5)	1(1.5)
Public Aid			
Yes	37(55.2)	20(29.9)	57(85.1)
No	7(10.4)	3(4.5)	10(14.9)

Note. Descriptive data pertains to the 36-month outcome sample

Table 3.13
Minimum, Maximum, Mean, Standard Deviation

Variable	Min.	Max.	Mean	SD
Assessment time (minutes)				
ESCSTime	9.07	34.83	17.70	4.14
MBRSTime	2.75	8.03	6.47	0.77
36 Month Outcome				
Receptive	62.00	121.00	86.27	14.36
Expressive	62.0	125.00	82.72	15.14
Predictors				
IJA(rpm)	0.00	2.32	0.79	0.47
RJA percent	0.00	100.00	60.55	32.36
Moderators				
Average sensitivity	1.00	5.00	2.50	1.07
Average responsivity	1.00	4.00	2.36	0.94
Average effectiveness	1.00	3.50	2.04	0.82
Responsiveness	1.00	4.00	2.30	0.88
Average achievement	1.00	3.50	1.99	0.76
Average praise	1.00	3.50	1.19	0.48
Supportiveness	1.00	3.00	1.59	0.51
Average directiveness	1.00	5.00	3.35	0.91
Average pace	1.00	4.00	2.82	0.58
Intrusiveness	1.25	4.50	3.09	0.68
Control variables				
NDWperMinute	1.84	25.88	12.87	4.48
18 REEL composite	50.0	129.00	88.39	18.74

Note. Descriptive data pertains to the 36-month outcome sample. The moderator constructs are listed in bold.

Table 3.14
Correlations between Predictors and 36-month Language

	Receptive	Expressive
IJA(rpm)	-.081	-.085
RJA percent	.387**	.258*
Sensitivity	.117	-.014
Responsivity	.177	.059
Effectiveness	.133	.011
Responsiveness	**.152**	**.019**
Achievement	.199	.108
Praise	.051	-.044
Supportiveness	**.173**	**.060**
Directiveness	.228	.188
Pace	.151	-.028
Intrusiveness	**.215**	**.113**

*p<.05. **p<.01.

Table 3.15
Correlations among all the predictor variables

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
IJA	1											
RJA	-.087	. 1										
Sens.	-.107	-.184	1									
Resp.	-.038	-.043	.889***	1								
Effe.	.018	-.149	.742***	.761***	1							
RESP.	**-.052**	**-.135**	**.953*** **	**.953*** **	**.883*** **	**1**						
Ach.	-.027	-.026	.654***	.787***	.599***	.732***	1					
Praise	-.045	.070	.163	.198	.271*	.221	.317**	1				
SUP.	**-.041**	**.013**	**.565*** **	**.681*** **	**.575*** **	**.650*** **	**.896*** **	**.705*** **	**1**			
Dir.	-.100	.075	-.089	.161	.200	.084	.398**	.138	.362**	1		
Pace	-.047	.096	.012	.176	.182	.125	.326**	.101	.291*	.680***	1	
INTR.	**-.086**	**.090**	**-.054**	**.181**	**.210**	**.108**	**.402****	**.134**	**.363****	**.951*** **	**.873*** **	**1**

*p<.05. **p<.01. ***p<.001.

Table 3.16
Correlations with Initial Language, Linguistic Richness, and Birth Weight

	18 REEL	NDW Per Minute	Birth weight
36 Receptive	.220	.249*	.217
36 Expressive	.284*	-.011	.181
IJA(rpm)	-.276*	-.048	.007
RJA percent	.160	.153	-.020
Sensitivity	.255*	.204	.110
Responsivity	.217	.387	.150
Effectiveness	.306*	.193	.184
Responsiveness	**.275***	**.281***	**.154**
Achievement	.203	.478***	.176
Praise	.174	.274*	.208
Supportiveness	**.233**	**.485*****	**.221**
Directiveness	.046	.360**	.280*
Pace	-.037	.466***	.190
Intrusiveness	**.014**	**.436*****	**.266***

*p<.05. **p<.01. ***p<.001.

Table 3.17
Group Differences by Gender

	Gender		
	Boys	Girls	
	M(SD)	*M(SD)*	*F*
36-Month Outcome			
Receptive	82.63(11.32)	89.60(16.11)	4.13*
Expressive	77.72(12.38)	87.29(16.14)	7.31**
Predictors			
IJA(rpm)	0.74(0.49)	0.84(0.45)	0.70
RJA percent	57.08(30.76)	63.71(34.88)	0.70
Moderators			
Sensitivity	2.41(1.09)	2.59(1.07)	0.46
Responsivity	2.22(0.93)	2.49(0.94)	1.35
Effectiveness	1.95(0.87)	2.11(0.78)	0.64
Responsiveness	**2.19(0.92)**	**2.39(0.85)**	**0.88**
Achievement	1.86(0.74)	2.11(0.77)	1.90
Praise	1.16(0.41)	1.23(0.53)	0.38
Supportiveness	**1.51(0.46)**	**1.67(0.54)**	**1.75**
Directiveness	3.27(1.02)	3.43(0.80)	0.53
Pace	2.81(0.56)	2.83(0.59)	0.01
Intrusiveness	**3.04(0.73)**	**3.13(0.65)**	**0.28**

*p<.05. **p<.01.

Table 3.18
Group Differences by Treatment Group

	Treatment Group		
	Center	Home	
	M(SD)	*M(SD)*	*F*
36-Month Outcome			
Receptive	87.93(13.99)	83.09(14.84)	1.74
Expressive	84.95(15.16)	78.43(14.78)	2.88
Predictors			
IJA(rpm)	0.69(0.43)	0.97(0.50)	5.67*
RJA percent	62.35(32.17)	57.10(33.15)	0.39
Moderators			
Sensitivity	2.49(1.01)	2.52(1.20)	0.01
Responsivity	2.40(0.87)	2.28(1.07)	0.22
Effectiveness	2.05(0.75)	2.02(0.96)	0.01
Responsiveness	**2.31(0.80)**	**2.28(1.03)**	**0.02**
Achievement	2.00(0.73)	1.98(0.83)	0.01
Praise	1.16(0.40)	1.26(0.60)	0.69
Supportiveness	**1.58(0.46)**	**1.62(0.61)**	**0.09**
Directiveness	3.56(0.81)	2.96(0.98)	7.21**
Pace	2.84(0.59)	2.78(0.56)	0.15
Intrusiveness	**3.20(0.66)**	**2.87(0.69)**	**3.65**

*p<.05. **p<.01.

Table 3.19
Group Differences by Caregiver Type

	F	*p*
36 Month Outcome		
Receptive	2.77	0.01
Expressive	0.86	0.55
Predictors		
IJA(rpm)	0.91	0.51
RJA percent	0.60	0.76
Moderators		
Sensitivity	1.92	0.08
Responsivity	2.72	0.02
Effectiveness	1.33	0.25
Responsiveness	**1.95**	**0.08**
Achievement	4.18	0.00
Praise	0.78	0.61
Supportiveness	**3.09**	**0.01**
Directiveness	1.25	0.29
Pace	1.86	0.09
Intrusiveness	**1.58**	**0.16**

Note. Means and standard deviations are not provided as several groups had fewer than two cases.

Table 3.20
Sequential Steps of the IJA Moderation Analyses

Predictor	36-Receptive ΔR^2	β	36-Expressive ΔR^2	β
Step 1	0.285*		0.148*	
Control variables				
Step 2	0.009		0.018	
IJA		-0.061		-0.038
Responsiveness		0.074		-0.068
		0.096		0.032
		0.059		-0.105
Step 3	0.039		0.044	
IJA X RESP.		-0.022		-0.119
		0.011		0.125
		-0.246		-0.142
Total R^2	0.332		0.211	
Step 1	0.285*		0.148*	
Control variables				
Step 2	0.022		0.008	
IJA		-0.032		-0.052
Supportiveness		0.066		0.026
		0.168		0.050
		0.130		0.077
Step 3	0.016		0.024	
IJA X SUP.		0.070		-0.046
		0.117		0.147
		-0.085		-0.062
Total R^2	0.323		0.181	
Step 1	0.285*		0.148*	
Control variables				
Step 2	0.022		0.034	
IJA		-0.076		-0.030
Intrusiveness		-0.032		-0.005
		0.010		-0.102
		0.151		-0.177
Step 3	0.048		0.109	
IJA X INTR.		-0.272		-0.389
		-0.061		-0.130
		-0.207		0.021
Total R^2	0.355		0.291	

Note. Caregiver behaviors did not significantly moderate the relation between IJA and language.

Table 3.21
Sequential Steps of the RJA Moderation Analyses

Predictor	36-Receptive ΔR^2	β	36-Expressive ΔR^2	β
Step 1	0.285*		0.148*	
Control variables				
Step 2	0.104		0.052	
RJA		0.349		0.197
Responsiveness		0.059		-0.087
		0.156		0.058
		0.167		-0.078
Step 3	0.048		0.061	
RJA X RESP.		0.059		-0.252
		0.269		0.107
		-0.073		-0.089
Total R^2	0.436		0.262	
Step 1	0.285*		0.148*	
Control variables				
Step 2	0.103		0.038	
RJA		0.306		0.184
Supportiveness		0.036		0.014
		0.147		0.045
		0.135		0.071
Step 3	0.033		0.038	
RJA X SUP.		0.168		-0.045
		0.237		0.056
		0.225		0.195
Total R^2	0.421		0.224	
Step 1	0.285*		0.148*	
Control variables				
Step 2	0.101		0.074	
RJA		0.311		0.218
Intrusiveness		-0.004		0.035
		0.005		-0.139
		0.156		-0.164
Step 3	0.028		0.069	
RJA X INTR.		-0.243		-0.243
		-0.105		0.104
		-0.074		-0.232
Total R^2	0.414		0.292	

Note. Caregiver behaviors did not significantly moderate the relation between RJA and language.

Table 3.22
Main Effects for the Joint Attention and Caregiver Predictors

	36-Receptive			36-Expressive		
	df	*F*Δ	*p*	*df*	*F*Δ	*p*
IJA Responsiveness	4,53	0.17	.954	4,54	0.30	.880
IJA Supportiveness	4,53	0.42	.795	4,54	0.13	.970
IJA Intrusiveness	4,53	0.43	.789	4,54	0.56	.693
RJA Responsiveness	4,53	2.25	.076	4,54	0.88	.480
RJA Supportiveness	4,53	2.24	.078	4,54	0.64	.640
RJA Intrusiveness	4,53	2.19	.083	4,54	1.29	.286