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**PARENTAL MIND-MINDEDNESS AND LANGUAGE DEVELOPMENT IN EARLY
INFANCY**

by

NADA ALRAJHI

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2016

MAJOR: SPECIAL EDUCATION

Approved By:

Advisor Date

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DEDICATION

In the name of God, the most compassionate, the most merciful

There are several people to whom I would like to dedicate this work. To my husband, Abdulaziz Alshgeri, for his forever-lasting love, real and responsible family partnership and support during this process of study and research. To my children, Alhanouf, Nawaf and Mohammad, whose love keeps me going and provides me with the inspiration for all that I do. Alhanouf, I will never forget your patience, understanding, and unbelievable support throughout this journey. To my family in Saudi Arabia, without your love and prayers this work could not have been accomplished. To the most important person in my life, my mother, who taught me to set my goals high and believe anything is achievable. I would also like to wholeheartedly dedicate this to Dr. Ann Stacks, who truly serves as a secure base that provides constant support, encouragement and inspiration. Dr. Stacks endless teaching and reinforcement have helped me personally and professionally, and she graciously made herself incredibly available to me throughout this entire process.

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CHAPTER 1: INTRODUCTION

Background

Early Childhood Special Education (ECSE) is a field that provides services and supports to young children, from birth to age six, who qualify for an Individualized Education Plan (IEP) as required by the Individuals with Disabilities Act (IDEA, Part B, Section 619). Within this field, Part C of IDEA authorizes and supports states to provide statewide, comprehensive, coordinated, multidisciplinary early intervention services for families and their infants and toddlers with a developmental delay or a diagnosed physical or mental condition related to developmental delay (Individuals with Disabilities Education Act, Reauthorization 2004). According to the U. S. Department of Education, Office of Special Education Programs, 2.77% of infants and young children received early intervention services (Early Childhood Technical Assistance Center, 2014). This number has increased gradually during the past decade. For infants and toddlers with delays, recent federal data showed that the number served under Part C Early Intervention increased from just under 190,000 (1.6% of all infants and toddlers) in 1998 to over 320,000 (2.2%) in 2007 (U.S. Department of Education, 2014) and suggested that 8% to 12% of preschool children have language delays (U.S. Preventive Services Task Force, 2006). Early interventions for language delays are important because children with language delays are more likely to experience literacy delays (Catts, Bridges, Little, & Tomblin, 2008) social, emotional, or behavioral disorders (Van Daal, Verhoeven, & Van Balkom, 2007), mental health, later academic achievements, and other disabilities such as autism spectrum disorder (Stock & Fisher, 2006; Tomblin, Zhang, Buckwalter, & Catts, 2000; Wetherby et al., 2004; Moore, Barton, & Chironis, 2013).

Early intervention services are not only beneficial to children with language delays but also to their families. Interventions are likely to be more effective and less expensive when they are

provided early. High-quality early intervention services can improve a child's developmental trajectory and change a family's quality of life. The role of parents takes a central place in early interventions and parents are considered to be important change agents for young children with disabilities.

Relationship-Focused Interventions in ECSE

Over the past 25 years, there has been a growing attention to relationship-focused interventions for children with disabilities, possibly because evidence suggests that parental responsiveness is positively associated with developmental outcomes such as social-emotional functioning, language and communication. Relationship-focused interventions seek to enhance children's development by coaching parents to engage in highly responsive interactions with their children (Diken & Mahoney, 2013). One of these interventions called Responsive Teaching (RT), which is designed to target cognitive, language, and social emotional needs of children with developmental risks and disabilities. RT was developed for parents, who spend a great amount of time interacting with children during daily routine interactions, to improve their children's developmental outcomes (Mahoney, Perales, Wiggers, & Herman, 2006). There is a growing evidence, which is discussed in more details in the literature review chapter, that relationship-focused interventions like RT are effective at improving parent-child interactions and in turn children's language development (Karaaslan, Diken, & Mahoney, 2011; Mahoney & Perales, 2005). Another way that the field of ECSE recognizes the importance of fostering maternal sensitivity and responsivity as a way to support language development in children with disabilities is to target parental mind-mindedness in the first year of a child's life.

Parental Mind-Mindedness

Mind-mindedness is a parent's ability to consider his or her child's internal mental world (e.g. thoughts and feelings). This ability allows a parent to give meaning to his or her child's behavior and thus is the foundation of parental sensitivity and responsivity (Demers, Bernier, Tarabulsky, & Provost, 2010a; Meins, Fernyhough, Fradley, & Tuckey, 2001; Rosenblum, McDonough, Sameroff, & Muzik, 2008). Mind-mindedness is associated with social-emotional and cognitive development in early childhood, including attachment, prosocial behavior (McMahon & Meins, 2012; Meins et al., 2012; Bernier, Carlson, & Whipple, 2010; Meins, Fernyhough, Arnott, Leekham, & de Rosnay, 2013; Centifanti, Meins, & Fernyhough, 2016), and may also be associated with language development. Not a single study has assessed whether mind-mindedness is associated with language development in early infancy or whether the mechanism of this relationship is through parenting.

Statement of the Problem

Supporting parental sensitivity and responsivity can be challenging in ECSE, especially when children show a variety of challenging characteristics that are related to their disabilities (Slade, 2009). These characteristics make it difficult for parents to understand what their children are thinking and feeling, which can result in parents not feeling close and connected to their children or even feeling rejected by their child. These challenges can negatively impact parent-child interactions and in turn have negative consequences for children's developmental outcomes, including language. This suggests that by targeting parental sensitivity and responsivity may enhance interventions for language delays. One way to foster sensitivity is to support parent's mind-mindedness, which is the ability to imagine internal states in his/her child, which provides a foundation for sensitive and contingent parenting responses. Yet, it is not clear whether maternal

mind-minded comments in particular, or simply the number of words that infants hear, is associated with language development in the first year.

Purpose of the Study

The present study contributes to the literature by examining mind-mindedness, parenting and language development in early infancy. The purpose of this study was: 1) to assess the relationships among maternal sociodemographic characteristics and mind-mindedness, parent-child interactions and infant language development; 2) to determine whether variations in infant language development were associated with maternal mind-mindedness and parent-child interactions; and 3) to test whether parent-child interactions were the mechanism by which mind-mindedness and infant language development were related.

Research Hypotheses

The following hypotheses were tested: H1) maternal sociodemographic characteristics, including education, depressive symptoms, age, and total number of maternal words would be correlated with the proportion of mind-minded comments, parent-child interactions and infant language development; H2) the proportion of mind-minded comments would contribute to parent-child interactions and child language development after controlling for demographic variables that were also associated with language development; and H3) the proportion of mind-minded comments would be related to infant language development through the mechanism of parenting.

Significance of the Study

This study is significant because it added to the literature on parent-child interactions and infant language development and has the potential to inform the field of early intervention. While empirical studies have established a link between a) parent mind-mindedness and parent sensitivity and b) parent sensitivity and infant language development, research linking mind-minded

comments to infant language development has not been conducted. Findings from this study may support interventionists in ECSE to design and develop interventions for language delays by targeting parental mind-mindedness.

Limitations of the Study

This study presents some limitations that call for a cautious interpretation of the findings while suggesting avenues for future research. First and foremost, infants in the study were not drawn from an early intervention sample. Infants also were young and perhaps the effects of mind-mindedness on language development are not seen until toddlerhood or preschool when the range of language is much larger. While there was variability in language scores in the sample, detecting language delays in early infancy is difficult. Mind-mindedness is typically coded during a free play interaction with her child. In this study, mind-mindedness was coded during free play and reunion episodes of the Double Still Face Paradigm, which may not be an ideal way to assess mind-mindedness.

Definition of Terms

Mind-Mindedness: Mind-mindedness is a construct that refers to a mother's ability to consider and treat her infant as having an active and autonomous mental life of thoughts, intentions, and desires, etc. (Demers et al., 2010a; Meins, 1999).

Maternal Sensitivity: Maternal sensitivity is a mother's ability to perceive her infant's signals, to interpret them correctly, and to respond appropriately and promptly (Ainsworth, Blehar, Waters, & Wall, 1978).

Language Development: Language development refers to infants' emerging abilities in receptive and expressive language and the base for language development is set in infancy and then expands rapidly. Language development is among the most important tasks of the first five years of infants'

life. Language can be defined as verbal, physical, biologically innate, and a basic form of communication. Language development is a complex process that starts from infants' early cries to express needs, to the development of babbling, and then single words and eventually complex sentences (Fogel, 2011).

Language Delay: Language delay is defined as having early vocabulary delay, slow vocabulary growth, and/or delayed onset of word combinations. It is most commonly identified between about 18 and 30 months of age (Moyle, Stokes, & Klee, 2011)

CHAPTER 2: LITERATURE REVIEW

Introduction

The first two years of children's lives are characterized by rapid changes in language development. Typically developing children begin to babble and form sounds between three and six months, and by 24 months, children produce around 320 words and can speak comprehensibly (Fogel, 2011). This capacity does not come simply for children with language delays, which results in negative developmental outcomes such as literacy delays (Catts et al., 2008); social, emotional, or behavioral disorders (Van Daal et al., 2007); mental health, autism spectrum disorder; and later academic achievements (Stock & Fisher, 2006; Tomblin et al., 2000; Wetherby et al., 2004; Moore et al., 2013). Language development also appears to be highly sensitive to parent-child relationship, which plays a crucial role in facilitating the development of language. Research has established that aspects of parent-child interactions, such as parental sensitivity, responsiveness, and stimulation, are associated with children's early language acquisition (e.g., Hirsh-Pasek & Burchinal, 2006; Magill-Evans & Harrison, 2001; Raviv, Kessenich, & Morrison, 2004; Stein, Malmberg, Sylva, Barnes, & Leach, 2008; Tamis-LeMonda, Bornstein, & Baumwell, 2001).

Mind-mindedness is a foundation of parental sensitivity and responsivity, which allows parents to give meaning to children's behaviors (Demers et al., 2010a). Supporting parental sensitivity and responsivity can be challenging in ECSE. Therefore, more research is required on parental mind-mindedness and language development, especially in infancy, to establish early relationship-focused interventions that positively impact parent-child interactions, and in turn promote developmental outcomes for young children with disabilities.

This chapter examines the literature on language delay in ECSE and the impact that language delay has on other domains of children's development. Parent-child interactions as a

context for intervention and relationship-based intervention are also discussed as well as how family-centered early intervention practices have been shown to positively impact parent-child interactions and thereby improve children's language development. In the remaining sections parental mind-mindedness is explored as an important component of parental sensitivity, which in turn enhances language development in children with disabilities. The current study proposed that parental mind-mindedness fosters early language development via parent-child interactions. Findings from this study may have implications for relationship-focused interventions in ECSE.

Language Delay in Early Childhood Special Education

The capacity to communicate wants and feelings does not come simply for all children and language delays are prevalent among children in ECSE. Early language difficulties can be linked to later reading, social, and behavior disorders such as conduct disorder, internalizing, depression, and poor self-worth (Tomblin et al., 2000). In addition, language delays are often the first sign of concern for parents of children with autism (Wetherby et al., 2004). Even though, some signs of autism begin shortly after birth, some children with autism show differences in the ability to recognize their mothers' voice, eye gaze, and develop a variety of facial expressions; it is not until the time when children should be developing intentional communication with words that the indicators of autism become obvious. As indicated in the diagnostic criteria for autism spectrum disorder, the failure to develop appropriate language and communicative abilities is a major characteristic of autism (Wetherby et al., 2004).

In addition to the association with autism, studies have established that children with language delays are likely to develop learning disabilities and struggle with early literacy tasks (Craig-Unkefer & Kaiser, 2002; Catts et al., 2008; Silva, McGee, & Williams, 1983; Sherrod, Siewert, & Cavallaro, 1984). In particular, these children have smaller vocabularies, less lexical

diversity, less knowledge about word meanings, and have difficulty recalling and using words rapidly. Children also do not initiate conversations, switch topics quickly, and are less responsive to peers' attempts to initiate interactions (Craig-Unkefer & Kaiser, 2002).

Besides academic associated difficulties, children with language delays also have difficulty initiating and sustaining play. They spend less time in group play and engage in more non-functional play behavior than their typically developing peers. For example, Sherrod et al., (1984) found that children with language delays tend to play with only one other child, and if that child is absent, they hardly ever become engaged with the other children or activities. In addition, children with language delays engage in less mature play and show lower levels of imaginativeness in free playtime. These children engage in type of play that involves easy manipulation of toys and usually is repetitive and patterned, as opposed to dramatic or symbolic (Rescorla & Goossens, 1992; Desmarais, Sylvestre, Meyer, Bairati, & Rouleau, 2010). Children with language delays are also more likely to display problem behaviors at home and in school and be isolated from their peers. This cycle of difficulty and isolation is likely to continue without early intervention. Early childhood special educators often have children on their caseloads who exhibit language difficulties making it critical to understand and address effective intervention strategies for children with early language delays.

Parent-Child Interactions as a Context for Intervention

Best Practice in ECSE is Family-Centered

Best practice in the field of special education includes involving parents in their children's intervention and the planning process. The way in which families are included in intervention is important to their effectiveness (Dempsey & Keen, 2008). The evidence-base for family-centered interventions shows that these practices have positive outcomes for families and children with and

without disabilities. Bronfenbrenner's Ecological Model of Human Development and family-systems theory provide the theoretical foundations for early intervention practices. Bronfenbrenner's Ecological Model of Human Development (1979) recognizes that complex relationships between different elements of a child's environment, for instance home and school, influence the child's development. He conceptualized environments from the child's perspective and viewed them in terms of different nested structures that interact. Environments in which children and families live are a central part of Bronfenbrenner's (1979) theory. He theorized that proximal processes in a child's microsystem have the most influence on development; a main feature of family-centered practice is that interventions take place in natural learning environments.

These natural learning environments include everyday natural activities in the child's family or community, which provide the child with experiences and opportunities that promote their learning and development. Examples of family activities include gathering for mealtimes and bedtime stories, whereas community activities include eating out and grocery shopping (Dunst, Bruder, Trivette, & Hamby, 2006). Parent-child interactions should be considered a part of the natural learning environment because they are so critical to the child's developmental outcomes. Family-centered early intervention practices have been shown to positively impact parent-child interactions and thereby improve child developmental outcomes because children's learning occurs in the context of interactions with others within their natural environments (Trivette, Dunst, & Hamby, 2010).

Parent-Child Interactions are a Foundation for Language Development

Early childhood development occurs in the context of parent-child interactions that are sensitive and responsive. Parental sensitivity and responsiveness include the parent's ability to

recognize their child's signals, to correctly interpret them, and to promptly respond verbally and nonverbally. Sensitive and responsive behaviors, including contingent responses, verbal responses, emotional-affective support, and joint attention that meet developmental needs, are related to positive child outcomes in social, cognitive, emotional, language, and communication development. Specific aspects of parental responsivity, including, contingent responsiveness, labeling objects, and warmth are more strongly associated with language development (Landry, Smith, & Swank, 2006), and provide opportunities to introduce language to children (Magill-Evans & Harrison, 2001).

Research suggests that a number of elements of mother-child interactions are linked to children's early understanding of language and language acquisition, such as parental sensitivity, responsiveness, and stimulation (e.g., Hirsh-Pasek & Burchinal, 2006; Magill-Evans & Harrison, 2001; Raviv et al., 2004; Stein et al., 2008; Tamis-LeMonda et al., 2001). Multiple large longitudinal studies support the link between parenting quality and language outcomes in early childhood. For example, using the population-based National Institute of Child Health and Human Development (NICHD) study of Early Child Care and Youth Development (SECCYD), researchers found that maternal responsivity and cognitive stimulation in infancy were associated with preschool language development (Raviv et al., 2004), and that increases in maternal sensitivity across early childhood were associated with higher language scores when the child was six years old (Hirsh-Pasek & Burchinal, 2006).

In another longitudinal study with a follow-up at age four, Magill-Evans and Harrison (2001) concluded that more responsive mother-child interactions at 12 months were related to children's receptive language at 12 months and four years. Tamis-LeMonda et al., (2001) investigated how child language milestones and maternal responsivity are related to children's

acquisition of later language milestones. Tamis-Lemonda et al., (2001) linked child activity and maternal responsiveness to the ages at which children achieved five developmental milestones in expressive language: first words, first imitations, 50 words in production, first use of multi-word utterances, and first use of language to refer to the past. The findings showed that maternal responsiveness at nine and 13 months of age predicted all five of the milestones, above and beyond children's own behaviors. Children whose mothers were consistently responsive expressed their first words, achieved 50 words in production, engaged in combinatorial speech, and used language to talk about the past before children whose mothers were less responsive.

Mothers who are more responsive also use more language with their children, which is further associated with language development. A number of studies have found that the amount of maternal language input is consistently related to vocabulary growth more rapidly (e.g., Hoff & Naigles, 2002; Hurtado, Marchman, & Fernald, 2008; Weizman & Snow, 2001). For instance, Hurtado et al., (2008) concluded that 24-month-old Spanish-learning children who experienced more input at 18 months had larger vocabularies, were faster at identifying familiar words, and made greater achievements in subsequent vocabulary development between 18 and 24 months than children who had less input. In addition, the amount of maternal language input has shown to effect parent-child interactions. Clearly, a responsive and emotionally supportive parent provides an interactive environment for their children to engage in reciprocal verbal and nonverbal interactions that are associated with more advanced language development. These studies however, did not include large numbers of children with developmental delays or disabilities. Consistent with best practice guidelines in ECSE and empirical evidence, interventions for children with disabilities that target parental sensitivity and responsiveness are effective.

Parental Sensitivity in Special Education

Supporting parental sensitivity and responsiveness can be challenging in early childhood special education, especially when children lack eye contact and shared emotion, have tantrums and exhibit aggression, and show sensory sensitivities to touch, light and/or sound (Slade, 2009). These characteristics that are present in a variety of disabilities, including autism, make it challenging for parents to understand what their children are thinking and feeling, which can result in parents not feeling close and connected to their children or even feeling rejected by their child. These challenges can impact parent-child interactions and further impact the child's engagement. In fact, Kim and Mahoney (2004) found that compared to parents of typically-developing children, mothers of children with disabilities were less responsive and more directive when playing with their child and their child, in turn, was less engaged. This suggests that targeting sensitivity and responsiveness in parents of children with disabilities would be effective. Emerging research suggests that parental sensitivity can be supported as a means to improve children's development.

Parental Sensitivity and Language Development in Children with Autism

Autism is a disability that presents many challenges to parental sensitivity because of the characteristics of autism, including delays in language and communication development, lack of eye contact and shared emotion, and difficulty developing and engaging in joint attention. Yet research suggests that parental sensitivity and responsiveness in toddlerhood is associated with growth in language skills among children with autism (Baker, Messinger, Lyons, & Grantz, 2010; Siller & Sigman, 2008). Further, interventions that promote parental responsiveness and sensitivity, among parents whose children have autism, support preverbal communication (e.g. imitation, joint attention, and object labeling), expressive language, school readiness, and behavior (Baker et al., 2010; Siller, Hutman, & Sigman, 2013; Warren & Brady, 2007). Strategies used to promote language development and joint attention in children with autism focus on reading their children's

cues, noticing what children are doing, imitating the child's behavior, and labeling objects that children are interested in (Dawson & Osterling, 1997; Landry et al., 2006; Warren & Brady, 2007). Appropriately, reading children's cues is a necessary but not sufficient step in responding sensitively. Relationship-focused interventions move beyond reading cues to encourage parents to respond contingently.

Relationship-Focused Interventions in ECSE

There has been an increasing interest in relationship-focused intervention, for children with a variety of disabilities, to support children's development by coaching parents to engage in highly responsive interactions with their children (Diken & Mahoney, 2013). Relationship-focused intervention was derived from two basic ideas, which is supported by child development theory and research: (1) parents are likely to have a better impact on their children's development than professionals, because of the greater number of opportunities they have to support and provide developmental stimulation to their children; and (2) parents encourage their children's development through engaging in highly responsive interactions with them (Mahoney & Perales, 2008).

Responsive Teaching (RT) is a relationship-focused intervention designed purposely for parents or caregivers. This approach is developed to target cognitive, language, and social emotional needs of children (Mahoney et al., 2006). RT was developed for parents, who spend a great amount of time interacting with their children, to support their ability to maximize daily routine interactions to improve their children's developmental outcomes. The RT curriculum was organized around the conception that responsive parents enhance children's development more through helping children to engage in pivotal development behaviors and less by directly teaching the skills (Mahoney et al., 2006). RT includes five interactive dimensions, based on the principle

of active learning, that are linked to parental responsiveness when they interact with their children. These dimensions include the following: reciprocity, contingency, shared control, affect, and match. RT sessions can last 30 minutes to one hour weekly and can be conducted individually with parents and children in the home, center-based settings, or with groups of children with similar developmental delays (Mahoney et al., 2006).

There is growing evidence that relationship-based interventions like RT are effective at improving parent-child interactions, which in turn improve children's language development. For instance, two studies evaluated the effectiveness of RT with children with a range of disabilities from 12 to 54 months of age. The findings from a randomized control study showed that mothers who received RT intervention had significantly greater increases in responsiveness and their children had greater improvements in interactive engagement, when compared to the control group, who received standard classroom services (Karaaslan et al., 2011). This study and another conducted by Mahoney and Perales, (2005) also suggest that RT improves children's developmental and social-emotional outcomes. Another way to improve parental responsiveness and sensitivity, which in turn enhances children's language and communication development, is to target parental mind-mindedness. This may be particularly effective in the first year of life.

Mind-Mindedness

Mind-mindedness (Meins, 1999) is a construct that refers to "mothers' proclivity to consider and treat their infant as having an active and autonomous mental life of thoughts, intentions, desires, etc." (Demers et al., 2010a, p. 3). This ability to think of the infant as being motivated by intention and having an active mental life allows parents to give meaning to infants' behaviors (Demers et al., 2010a), which is a foundation of parental sensitivity and responsiveness. In fact, mind-mindedness can be thought of as a cognitive component of maternal sensitivity that is

focused specifically on the mother's sensitivity to the infant's mental states. Mind-mindedness is observed when a parent accurately labels or comments on her infant's mental states (*what happened? Why are you so sad?*), rather than focusing solely on behavior (*why are you crying?*).

Meins and her colleagues have used two measures to assess mind-mindedness through coding maternal speech (Meins et al., 2001; Meins, Fernyhough, Russell, & Clark-Carter, 1998). The first is an interview in which the mother is asked to describe her infant to assess the quantity of mind-minded descriptors that are used in the overall description. The second is an observation of the mother interacting in face-to-face interactions with her infant. The interaction is video recorded and the mother's verbal comments are transcribed verbatim. Coders assess first to determine whether the mother's comments are attuned (mind-minded) or non-attuned (not mind-minded). An example of an attuned comment might be a parent saying "*oh, you didn't like that noise,*" whereas a non-attuned comment might be a parent saying, "*Why are you crying?*" Once the coder has identified attuned comments, they assess them for accuracy of interpretation and positive vs. negative comments (Meins & Fernyhough, 2010).

Mind-Mindedness, Parenting Sensitivity, and Child Developmental Outcomes

Mother's who use more mind-minded comments are able to attribute meaning to their infant's behaviors because they have an understanding that the infant's actions are guided by the infant's mental/internal life (Demers et al., 2010a). Research has established the connection between maternal mind-mindedness and sensitive parenting when the infant is only six-months old (Meins et al., 2001; Rosenblum et al., 2008). Three aspects of mind-minded comments are related to parental sensitivity in adult mothers: labeling mental states, accurate attributions of mental states, and positive mind-minded comments (Demers et al., 2010a). Further, research found that maternal mind-minded comments when their infant is six-month-old are associated with infant

attachment security at 12-months old (Meins et al., 2001). Both attuned and non-attuned comments predict infant-mother attachment security (Meins et al., 2012). Maternal sensitivity appears to mediate the relationship between mind-minded comments and infant attachment security (Demers et al., 2010a & Laranjo, Bernier, & Meins, 2008). Interestingly, mothers who are not sensitive do not use mind-minded comments as a response to infants' emotions, which could affect toddlers' ability to develop strategies for regulating their own social and emotional behavior (Garner, 2006). Maternal mind-minded comments during interactions with preschool children are also linked to less aggressive interactions (McMahon & Meins, 2012).

While most research on mind-mindedness and child developmental outcomes has focused on social-emotional outcomes like attachment, some research suggests that mind-mindedness may also support executive functioning skills in toddlerhood (Bernier et al., 2010; Bernier & Dozier, 2003) and toddlers and preschoolers' theory of mind and stream of consciousness (Laranjo, Bernier, Meins, & Carlson, 2010; Meins et al., 2003; Meins et al., 2013). Since children's language learning occurs in a context in which parents scaffold the development of their cognitive skills (Tamis-LeMonda & Rodriguez, 2008), mothers who are more likely to comment on their children's mental activity facilitate children's language learning process. Much less research has been conducted on mind-mindedness and language development, especially in infancy.

Expanding on the concept of cognitively motivating parenting, two studies investigated maternal references to specific types of mental states. Taumoepeau and Ruffman (2006; 2008) aimed to understand what aspects specifically of maternal mental-state talk were beneficial for children's internal-state language. The studies examined maternal talk about desires, cognitions, and emotions; the authors concluded that references to desires when children were 15 month-old, and references to thoughts and knowledge when children were 24 month-old, were predictors of

children's internal-state language at 24 and 33 months of age respectively. These findings imply that the importance of references to different mental states might differ across outcomes and children's age. Indeed, mind-minded mothers are likely to be sensitive to their child's current level of social understanding, and to accordingly adjust their communication. In turn, these references to different mental states show different levels of relevance, at least when predicting children's internal-state language (Taumoepeau & Ruffman, 2006; 2008). It is not clear if mind-minded comments in particular, or simply the number of words that infants hear, is related to language development in the first year. However, focusing on mind-mindedness in early infancy may support parents' ability to read their infants' cues and respond contingently. Contingent responses are a necessary component of sensitivity, which fosters language development among children with disabilities.

Maternal Characteristics Associated with Mind-Mindedness and Child Developmental Outcomes

While mind-mindedness could be a target for early relationship-focused interventions in ECSE, it appears that some maternal characteristics are associated with their ability to make sense of what is on their child's mind. For instance, mothers who feel more stress in their parenting role use less mind-minded comments (McMahon & Meins, 2012). It is not clear from this study whether stress related to the parenting role prevents parents from thinking about their children's internal states or if the lack of awareness of the meaning behind their child's behavior is what causes the stress.

Research has also suggested that maternal age is associated with mind-mindedness. Adolescent mothers, compared to older mothers, utilize fewer mind-minded comments and more non-attuned comments when interacting with their children (Demers, Bernier, Tarabulsy, & Provost, 2010b). Younger mothers were also observed to be less sensitive during interactions with

their infants compared to older mothers (Demers et al., 2010b). Keown, Woodward, and Field (2001) reported that younger mothers, compared to older mothers, were more intrusive and less verbally stimulating, sensitive, and warm during interactions with their preschool children.

Maternal depression was also found to effect parent-child interaction quality. Depressed mothers show more negative affect, hostile, disengaged, and tough behavior when interacting with their infants than non-depressed mothers (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Sohr-Preston and Scaramella (2006) indicated that mothers who suffered from postpartum depression are less contingent, less positive, and more negative during interactions with their infants.

Research has not been consistent with regard to the relationship between mind-mindedness and education. For instance, Rosenblum et al., (2008) found that maternal education was related to mind-mindedness in a white and primarily college-educated sample. On the other hand, several studies have not found relations between education and mind-mindedness. These samples included white lower-middle class mothers, primarily high school or GED degree (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011), white, college-educated mothers (McMahon & Meins, 2012) and lower-middle class African-American mothers (Bernier & Dozier, 2003). While findings are mixed with regard to relationships between mind-mindedness and education, mind-mindedness is associated with parent-child interactions and studies consistently find relationships among maternal education, maternal responsiveness (Diken & Mahoney, 2013) and parent-child interactions (Rosenblum et al., 2008; Reitman, Currier, & Stickle, 2002).

Prior work has demonstrated associations not only between maternal education and parent-child interactions, but also between maternal education and young children's language outcomes (Hoff, 2006; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010). In a study that examined the relationship between parent-infant book reading and infants' language abilities,

maternal education was significantly correlated with infants' language at 16 months (Karrass & Braungart-Rieker, 2005). This means that mothers who had higher level of education read more books to their infants than mothers who had lower level of education, which indeed positively impacted their infants' language. Dollaghan et al., (1999) found statistically significant linear trends for several measures of three-year-old children's language across three levels of maternal education: less than high school graduate, high school graduate, and college graduate.

Even with relatively low educational levels, just below 12 years of schooling, maternal education was significant predictor of the children's language at four years of age (Hammer, Farkas, & Maczuga, 2010). The study found that children whose mothers who had higher educational levels experienced more literacy activities than did children whose mothers had lower educational levels (Hammer et al., 2010). Another study concluded that three-year-old children whose mothers who had a high school diploma had higher language scores compared to children whose mothers did not have a high school diploma, which indicated that maternal educational level was an important link to children's language development (Britto & Brooks-Gunn, 2001).

Research has also found associations between maternal depression and mind-mindedness in socioeconomically diverse samples. For example, in a middle-class sample, Lundy (2003) assessed father and mother mind-mindedness through face-to-face interactions with their infants for six-minutes. The study demonstrated that depressive symptoms in mothers were negatively correlated with appropriate mind-related comments (Lundy, 2003). In a sample of college educated mothers and their preschool children, Lok and McMahon (2006) also found that depressed mothers used a significantly lower proportion of mind-related comments (Lok & McMahon, 2006). Research also suggests that mothers hospitalized for a range of severe mental illnesses utilized less

mental state language, when interacting with their infants without the use of toys, twice for five-min, made fewer and less accurate mind-minded comments (Pawlby et al., 2010).

Studies established associations not only between maternal depression and mind-mindedness, but also between maternal depression and infant language development. A study found significantly lower expressive language scores for 24-month-old children of mothers who were chronically depressed compared to three-year-old children of never or sometimes depressed mothers (NICHD, 1999). Brennan et al., (2000) reported lower expressive language development scores only for five-year-old children of chronically depressed mothers.

While the field of ESCE recognizes the importance of fostering maternal sensitivity and responsivity as a way to support language development in children with disabilities, this work may be informed by the construct mind-mindedness in early infancy. Interventions that target mind-mindedness may support parents' ability to read their infants' cues and respond contingently, especially for young parents, or those under significant amounts of stress and/or struggling with mental health issues. Contingent responses are an essential component of sensitivity, which promotes language development among children with disabilities. While several studies have demonstrated that maternal mind-mindedness is associated with parenting that supports language development (Hoff & Naigles, 2002; Hurtado et al., 2008; Weizman & Snow, 2001; Hirsh-Pasek & Burchinal, 2006; Magill-Evans & Harrison, 2001; Raviv et al., 2004; Stein et al., 2008; Tamis-LeMonda et al., 2001), it is not clear if maternal mind-minded comments in particular or simply the number of words that infants hear that is associated with language development in the first year.

This literature review suggests that there is a gap in knowledge regarding mind-mindedness and language development, especially in infancy. The purpose of this study was: 1) to assess the

relationships among maternal sociodemographic characteristics and mind-mindedness, parent-child interactions, and infant language development; 2) to determine whether variations in infant language development were associated with maternal mind-mindedness and parent-child interactions; and 3) to test whether parent-child interactions were the mechanism by which mind-mindedness and infant language development were related. For this study, the following hypotheses were tested:

H1: Maternal sociodemographic characteristics, including education, depressive symptoms, age, and total number of maternal words would be correlated with the proportion of mind-minded comments, parent-child interactions and infant language development.

H2: The proportion of mind-minded comments would contribute to parent-child interactions and child language development after controlling for demographic variables that were also associated with language development.

H3: The proportion of mind-minded comments would be related to infant language development through the mechanism of parenting.

CHAPTER 3: METHODOLOGY

Procedure

This study utilized a subsample of parent-infant dyads participating in a larger study, Parental Representations During Pre- and Postnatal Periods Linked to Early Outcomes (PURPLE). This study collected three waves of data beginning in the third trimester of pregnancy through eight months postpartum to understand how maternal thoughts, feelings, and experiences influence parenting and child developmental outcomes. Participants were recruited from the Prenatal Investigation of Neural Connectivity (PINC) Study that aimed to assess functional connectivity in the fetal brain. Recruitment for the PINC study took place at the Center for Advanced Obstetrical Care and Research (CAOCR) at Hutzell Women's Hospital. A clinician who has a relationship with the pregnant woman introduced her to the study and if the participant was interested, a research assistant was introduced to discuss study details. After research assistants reviewed the protocols, the participant was given the opportunity to ask any questions, or mention any concerns about participating. After providing consent the participant's MRI was scheduled. At their MRI scan for the PINC study, participants were approached by a research assistant and asked if they would like to participate in a study that sought to link fetal brain development in the PINC study with their infants' development in the first year of life and to understand maternal thoughts and feelings about pregnancy and parenting and how these, together with early brain development are associated with development in infancy.

Mothers, who consented to participate in the PURPLE study, were asked to participate in three research sessions. The first session was a laboratory visit during the last trimester of participant's pregnancy. It included a one-hour structured interview to assess prenatal reflective functioning and the administration of a series of self-report measures assessing mothers' thoughts

and feelings during pregnancy. The second session was a newborn neurobehavioral assessment that took place in the hospital or the participant's home within four weeks of the infant's birth. The final session, was a 3-hour laboratory visit that took place when infant was 6 to 10 months old. During this lab visit, the infant's development was assessed and parents and infants participated in the double still face paradigm. In addition, parents completed a series of self-report measures that assessed demographic information, child temperament, parenting stress and potential for maltreatment, life events, and mental health. Parents also participated in a two-hour semi-structured interview to assess reflective functioning and their representation of their relationship with their child. Additionally, saliva samples were collected from the mother and infant to assess cortisol reactivity.

Participants

The current study included a sub sample of 67 mother-infant dyads from the PURPLE study who participated in the final study visit at approximately 7-months postpartum. The sample included mothers who did not have any complications during their pregnancy and infants who were delivered full-term (<37 weeks). Of the infants, 43 (65.15%) were males and ranged in age from 6.46 to 9.50 months ($M = 7.47$, $SD = 0.61$). Mothers ranged in age from 19-38 years ($M = 26.03$, $SD = 4.45$). The range of the annual household income fell between under \$5,000 to above \$100,000. The majority of the women in the sample were African-American 76% ($N = 38$), 18% ($N = 9$) of the mothers were Caucasian, and 6% ($N = 3$) of mothers identified as Hispanic or Other. Mothers' self-report of education varied. Four (6.77%) mothers had less than a high school education, 18 (30.50%) mothers reported having a high school diploma or GED, 26 (44.06%) mothers had some college, seven (11.86%) mothers earned a college degree, and four (6.77%) mothers reported having a graduate degree. Just over half of mothers were married or had a long-

term partner (N = 33, 53.22%). Among those who were married or had a partner, the majority (N = 38, 73.07%) were living with their partner, and 14 (26.92%) were not living together with their partner. Among those who were living with their partner, the majority were living with the birth father (N = 49, 87.50%), and seven (12.50%) mothers were not living with the birth father. Demographic information presented above is also available in Table 1.

Measures

This study utilized a subset of measures collected during the third wave of data including maternal self-report of parenting stress and parent-infant relationships, maternal mind-mindedness coded from the Double Still-Face Paradigm, and a direct assessment of infant language development. Each measure is described below.

Dependent Variables

Language Development was assessed with the Bayley Scales of Infant and Toddler Development, third edition (Bayley-III) (Bayley, 2006). The Bayley-III is an individually administered instrument, designed to evaluate developmental functioning of children between one and 42 months of age. It is utilized to identify suspected developmental delay in children consistent with current scholarship on child development, to assist in intervention planning and other important clinical services, as well as to be consistent with federal standards (e.g., Individuals With Disabilities Education Improvement Act of 2004, Public Law 108-446[IDEIA], 2004; No Child Left Behind Act, 2001). It quantifies five developmental domains: Cognitive, Language (Receptive Communication and Expressive Communication), Motor (Fine Motor and Gross Motor), Social/Emotional, and Adaptive Behavior. The Bayley-III was administered by doctoral students specializing in infant mental health who had taken a class on infant assessment, conducted

at least five videotaped assessments and demonstrated that more than 85% of the items in each domain were administered and scored accurately.

For this study, only the Language Composite scores were used, which are derived from sums of receptive and expressive subtest scaled scores. Composite scores range from 40 to 160 and have a mean of 100 and standard deviation of 15. The Receptive Communication assess preverbal behaviors, including a child's ability to recognize sounds, objects, people in the environment, and to understand spoken words and directions. The Expressive Communication subset assess preverbal communication, including a child's ability to communicate using sounds, smile, babble, gesture, joint referencing, and laughing etc. According to the author, these scales have adequate psychometric properties, which typically are evaluated by examining the scales' reliability and validity. The scales reliability was evaluated for both normative and clinical samples through studies that examined the scales' internal consistency, inter-rater agreement, and test-retest stability. The overall average reliability coefficient of Expressive Communication subtest is .91, Receptive Communication is .87, and for the Language Composite scales are .93.

Independent Variables

Maternal mind-mindedness was assessed from transcripts of the videotaped Double Still-Face Paradigm (SFP) (Tronick, Als, Adamson, Wise, & Brazelton, 1979). For the SFP, infants sat in a highchair facing their mothers who were seated directly in front of them. Next, mothers were given specific instructions for the SFP, which consisted of five, two- minute episodes (free play, still-face, reunion/play, still-face, and reunion/play). For the free play episode, mothers were instructed to play with their infants as they normally would, without the use of toys. Immediately after the two- minutes, mothers were told to look down, then back up and hold a still face. In the still-face episode, mothers looked at their infants for two- minutes without responding in any way

with facial or vocal expressions. Next, a two- minute reunion episode followed the still-face, in which mothers resumed free play. Then the still-face and reunion episodes were repeated. This procedure was video recorded using a split-screen method so that the behaviors, facial expressions and language use of both mothers and infants could be recorded.

To assess maternal mind-mindedness, the six minutes of free play and reunion episodes were transcribed verbatim and coded using procedures outlined in the Mind-Mindedness Coding Manual, Version 2.0 (Meins & Fernyhough, 2010). According to the manual, the transcript was reviewed and mind-minded comments were identified. Comments were considered mind-minded if the parent (a) used an explicit internal state term to comment on what the infant was thinking, experiencing, or feeling, or (b) 'put mind-minded words into the infant's mouth' with the caregiver talking on the infants' behalf. Maternal comments were coded as mind-minded if the comment fell under one of seven categories: 1) desires and preferences (e.g., "You like that rattle" and "You want to shake that"), 2) cognitions (e.g., "You think that's fun" and "You know that from home"), 3) emotions (e.g., "You're frustrated" and "You are so happy"), 4) epistemic states (e.g., "You're playing peek-a-boo with me"), 5) speaking on behalf of the infant (e.g., "Say, 'Mommy, look at this'" or "You're saying 'Mommy, get me out of this highchair'"), 6) physical states (e.g., "You're hungry") upon the absence of any accompanying signs of such a state from the infant, it is important to note that this category was always non-attuned, and 7) trying to (e.g., "you're trying to get out of the chair") upon specifying the precise goal that the infant was trying to achieve. Comments were not considered mind-minded if they were about the infant's perceptions (e.g., "You're looking at my cell phone"), physical states (e.g., "You're hungry"), were non-specific references to the infant's internal states (e.g., "Are you okay?" and "What's wrong?"), or

vocalizations/noises conveying meaning but not in the form of actual words (e.g., Mother gasps in an exaggerated manner to gain infant's attention) were not classified as mind minded.

Next, the coded transcript was reviewed while watching the video interaction to determine if each comment was appropriate to context. Each mind-minded comment was coded dichotomously as being appropriate to context (appropriate mind-mindedness) or not appropriate to context (non-attuned mind-mindedness) based on the coder's review of the videotaped interaction and its associated transcript. Criteria for coding a mind-minded comment as appropriate were as follows: (a) the comment followed an infant behavior and the coder agreed with the mother's reading of the infant's current state, (b) the comment tied the infant's current activity to similar events in the past or future, and (c) the comment served to clarify how to proceed after a "lull" in the interaction (e.g., "You want to play Pat-a-cake?"), which meant to suggest a new activity during a "lull" in the infant's engagement in any particular activity. It is important to note that this comment was non-attuned if the mother asked this while her infant was already actively engaged in attending to or playing with something else.

Criteria for coding a mind-minded comment as non-attuned were: (a) the coder did not agree with the mother's reading of the infant's current state, (b) the comment was not tied to the infant's current activity or interests, and (c) the coder could not determine or understand what the mother was referring to while viewing the videotaped interaction. Scores for non-attuned mind-minded comments and appropriate mind-minded comments are articulated as a proportion of the total number of comments produced by the mothers during the six minutes of free play and reunion episodes in order to control for differences in verbosity.

For this study, the proportion of mind-minded comments and the total number of maternal words were used. Scores for the proportion of mind-minded comments were calculated by dividing

the total number of maternal comments by the total number of maternal words. Scores for the total number of maternal words were calculated by counting all the words produced by the mothers during the six minutes of free play and reunion episodes. Coding was done by the author and two undergraduate students trained by the author. The two undergraduate students were blind to all other measures in this study. Training involved group review of the manual outlining coding procedures, code definitions, and examples. Eight (10%) of transcripts/videos, were used for practice coding prior to reliability coding. To determine inter-coder reliability, the author coded a randomly selected of 40% ($n = 27$) of the transcripts/videos, which were then coded by undergraduate coders. Coder one double coded 15 transcripts/videos and coder two coded 12 transcripts/videos. Disagreements were discussed among all coders until agreement was reached. There was a high degree of single measure inter-rater reliability between the author and the first coder for the total number of maternal words ($ICC = 1.00, p < .001$, respectively) and for the proportion of mind-minded comments ($ICC = .92; p < .001$, respectively). In addition, a high degree of single measure inter-rater reliability was determined between the author and the second coder for the total number of maternal words ($ICC = 1.00, p < .001$, respectively) and for the proportion of mind-minded comments ($ICC = .93, p < .001$, respectively). Disagreements were conferenced and consensus scores were used in the analyses.

Parent-Child Dysfunctional Interaction was assessed using the Parent-Child Dysfunctional Interaction Subscale (PCDI) of the Parenting Stress Index-Short Form (PSI-SF) (Abidin, 1995). The PSI-SF is a 36-item measure of parenting stress. Parents utilize a 5-point scale to rate the degree to which they agree with each statement (1 = strongly agree, 5 = strongly disagree). The PSI-SF includes a total score and three subscale scores. The PCDI subscale was used in this study; it contains 12 questions that assess the parent's dissatisfaction with the

interactions with her infant and the degree to which she finds her infant acceptable. Scores on this subscale range from 12 to 60 with higher scores indicating more dysfunctional interactions. In this sample internal consistency was $\alpha = .89$

Covariates. Previous research demonstrates that demographic variables, including maternal race, age, education level, marital status, income, and depression have been associated with maternal mind-mindedness, parent-child interactions, and infant development.

Demographic data. Participants provided information about their race, age, education level, marital status, total household income, and their infant's gender.

Maternal Depression. The Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977) was used to assess maternal depression. The CES-D contains 20 items selected from previously validated scales of depression. It includes six components: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. Participants indicated how often within the last week they experienced the symptoms, responding: "rarely or none of the time" (0), "some or little of the time" (1), "occasionally or a moderate amount of time" (2), and "most or all of the time" (3). The scores for the 20 items were added, resulting in a range of possible total scores from 0 to 60. Reliability and validity of the scale have been tested in general and clinical populations yielding very good internal consistency with an alpha of .85 for the general population and 0.90 for a psychiatric population. Satisfactory test-retest reliability over a two to eight week period ranged from .51 to .67 and from .32 to .54 over a three to 12-month period. Convergent validity was supported by significant correlations with other scales designed to measure depression. Differences between the psychiatric inpatients and the general population established construct validity (Radloff, 1977). In this sample internal consistency was $\alpha = .88$

Statistical Analyses

Data were analyzed using the statistical software, IBM SPSS statistics version 23. To begin, data were examined for input accuracy, plausible means and standard deviations, outliers, and assumptions. Next, bi-variate correlations between variables of interest were conducted in order to get preliminary results.

Hypothesis Testing

Hypothesis one: Maternal sociodemographic characteristics, including education, depressive symptoms, age, and total number of maternal words would be correlated with the proportion of mind-minded comments, parent-child interactions and infant language development. These hypotheses were tested using one-way ANOVAs and correlational analyses.

1a: There would be differences in the proportion of mind-minded comments, parent-child dysfunctional interactions, and infant language development among mothers with different levels of education. Higher levels of education would be associated with greater proportions of mind-minded comments and infant language scores and lower parent-child dysfunctional interactions.

1b: Maternal depressive symptoms would be positively correlated with parent-child dysfunctional interactions, and negatively correlated with the proportion of mind-minded comments and infant language development.

1c: Total number of maternal words would be positively correlated with the proportion of mind-minded comments and infant language development, and negatively correlated with parent-child dysfunctional interactions.

1d: Maternal age would be positively correlated with the proportion of mind-minded comments and infant language development, and negatively correlated with parent-child dysfunctional interactions.

Hypothesis two: The proportion of mind-minded comments and parent-child interactions would be associated with infant language development after controlling for demographic variables that were also associated with language development. This hypothesis was tested using linear regression.

Hypothesis three: The proportion of mind-minded comments would be related to infant language development through the mechanism of parenting. This hypothesis was tested using PROCESS, a macro that can be used with SPSS and SAS (Hayes, 2013). PROCESS estimates coefficients using maximum likelihood logistic regression and uses asymmetric bootstrap confidence intervals for inference and is more appropriate for small samples.

CHAPTER 4: RESULTS

Data Cleaning and Descriptive Analyses

All study variables were checked for accuracy of input by examining individual ranges of each variable. In order to inspect univariate outliers, z-scores were computed, individual cases with scores beyond ± 3.29 ($p < .001$, two-tailed test) were considered to be outliers. There were no identified univariate outliers.

In order to examine study variables for normality, z-scores were computed by taking the value of the skew or kurtosis and dividing by its standard error. Z scores greater than 1.96 indicate non-normal distribution. Once examined, histograms and P-P plots were checked for skew and kurtosis in order to further verify the departure from normality. Three variables showed significant skew. Maternal depression (CES-D) (skewness = 1.52, $SE = 0.31$), child age (skewness = 0.81, $SE = 0.29$), and parent-child dysfunctional interactions (skewness = 0.82, $SE = 0.31$) were skewed. However, the P-P plots suggested that child age and maternal depression were not substantially skewed, so transformation was not necessary. In addition, a square root and a log transformation failed to return parent-child dysfunctional interaction subscale back to normality. As a result non-parametric statistics were used for analyses that included parent-child dysfunctional interaction.

Preliminary Analyses

Descriptive Findings

Mothers' total number of words spoken to the infant during the SFP varied widely. On average mothers used 406.76 words while interacting ($SD = 145.02$, range = 93-745). While mothers were quite talkative, they used few mind-minded words; average proportion of mind-minded comments was quite small ($M = 0.03$, $SD = 0.02$, range 0-7). Nearly one-quarter (23.72%) of mothers screened positive for depression; scores on the CES-D ranged from 0-40, ($M = 10.93$,

$SD = 9.17$). The average parent-child dysfunctional interactions score was 16.27 ($SD = 5.06$) and scores ranged from 12-27. Infants' language composite scores at seven months fell just below the population mean of 100 ($M = 92.88$, $SD = 10.56$) and ranged from 65-121. Only one infant met the criteria for developmental delay ($-2SD$). Descriptive statistics and frequencies for all study variables are presented in Table 1.

Hypothesis Testing

Relationships Among Maternal Sociodemographic Characteristics, Mind-Mindedness, Parenting, and Language Development.

It was hypothesized that maternal sociodemographic characteristics would be associated with the proportion of mind-minded comments, parent-child dysfunctional interactions, and infant language development. To test hypothesis 1a, that there would be differences in the proportion of mind-minded comments, parent-child interactions and infant language development among mothers with different levels of education, one-way ANOVAs and Kruskal-Wallis tests were used. Maternal education was collapsed into the following four groups: less than high school, high school or GED, some college and college/graduate degree.

First, a one-way ANOVA test was conducted to evaluate differences in the proportion of mind-minded comments among mothers with different levels of education. The test revealed that the proportion of mind-minded comments was not affected by maternal education, $F(3,55) = .82$, $p = .49$, partial $\eta^2 = .04$. About 4% of the variance in the proportion of mind-minded comments could be explained by education.

Second, a Kruskal-Wallis test was conducted to evaluate differences in parent-child dysfunctional interaction among mothers with different levels of education. The test showed that parent-child dysfunctional interactions were significantly affected by maternal education, $H(3) = 8.26$, $p = .04$, partial $\eta^2 = .16$. The variance in parent-child dysfunctional interactions, about 16%,

could be described by education. Because there was a significant effect, post-hoc tests were conducted using Mann-Whitney U tests for each pair of educational groups: no high school or GED ($M_{rank} = 47.17$), high school or GED ($M_{rank} = 30.72$), some college ($M_{rank} = 26.19$), and college/graduate degree ($M_{rank} = 20.32$). Also, Bonferroni's correction was used to prevent inflation of type I error rate. For six comparisons, alpha per comparison is $.05/6 = .01$. Only mothers who had no high school or GED level of education had a significantly higher parent-child dysfunctional interactions, than mothers who had college/graduate degree level of education, $p = .01$.

Third, a one-way ANOVA test was conducted to assess differences in infant language development among mothers with different levels of education. The test showed that infant language development was not related to maternal education, $F(3,55) = 0.33$, $p = .80$, partial $\eta^2 = .02$. Roughly, 2% of the variance in the infant language development could be elucidated by education. In conclusion, the hypothesis 1a was partially supported for the relationship between parent-child dysfunctional interactions and education. One-way ANOVAs and Kruskal-Wallis tests among study variables are reported in Table 2.

To test hypothesis 1b, that maternal depressive symptoms would be positively correlated with parent-child dysfunctional interactions and negatively correlated with the proportion of mind-minded comments and infant language development, correlational analyses were used. As hypothesized, maternal depressive symptoms were positively correlated with parent-child dysfunctional interactions, $r = .47$, $p < .01$. Results showed that there was no significant correlations between maternal depressive symptoms and proportion of mind-minded comments, $r = -.22$, $p = .10$, or infant language development, $r = -.06$, $p = .64$, although the direction was

consistent with the hypothesis. Therefore, the hypothesis 1b was partially supported for the relationship between maternal depressive symptoms and parent-child dysfunctional interactions.

To test hypothesis 1c, that total number of maternal words would be positively correlated with the proportion of mind-minded comments and infant language development and negatively correlated with parent-child dysfunctional interactions, correlational analyses were used. Results of correlational analyses revealed that there were no significant correlations between total number of maternal words and proportion of mind-minded comments, $r = .12$, $p = .34$, infant language development, $r = -.07$, $p = .56$, or parent-child dysfunctional interactions, $r = .04$, $p = .74$. Statistical findings concluded that hypothesis 1c was not supported for the relationship between total number of maternal words, the proportion of mind-minded comments, infant language development, and parent-child dysfunctional interactions. Only the direction of the relationship between total number of maternal words and the proportion of mind-minded comments was consistent with the hypothesis.

To test hypothesis 1d, that maternal age would be positively correlated with the proportion of mind-minded comments and infant language development, and negatively correlated with parent-child dysfunctional interactions, correlations were used. Results indicated that there was a significant positive correlation between maternal age and the proportion of mind-minded comments, $r = .26$, $p < .05$. However, there was no significant correlation between maternal age and infant language, $r = -.12$, $p = .35$, or parent-child dysfunctional interactions, $r = .05$, $p = .73$. Hypothesis 1d was partially supported for the correlation between maternal age and the proportion of mind-minded comments. The directions of the correlations between maternal age, infant language, and parent-child dysfunctional interactions were inconsistent with the hypothesis. Correlations among study variables are reported in Table 3.

The Proportion of Mind-Minded Comments, Parent-Child Interactions and Infant Language Development.

It was hypothesized that the proportion of mind-minded comments and parent-child interactions would be associated with infant language development after controlling for demographic variables that were also associated with language development. Because previous analyses confirmed that demographic variables were not associated with language development in this sample, this hypothesis was tested using linear regression. Findings revealed that the proportion of mind-minded comments and parent-child interactions explained only 12% of the variance in infant language development, $R^2 = .12$, $F(2, 56) = 3.75$, $p = .03$. The proportion of mind-minded comments was negatively related to infant language development, yet not significant, $t(56) = -1.87$, $p = .07$. Parent-child dysfunctional interactions was significant and also negatively related to infant language development $t(56) = -2.27$, $p = .03$.

In conclusion, the proportion of mind-minded comments was not related to infant language development, but parent-child dysfunctional interactions was related to infant language development, which means when parent-child dysfunctional interactions increased, infant language development decreased.

It was further hypothesized that the proportion of mind-minded comments would be related to infant language development through the mechanism of parenting. Previous analyses revealed that there were no relationships between the proportion of mind-minded comments and parenting, so a mediation analyses was not conducted.

CHAPTER 5: DISCUSSION

The purpose of this study was: 1) to assess the relationships among maternal sociodemographic characteristics and mind-mindedness, parent-child interactions, and infant language development; 2) to determine whether variations in infant language development were associated with maternal mind-mindedness and parent-child interactions; and 3) to test whether parent-child interactions were the mechanism by which mind-mindedness and infant language development were related. Most study hypotheses were not supported. Most of the maternal sociodemographic characteristics were not associated with mind-mindedness or infant language development. Education was associated with parenting and older mothers were more talkative, which is consistent with other studies (Diken & Mahoney, 2013; Reitman et al., 2002; Rosenblum et al., 2008; Demers et al., 2010b; Keown et al., 2001). While parent-child interactions were associated with language development, such that higher levels of parent-child dysfunctional interactions were associated with lower language development scores, mind-mindedness was not associated with infant language or parent-child dysfunctional interactions. The lack of hypothesized findings could be accounted for by several factors, including the way that mind-mindedness and parenting were assessed, the lack of variability in language scores and the age of the child when language was assessed.

The current study assessed mind-mindedness differently from most other studies. In this study mind-mindedness was assessed just from six-minutes of face-to-face interaction, without toys compared to either 20-min free play sessions with toys (Meins et al., 2011), or mothers' descriptions of their children with unlimited time to think about and describe their children's characteristics (Bernier & Dozier, 2003; McMahon & Meins, 2012). Although one study did assess mind-mindedness from a three-minute parent-child free play interaction (Rosenblum et al., 2008).

In the current study, mind-mindedness was assessed from the Double Still-Face Procedure, which is structured, includes no toys and mothers had to stop the interactions two times to hold a still-face. Parent-child interactions in this study did not reflect the normal daily interactions because the still-faced mother violated the infant's expectation for a normal interaction, which caused distress for most dyads. Further most studies allowed dyads to use developmentally appropriate toys (Rosenblum et al., 2008; Meins et al., 2011). Mothers in this study were not allowed to use any toys during the interactions, which may have limited the number of opportunities for mind-mindedness.

Children in the above studies also tended to be older (Bernier & Dozier, 2003; McMahon & Meins, 2012; Meins et al., 2011) than infants in this study, thus it is possible that mothers had more difficulty interpreting young infants' mind who are not mobile and not using words. Studies that have assessed mind-mindedness at seven months of age used a free play paradigm (Rosenblum et al., 2008; Meins et al., 2011). In the current study seven-month-old infants, who were mobile and curious were restrained in a highchair without toys as part of the Double Still-Face Procedure, which again may have limited the occurrence of mind-minded comments. In addition to assessing mind-mindedness with regard to older infants, most language development studies assessed infants' vocabulary or first words (Hoff, 2006; Huttenlocher et al., 2010; Karrass & Braungart-Rieker, 2005; Dollaghan et al., 1999; Hammer et al., 2010; Britto & Brooks-Gunn, 2001), but infants in this sample were much younger and still in prelinguistic communication stage. It is also conceivable that the effects of demographics and parenting, including mind-mindedness do not yet have an effect on infant language development, because infants in the current study were so young. While other studies used self-report of parenting (McMahon & Meins, 2012), it is likely that self-report of parenting may not be sufficient for making associations with mind-mindedness in this

study because infants were so young. Perhaps older infants' mothers have the necessary insight to think about their infants' experiences and intentions, and then they accurately report on parenting interactions. Potential stress during early parenthood could influence the development of more positive or mind-minded comments of the infant as the relationship unfolds over time (Demers et al., 2010b).

Psychosocial Differences in Mind-Mindedness, Parent-Child Interaction and Infant Language Development

Differences in Mind-Mindedness, Parent Child-Child Interactions, and Infant Language Development among Maternal Level of Education

It was hypothesized that there would be differences in the proportion of mind-minded comments, parent-child interactions, and infant language development among mothers with different levels of education. This hypothesis was partially supported. Maternal education was associated with parent-child interactions, but it was not associated with the proportion of mind-minded comments or infant language development. Mothers who had no high school or GED had significantly higher parent-child dysfunctional interaction scores, than mothers who had a college/graduate degree. The findings with regard to education and parenting are consistent with other studies which reported that maternal education explained a significant amount of variance in parent-child dysfunctional interactions (Diken & Mahoney, 2013; Reitman et al., 2002; Rosenblum et al., 2008). The combination of being low income and having a low education can cause stressful living conditions, which in turn results in higher parent-child dysfunctional interactions (Reitman et al., 2002; Tamis-LeMonda, Briggs, McClowry, & Snow, 2009).

It was hypothesized that mothers with higher levels of education would use a higher proportion of mind-minded comments when interacting with their infants. This hypothesis was not supported. Studies that have found educational differences in mind-minded comments used white, primarily college educated samples (Rosenblum et al., 2008), while studies that included

predominately lower middle-class or African American samples have not found educational differences in maternal mind-mindedness (Bernier & Dozier, 2003; Meins et al., 2011). While education levels varied in the current sample only 11% of mothers earned a college degree.

While a substantial body of evidence argued that maternal education might be the element of SES most relevant to children's language development (Hoff, 2006; Huttenlocher et al., 2010; Karrass & Braungart-Rieker, 2005; Dollaghan et al., 1999; Hammer et al., 2010; Britto & Brooks-Gunn, 2001), in this study there were no differences in infant language development among levels of maternal education. Infants in this study were much younger than those in the above studies, and still in the prelinguistic communication stage. Perhaps if infants were tested after the onset of first words, differences in infant language development would be found among different levels of education.

Maternal Depression as a Correlate of Mind-Mindedness, Parent-Child Interactions, and Infant Language Development

It was hypothesized that maternal depressive symptoms would be positively correlated with parent-child dysfunctional interactions and negatively correlated with the proportion of mind-minded comments and infant language development. Consistent with the hypothesis maternal depressive symptoms were positively associated with parent-child dysfunctional interactions. This finding is in line with studies which reported that depressed mothers show more negative affect, hostile, disengaged, and tough behaviors when interacting with their infants than non-depressed mothers (Lovejoy et al., 2000). Sohr-Preston and Scaramella (2006) indicated that mothers who suffered from postpartum depression are less contingent, less positive, and more negative during interactions with their infants.

It was also hypothesized that maternal depressive symptoms would be negatively correlated with the proportion of mind-minded comments and infant language development. These

hypotheses were not supported. Several studies with economically diverse samples have found links between CES-D scores and mind-minded comments (Lundy, 2003; Lok & McMahon, 2006; Pawlby et al., 2010). Contrary to these findings, in this study there were no significant correlations between maternal depressive symptoms and the proportion of mind-minded comments. One major difference between the previous studies and the current one is that the majority of the mothers in this study were African-American. While Bernier and Dozier's (2003) study did not assess depression, they did not find expected relationships between education and mind-minded comments and their sample was predominately African-American. No previous research that included maternal depression and mind-mindedness in the analyses had African-Americans mothers in their samples. Thus, the question becomes whether or not depression has an effect on African-Americans mothers' ability to accurately recognize and comment upon their infants' mental state or whether mind-minded comments are related to parenting and psychosocial factors in African-American samples. Previous work has showed that African-American mothers use verbal distractions as a parenting strategy to avoid dealing with their children's emotions (Garner, 2006).

Contrary to the hypothesis, our results indicated that there was no significant relationship between maternal depressive symptoms and infant language development. However, depression was correlated with parenting, which was further correlated with language. Perhaps the effects of depression on language are indirect, through parenting. A number of studies have reported that only infants of depressed mothers exhibited decreases in language development in the toddler and preschool years (Brennan et al., 2000; NICHD, 1999). Infants in this study were much younger than those in above studies, and perhaps the effects of depression on language development are not seen until toddlerhood or preschool when the range of language is much larger.

Maternal Words as a Correlate of Mind-Mindedness, Parent-Child Interactions, and Infant Language Development

The hypotheses that total number of maternal words used during the still-face procedure would be positively correlated with the proportion of mind-minded comments and infant language development, and negatively correlated with parent-child dysfunctional interactions were not supported. These findings are not consistent with other research which suggests that the amount of maternal language input is associated with vocabulary growth (Hoff & Naigles, 2002; Hurtado et al., 2008; Weizman & Snow, 2001). Language development for young infants does not include word knowledge or vocabulary, rather it includes responding to sounds, vocalizing mood, and using consonants and vowels. Perhaps the amount of maternal language input has an effect on vocabulary development and would be seen after 12 or 18 months when infants begin to use words. It is also possible that mothers, in this study, felt that they had to talk and engage with their infants during the reunion playtime, which did not represent their normal parenting style.

Maternal Age as a Correlate of Mind-Mindedness, Parent-Child Interactions, and Infant Language Development

It was hypothesized that maternal age would be correlated with the proportion of mind-minded comments, parent-child interactions, and infant language development. This hypothesis was partially supported. The results suggested that there was a positive significant correlation between maternal age and the proportion of mind-minded comments. The findings are consistent with other studies, which indicates that older mothers, who were more sensitive, utilized more mind-minded comments compared to younger mothers (Demers et al., 2010b; Keown et al., 2001). A possible explanation for young mothers' lack of ability to comment on their infants' mental states might stem in part from their higher parenting stress and lower sensitivity (Demers et al., 2010b; Keown et al., 2001). Older mothers seem to be more aware of their infants' mental states

during interactions and appear to be well equipped to provide the infant with sensitive responsiveness (Demers et al., 2010b).

Contrary to expectations, the relation between maternal age and parent-child dysfunctional interactions, or infant language did not reach statistical significance. These findings are not consistent with other research, which suggests that younger mothers, compared to older mothers, were more intrusive, and less verbally stimulating, sensitive, and warm during their interaction with their children who had lower language scores (Demers et al., 2010b; Keown et al., 2001). One major difference between the previous studies and the current one is that a relatively few number of mothers under the age of 20 compared to those in the Demers et al., (2010b) and Keown et al., (2001) studies. Further, infants in this study were much younger than those in the above studies and perhaps the effects of mothers' age on infants' language development and parent-child interactions are not seen until toddlerhood or preschool when the range of language is much larger.

Mind-Mindedness, Parent-Child Interactions and Infant Language Development

It was hypothesized that the proportion of mind-minded comments and parent-child interactions would be associated with infant language development after controlling for demographic variables that were also associated with language development. This hypothesis was partially supported. Findings revealed that the proportion of mind-minded comments were not related to infant language development, but parent-child dysfunctional interactions was related to infant language development. When parent-child dysfunctional interactions increased, infant language development decreased. This finding is consistent with other studies, which suggest that parent-child interactions are associated with children's early language acquisition (Hirsh-Pasek & Burchinal, 2006; Magill-Evans & Harrison, 2001; Raviv et al., 2004; Stein et al., 2008; Tamis-LeMonda et al., 2001). Infants learn new pieces of linguistic information best when they engage

in positive interactions with a mature language user. Therefore, parent-child interactions provide these opportunities to introduce language to children (Magill-Evans & Harrison, 2001).

While studies have investigated maternal mind-minded comments and social-emotional, cognitive development in early childhood, including attachment and prosocial behavior (McMahon & Meins, 2012; Meins et al., 2012; Bernier et al., 2010; Meins et al., 2013; Centifanti et al., 2016), this study is the first study, to examine the relationship between maternal mind-minded comments and infant language development prior to the first word stage. A number of factors may explain our findings. While Bernier et al., (2010) and Meins et al., (2001) used the Bayley Scale to assess cognitive development, this study is the first to use the Bayley Scale to assess the relationship between mind-mindedness and language development. Infants in this study were young and perhaps the effects of mind-mindedness on language development are not seen until toddlerhood or preschool when the range of language is much larger. It is also possible that the way that mind-mindedness was measured in this study had an effect on the results. The question of whether maternal mind-minded comments has an effect on infant vocabulary development remains unanswered.

Limitations and Recommendations

This study presents some limitations that call for cautious interpretation of the findings while suggesting avenues for future research. First and foremost, infants in the study were not drawn from an early intervention sample. It may be that hypothesized relationships between mind-mindedness and language development would have been supported in a sample that included both typically developing and delayed infants. While there was some variability in language scores in the sample, detecting language delays in early infancy is difficult and only one infant in the sample presented with a language delay. Infants also were young and perhaps the effects of mind-

mindfulness on language development are not seen until toddlerhood or preschool when the range of language is much larger. Another limitation was in the procedure used for coding mind-mindedness from the Double Still-Face Paradigm may affect the findings; especially mothers were not allowed to use toys. Despite these limitations, it is possible that maternal stressful life circumstances, maternal cultural, child temperament, and other socioeconomic risks, which were not included in the present analyses, impact mothers' ability to comment upon their infants internal mental states (e.g. thoughts and feelings). Despite these limitations, the current study is the first to examine the relationship between maternal mind-minded comments and infant language development and one of the few to assess maternal mind-mindedness in a predominately African American sample.

Future studies should compare mind-minded comments in situations like the Still Face Paradigm and a free play with toys to see if there are limitations to assessing mind-mindedness in this way. Further, studies should assess the relationship between mind-mindedness and early parenting using a coded measure (rather than self-report). It could be that mothers who have difficulty interpreting their infants' experiences may also struggle to report their own internal experiences and stress associated with parenting. Finally, researchers should consider assessing the relationship among mind-mindedness and language development in samples with older infants.

Table 1

Demographic Characteristics of Participants (N = 67)

Characteristic	n	%
Child Sex (Male)	43	65.15
Mother's Race		
Caucasian	9	18.00
African American	38	76.00
Hispanic/ Other	3	4.00
Mother's Martial Status		
Married or have a partner (Yes)	33	53.23
Living together with a partner (Yes)	38	73.08
Living with the birth father (Yes)	49	87.50
Mother's Education		
Less than a high school	4	6.78
High school degree or GED	18	30.51
Some college	26	44.07
College degree	7	11.86
Graduate degree	4	6.78
Total Household Income		
Less than \$5,000	7	13.46
\$5,000 to \$10,000	9	17.31
\$10,000 to \$20,000	11	21.15
\$20,000 to \$30,000	10	19.23
\$35,000 to \$50,000	6	11.54
\$50,000 to \$60,000	2	3.85
\$65,000 to \$80,000	4	7.69
\$80,000 to \$100,000	1	1.92
\$100,000 to \$140,000	2	3.85

Note. Totals of percentages are not 100 for every characteristic because of rounding.

Table 2

The Effects of Education on Mind-Mindedness, Language Development and Parent-Child Dysfunctional Interactions

	Mind-Mindedness		Language		PCDI ^a
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M_{rank}</i>
No High School or GED	0.03	0.01	94.25	9.70	47.17
High School or GED	0.02	0.01	92.50	12.34	30.72
Some College	0.03	0.02	91.88	9.06	26.19
College/Graduate Degree	0.03	0.02	95.54	11.78	20.32
F	0.82		0.33		8.26
df1,df2	3,55		3,55		3
p	.49		.80		.04
Effect size partial ²	.04		.02		.16

Note. PCDI = Parent-Child Dysfunctional Interactions; ^amean ranks and Kruskal-Wallis are reported for Parent-Child Dysfunctional Interactions.

Table 3

Means, Standard Deviations, and Correlation Matrix of Study Variables

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Maternal Age	26.03	4.45	—						
2. Child Age	7.47	0.61	.01	—					
3. Words	406.76	145.02	.22	-.36**	—				
4. MM	0.03	0.02	.26*	.00	.12	—			
5. Language	92.88	10.56	-.12	-.09	-.07	-.18	—		
6. CES-D	10.93	9.17	.02	.09	-.02	-.22	-.06	—	
7. PCDI	16.27	5.06	.05	.13	.04	-.22	-.28*	.47**	—

Note. * $p < .05$, ** $p < .01$. Words = Maternal Total Words, MM = Proportion of Mind-Minded Comments, Language = Child Language Composite Scores, CES-D = Maternal Depression, and PCDI = Parent-Child Dysfunctional Interactions.

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ABSTRACT**PARENTAL MIND-MINDEDNESS AND LANGUAGE DEVELOPMENT IN EARLY INFANCY**

by

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Research suggests that mother-child interactions, including sensitivity, responsiveness, and stimulation, are linked to children's early language. Mind-mindedness refers to mothers' proclivity to consider and treat their infant as having an active and autonomous mental life of thoughts, intentions, desires, etc. Mind-mindedness is a foundation of parental sensitivity and responsivity. Little research has been conducted on mind-mindedness and infant language development. The purpose of this study was to assess: 1) to assess the relationships among maternal sociodemographic characteristics and mind-mindedness, parent-child interactions and infant language development; 2) to determine whether variations in infant language development were associated with maternal mind-mindedness and parent-child interactions; and 3) to test whether parent-child interactions were the mechanism by which mind-mindedness and infant language development were related. This study utilized a subsample of 67 parent-infant dyads participating in a larger study, Parental Representations During Pre- and Postnatal Periods Linked to Early Outcomes (PURPLE). Most of the mothers were African American (76%), married/partnered (53.22%), and had at least a high school or GED (44.06%). Data were collected during a lab visit that took place when the infant was 6 to 10 months old. The measures used include maternal self-

report of parenting on the Parenting Stress Index – Short Form (Abidin, 1995), six minutes of parent-child interactions during a double Still-Face Procedure that were coded for maternal mind-minded comments using Coding Manual, Version 2.0 (Meins & Fernyhough, 2010). Children's language development was assessed using the Bayley Scales of Infant and Toddler Development, 3rd Edition (Bayley, 2006). Findings suggested that most of the maternal sociodemographic characteristics were not associated with mind-mindedness or infant language development. Parent-child interactions were associated with language development, such that higher levels of parent-child dysfunctional interactions were associated with lower language development scores, mind-mindedness was not associated with infant language or parent-child dysfunctional interactions.

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