

INFANT COMMUNICATIVE BEHAVIORS AND  
MATERNAL RESPONSIVENESS

A Thesis

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## DEDICATION

And we know that all things work together for good to those who love God, to those who are the called according to His purpose (Romans 8:28).

This work is also dedicated to the many young mothers of our world, who encounter the joys, stresses and heartaches of motherhood, but are strengthened and encouraged by their faith in the undying and immutable bond between a mother and her infant.

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## TABLE OF CONTENTS

DEDICATION .....	ii
ACKNOWLEDGMENTS.....	iii
LIST OF TABLES .....	vi
LIST OF FIGURES .....	vii
ABSTRACT.....	viii
CHAPTER 1. INTRODUCTION.....	1
Statement of The Problem .....	1
Objective .....	4
Benefits and Limitations .....	5
Definitions .....	5
Assumptions .....	6
CHAPTER 2. REVIEW OF LITERATURE .....	7
Transactional Model of Development .....	7
Communication Behaviors .....	10
Attachment Behaviors .....	11
Intervention Strategies .....	15
CHAPTER 3. METHODS .....	18
Setting .....	18
Participants .....	19
Right from Birth Training Materials .....	20
Behavior Definitions .....	21
Experimental Design .....	23
Observation Procedures .....	25
Baseline .....	26
Right from Birth Intervention .....	27
Interobserver Reliability .....	28
CHAPTER 4. RESULTS .....	30
Dyadic Interaction .....	33
CHAPTER 5. DISCUSSION .....	35
Limitations .....	40
Clinical Implications .....	40
Future Research Implications .....	41
Conclusion .....	43

REFERENCES .....44

APPENDIX A: LSU INSTITUTIONAL REVIEW BOARD APPLICATION .....52

APPENDIX B: LSU INSTITUTIONAL REVIEW BOARD APPROVAL....53

APPENDIX C: CONSENT FORM.....54

APPENDIX D: SAMPLE DATA SHEET.....56

VITA .....57

## LIST OF TABLES

Table 1. Average percentage of positive maternal responses and infant communication across baseline and intervention. ....	33
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## LIST OF FIGURES

Figure 1. Intervention model for improving infant developmental outcome. ....	15
Figure 2. Percentage of observed intervals with infant communication and positive maternal responses. ....	32

## ABSTRACT

This study is an examination of infant communication and maternal responsiveness in order to determine the impact of training on mother-infant communicative interaction. A sample of three mothers and their infants were observed during 10 minute free play sessions before and after a training intervention. The focus of the training was the principles of parenting contained in the *Right-from-Birth: A Parenting Series* (Grace & Lindsey, 2003) training. A multiple baseline design was used to measure maternal responsiveness to infant communication. Positive and negative maternal responses, as well as the rate of infant communication were also measured. Results showed an increase in positive maternal responses and a corresponding decrease in negative maternal responses. These findings underscore the importance of training on correct interpretation and appropriate maternal responses to infant's communicative cues, in order to encourage positive mother-infant interactions.

## CHAPTER 1: INTRODUCTION

### *Statement of Problem*

The family is the fundamental nucleus of interaction and socialization for the infant; it is the medium through which they view and understand the world around them. Bronfenbrenner's (1979) ecological systems theory posits that a child's development is shaped within the context of a complex system of interactions between the child and multiple levels of the child's surrounding environment. The child comes to understand the world cognitively and socio-emotionally, as well as develop a sense of self through the quality of interactions that they experience with the multiple levels of their environment. Bronfenbrenner's theory supports the idea that the child's development is influenced by transactional behavior between the child and the people in his/her environment (Sameroff, 1975) in other words, the child's behavior affects and is affected by the interactions with and between the individuals in the family, school, peer-group, neighborhood, and the community. External factors, such as income level, influence the quality and patterns of interaction between the child and the individuals in the various levels of the child's environment, especially the home. These external factors can have positive or negative effects on the infant-mother interaction pattern, which shapes the child's quality of development.

The relationship between family socioeconomic status and childhood development has been documented by research (Conley, 1999; Oliver & Shapiro, 2001; Bakermans-Kranenburg, van Ijzendoorn, & Kroonenberg, 2004). The income level in a home is highly correlated with the quality of interaction between a mother and her infant (Bakermans-Kranenburg, et al., 2004). Mothers who are faced with the challenge of

providing for their families on a limited income have been found to experience stress and depression (McLoyd, Jayaratne, Ceballo, & Borquez, 1994; Hwa-Froelich, Loveland, & Flick, 2008) which affects their parenting style and the degree of sensitivity/responsiveness to their infant's communicative behaviors (Mistry, Lowe, Benner, & Chien, 2008). Depressed mothers are often more punitive and less authoritative, and they face more difficulties interacting with their children than psychologically well mothers (Downey & Coyne, 1990; Kaslow, Gray, & Racusin, 1994). Such a parenting style makes infants from low SES families at risk for developing sub-optimal attachment relationships, and contribute to research findings that children from low SES families show the characteristics of the insecure-disorganized attachment style (Lyons-Ruth, Connel, & Grunebaum, 1990). Adolescent mothers have also been found to be particularly at risk for experiencing high parenting stress and not providing a nurturing environment for their infants (Holub, Kershaw, Ethier, Lewis, Milan, & Ickovics, 2007), suggesting that adolescent motherhood and its attendant limits in knowledge and experience of nurturing may be a risk factor for the development of infants of such parents.

Maternal response to infants' communicative behaviors is implicated in the development of an attachment relationship between the mother and her infant (Sroufe, Fox, & Pancake, 1983; Thompson, 1998). Infant communicative behaviors are observable actions that infants exhibit to interact with their mothers or caregivers. Communicative behaviors are for instance, evidenced in joint attention episodes between a mother and her infant, during which the joint attention experience involves simultaneous mother and infant attention to the same object or event (Bakeman &

Adamson, 1984; Tomasello & Farrar, 1986). Investigations of at-risk children have indicated that child-initiated joint attention is positively related to later measures of prosocial behavior, as well as significantly associated with reduced risk for disruptive behaviors in preschool children (Sheinkopf, Mundy, Claussen, & Willoughby, 2004). Mothers who respond appropriately to their infants' communicative behaviors encourage infants' socioemotional development (Parlade, Messinger, Delgado, Kaiser, van Hecke, & Mundy, 2009), providing a framework for the infants' attachment development and competence in positive interaction.

Attachment is the strong, affectionate tie that human beings have that arises from, and leads to feelings of pleasure in interacting with others, and being comforted by the presence of others during times of stress (Ainsworth, Blehar, Waters, & Wall, 1978). The quality of the infant's attachment to the mother has profound implications for the child's feelings of security and his capacity to form trusting relationships (Ainsworth et al., 1978). Mother-infant interactions lead to the development of patterns of attachment, which in turn lead to the child's internal working model (Sroufe & Waters, 1977). The internal working model is the child's concept of the self and relationships (Bowlby, 1980; 1988). Early experiences of sensitive or insensitive care provide the foundation for broader representations of one's worth in present as well as future relationships. The internal working model is largely unconscious, guides the child's feelings, expectations and behavior in present and later relationships (Bretherton & Munholland, 1999). Children in adverse environments who experience negative interaction situations are still capable of developing quality attachment relationships with their mothers if they

experience an otherwise positive, responsive and nurturing environment (Lyons-Ruth, et al., 1990).

Based on the dynamics of infant attachment, the developmental importance of maternal behavioral responses, and the possibility of negative mother-infant interaction experiences within a low SES environment, research attention should be given to mothers from low SES families in order to mediate the possible negative effects of poverty, and assist in the formation of healthy mother-infant interactions. One strategy to accomplish this purpose is through mothers' increased knowledge of their infant's development (Fish & Stifler, 1993). This study suggests that mothers who are provided with accurate and developmentally appropriate knowledge of their infant's development, with specific reference to the importance of responsiveness to infants' needs and the interpretation of infant communication, will most likely experience an increase in maternal responsivity and parenting skills, which will, in turn, contribute positively to the interaction between mothers and their infants.

### *Objective*

The purpose of the present study is to measure the communicative behaviors of infants (less than 12 months), and their mothers' responsiveness to their communications. Increased maternal responsiveness could be attributed to training in infant development (Seo, 2006) (particularly in responsiveness to, and interpretation of infants' needs) and specific individualized parenting skills; elements that have been considered essential in the implementation of intervention programs aimed at improving mother-infant interaction (Boger & Smith, 2000; Cowan & Cowan, 1995; Massengill, 2004).

### *Benefits/ Limitations*

Single-subject study of 3 mother-infant Dyads will be conducted. This study should result in increased maternal responsiveness and infant communication in participating dyads; however, because of the small sample size, results are not generalizable.

### *Definitions*

Infant communicative behaviors:

*Eye gaze* was defined as the child looking at the mother, then looking at an object, then looking back at the mother.

*Vocalizations* were defined as any sound made by the child, either pleasant or unpleasant.

*Reach/gesture* was defined as arm movement or movement toward an object.

*Manipulation* was defined as exploration/interaction with a material using hands, feet, or mouth. Manipulation also includes mouthing the hands or the feet.

*Smiling* was defined as infant smiling at the mother or other stimuli in the environment.

Appropriate maternal responsiveness:

1. Engaging in *joint attention behavior* with the infant within 3 seconds of infant initiated communication.
2. *Positive response* to infant's communicative behaviors within 3 seconds of occurrence.
3. *Vocalization* to the infant as a response to infant behavior or an initiation of interaction.
4. *Touching* the infant by holding or caressing.
5. *Positive facial expressions*.

### *Assumptions*

The following assumptions guide the study:

1. Communicative behavior is emitted by the infant, designed to elicit an interaction with the environment.
2. Maternal responsiveness is reinforcing to infants and likely to increase infant communicative behavior.
3. Mother-infant interaction leads to the development of infant attachment which predicts the quality of infant adjustment later in life.
4. The measures of infant communicative behaviors and maternal responsiveness used in the study are valid and reliable.

## CHAPTER 2: REVIEW OF LITERATURE

The review of literature is organized across major themes that contribute to an understanding of the interface between mother-infant interactions and low SES as it affects the infant's developmental outcome. Intervention strategies that can mediate the effects of low SES on the infant's developmental outcomes are also discussed. The topics focused on are aimed at addressing the question: Does the quality of mother-infant interactions within a low SES family environment improve, following an intervention program aimed at increasing maternal knowledge of infant development and providing specific parenting skills? The review of literature consists of descriptions of the transactional model of development, communicative behaviors and attachment behaviors.

### *Transactional Model of Development*

The transactional model of development emphasizes the bi-directional interplay between parent and child characteristics that shape parent-child interactions and that contribute to the child's developmental outcome (Sameroff & Chandler, 1975, Wijnroks, 1999, Barry, Dunlap, Cotton, Lochman, & Wells, 2005). This bi-directional interplay means that the child's behavior affects the mother's behavior as much as the mother's behavior affects the child (Miller, 1993). For example, a child who has an irritable temperament will influence the mother's behavior and interaction style (e.g. she may become cross), which will in turn affect the child's relationship with the mother (e.g., the child may become further upset by the mother's reaction). The transactional model proposes a holistic view of family relationships, especially the interaction between mothers and their children. Transactional dynamics suggests that one cannot understand the family system by looking at the parent or the child in isolation, because the patterns

of interaction between the parent and child are critical (Corwyn & Bradley, 2005), consequently the contributions that mothers and infants make to their own unique interactions daily is a highlight of this study. The pattern of behaviors within the dyad will be extrapolated in order to provide an assessment of the adequacy of maternal responsiveness, as well as the possible influence of the infant's communication on maternal behavior. This assessment will serve as a foundation for intervention training.

The present study integrates the transactional model with Belsky's (1984) model of the determinants of parenting, and attachment theory (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1979). Both models propose that child outcomes are affected by parental (especially maternal) characteristics, contextual sources of stress and support, and child characteristics. Belsky's (1984) model in particular, identifies parental characteristics as parental attachment security and personality, and also views parental characteristics as the most influential determinant of developmentally appropriate parental behavior. An ecological model would consequently suggest that maternal responsiveness is affected by a lack of knowledge of child development and appropriate responses to infant behavior, as well as low SES. The present study focuses on the effects of contextual sources of stress and support in the lives of the participating Dyads on mother and child communicative interaction, as well as strategies to mitigate the adverse affects of low SES.

A theoretical model that informs the intervention strategy used in this study to alleviate the effects of low SES on infant development is the family process model proposed by Corwyn & Bradley (2005). This model delineates mediating processes and suggests that economic pressure leads to caregiver emotional distress. Emotional distress

can lead to damaged parent-child and spousal relationships and dysfunctional parenting practices, which in turn can lead to maladaptive child outcomes. Adolescent, like adult, mothers have been shown to experience distress in terms of adjustment to new motherhood (Holub, Kershaw, Ethier, Lewis, Milan, & Ickovics, 2007), but adolescent mothers tend to be less responsive and less sensitive in interactions with their infants, compared to adult mothers (McAnarney, Lawrence, Ricciuti, Polley, & Szilagy, 1986; Passino & Whitman, 1993). Socioeconomic status and accumulated stressors during parenthood among adolescent mothers have been linked with difficult maternal adjustment (Milan, Ickovics, Kershaw et al., 2004). Limited material resources have been indicated as stressors exacting a significant toll on family functioning and child development (McLoyd, 1998; Seccombe, 2000).

The relationship of economic pressure to parenting style is not a result of absolute levels of income and economic resources, but parents' perceived financial inadequacy that has an effect on their psychological well being (e.g., emotional distress) and parenting style (Conger & Elder, 1994; McLoyd, 1990). This family process model describes the home environment as a mediator, meaning that children's experiences in the home are strong predictors of the quality of interaction they experience and the development they attain. The present study builds on the work of Corwyn & Bradley (2005), to propose that familial experiences, especially sensitive and responsive caregiving significantly contributes to infant growth, with particular emphasis on attachment development.

### *Communicative Behaviors*

Mother-infant interactions which meet the communicative needs of the infant are a significant predictor of children's cognitive and emotional development (Hwa-Froelich, et al. 2008). Vygotsky (1934/1986) proposed that children's development and learning are facilitated through social interactions with a competent adult. A competent adult could be a father, mother or mother substitute, however, considering the target population for this study (i.e., single, adolescent mothers) emphasis will be on maternal-infant communication. The amount and quality of maternal communicative behavior, including gaze, smile, vocalizations and affectionate touch has been shown to predict the infant's attachment security (Goldberg, Perrotta, Minde, & Corter, 1986). Mothers who incorrectly interpret their children's communications, or who respond inconsistently or inappropriately, are more likely to have children with delayed or dysfunctional communication development and socio-emotional relationships (Coh, Matias, Tronick, Connell, & Lyons-Ruth, 1986; Solantus-Simlva, Punamaki, & Beardslee, 2002). Such research highlights the importance of appropriate and adequate maternal communicative behavior in response to their infants.

The mother-infant relationship is shaped by the degree of coordination or synchrony between infant and maternal communicative signals. This interactional synchrony (Gratier, 2003) describes a flow of communication that is distinguished by the mother's response to infant signals in a well-timed, rhythmic, appropriate fashion, as well as the infant's ability to alter his states and movement patterns in response to the mother's actions (Minde, Martin, Manning, & Hines, 1981). Interactional synchrony is characterized by joint attention experiences between the mother and her infant.

This dyadic synchrony can shape the child's cognitive, symbolic, self regulatory and socioemotional development (Feldman & Eidelman, 2004; Feldman, Greenbaum, & Yirmiya, 1999a; Feldman, Greenbaum, Mayes, & Yirmiya, 1996; Jaffee, Beebe, Feldstein, Crown, & Jasnow, 2002). The reciprocal and responsive parenting involved in interactional synchrony aligns well with the premise for attachment development (i.e. early responsive parenting) provides the infant with a sense of security and confidence in the caregiver and the environment (Ainsworth et. al., 1978).

### *Attachment Behaviors*

The infant's initial socioemotional relationship occurs within the context of the mother-infant attachment relationship (Willinger, Diendorfer-Radner, Willnauer, Jörgl, Hager, 2005). Attachment is the affectional bond between the infant and his mother figure (Ainsworth, et al., 1978). It is a mental construct that motivates infants to behaviorally seek out available caregivers for comfort, with the confident expectation that they will be soothed (Sroufe et al., 1983). Attachment classifications, based on infant responses to stressful situations that involve exposure to a stranger (Ainsworth et al., 1978; Main & Solomon, 1990) include secure attachment (i.e., infants are upset when the mother leaves, show positive emotional expression and seek contact when they are reunited, and use the mother as a secure base from which to explore), avoidant attachment (i.e., infants are usually not distressed when the mother leaves, react to the stranger the same way they do with the mother, and tend to avoid the mother and show minimal emotional expression), resistant attachment (i.e., infants are clingy, seek closeness to parents, choose not to explore, show resistive behavior such as hitting and kicking when reunited with the mother, and often continue crying after being picked up),

and disorganized/disoriented attachment (i.e., infants display confused behaviors at reunion with the mother, such as looking away while being held by the mother, or approaching with a dazed facial expression).

Attachment behaviors include smiling, reaching, touching, crying, eye gaze and separation anxiety (i.e., becoming upset when the mother or caregiver leaves) (Ainsworth, 1978; Bowlby, 1980). Attachment behaviors encourage interaction and communicate to the mother that the infant wants to be close to her. Numerous mother-infant interactions expose infants to regulatory skills and strategies and provide opportunities for practicing emerging regulatory skills (Kopp, 1982). Mother-infant interactions are also recognized to contribute to the development of the mother-infant attachment relationship, because the frequency and quality of the interactions may affect the development of the prefrontal cortex that mediates the ability to be emotionally balanced and socially appropriate (Feldman, Greenbaum, & Yirmiya, 1999a).

Appropriately sensitive maternal behavior includes the provision of an environment that supports the infant's feelings of importance, frequent and sustained maternal physical contact with the infant, the maternal ability to soothe the distressed infant, the maternal ability to time responses and other interactions in synchrony with the infant's signals and rhythms, and mutual delight between mother and infant when they are in each other's company (Wallach & Caulfield, 1998). An infant's secure attachment to a caregiver is based on maternal sensitivity, and can modify the effects of a high-risk environment on a child's intellectual development and academic performance (Wallach & Caulfield, 1998). The consequences of insecure attachment classifications include being overly dependent and frequently eliciting negative attention from teachers (Sroufe,

Fox, & Pancake, 1983). In contrast, children who are securely attached are less emotionally dependent, and are treated by their teachers in warm, age-appropriate ways. At 10 years of age, children with insecure attachment are less socially competent and more dependent on adults than are children with secure attachment histories (Urban, Carlson, Egeland, & Sroufe, 1991).

The caregiver's state of mind with regards to attachment has been proposed to be the most important predictor of attachment development (van Ijzendoorn, 1995; Dozier, Stovall, Albus, & Bates, 2008). Caregiver state of mind has been defined as the way in which adults process their thoughts and feelings with regards to their own attachment experiences (Dozier et al., 2008). Caregiver state of mind has also been characterized as parental ego resiliency (i.e., resourceful problem solving and the integrated performance of multiple obligations under stress; van Bakel & Riksen-Walraven, 2002), the positive recollection of a parent's own childhood caregiving experience (Page, Combs-Orme, & Cain, 2007), maternal perceptions of infant soothability (Ghera, Hane, Malesa, & Fox, 2006), and maternal representations or perceptions of current relationship with the infant (Cox, Hopkins, & Hans, 2000). Caregiver state of mind is an indication of the caregiver's psychological wellbeing and degree of confidence in being an adequate mother. Chronic stressors, however, such as those associated with low SES (i.e., maternal depression, general and parenting stress and parenting efficacy) affect psychological wellbeing (Halpern, 1990), and limit the physical and emotional energy that parents can invest in caregiving (Lyons-Ruth, Zoll, Connell, & Odom, 1987). Depressed mothers were found to be less able to provide regular daily routines, were more irritated by their children, and were more likely to be physically or verbally aggressive towards their children (Lyons-

Ruth, Lyubchik, Wolfe, and Bronfman, 2002a). Mothers who reported feeling more stressed and depressed noted lower levels of efficacy and greater difficulties with managing their children's behaviors and activities, while those reporting higher feelings of efficacy and confidence showed more affection to their children, and were more efficacious in monitoring and protecting their children (Mistry, Lowe, Benner, & Chien, 2008).

However, research findings indicate that maternal responsiveness mediates the impact of caregiver/maternal state of mind on infant attachment development (Atkinson, et al., 2005). The level of maternal responsiveness exhibited by the mother to the infant, regardless of her state of mind, is suggested to be critical to the developing attachment relationship between a mother and her infant. This finding supports the assertion that interventions aimed at changing maternal responsiveness as opposed to modifying maternal state of mind alters the quality of mother-infant attachment more effectively (van Ijzendoorn, Juffer, & Duyvesteyn, 1995). The present study proposes that both maternal responsiveness and maternal state of mind towards caregiving can be improved by an increase in maternal knowledge of infant development, and parenting skills specific to the mother-infant dyad. Interventions that are aimed at increasing the mother's accurate interpretation and appropriate response to their infant's communicative cues should increase positive parenting practices, maternal confidence in caregiving (Fish & Stifler, 1993), and improve the mother's psychological wellbeing.

Consequently, intervention strategies aimed at improving both maternal responsiveness and maternal state of mind (especially with regards to efficacy and confidence in caregiving) would be beneficial to the developmental relationship between

the mother and her infant. An intervention model that incorporates the suggested strategy is represented below.

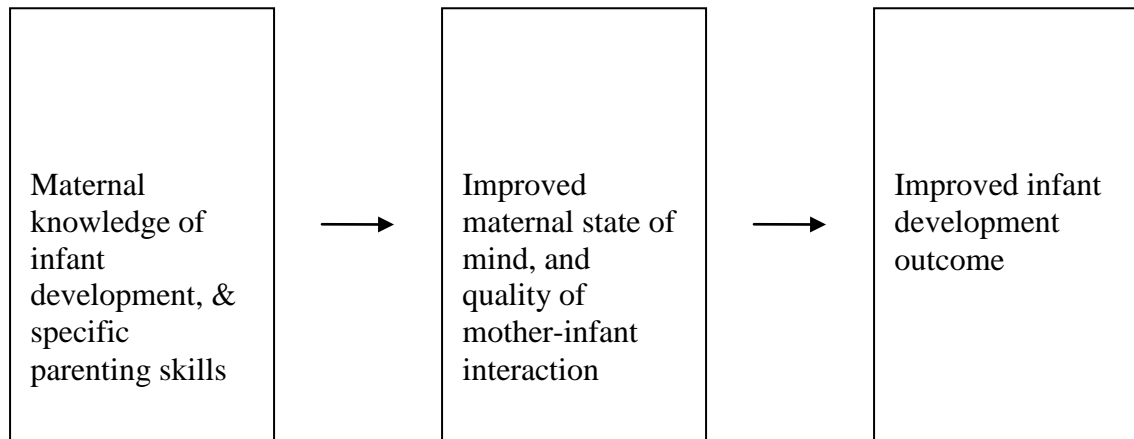


Figure 1. Intervention model for improving infant development outcome, by improving maternal knowledge of infant development.

#### *Intervention Strategies*

Interventions programs that use the transactional model of development (Sameroff, 1975) are aimed at identifying infant and maternal characteristics that influence or shape their behavior towards each other and the pattern of interaction developed between the mother and her infant. Intervention programs that applied the transactional model, and also focused on maternal understanding of her infant's cues have been found to improve at-risk infant-mother communication and interaction with regards to the infant's developing behavioral and emotional control (Olafsen, Ronning, Kaaresen, Ulvund, Handegard, & Dahl, 2006), attachment patterns and cognitive development (Sajaniemi, Makela, Salokorpi, von Wendt, Hamalainen, & Hakames-Blomqvist, 2001), and increased knowledge of infant behavior (Maguire, Bruil, Wit, & Walther, 2007). Longer, more intensive and therapeutic interventions appear to be less effective than short-term preventive interventions (van Ijzendoorn, Juffer, & Duyvesteyn,

1995). Intervention programs have also been used to teach mothers how to accurately interpret and effectively manage their infant's behaviors (Olafsen, Kaaresen, Handegard, Ulvund, Dahl, & Ronning, 2007). The present study builds on the work of the above-mentioned studies to show that intervention programs, aimed at increasing maternal responsiveness and sensitivity for infants living in low SES homes, can mediate the relations of economic adversity to infant developmental outcomes.

In summary, appropriate and responsive mother-infant interactions during the first year of life provide a premise for infants' attachment development (Ainsworth, Bell, & Stayton, 1971) and can also predict children's rate of development through the next three years of life (Landry, Smith, Miller-Loncar, & Swank, 1997). Research has found that children living in poverty are exposed to less stimulating experiences, receive less support at home and are also exposed to more negative conditions that hamper their socioemotional development (Corwyn & Bradley, 2005). A study linking chronic low income to harsh and neglectful parenting as a result of the attending stressful circumstances supports this view of hampered socioemotional development (Conger, Wallace, Sun, Simons, Mcloyd, & Brody, 2002), and infants from low SES homes have been found to show the characteristics of an insecure-disorganized attachment style (Lyons-Ruth et al., 1990).

Mothers of infants with secure attachment have been found to be more knowledgeable about their infants and appear to enjoy them more than mothers of less secure infants; they also notice their babies' signals and use the signals to guide their behavior (Pederson, Moran, Sitko, Campbell, Ghesquire, & Acton, 1990), therefore, maternal knowledge of infant needs is a significant predictor of infants' developmental

outcome (Seo, 2006). The transactional synchrony created by the bi-directional interaction between a mother and her infant fosters the development of a secure attachment relationship, and forms the basis of intervention programs that use a transactional model of development, in which maternal characteristics (i.e., pattern of responsivity) and knowledge of infant behavior fosters are applied in improving the quality of mother-infant interaction. The transactional model would suggest that the mother's responsiveness to her infant's communicative behavior can elicit increased infant communicative behavior, which in turn elicits increased maternal responsiveness.

Parenting is socially patterned (Brown, Cohen, Johnson, & Salzinger, 1998) and the parenting style found among the participants in the present study could be a result of an existing social pattern. This study provides insight into the interaction styles of the participating dyads in order to ascertain the effect of training in increased maternal knowledge of infant needs and appropriate responsivity on mother-infant relations. A change in the quality of interaction is hoped to change inadequate patterns of nurturing as found among the participants.

## CHAPTER 3: METHOD

Mother-infant interactions make up a significant portion of the relationship between a mother and her infant, and are the building blocks for young children's socio-emotional and cognitive development (National Institute of Child Health and Human Development, 2006). The present study used a single-subject research design to examine the interaction patterns between adolescent mothers and their infants from low SES homes, with the aim of implementing intervention training in order to improve the quality of maternal responsiveness to their infant's communicative behaviors. The questions guiding the present study are:

- a) Does maternal responsiveness increase with the implementation of a training intervention for improved parenting? and,
- b) Does infant communication increase or decrease with improvements in maternal responsiveness?

The hypothesis was that increased maternal knowledge of overall infant development, as well as appropriate maternal responses specific to each dyad would show an improvement in the quality of mother-infant interactions, as well as increased infant communicative cues.

### *Setting*

The present study was conducted in an inclusive Early Head Start center in the southern United States, serving children 6 weeks to 3 years of age. The center offers child care and early learning opportunities for infants and their parents. Enrollment includes the infants of both adolescent and adult mothers. The program is a full-day comprehensive program that also offers parent education and mental health services.

### *Participants*

The mother-infant dyads targeted for inclusion in the study included mothers over 18 years of age and their infants 0-12 months of age. Seven mothers were eligible for inclusion in the study. Letters requesting their participation in the study were given to them personally by the author or the center staff. The letters also contained information about an incentive for participation in the study, in the form of registration for their babies in *The Little Bookshelf* program, an initiative of the Research and Extension arm of the College of Agriculture at Louisiana State University, aimed at encouraging parents to read to their children as early and as often as possible. The parents were each given 12 age appropriate books for their infants for participating in the study (i.e., at the beginning of the study, before and after intervention, and finally at the end of the study).

Five parents responded to the requests for participation, out of the five recruited, two dropped out of the study for personal reasons leaving three mother-infant Dyads. Dyad 1 included an 18 year old mother and her 7 month old infant; Dyad 2 had an 18 year old mother and a 4 month old infant, and Dyad 3 was an 18 year old mother and her 10 month old baby. The infants' level of mobility consisted of crawling for the infants in Dyads 1 and 2, while the infant in Dyad 3 was just beginning to walk with assistance from an adult. The infants from Dyads 1 and 3 had no siblings. All the participating mothers included as participants in the study were African American, single parents and were enrolled as seniors in high school at the time of the study, although by the end of the study only the mother in Dyad 3 graduated: the mother in Dyad 2 dropped out of high

school for undisclosed reasons and the mother in Dyad 1 planned to graduate after summer school. Two out of the three mothers worked part-time.

### *Right-from-Birth Training Materials*

The Right from Birth: A Parenting Series (Grace & Lindsey, 2003) training was used for the planned intervention. This training is based on the best-selling parenting guide, *Right from Birth: Building Your Child's Foundation for Life* by Sharon and Craig Ramey (1999). The book summarizes scientific findings about how best to promote child development, and highlights seven daily essential and interactive activities for positive caregiving culled from years of research (Ramey & Ramey, 1999). The *Right-from-Birth* training provides concrete suggestions about caregiver behavioral responses that are appropriate at various infant developmental stages. The *Right-from-Birth* training is aimed at giving participants a fuller appreciation of a child's developmental stages during the first eighteen months of life, and a more balanced and enjoyable approach to parenting. Part of the training includes information on responsive caregiving, as well as the correct interpretation of their infant's communicative cues. The topics for the training include the following: (a) the wonders of the brain, (b) people skills in infancy, (c) learning and intelligence, (d) the many worlds of infancy, (e) the seven essentials, (f) getting oriented and building trust: the first month, (g) discovering the world: two to three months, (h) becoming a social being: four to six months, (i) thinking and experimenting: 7 to 10 months, (j) independence: 11 to 14 months, and (k) self-competence: 15 to 18 months.

The *Right-from-Birth* training concept supports the intervention model previously discussed (see Figure 1), and the definitions used for appropriate maternal responsiveness

are consistent with previous research on maternal behavior conducive to the infant's attachment development (Wallach & Caulfield, 1998). As noted previously, a supportive environment, adequate maternal physical contact, a synchrony of responses between the mother and her infant and mutual delight between mother and infant when they are in each other's company provide the foundation for appropriate maternal responsiveness. Both the training and the model propose that increased maternal knowledge in child development topics leads to an increase in appropriate maternal responsiveness to infant communication, and improved child development outcomes. Previous research with early childhood caregivers demonstrated an increase in appropriate caregiver responsiveness following training using the *Right-from-Birth* materials (Ota, DiCarlo, Burts & Laird, 2005).

### *Behavior Definitions*

*Infant communicative behaviors.* Infant communicative behaviors are defined as any vocal or non-vocal behavior exhibited by the infant in the presence of the mother that can be interpreted as an indication of the infant's need at a specific point in time.

Behaviors include the following:

*Eye gaze* was defined as the infant looking at the mother, then looking at an object, then looking back at the mother within 3 seconds of the infant's initiated communicative behavior (Vaughan et. al., 2003). Focusing on an object in the absence of looking at the mother as described above was not considered communicative.

*Vocalizations* were defined as any sound made by the child, either pleasant or unpleasant.

*Reach/gesture* was defined as arm movement or movement toward an object.

*Manipulation* was defined as exploration/interaction with a material using hands, feet, or mouth. Manipulation also includes mouthing the hands or the feet.

*Smiling* was defined as infant smiling at the mother or other stimuli in the environment.

*Mother responsive behaviors.* Mother responsive behaviors are defined as any maternal verbal or nonverbal behavior that is directed toward the infant *in response* to an infant's communicative behavior (see above) within 3 seconds of the infant's communicative behavior. Based on the categories provided by the *Right-from-Birth* training, maternal responsive behaviors were identified as positive or negative. *Positive behaviors* are actions which are generally viewed as resulting in desirable developmental outcomes for children, whereas *negative behaviors* are generally viewed as actions leading to poor developmental outcomes for children. Both positive and negative categories are further sub-categorized as *positive active* and *negative active* behavior.

*Positive active behaviors* are actions that the mother exhibits within the immediate interaction with the infant that encourage interaction, examples include holding (only when the child is picked up AFTER a communicative behavior is exhibited), smiling, talking to the infant (using comments that are related to what the child is doing), and/or presenting an object in response to an infant communicative behavior. If the child was being held while he exhibited a communicative behavior, it was NOT counted as a maternal responsive behavior if she merely continued to hold the child; the mother's behavior had to be in response to the child's behavior to be considered responsive. Mother responsive behavior was not coded if the mother exhibited any of the above behavior in the absence of an infant communicative behavior.

*Negative active behaviors* are maternal actions that are exhibited within the immediate interaction with the infant that do not encourage interaction, examples include using a negative tone while talking to the infant, restricting the infant's play or activity, and not responding to the infant's vocalizations. Taking a material away from the child, even if the material is not appropriate for the child to have access to, was coded as negative active behavior; the focus of the intervention was infant development, which included training on creating a safe environment and providing appropriate materials for very young children.

### *Experimental Design*

A single subject research design was used to measure infant communication and maternal responsivity prior to and following the training intervention. A single subject design allows for the introduction of different conditions to a research study, and the assessments of the effects of these different conditions on the individual's behavior. In single-subject designs, individuals are compared to themselves instead of other groups (Alberto & Troutman, 2006), and the results of single subject research designs typically provides pertinent information about beneficial treatment for an individual participant (e.g., mothers, childcare providers). In single-subject study, the strategy is to increase confidence in the occurrence of a relationship between treatment and improvement by replicating the procedures and the effect across the subjects. An advantage of this clinical application of the single subject research design is that a treatment intervention can be applied to an individual to determine its effectiveness before applying the treatment intervention to another individual or behavior, or to determine what type of treatment intervention is needed by an individual subject.

A multiple baseline design (Kazdin, 1982) was used to measure the impact of the training intervention across Dyads. With this design, the intervention is provided to the mothers in a time-lagged process and not at the same time, in order to allow comparisons between the mothers. Multiple baseline design also allows for the evaluation of an independent variable (i.e., intervention training) by comparing behavior during baseline and intervention conditions; there is no need to withdraw the intervention in order to demonstrate experimental control, and if the intervention effects do not include the desired behavior change, the intervention can be modified (Kazdin, 1982).

The intervention was introduced to the mothers sequentially (i.e., intervention training was delivered in a time-lagged process the mothers did not receive intervention all at the same time, but one after another as the study progressed) in order to assess behavior changes upon the implementation of the *Right-from-Birth* intervention. For example, as Dyad 1 received intervention, Dyads 2 and 3 continued with baseline observations. Subsequently, when intervention training was delivered to Dyad 2, observations remain stable in baseline condition for Dyad 3 (see Figure 2). This procedure allows for maternal and infant behavior comparisons between the Dyads. During the intervention sessions, intervention procedures were reviewed with each mother following a session where the mother engaged in behavior that was not in alignment with the intervention. Replication of the intervention across mothers provides evidence of a functional relationship between the independent (i.e., the intervention training) and the dependent (i.e., maternal responsive behaviors) variables.

### *Observation Procedures*

Video-recorded observations were conducted by the author and her major professor, both of whom also served as the data collectors. Data collectors were trained using both written instructions and feedback during the practice sessions to teach behavior definitions, the interval recording procedures, and the ethics of observational research, until 80% reliability was achieved between the data collectors. Video-recorded observations were conducted at the center in either the infants' classrooms, outside on the playground when the mothers came to pick up their infants at the end of the day, or in any available room with toys and play objects provided if the first two options were unavailable. One of the observations was conducted in the mothers' home. During most of the classroom observation sessions, the teacher was able to relocate all the other children to another classroom so that the observations could go on uninterrupted. In the event that the children could not be relocated, the observations were carried out with other children in the room. Mother-infant interactions were video-taped during 10-minute free play sessions during which the mothers were asked to 'do what they would normally do' with their infants. At the end of the post intervention observations, mothers were asked if they had learned anything new from the intervention training, as a conclusion of the study.

Mother-infant interactions were coded using partial and whole interval recording systems. Partial interval recording involves recording the occurrence of a discrete behavior when it happens at any time during the duration of a set interval (Alberto & Troutman, 2006), while whole interval entails recording behavior that has a long duration

of occurrence (i.e., the behavior consumes the entire interval) (Alberto & Troutman, 2006).

A datasheet was used to record maternal responsivity and infant communicative behaviors (see Appendix A). The 10 minute free play sessions were divided into 15 second intervals; a duration that was expected to be adequate in capturing the frequency of infant and maternal behaviors exhibited during interaction. Both types of interval recording were used in coding infant and maternal behaviors during the 15 second intervals of the 10 minute free play sessions. For partial interval recording, infant or maternal behavior was coded as having occurred if observed at any time during the 15 seconds of the interval. Whole interval recording was used in coding *No response* behaviors, which occurred if the infant did not engage in communication for the entire interval, or if the mother did not respond during the entire interval, as such *No response* behavior lasted throughout the duration of the interval.

### *Baseline*

The purpose of collecting baseline data was to establish the infant's rate of communicative behavior and the mother's rate and type of positive or negative responsiveness. Infant communicative and maternal responsive behaviors were observed during 10-minute sessions until a stable pattern of behavior was observed, as required for baseline observations (Kazdin, 1982), where a stable pattern of behavior refers to a consistency in the rate and type of maternal responsive behaviors across observations. Mothers and their infants were observed playing and interacting with one another. Maternal responses were targeted in order to establish the type and frequency of responses the mothers consistently provided to their infants during communicative

interactions. Mothers were not given any information or feedback about their behavior during baseline observations, and the maternal behaviors that were observed were categorized as either positive active or negative active (see *Behavior Definitions*).

Baseline for positive maternal responses for Dyad 1 consisted of 4 data points, 4 data points for Dyad 2, and 4 data points for Dyad 3.

### *Right-from-Birth Intervention*

Once a stable pattern of maternal responsive behavior was observed (as indicated by behavior frequencies that do not fluctuate greatly), the author, also serving as the trainer, met with each mother individually to deliver the intervention training using the *Right-from-Birth* training materials. The training was aimed providing mothers with a general overview of infant development, and also helping mothers correctly interpret their infant's communicative behavior (i.e., which behavior is trying to communicate what), and respond appropriately. Each mother was provided with information about her infant's general development up until the infant's age at the time of intervention, and then made aware of what to expect in the coming months of infancy. For Dyad 1, the infant was 7 months old at the time of intervention. The training included topics from (a) the wonders of the brain up to (i) thinking and experimenting: 7 to 10 months. Pertinent developmental milestones to expect were addressed in the later topics as an overview in order to provide the mother a complete picture of infant development. For Dyad 2, the infant was 3 months old at the time of the intervention. The training included topics from (a) the wonders of the brain up to (h) becoming a social being: four to six months. The mother was then given an overview of the developmental milestones to expect in the future. For Dyad 3, the infant was 12 months old at the time of the intervention. The

intervention training included topics ranging from (a) the wonders of the brain up to (j) independence: 11 to 14 months. As with Dyads 1 and 2, the mother in Dyad 3 was provided with an overview of pertinent information about the developmental milestones to expect with her infant. The intervention training was further individualized to each mother. Specific examples from baseline video-recorded observations of mother-infant interactions for each dyad were referenced in order to highlight the appearance and function of observable infant behaviors, to pinpoint positive or negative maternal responses to infants' behaviors, as well as address specific challenges in maternal responsiveness.

As stated previously and in order to fulfill the requirements of a multiple baseline across subjects, the training was delivered to the mother-infant dyads in a time-lagged procedure, with the training sessions delivered by the same trainer. The data collection following the intervention training was conducted in a manner identical to baseline. Intervention consisted of 3 data points for Dyad 1, 3 data points for Dyad 2 and 3 data points for Dyad 3 as well.

#### *Interobserver Reliability*

Interobserver reliability refers to the evaluation of how well the data from separate observers correspond (Cooper, Heron, & Heward, 1987; Kazdin, 1982). It is argued that if multiple observers independently record the same behavior, their data reflects the actions of the participants (Kazdin, 1982). Interobserver reliability requires average inter-observer agreements of 80% or higher (Cooper, et al., 1987; Kazdin, 1982). Interobserver reliability checks were conducted on 20% of all observation sessions for each Dyad (i.e., one observation each for baseline and post-intervention phases for each

Dyad). Agreements or disagreements between both observers on specific behaviors were recorded, and the observers' interval-by-interval recording was compared directly to see whether both observers recorded a particular response as occurring during each interval (Kazdin, 1982). Interobserver agreement was calculated across observations by dividing the agreements of the observers on specific 10 minute sessions by the number of agreements plus disagreements and multiplied by 100 to arrive at a percentage. Specifically, Dyad 1 averaged 96% (range, 92-100%) for infant communication (i.e. both observers agreed that in 96% of the total intervals within a 10 minute session, infant communicative behavior occurred), 88% (range, 82-94%) for positive active maternal responses, and 86% (range, 80-94%) for negative active maternal responses. Dyad 2 averaged 86 % (range, 85-87%) for infant communication, 82% (range, 80-85%) for positive active maternal responses, and 92% (range, 90-94%) for negative active maternal responses; while Dyad 3 averaged 97% (range, 95-100%) for infant communication, 92% (range, 88-97%) for positive active maternal responses, and 92% (range, 88-97%) for negative active maternal responses.

## CHAPTER 4: RESULTS

This study focused on the communicative behavior of infants and their mothers' responsivity, with specific emphasis on the effect of *Right-from-Birth* intervention training on maternal responsivity towards infant communications. In order to analyze the proposed mother-infant interaction, the percentages of intervals with child-initiated communications and positive or negative maternal responses were examined. Interaction completions consisted of infant communication and appropriate maternal responses. Percentages were calculated by dividing the number of each behavior by the total number of intervals per session. Total number of infant behaviors was divided by total number of intervals, and total number of maternal responses was divided by total number of intervals. Results are presented for each mother-infant dyad across baseline and intervention as shown in Figure 2, with sessions shown chronologically.

During baseline, infant communication and positive maternal responses varied for each Dyad (see Figure 2). After the *Right-from-Birth* intervention, results showed a level change in average maternal responsivity between baseline and intervention for each mother. For Dyad 1, the baseline average for positive maternal responsivity was 39% (range, 25-55%), and infant communication averaged 74% (range, 65-85%) of the observed intervals. During intervention for Dyad 1, positive maternal responses averaged 75% (range, 70-79%); a 36% increase, and infant communication averaged 91% (range, 89-95%); a 17% increase. For Dyad 2, the baseline average for positive maternal responses was 30% (range, 23-40%), and infant communication averaged 47% (range, 35-67%) of the observed intervals. During intervention for Dyad 2, positive maternal responses averaged 48% (range, 47-50%); an 18% increase, and infant communication

averaged 53% (range, 50-55%); a 5% increase. For Dyad 3, the baseline average for positive maternal responses was 53% (range, 48-65%), and infant communication averaged 85% (range, 73-95%) of the observed intervals. During intervention for Dyad 3, positive maternal responses averaged 67% (range, 50-88%); a 14% increase, and infant communication averaged 96% (range, 95-100%); an 11% increase.

Negative maternal responses in all the dyads showed a decrease after intervention. For Dyad 1, the baseline average for negative maternal responses was 24% (range, 12-35%). During intervention, average negative maternal responses was 4% (range, 0-13%). For Dyad 2, baseline average for negative maternal responses was 16% (range, 8-25%), after intervention, average negative maternal responses was 1% (range, 0-2%). For Dyad 3, baseline average for negative maternal responses was 13% (range, 3-22%), after intervention average negative maternal responses was 2% (range, 0-7%).

### *Dyadic Interaction*

Positive and negative maternal responsivity was calculated as a percentage of infants' communication. Specifically, the number of positive maternal responses was divided by the number of infant communications; the same calculations were made for negative maternal responses. These calculations were made in order to establish the degree changes in interactional synchrony between the dyads. The expectation of the present study was that dyadic interaction would be at 100% (i.e., as the infant's communication increased, maternal positive responses would also increase at a rate matching the infant's communication). On Figure 2, this data is represented in the difference between the data points showing the percentage of maternal responsivity and the data point showing the percentage of infant communication during the same session.

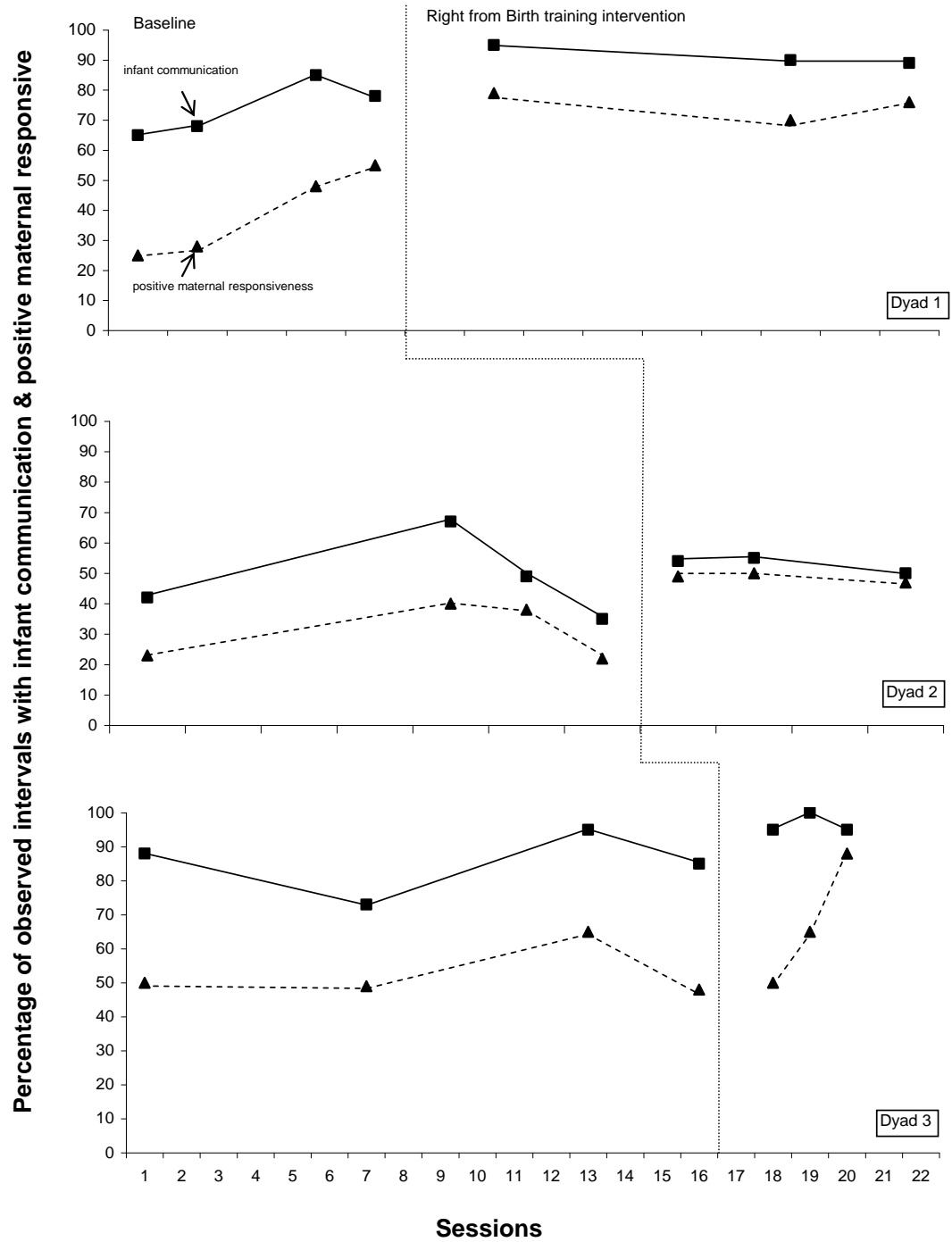


Figure 2. Percentage of observed intervals with infant communication and positive maternal responses.

Table 1 shows a summary of changes in positive maternal responsivity across baseline and intervention for all Dyads.

Table 1  
Average Positive Maternal Responses and Infant Communication across Baseline and Intervention

	Baseline	RFB Intervention	Increase	Decrease
<b>Dyad 1</b>				
Infant communication	74%	91%	17%	
Positive maternal responses	39%	75%	36%	
Negative maternal responses	24%	4%		20%
<b>Dyad 2</b>				
Infant communication	47%	53%	5%	
Positive maternal responses	30%	48%	18%	
Negative maternal responses	16%	1%		15%
<b>Dyad 3</b>				
Infant communication	85%	96%	11%	
Positive maternal responses	53%	67%	14%	
Negative maternal responses	13%	2%		11%

During baseline, positive maternal responsiveness averaged 51% (range, 38-71%) for Dyad 1, 64% (range, 56-78%) for Dyad 2, and 62% (range, 56-68%) for Dyad 3. Negative maternal responses averaged 29% (range, 16-35%) for Dyad 1, 34% (range, 21-56%) for Dyad 2, and 15% (range, 4-26%) for Dyad 3.

After intervention positive maternal responsiveness averaged 81% (range, 77-85%) for Dyad 1, 91% (range, 90-95%) for Dyad 2 and 74% (range, 56-88%) for Dyad 3. Negative maternal responses averaged 4% (range, 0-14%) for Dyad 1, 1% (range, 0-5%) for Dyad 2 and 2% (range, 0-7%) for Dyad 3. The results after intervention showed increases in positive maternal responses of 30%, 27% and 12% for Dyads 1, 2 and 3 respectively, and decreases in negative maternal responses of 25%, 33% and 13% for Dyads 1, 2 and 3 respectively.

## CHAPTER 5: DISCUSSION

The present study sought to improve maternal responsiveness by using the *Right-from-Birth* training program to provide an increase in maternal knowledge of infant development to adolescent mothers from low SES backgrounds. Specifically, the research questions included:

- a) Does maternal responsiveness increase with the implementation of a training intervention for improved parenting? and,
- b) Does infant communication increase or decrease with improvements in maternal responsiveness?

The results of the present study indicated that the training increased the average amount of observed positive maternal responsiveness, and decreased the average amount of negative maternal responsiveness. This is consistent with previous research showing that the *Right-from-Birth* training was effective in increasing positive caregiver behaviors (Ota, DiCarlo, Burts, & Laird, 2005), as well as an intervention study targeting maternal responsiveness to facilitate greater growth in targeted infant social, emotional, communication, and cognitive development (Landry, Smith, and Swank, 2006). Infant communication also increased with the level changes in maternal responsiveness across Dyads 1, 2, and 3 (7%, 6%, and 11%, respectively).

The procedures for the intervention training and the results observed represent the suggested model of infant developmental outcome discussed previously (see Figure 1). The transactional model of development noted earlier was highlighted in the interactions between the mother and the infant in each Dyad, especially after the intervention training. The information provided to the mothers helped them increase in the degree of bi-

directional interplay experienced (Miller, 1993) with the mother's increased responsivity eliciting increased communication from the infant. Appropriate maternal responses, especially after the intervention session, emphasized the interactional synchrony noted by Gratier (2003); the well timed and rhythmic interaction between the mother and her infant as it pertains to encouraging, mentoring, celebrating, rehearsing, protecting, communicating, and guiding brain development and infant learning (Grace & Lindsey, 2003). Evidence of this interactional synchrony is shown in the following highlights.

During baseline the mother in Dyad 1 appeared distant from her infant, was not very verbally communicative and tended not to comfort him during times of distress. She also engaged in teasing him with his pacifier. The mother appeared to be lacking in the energy required to interact with her infant as she would sometimes sit or partly lie next to the infant and just watch him play with toys or interact with the teacher without interacting with him. After intervention, the mother's responsivity to her infant's cues became less random and more in tune with the infant's communication; a synchrony that came from a better understanding of her infant's cognitive processes and emotional needs, as provided by the training intervention. The infant also showed marked increases in vocalization during intervention sessions. This increase, however, cannot be definitively attributed to the concurrent increase in maternal responsivity; the increase could be due to the infant's normal developmental trajectory.

The mother in Dyad 2 also displayed limited maternal verbal communication with her infant, showed periods of infant over stimulation and inappropriate responses to the child's gestures and vocalizations towards a toy/object; a communicative cue indicating her desire to play with the toy. She also engaged in teasing the infant with her pacifier

and inappropriately interpreting the infant's cues for interaction, for example, while interacting with her infant she held her by the torso, thereby restricting the infant's movements and ability to play, and she also tended to exhibit intrusive parenting by bringing her face close to the infant's face in her attempts to interact with the infant; her behavior sometimes made the infant cry. Similar to the mother in Dyad 1, the mother in Dyad 2 also appeared to be lacking in the energy required to communicate with her infant. After intervention, she became more responsive to her infant's communications and the amount of appropriate responses to her infant's cues increased (for example, the incidents of intrusive parenting decreased after intervention, and she responded appropriately to her baby's cues of over-stimulation). The infant also exhibited increased vocalizations similar to the infant in Dyad 1.

The mother in Dyad 3 engaged in taking away the child's toy to get her to play with another toy, teasing her infant with a pacifier and sometimes ignoring or incorrectly interpreting the infant's cues for play. After the intervention training, she stopped teasing her, and the number of times she took away the infant's toys or diverted her from one play area to another decreased. She also improved in the area of following the infant's lead during mother-infant interactions.

Results of maternal responsivity obtained as a percentage of infant communication help to corroborate the impact of intervention training on maternal responsivity. The expectation of the study was that maternal positive responsiveness covaries or matches infant communication; as infant communication increases; maternal responsivity should increase as well. The increases in maternal responsivity between

baseline and intervention sessions confirm this expectation and allow support for the efficacy of the intervention.

The increases evidenced above indicate a more coordinated interaction between the mother and her infant; a bi-directional interplay showing the mother's responsivity being increased by understanding her infant's behavior, and the infant's behavior also being affected by the mother's responsive behavior. The mother and her infant are essentially feeding off one another to arrive at a synchrony of interaction. This pattern of interdependence in communication and responsivity is consistent with the concept of a transactional model of development (Sameroff & Chandler, 1975; Wijnroks, 1999; Barry et. al., 2005); an increase that predicts positive developmental outcomes for the child, particularly attachment security (Parlade, et. al., 2009; Wallach & Caulfield, 1998). This increase in positive maternal responses and infant communication was commented on by one of the caregivers at the program center, who noted that the mother from Dyad 2 had been making more enquiries about her infant's everyday activities in the classroom, suggesting that the intervention training might have increased the mother's desire to be more involved in her infant's experiences; a behavior also consistent with transactional development (Sameroff & Chandler, 1975; Wijnroks, 1999; Barry et. al., 2005).

Results also indicate a level change in negative maternal responses between baseline and intervention sessions. During baseline observations mothers were noted to take away objects from their babies as they played to protect them from inappropriate or unsafe objects. Even though they were right to do this, such behavior was coded as negative active responses within the context of this study because such behavior disrupts the infant's experience of his/her environment. After the intervention training, the

mothers were less inclined to take objects away from their infants because they had taken care to ensure a safe environment for their infants before hand.

At the end of the study, the mothers were asked if they had taken anything away from the study. The mother from Dyad 2 said that the intervention's emphasis on safety in the environment had made her confident in her previous inclinations to be mindful of who is around her infant, and her attempts to ensure a safe play environment for her infant. The mother from dyad 3 said that she had always thought it was normal to tease her infant, but after the intervention training which highlighted the importance of a warm, positive and nurturing environment for children, she learned not to tease her infant. The mother from Dyad 1 asserted that she had previous knowledge of all the topics that had been discussed during the *Right-from-Birth* intervention training. The responsivity addressed during the intervention was, however not exhibited by the mother during baseline observations, indicating a need for the intervention. The mother from Dyad 3 also mentioned, at the beginning of the study, that she did not think she needed to attend any training programs on parenting as she felt that she had enough experience with children, having helped to take care of her sister's children. At the end of the study, however, she did state that she had learned some things about nurturing her infant; an indication that she realized she did not know everything about caregiving as she had previously asserted. These responses attest to the concept of 'naively confident' mothers, as proposed by Davis (1989), who were the least knowledgeable about child development, but maintained high confidence in their parenting abilities. These mothers were found to have the least positive interactions with their infants (Conrad et al., 1992; Davis, 1989). Davis suggested that such mothers might experience difficulties becoming

involved in intervention programs as they would question very little about their parenting skills and knowledge, and remain unaware of their children's developmental needs. This study therefore highlights the importance of individualized trainings that first assesses participants' specific needs in the area of parenting training before the implementation of the training.

### *Limitations*

As noted previously, infant communicative behaviors increased for dyad 1, but causality cannot be definitively attributed to the mother's increased maternal responsivity because other factors unknown to the research conditions might have influenced the increase in infant communication noted. The argument can be made, however, that due to the brevity of the study and the observations of the infant's vocalizations made during baseline, it could be assumed that the infant's improved vocalizations during post-intervention observations was not due to maturation, but some other motivational factor, such as the mother's increased responsivity.

Meeting times were problematic for Dyad 3, causing intervention data to be somewhat incomplete. Although positive changes were observed, subsequent data were not collected due to scheduling difficulties. This could be a result of the mother's perception of the value of the intervention (she perceived that she already knew what her infant needed) paired with the timing of the study, which coincided with the end of the year high school graduation.

### *Clinical Implications*

The results of this study indicate the need for organizations or institutions to assess an individual's degree of knowledge, experience or state of mind, before

implementing training in order to achieve effective results. With reference to the two mothers who said that they either did not need training in caregiving or had learned nothing during intervention, but showed increased responsivity after intervention, the individualized approach to baseline assessment and interventions highlighted specific needs that they have in terms of caregiving. The Early Head Start center could provide caregiving knowledge assessment for mothers periodically in order to establish what knowledge particular mothers might be lacking, and provide it during parent trainings.

Most other intervention programs aimed at increasing maternal responsivity by targeting improved mother-child interactions have been home-based models that teach parenting skills to the mothers in their homes, but adolescent mothers might find it difficult to participate in either home-based models or center-based models (as used in the present study) due to a demanding daily schedule that might include school, work and other obligations, as is evidenced in the schedules of the participating mothers in the present study. The participating mothers in the present study were also difficult to keep engaged in the study for the entire duration, especially the Dyad 3 mother. This lack of engagement has been evidenced in other research with adolescent mothers (Korfmacher & Marchi, 2002; Osofsky, Culp, & Ware, 1988), and could be attributed to the mothers' perception of the value of the intervention. One solution could be to offer both home-based and center-based trainings in order to provide alternate options to adolescent mothers whose challenging schedules might be difficult to work with if implementing only one training model.

### *Future Research Implications*

Previous studies in mother-infant interactions with adolescent mothers have been shown to be deficient in assessing and incorporating the mother's perspective about motherhood and nurturing, leading to a disharmony in the goals of the intervention and possible lack of engagement in the study ( Phoenix, 1991; Tilbury, Moynihan & Siddle, 1990; Healy & Piele, 1995), as is evidenced in the present study. Future research needs to incorporate strategies to encourage adolescent mothers to share their understanding of their circumstances and their responsibilities as mothers so that the intervention effects can be more in-depth results, and also to ensure behavior maintenance across time. More long term research is also needed to determine the duration of the behavior change and possible regression of behavior.

As noted previously, an increase in infant communication is arguably influenced by maternal responsivity and not maturation. Future research should address measures that can be implemented to control for external variables in order to provide a more accurate picture of co-variation in behavior between the mother and her infant, as well as a valid attribution of causality to the intervention training.

Data collection for this study was extremely difficult as some of the mothers became largely unresponsive after a 2 or 3 observation sessions. Due to the nature of the sampling procedure for this study, the participating parents were low-income, adolescent, high-school single mothers, and all were also graduating high school seniors. Consequently, time management challenges might have caused their inability to keep appointments. The mother in Dyad 3 specifically was very difficult to keep in touch with as she said she had various commitments at work and had to make preparations for

graduation. Future research could incorporate time management strategies into the intervention training, and also conduct the study at a period in the school year with a slower academic pace; perhaps at the beginning of the semester.

### *Conclusion*

The underlying idea of the present study was to expose mothers to the awareness of the importance of the quality of their interactions with their infants these interactions contributed to their infants' cognitive, social and emotional development. The use of the *Right from Birth* intervention training to increase maternal knowledge of infant development and pertinent parenting skills appears to have been effective in achieving the desired aim of promoting positive child development. Although the information about infants' influence on maternal behavior was inconclusive, there is still a contribution that both mother and infant make towards their unique interaction pattern and hopefully, early intervention will promote parental awareness of their infant's communicative cues, a secure mother-infant attachment relationship and more positive life-span development.

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APPENDIX A: LSU INSTITUTIONAL REVIEW BOARD APPLICATION

**Application for:  
Approval of Projects Which Use Human Subjects**

This application is used for projects/study's that cannot be reviewed through the exemption process.



Institutional Review Board  
Dr. Robert Mathews, Chair  
203 B-1 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
F: 225.578.6792  
irb@lsu.edu | lsu.edu/irb

- > Applicant, Please fill out the application in its entirety and include two copies of the completed application as well as parts A-E, listed below. Once the application is completed, please submit it to the IRB Office for review and please allow ample time for the application to be reviewed. Expedited review usually takes 2 weeks. Carefully completed applications should be submitted 3 weeks before a meeting to ensure a prompt decision.
- > A Complete Application Includes All of the Following:
  - (A) Two copies of this completed form and two copies of parts B thru E.
  - (B) A complete copy of any grant proposal relevant to the project.
  - (C) Copies of all instruments to be used.
    - If this proposal is a part of a grant application, include a copy of the grant proposal, the investigative brochure (if one exists) and any recruitment materials including advertisements intended to be seen or heard by potential subjects.
  - (D) The consent form that will be used. A copy of the Waiver of Signed Informed Consent is attached and must be completed only if there is the intention to use an unsigned consent form. The **script to be used as the unsigned consent script MUST be included** with the waiver of signed informed consent.
  - (E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: <http://php.nihtraining.com/users/login.php>.

1) Principal Investigator\*: Cynthia F. DiCarlo Rank: Assistant Professor  
 \*PI must be an LSU Faculty member  
 Dept.: Human Ecology Ph: 578-7005 E-Mail: cdicar2@lsu.edu

2) All Co Investigators: please include department, rank, phone, and e-mail for each  
 Chinwe Onwujuba, Human Ecology, Graduate Student, 578-7007, conwuj1@lsu.edu  
 Sarah Pierce, Human Ecology, Associate Professor, 578-1725, pierce@lsu.edu

3) Project Title: Attachment Behaviors between Mothers and Infants.

4) Proposed Start Date: 11-08 5) Proposed Duration Months: 4 months  
 6) Number of Subjects Requested: 10 dyads 7) LSU Proposal# \_\_\_\_\_  
 8) Funding Sought From: Department of Social Services

<input checked="" type="checkbox"/>	IRB# <u>2008-02</u>
<input checked="" type="checkbox"/>	LSU Proposal# _____
<input checked="" type="checkbox"/>	Human Subjects Training
<input checked="" type="checkbox"/>	Complete Application
<input checked="" type="checkbox"/>	Expedited
<input type="checkbox"/>	Full

Study Approved By:  
 Dr. Robert C. Mathews, Chairman  
 Institutional Review Board  
 Louisiana State University  
 203 B-1 David Boyd Hall  
 225-578-8692 | [www.lsu.edu/irb](http://www.lsu.edu/irb)  
 Approval Expires: 8-1-10

APPENDIX B: LSU INSTITUTIONAL REVIEW BOARD APPROVAL

ACTION ON PROTOCOL APPROVAL REQUEST



Institutional Review Board  
Dr. Robert Mathews, Chair  
203 B-1 David Boyd Hall  
Baton Rouge, LA 70803  
P: 225.578.8692  
F: 225.578.6792  
[irb@lsu.edu](mailto:irb@lsu.edu) | [lsu.edu/irb](http://lsu.edu/irb)

TO: Cynthia DiCarlo  
Human Ecology

FROM: Robert C. Mathews  
Chair, Institutional Review Board

DATE: September 25, 2008  
RE: IRB# 2883

TITLE: Attachment Behaviors between Mothers and Infants

New Protocol/Modification/Continuation: New Protocol

Review type: Full  Expedited  Review date: 9/25/2008

Risk Factor: Minimal  Uncertain  Greater Than Minimal


Approved  Disapproved

Approval Date: 9/25/2008 Approval Expiration Date: 9/24/2009

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: 10

Protocol Matches Scope of Work in Grant proposal : (if applicable) N.A.

By: Robert C. Mathews, Chairman 

**PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –  
Continuing approval is CONDITIONAL on:**

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects\*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. SPECIAL NOTE:

*\*All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.fas.lsu.edu/osp/irb>*

## APPENDIX C: CONSENT FORM

1

1. **Study Title:**  
Attachment Behaviors between Mothers and Infants
2. **Performance Sites:**  
Homes and Sites in the Community
3. **Contacts:** M-F 8:30 a.m. – 3:00 p.m.  
Dr. Cynthia Dicarlo, Assistant Professor, (225) 578-7005  
Chinwe Onwujuba, graduate student, (225) 578-7007; 24-hour contact: 225-326-4207  
Dr. Sarah Pierce, Associate Professor, (225) 578-1725
4. **Purpose of the Study:**  
The purpose of the present study is to examine communicative behavior in infants and facilitative responsiveness in mothers. Mother-infant dyads will be videotaped and analyzed to determine 1) the rate by which infants produce communicative behaviors, and 2) the percentage of behaviors that are responded to by the mother.
5. **Subjects:**
  - A. **Inclusion Criteria**  
Mothers who are older than 18 years of age who have infants younger than 1 year of age.
  - B. **Exclusion Criteria**  
Mothers who are younger than 18 years of age and/or have infants older than 1 year of age.
  - C. **Maximum number of subjects:** 10 mother-infant dyads
6. **Study Procedures:**  
Each mother-infant dyad will be videotaped for a 20-minute period on approximately 6 occasions. After coding several video segments, researchers will formulate an individual intervention to help the mother identify her infants subtle or ambiguous communicative behavior and teach the mother responsive strategies. This will be achieved through the viewing of the specific mother-infant videos, discussion, handouts, and feedback sessions.
7. **Benefits:**  
After intervention, mothers may become more responsive to their infants' communicative behaviors, which may in turn lead to more communicative behavior from the infant.
8. **Risks/Discomforts:**  
There are no known risks for participation in this study.
9. **Measures taken to reduce risk**  
There are no known risks for participation in this study.
10. **Right to Refuse:**  
Participation in the study is voluntary and subjects may change their mind and withdraw from the study at any time without penalty.
11. **Privacy:**  
This study is confidential. Results of the study may be publicly presented for educational purposes and no identifying information will be included in the presentation. Specific information concerning a child other than their own, will not be shared with parents.
12. **Financial Information:**  
No incentives will be delivered.
13. **Withdrawal:**  
Subjects may withdraw at any time.

**14. Removal:**

Individuals will be removed from the study at their request.

**15. Signatures:**

'The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, LSU Institutional Review Board, (225)578-8692. I agree to participate in the study described above and acknowledge the researchers' obligation to provide me with a copy of this consent form if signed by me.'

My child, \_\_\_\_\_, has permission to participate in the "Attachment Behavior between Mothers and Infants" study.

Parent Signature \_\_\_\_\_ Date \_\_\_\_\_

-----

**2. Child Assent**

A researcher will read the following statement:

"Someone will watch you with your mother. Is it okay if we watch how you interact with your mother?"

Subject Signature \_\_\_\_\_ Date \_\_\_\_\_

Students may write their name, mark an X, or give verbal assent.

Student gives verbal assent \_\_\_\_\_

Student does not give verbal assent \_\_\_\_\_

-----

**Study Approved By:**  
Dr. Robert C. Mathews, Chairman  
Institutional Review Board  
Louisiana State University  
203 B-1 David Boyd Hall  
225-578-8692 | www.lsu.edu/irb  
Approval Expires: 9-24-2009

## APPENDIX D: SAMPLE DATA SHEET

Name: \_\_\_\_\_  
 Observer: \_\_\_\_\_

Date: \_\_\_\_\_

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## VITA

Chinwe L. Onwujuba was born to Joseph and Maria Ugwu in Columbia, Missouri. She grew up in Nigeria to experience the wonderful tapestry of Nigerian cultures and peoples. A range of aunties, cousins and relatives fostered in her an intrigue in the wonder of the mother-child relationship. Chinwe is married to Charles Onwujuba; they both have a son – Zion, and are expecting a second bundle of wonder.

In 2001 she earned her bachelor's degree in psychology from the University of Nigeria, Nsukka. Her undergraduate experience introduced her to the complexities of human development and the absolute importance of the childhood period to lifespan development.

After her graduation, she worked in a bank for three years, got married and relocated to the United States to pursue a graduate degree. In 2005 she began her graduate program in human ecology, with a concentration in family, child and consumer sciences. During her graduate program she worked as a graduate assistant in the human ecology preschool and became an instructor for child care providers with Volunteers of America: Child Care Key.