

DISSERTATION

CORRELATES OF MOTHER-INFANT INTERACTION AND  
SELF-REGULATION IN A PERINATAL INTERVENTION PROGRAM

Submitted by

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In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

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August 13, 2003

WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED  
UNDER OUR SUPERVISION BY KAREN A. FEHRINGER ENTITLED  
CORRELATES OF MOTHER-INFANT INTERACTION AND SELF-REGULATION  
IN A PERINATAL INTERVENTION PROGRAM BE ACCEPTED AS FULFILLING  
IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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## ABSTRACT

The purposes of this study are to investigate whether the number of nurse home visits during pregnancy and the early postnatal period is related to mother-infant interactions and infant's patterns of self-regulation, whether these interactions change over the course of the first six weeks of life, and if demographic variables are related to mother-infant interactions and sleep patterns. A fourth purpose is to learn about the timing and topics for presentation of educational materials, and about support systems during pregnancy.

Twenty-three low-income, first time mothers completed the two week feeding and teaching session, using the Nursing Child Assessment Satellite Training (NCAST) feeding scale. Nineteen mother-infant dyads completed both the two week and six week feeding observations and the exit interview. Sixteen mothers completed the Sleep Activity Record (SAR).

Statistically significant ( $p < .05$ ) results from the feeding observation are as follows: a) mothers who had more education had a higher caregiver total score at two weeks and six weeks, b) infants of mothers with more education had a higher infant total score at two weeks, and c) the dyad had a higher total contingency (reciprocal interaction) score at two weeks. Mothers in households with higher levels of income had higher contingency scores at 6 weeks, and the change in the contingency score from two to six weeks was positive for mothers with more income. The cluster of positive findings

related to the SAR is that infants who had a higher total score at 2 weeks received more feedings at 3-4 weeks.

Mothers reported that the medical and health education information of the nurses was valuable during the pregnancy and after the birth of the baby. Mothers appreciated the social support of the nurses and credited them with being an important part of the support network.

A larger sample size pooled from multiple sites, a longer time period for intervention and data collection, and serial SAR recordings might yield more significant results. Further investigation into topics covered, the timing of education for pregnant and parenting women, and the role of social supports may provide information to shape policy and funding considerations.

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## DEDICATION

My decision to pursue research with mothers and their newborn infants has its roots in my childhood. Observing my younger newborn siblings, newborn animals, or newly hatched chickens fascinated me. I watched as the animal mothers took care of their young and I wondered what they would do next. I loved to watch quietly, often for hours on end, to observe their behavior, growth and development. I pestered my mother with endless questions of “what will the baby do next?” and “then what?”

My sense of wonderment never left me. While at Colorado State University for my undergraduate degree in occupational therapy I took my first child development class in a classroom on the oval. While the leaves of autumn dropped to the ground, I pondered what we had studied and wanted to learn more.

My career as an occupational therapist has spanned thirty years now, and I want to dedicate this study to all of the mothers, fathers, infants and children with whom I have worked for these many years. They have shared their joys and sorrows of working to become a family and provide for their children’s needs. They have brought both laughter and tears to me. They have deepened my sense of appreciation for the development of families. Thank you, families, for sharing your lives with me.

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## CHAPTER 1: INTRODUCTION

The second half of the twentieth century and the beginning of the twenty-first century proved to be a time period that was rich with investigation into the issues of pregnancy, transition to parenthood, and prenatal and postnatal study of the infant. The health and behavioral practices of the mother during pregnancy were determined to have an influence on the outcome of the infant (Institute of Medicine, 2001; Solchany, 2001). The mother's nutrition, sleeping patterns, and avoidance of alcohol, illegal drugs and substances, and tobacco were the focus of many private and publicly funded research projects (Barnard, 1994; Institute of Medicine, 2001; Olds et al., 1999; Richardson, 1996). Infants were shown to be active participants in relationships and with their environments (Fenichel, 2001; Kelly & Barnard, 2000). Quality interaction with caregivers and the structure of the environment proved to influence the development of the brain (Johnson, 2000; Meisels & Shonkoff, 2000; Nelson, 2000; Thompson, 2001). Poverty, level of maternal education, minority status, family support, and other risk factors were investigated for their impact on the developing infant, caregiver, and the environment (Brooks-Gunn & Duncan, 1997; Institute of Medicine, 2001; Sameroff, 1998; Shonkoff & Phillips, 2001). Johnson (2001), Olds, Henderson, and Kitzman (1994), and Olds et al. (1999) provided information about the impact of nurse home visitation on the lives of women and children living in poverty.

The main research problem of this study is to investigate whether the number of nurse home visits during pregnancy and/or the early postnatal period is related to mother-

infant interactions and infants' patterns of self-regulation. Second, this study will also investigate if mother-infant interactions change during the first six weeks of life. The third part of the research problem is to see if demographic and birth variables are related to mother-infant interaction and sleep patterns.

The Nurse Home Visitation Program was established as a research-demonstration project in 1977 by a group of researchers from Rochester, New York (Olds, et al., 1999) working in Elmira, New York. Their early research focused on the early outcomes of the mothers (such as reduction in smoking and fewer deliveries of low-birth weight infants) and more long-term outcomes (such as mothers' use of public assistance, fewer subsequent pregnancies, and less involvement for themselves or their teenage children with the law).

This nurse home visitation model was replicated in Memphis, Tennessee and in Denver, Colorado (Olds, 2002; Olds, et al 2002). The model was adopted by Colorado as the model for visitation for low income, first time mothers. The program is funded through the Colorado tobacco settlement fund and is administered through the Colorado Department of Public Health and Environment. The program is now referred to as the Nurse-Family Partnership (Gallagher, 2001). The Nursing Child Assessment Satellite Training (NCAST) Feeding Scale, the Sleep Activity Record, and other parent and child measures from the program in Seattle, Washington (Barnard, 1994; Sumner & Spietz, 1994) have been incorporated into the Colorado Nurse-Family Partnership program

The pregnant women, who enroll in the Nurse-Family Partnership program prior to twenty-eight weeks of gestational age, receive information about nutrition, smoking cessation, self-regulation of eating and sleeping patterns, as well as general health care

and infant development prior to delivery. Following enrollment, home visitation is weekly for about four weeks, followed by biweekly home visits until delivery.

Following delivery of the infant, weekly home visitation by the nurse for six weeks assists the woman (and other family members) with the transition to parenthood. The family is followed with biweekly visits for the following two years.

#### *Purpose of the Study*

The purpose of this study is to capture any differences in early relationships and self-regulation based upon the amount of a mother's participation in an education and health care program during pregnancy and the early postnatal course. Past studies have focused on parent outcomes. The focus of this study is to capture the mother and infant in interaction during the feeding time and to document early self-regulation through sleep-wake-activity cycles. The first six weeks of the infant's life will be the measured time period.

#### *Research Questions*

Specific research questions addressed by this study include:

1. Is there a change in feeding scores between the 2 week observation and the 6 week observation with the Nursing Child Assessment Satellite Training Feeding Scale for each dyad?
2. Is there a relationship between the numbers of visits completed during pregnancy and the initial feeding score, the 6 week feeding score, the feeding change score, and the sleep activity record?

3. Is there a relationship between the number of visits completed following the birth of the baby and the initial feeding score, the 6 week feeding score, the feeding change score, and the sleep activity record?
4. Is there a relationship between the age of the mother and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
5. Is there a relationship between the years of education of the mother and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
6. Is there a relationship between the mother's income status (household income) at program entry and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
7. Is there a relationship between the mother's weeks of pregnancy at program entry and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
8. Is there a relationship between the gestational age at birth and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
9. Is there a relationship between the infant's birth weight and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
10. Is there a relationship between the mother's employment status at entry into the program and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?

11. Is there a relationship between the mother's marital status at program entry and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
12. Is there a relationship between the mother's race/ethnic status and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
13. Is there a relationship between the gender of the infant and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
14. Is there a relationship between the return to work status of the mother and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record?
15. Is there a relationship between the mother's sleep/wake/activity patterns during pregnancy as reported by the RN and the infant's sleep activity record (SAR)?
16. Is there a relationship between the NCAST feeding scores at 2 weeks, 6 weeks, the change score and the sleep activity record?

#### *Definition of Terms*

*Feeding score* refers to the sum of the individual subscale scores for the Nursing Child Assessment Satellite Training Feeding Scale (NCAST Feeding Scale) as part of the NCAST program, as developed by Kathryn Barnard (1994). The scores are divided into caregiver total, infant total, and caregiver/infant total. A total of 76 points is possible for the caregiver/infant scale, with the caregiver total contributing 50 points and the infant total contributing 26 points. A second set of scores for the contingency items (based on

reciprocal interaction between mother and infant) are recorded. The contingency scores are divided into the three divisions listed above. A total of 18 points is possible, with the caregiver total contributing 15 points and the infant total contributing 3 points. The scores are checked against norm comparison scores, divided by age of mother, education of mother or ethnicity of mother to identify those individuals or dyads who may need intervention to facilitate the relationship.

*Gestational age*, as defined by Endo and Nishioka (1993) is the determination of the approximate length or duration of fetal development. The range for full-term development is 40 weeks gestation +/- 2 weeks.

*Home visitation* is considered a strategy for delivering services directly to families in their homes, with the focus on providing information and support around topics of interest or need, which in this case may include pregnancy outcomes, child development, parent-child relationships, or use of community resources (Powers & Fenichel, 1999).

*Low income* is a term that defines a person's household income. To qualify for the Nurse-Family Partnership a family may participate if their household income does not exceed 200 per cent of the state's current poverty level definition.

*Mother-child interaction during the feeding*, as regarded by Sumner and Spietz (1994) is the mutual interaction of caregivers and children during this specific activity.

*Nurse-Family Partnership* is the nurse home visitation program adopted by the Colorado Legislature, funded through tobacco settlement money and implemented through the Colorado Department of Public Health and Environment, county health

departments and county health services by Invest in Kids, a Denver based non-profit organization (Gallagher, 2001).

*Self-regulation* is the establishment of basic biological rhythms, which includes sleep and wake cycles, regularity to feeding times, ability to maintain and change states of behavior. The caregiver is an influence on the baby's self-regulation by the caregiver's patterns of behavior (Barnard, 1999).

*Sleep Activity Record (SAR)* is a one page (double sided) form with parent and infant demographics, day time and night time 12 hour divisions for recording sleep, feeding, crying, and any other variable that might be selected on side one. Side two has an explanation of the tool and instructions for completing the SAR. The SAR is a 7-day record and is useful as a recording tool for both the pregnant mother as well as for logging the sleep-wake and activities patterns of infants to three year olds (Barnard, 1999).

*Sleep-wake behavior* as described by Barnard (1999) is the alternating periods of activity and inactivity in the fetus and is observed as patterns of brain waves, eye movements and body activity in the newborn that are categorized into sleep and wakes states.

#### *Delimitations of the Study*

This study will confine itself to collection of data about the interactions of mothers and infants and infant self-regulation in the first six weeks of the infant's life.

The brief period of involvement with infants and caregivers may limit the generalization of findings about long-term outcomes for infants and caregivers. This study will also be restricted to one semi-rural county in western Colorado. The population

studied will be primarily Caucasian and Hispanic and have low-income status. This delimitation will limit the generalizations of the findings to this type of participant.

#### *Limitations of the Study*

Mothers may not feed their infants in the same way in the presence of the nurse/evaluator as they might if they were alone or in the presence of family or close friends. Mothers may not complete the Sleep Activity Record with accuracy, as it does require discipline and commitment to complete frequently throughout each twenty-four hour time period. Completion of the SAR also relies on the mother's memory, which may be compromised at this time due to new responsibilities and lack of sleep.

This researcher collected all of the data. However, this researcher did not collect the demographic data from the health department until after the 2 and 6 week feeding observations were recorded, the sleep record was completed, and the exit interview conducted. This researcher attempted to limit the demographic information known during the visits by not asking questions or encouraging information of this nature to be shared. (Some demographic data was collected at the health department at the time of program enrollment and other data was compiled by the nurses after the exit interview had been completed).

#### *Significance of the Study*

Programs can be expensive to implement and conduct, dependent upon the educational level of the staff and the training given to the staff to initiate and maintain a program. The intensity and duration of the visitation schedule, during both the pregnancy and the postnatal period is a cost consideration. Other cost factors are the cost of curriculum materials and the on-going training requirements of the staff. This study is

asking questions about the outcome variables of mother-infant interaction and self-regulation of the infants and whether they are dependent upon the level of participation of the mothers in the program. Although this study is of short duration, it may indicate that there is a need for additional experimental studies to ascertain if the amount of early intervention produces differences in both short and long-term outcomes for the infants in the areas of mother-child interaction, self-regulation, and cognitive and social interaction. It may lead to decision-making about what needs to be included in state funded programs for pregnant and parenting women.

### *Researcher's Perspective*

I have worked with mothers (and fathers) and infants for nearly 30 years. I search for the best ways to educate and interact with parents in the context of their infant. I am interested to see if an intensive education program will show any differences in mother-infant interaction. I am interested in the financial aspect of any program and the personnel needed to deliver it. The design of this research project does not have the researcher handle the baby at any time during data collection. The intervention (following the first feeding observation) is reflecting on and discussing the feeding observation.

This author's involvement with the program concepts that evolved into the Colorado Nurse Family Partnership (NFP) program began in the 1980's when I was employed in a neonatal intensive care unit and our unit began the process of defining not only biologic risk factors for the infants and their families, but the social-emotional-environmental risk factors that many families seemed to share. The work of David Olds and other researchers who were involved in the Elmira, New York demonstration project was reviewed (Olds, Henderson, Chamberlin, & Tatelbaum, 1986; Olds, Henderson,

Tatelbaum, & Chamberlin, 1986; Olds, Henderson, Tatelbaum, & Chamberlin, 1988). A risking form was developed and used to define needs and services for the NICU families during the hospitalization period and for their transition into the community. Nearly all of the risk factors identified during the 1980's continue to be risk factors now and are the risk factors that Nurse Family Partnership addresses during the pregnancy and post delivery phases of the current program, including age of mother, maternal education, income level, maternal mental health, marital status, lack of permanent housing, lack of familial or social support, prenatal care, birth weight, use of alcohol, street drugs, or tobacco products. Areas of concern include the health and well being of the mother and her unborn child during the pregnancy, as well as during the two-year service period post delivery. Part of the Nurse Family Partnership program includes the implementation of the program materials for the Nursing Child Assessment Satellite Training Program (NCAST) in Seattle, Washington. I am a certified instructor for the NCAST program and have trained several cohorts of NFP nurses across the state of Colorado, including the nurses who participated in this research program.

Working with the program during its development phase in our county as an NCAST instructor and continuing to work with the program as the local NCAST instructor, member of the NFP Supporting Council, and as a researcher, I have had extensive contact with the administrator, nurses, and clients of the NFP program in our county (as well as staff for other Colorado counties). The NFP program is a credible program. Statistics kept by the Invest in Kids program from the monthly reports submitted from the sites around the state, including from the local site, demonstrate reduction in smoking, fewer premature births, and a lower rate of subsequent pregnancies

compared to the Denver clinical trials which are used for the benchmarks (State of Colorado, 2002).

The previous research studies based on the Nurse Family Partnership model have focused on maternal outcomes (Olds, 2002). My interest in mother-infant and parent-infant interactions and relationships provided the impetus to focus my own research on the dyadic relationship in this program model to learn more about newborn infants and their mothers during feeding interactions. Feeding interactions constitute a majority of the time spent together in the early days and weeks; this time can set the stage for the beginning of the relationship and the feelings of competence for mother and her infant. Secondly, for many years I have had a high interest in patterns of sleep and activity and how they influence not only adults, but infants and children as well. The sleep activity record from the NCAST curriculum, as well as the emphasis on maternal and infant patterns as discussed by Barnard (1999) provided the curiosity for me to investigate these dimensions with pregnant mothers and newborn infants as part of this research project.

In summary, I have been provided with a rich learning experience by spending time with administrators, nurses, mothers, fathers, and newborn infants as I have been allowed to enter into the homes of families with newborn infants.

## CHAPTER 2: LITERATURE REVIEW

The literature review will focus on three primary topics that relate to the constructs of this research project. First, I will examine the body of literature which relates to mother-infant interaction or the reciprocal relationship between mother and infant, the target individuals in this study. I consider the concept of attachment critical to understanding the importance of early mother-infant interaction. I will begin with the history of attachment and our current knowledge as relates to the formation of attachment. The attachment history contains examples about older infants, children and adults, which serves to provide deeper understanding of how attachment develops and why a secure attachment based on a sensitive caregiving relationship is crucial to infant development. The use of the NCAST feeding scale as a means to measure interaction will be discussed, including studies which have used this tool to measure similar variables to the ones measured in this study.

Second, I will review the dyadic regulation and the maternal and infant self-regulation literature to gain insight into the biological and psychological processes that are the basis of our everyday activities. I will explore the topics of sleep/wake/activity and of infant crying behavior, which is also discussed in the attachment literature.

Thirdly, I will review the literature related to home visitation, with specific emphasis on nurse home visitation programs in the United States, including the Nurse-Family Partnership program which has been adopted by the state of Colorado

for visiting low-income, first time mothers. The role of the nurse and the importance of social support during pregnancy and following the birth of the baby will be highlighted.

### *Mother-Infant Interaction*

#### *Attachment*

Interest in the nature of human relationships and the workings of the mind related to attachment or mother-infant (caregiver-child) interaction spans three centuries, beginning with Freud in the nineteenth century (1914/1962). Rene Spitz (1945; 1946), John Bowlby (1969/1982), Mary Ainsworth (1967), Sroufe & Waters (1977), Main, Kaplan, & Cassidy (1985) and their students and other researchers pursued the study of attachment across the twentieth century. Research labs around the world, headed by some of these professionals and many new scholars, continue to support research about the most basic processes of human relationships.

Karen (1990) and Cassidy (1999) provide overviews of significant individuals who have contributed to attachment theory and research, using both animal and human models. Freud (1914/1962) developed his psycho-analytic theories while working in Paris for a short time and in Vienna, Austria for a lifetime. He believed that the infant's attachment to the mother was based on secondary drive theory and resulted from the fact that the mother fed the infant (Karen, 1990). Waters (2000) referenced the work of Konrad Lorenz, who as a medical student made detailed observations of animals, and after completing degrees in both medicine and zoology, described the learning behavior of ducklings and goslings. Working in Vienna in the 1930's, Lorenz defined the imprinting

process in 1935, where behavior learned as a young bird influenced its adult behavior. Spitz (1945) employed the term “hospitalism” for the total emotional deprivation infants incurred during his research with 164 infants raised in private homes and breast fed until the age of 3 months, when the infants were then separated from their mothers and placed in an institution with one caregiver to eight children. The deterioration included symptoms of emotional and physical decline to the point of developmental retardation, and in some cases, was so marked that children even developed autistic behaviors. One-third of these infants died.

In 1946 Spitz wrote of the anaclitic depression (severe, unresolving depression) observed in 19 of the 123 infants and toddlers in the institutions who experienced partial emotional deprivation. This group of infants had experienced mothering until about 6 months before they were separated from their mothers for several months. These infants, who were deprived of a love object that they had once had, developed symptoms of sadness, physical decline, including weight loss and disrupted sleep patterns, as well as developmental retardation. Harry Harlow’s experiments in the 1950’s with rhesus monkeys as cited in Cassidy (1999), and as recorded on film (Irving Harris Foundation, 1995), show the frantic disorganization of the monkeys raised in wire cages and the preference of the young monkey for the cloth covered “mother” as a comfort object versus the wire “mother who provided food”.

John Bowlby, a British psychoanalyst, became interested in attachment after his graduation from Cambridge when he worked in a home where he observed two maladjusted boys. Both boys had experienced a disruption in their relationship with

their mothers (Cassidy, 1999). Bowlby (1969/1982) also studied the nature of homeless children in London during the post-war time and reported to the World Health Organization in 1951 that children should not be separated from their mothers. If separated from their mothers they were at increased risk of physical and mental illness (Karen, 1990). As reported by Berlin and Cassidy (2000), Bowlby put forth that relationships had an evolution advantage, being that infants who could cry and reach out for the caregiver increased the likelihood that a caregiver would care for them. Infants begin to elicit care from specific people by midyear and by the end of the first year have a clearly defined attachment system. Bowlby (1969/1982) approached his study of the infant and child differently than the psychoanalysts. He viewed the psychoanalysts as starting at the end-point, attempting to explain the function of a personality, both the healthy and pathological aspects, by working backwards. Bowlby and his colleagues took the opposite approach and used primary observations of the infants, defined certain points of personality development, and extrapolated forward. Bowlby outlined the history of observations of infants who were separated from their mothers. He credits Dorothy Burlingham and Anna Freud for their observations of infants separated from their mothers at the Hampstead Nurseries during the Second World War. He highlights the work of Rene Spitz and Katherine Wolf for their observations of infants separated from their mothers (as previously discussed) and cared for in a penal institution. James Robertson (who had worked at the Hampstead Nurseries as well) and his wife Joyce Robertson (1953) documented with film the protest, despair and grief of a young child separated from her mother.

Bowlby was criticized by the psychoanalysts of the time for oversimplifying psychological theory by stating that pathology resulted from disturbances of the mother-infant bond. They held that early medical or environmental trauma, or the infant's ability to develop a negative construct of his mother with no rationale basis, was being disregarded (Karen, 1990). Bowlby (1969/1982) based his work on biology and the system's ability to adapt to the environment. He argued that while animals are limited by instinctive behavior, man's cultural surroundings and his ability to adapt to it influence man. Man tends to live in social grouping, comprised of males, females and the young. Another characteristic of man is that he has predictable sets of behavior, with one form of that behavior being goal-directed, or as Bowlby writes, "goal-corrected" (p. 69). Crucial to the functioning of the goal-corrected system is the ability to receive and store information about the set-goal and the ability to seek the goal and change the behavior to reach the goal. The ability to retain a cognitive map of the familiar environment and to locomote contributes to the system that allows for an infant or young child to maintain proximity to its mother. Bowlby developed his internal working model theory based on these representations, not only of the environment, but of people as well. Researchers believed that after seven months infants formed a stable internal working model of the parent-child relationship and this establishes their expectations of the parent will respond to them (Ainsworth, et al., 1978; Bowlby, 1969/1982). Berlin & Cassidy (2000) synthesize Bowlby's work. They state that the child, through its daily interactions with adults, formed working models about the caregiver and the infant's relationship to the caregiver.

Sensitive caregiving potentiates the development of an internal working model of the caregiver as trustworthy and helpful and of the self as deserving of the caregiver's sensitive treatment. Conversely, insensitive caregiving leads to working models of the caregiver as unavailable and untrustworthy and of the self as unworthy of the caregiver's benevolent treatment. (p.139).

Mary Salter (later to be Ainsworth) first studied in Toronto under William Blatz, who had developed a "security theory", which would influence her development of the theory of the mother as the "secure base". After serving as a Canadian army major in the Second World War, Salter returned to Toronto where she married Len Ainsworth (Karen, 1990). Ainsworth related they went to London where she answered a newspaper ad placed by John Bowlby for a researcher in child development and projective techniques (Rudnytsky, 2000). After working with Bowlby from 1950-1953, Ainsworth followed her husband to Uganda where she documented the behavior of twenty-eight babies and their mothers in Kampala from 1954-55. She describes that the "development of the baby's attachment to his mother was the center of interest in our study of infant development" (Ainsworth, 1967, p.331). She developed a catalog of 16 behavior patterns that she had observed in infants who could be judged as attached to their mothers. The full catalog of behaviors will be listed as documentation of Ainsworth's power of observation and for the significance of the behaviors in the development of her later attachment classification work.

The list of patterns of attachment behavior is as follows:

1. Differential crying
2. Differential smiling
3. Differential vocalization
4. Crying when the mother leaves
5. Following

6. Visual-motor orientation
7. Greeting through smiling, crowing, and general excitement
8. Lifting arms in greeting
9. Clapping hands in greeting
10. Scrambling over the mother
11. Burying the face in the mother's lap
12. Approach through locomotion
13. Embracing, hugging, kissing\*
14. Exploration away from the mother as a secure base
15. Flight to the mother as a haven of safety
16. Clinging

\*No Ganda infant was observed to hug, kiss, or embrace. Nevertheless, this pattern is included in the list since it does occur with babies in Western societies. (p. 332)

Ainsworth classified the infants as secure-attached group, N= 16, insecure-attached group, N= 7, and a “non-attached” group, N=5. She elaborated on how infants formed the attachments and elucidated these attachments by exploring maternal-care variables, including warmth of mother, multiple caretakers, feeding schedules, mother's milk supply and breast feeding attitudes, and eventually, the weaning process.

During her observations in Uganda, Ainsworth (1967) noted that once infants can crawl they do not always remain next to the mother. The infant moves about in the environment and then returns to the mother, as though to reassure himself that she is still there. Bowlby (1969/1982) discusses that the exploratory system and the attachment system are developing together.

#### *Antecedents to the Four Classifications of Attachment*

What determines how the affective bond of parent and child will form? For clarification, per Ainsworth et al. (1978) she clearly distinguishes between attachment and attachment behavior. She states the following:

By *attachment* we mean the affectional bond or tie that an infant forms between himself and his mother figure—a bond that tends to be enduring and independent of specific situations. By *attachment behavior* we mean the class of behaviors that share the usual or predictable outcome of maintaining a desired degree of proximity to the mother figure—behaviors through which the attachment bond is first formed and then later mediated, maintained, and further developed. Further, we refer to the *attachment-behavioral system*, which implies that the behaviors that may be classed together as attachment behavior come to operate systematically together. (p. 302).

Ainsworth et al. (1978) recorded discrete maternal behaviors during their observations. They had four global scales, which allowed them to look at the more behavior characteristics of the mothers. One scale measured maternal sensitivity or the ability to respond to infant cues, another measured acceptance-rejection or the ability of the mother to balance her positive and negative emotions about parenting, a third measured cooperation-interference or the mother's controlling or intrusive behaviors, and the fourth measured accessibility-ignoring or the mother's emotional availability to the infant. Ainsworth states that the quality of the mother's interactions with the young infant is the most important index to her sensitivity (Ainsworth, 1969; Berlin & Cassidy, 2000).

Maternal sensitivity is often cited as a crucial antecedent/determinant of an infant's attachment (Ainsworth, 1969; Belsky, Rovine, & Taylor, 1984; Pederson, Gleason, Moran, & Bento, 1998). Maternal sensitivity does not necessarily mean more involvement, but a carefully graded involvement that is reflective of the infant's bid for attention and the maternal response. The child who is labeled as secure, or a B classification of attachment, has a mother who is contingent in her response. She neither intrudes nor ignores the infant. She neither over- nor under-stimulates the infant. She encourages and supports exploration. The infant who is

labeled as insecure-avoidant, or an A classification, has a mother who may be rejecting or controlling. This infant may isolate himself for his exploration, thus lacking the social interaction of an infant of a secure mother. He prefers objects to people. The infant who is labeled as insecure-ambivalent or C classification may have a mother is inconsistent in her interactions with the infant. She may be non-contingent in her responses and may interfere in her infant's attempts to explore (Cassidy & Berlin, 1994). Carlson, Barnett, Cicchetti & Braunwald (1989) report that infants who have a D classification may have suffered maltreatment at the hands of a caregiver. Boys are more likely to exhibit a D classification or behavior patterns than girls who have suffered maltreatment are.

#### *Adult Attachment Status*

Adults have attachment classifications as well, which influence how we relate to our infants children, and other adults. The Adult Attachment Interview (AAI) as developed by George, Kaplan, & Main (as cited in Crowell & Treboux, 1995) is a semi-structured interview of an adult about their childhood attachment relationships. The narrative is evaluated for his content of the experiences and the coherence with which it is told, as well as the meaning given to the content.

Berlin & Cassidy (2000) and Karen (1990) discuss the adult classification system. Adults who are secure are labeled as having an F category, and they value attachment relationships. Adults who are similar to avoidant infants are labeled as dismissing or D category and devalue attachments and disregard the influence of relationships. Adults who are classified as preoccupied receive an E label and their interviews reveal they are overwhelmed by past attachment experiences. Parallel to

the infant D or disorganized category, adults may be classified as U or unresolved. These adults seem to have been the victims of childhood trauma or abuse or may have lost a parent in their childhood. This adult may be frightening to their child through their appearance or behaviors.

In 1998, Pederson, Gleason, Moran, & Bento) reported on a study of sixty mother-infant dyads observed in the home and in the Strange Situation at 13 months of age, with mothers receiving the AAI within the next six months. They found a strong relationship between the maternal classification of attachment and the classification of her infant. This finding lends support to the argument for intergenerational transmission of attachment. Fonagy, Steele, & Steele (1991) administered the AAI to 100 mothers expecting their first child. One year later, 96 dyads were seen for the Strange Situation. The mothers' classification on the AAI was predictive at the rate of 75% for the classification of the infant as being in the secure or insecure (B/non-B) classification groups.

Braungart-Rieker, Garwood, Powers, and Wang (2001) followed 94 families to assess parental sensitivity, infant affect, and affect regulation at 4 months as a predictor of mother-infant and father-infant attachment classifications at one year. This study used the Tronick "still-face" episode to assess the infant's response to a stressful situation for affective and regulatory responses to the parents' emotional unavailability. Parental sensitivity was defined as "the parent's ability to perceive infant's signals accurately and vary his or her behavior appropriately (e.g., contingent responding, appropriate levels of stimulation in which the infant is neither under- nor over stimulated)" (p.256). Results showed that mothers and

fathers did not differ in parental sensitivity at 4 months; infants showed more self-regulation with mothers. Infants whose mothers were more sensitive at 4 months were more often classified as securely attached at one year. Another finding was that infants who have a better developed regulatory system are less easily stimulated, making maternal sensitivity easier to achieve.

### *The Reciprocal Relationship*

The birth of the baby brings about the first face-to-face interactive processes and the shaping of the reciprocal relationship begins. The infant's first contribution to the beginning interactions is biologically/neurologically based and that contribution is the infant's ability to control its state of alertness (Wolff, 1973).

Barnard (Sumner & Spietz, 1994) initiated developing the tools for measuring mother-infant interaction during a Nursing Child Assessment Project in the 1970's while at the University of Washington. The program developed a model to study the child, the caregiver, and the environment in interaction. The researchers developed the Nursing Child Assessment Feeding Scale (Barnard, 1994) as a means of recording and quantifying the observations made during a feeding observation. The scale addresses maternal sensitivity to infant cues, the mother's response to the infant's distress, the mother's capacity for social-emotional and cognitive growth fostering with her infant. The scale also measures the infant's ability to signal to its mother and be responsive to her interactions. The scale adds an extra dimension in that it also captures the reciprocal nature of the relationship in the contingency scores. Of interest is that several of the early behaviors that Ainsworth (1967) identifies for attachment behaviors are behaviors

that are measured by the NCAST feeding scale. The scale measures crying, smiling, vocalizations, and visual-motor orientation for the newborn infant.

Mother and infant are described as engaging in a dance, according to Barnard (as cited in Sumner & Spietz, 1994); however this dance is slightly different in that the partners can change roles for who is leading and who is following in this sensitive interaction that is the beginning of long-term relationships and emotional development.

#### *Measurement of Mother-Infant Interaction with the NCAST Feeding Scale*

The NCAST feeding scale has been used in multiple research projects to assess both the need for nursing interventions or to measure the effects of nursing or other early interventions. The scale has been used with full-term infants, preterm infants, high risk infants, ethnic or cultural minority infants and mothers, and mothers of adolescent and adult age categories. Most studies have used mother-infant dyads older than the dyads that are the target population of this study.

In 1991 Farel, Freeman, Keenan, and Huber reported a study they had completed using the NCAST feeding scale (plus the NCAST teaching scale and the HOME scale) to compare interactions between healthy mother-infant dyads ( $n = 37$ ) and high-risk dyads ( $n = 37$ ) when the infants were 8 months old. High risk infants were enrolled in a state infant program and were infants with birth defects, infants of teenage mothers, infants living in poverty status, and infants with either low birthweight or low Apgar score. A matched pairing design was used for age of infant, race, sex of infant, but other variables such as age of mother, parity, marital status, income, and educational level could not be matched. Using  $t$ -tests, Chi-

square tests and matched univariate odds ratios, they found that the NCAST feeding and teaching scale may be useful to screen for pairs where interaction was dysfunctional. Twenty-five of the high risk dyads had low scores on one or more of the three scales used, while only 10 of the control dyads had a low score on one of the three scales used. The control dyads averaged  $63.3 \pm 8.4$  and the experimental dyads total score was  $57.8 \pm 10.7$  ( $t [37] = 2.96, p < .01$  on the NCAST feeding scale. The discussion addresses the primary topic of this research study, which is that the primary relationship between mother and infant has an impact on development and recognizes that the at-risk infant may have altered interactions. The infant, who is at-risk or disabled, may not respond to pleasure at the parent's interaction or give the same kind of signals to the parent as the healthy, full-term infant. The study calls for continued use of the NCAST scale into a state-wide tracking system for high-risk infants with determination of the instrument's usefulness as a screening tool and to build a data base about infants for use in further research.

Koniak-Griffin & Verzemnieks (1991) used the NCAST feeding scale as one measure in a study of maternal role attainment with a group of 20 primiparous adolescent (age range 12-19) black or Hispanic women randomly assigned to the control or experimental group. Mothers in the experimental group received 6 hours of class during the pregnancy at 4 weekly intervals, with emphasis on conceptual material from the Nursing Child Assessment Satellite Training Program. While mothers in the experimental group demonstrated a significant increase in prenatal attachment scores, this study reported no difference in mothering behaviors from

the control group, as measured using the NCAST Feeding Scale between four-six weeks postpartum during a nurse home visit. Limitations of this study included small sample size, short term intervention and lack of long term follow-up time frame.

Teenage mother-infant pairs were the focus of a study to determine the relationship between maternal age, social support and the home environment (vonWindeguth & Urbano, 1989). The NCAST feeding scale was used as the measure of mother-infant interaction, with the infants ranging in age from 4 to 12 months. The 33 adolescent mothers and 33 older mothers (> 20 years) were from a community health center. The mean education level for both groups was 11 years of education. Data was collected during a home visit by a public health nurse.

ANOVA results showed that there were significant differences between the two age groups of mothers on the subscales of maternal sensitivity to cues ( $p < .02$ ), social-emotional growth fostering ( $p < .03$ ), and the total score ( $p < .02$ ) in favor of the older mothers. Additionally, there was a significant relationship between the mother's perceived level of social support and mother-infant interaction. The researchers offer that parent education programs should be offered to young mothers to help them utilize their resources and strengthen their parenting skills with a match of intervention to address the needs of the mother.

The NCAST feeding scale was used in a study to assess whether maternal postpartum behaviors toward the newborn would predict the quality of maternal-infant interactions and the relationship during the first year of life. The Postpartum Parenting Behavior Scale (PPBS) was administered shortly after birth and the

feeding scale was administered at 6 months, with the NCAST teaching scale and the Ainsworth Strange Situation administered at 12 months (Britton, Gronwaldt, & Britton, 2001). One hundred seventy-four dyads enrolled and 152 dyads completed the study at 12 months. Mothers were selected who had a singleton, uncomplicated pregnancy; maternal ages ranged from under 18 (4.1%), 18-25 (37.2%), 26-35 (50%), and over 35 (8.7%). Ethnic categories included non-Hispanic white (75.4%), Hispanic (21.6%), and other (2.9%). Educational levels ranged from did not complete high school to advanced degree status. Eighty-two per cent of the mothers were married; 23% were primiparous. Analysis of data included use of Pearson correlations, analysis of variance with Bonferroni post hoc test, and the *t* test for continuous variables. The PPBS correlated significantly with the feeding scale. Parent feeding scale correlation = .26,  $p < .005$ ; total score correlation = .27.  $P < .005$ ; child scale correlation = .20,  $p < .05$ . Also of interest to the premise of this research project is that infants of mothers who were classified as securely attached at one year had mothers whose PPBS scores were significantly higher at birth than mothers who had infants who were classified as insecurely attached at one year. The PPBS score significantly predicted the total scores on the NCAST feeding scale. While this was not a primary study of the use of the NCAST feeding scale, its use in a study to assess mother-infant interaction, including attachment status at one year, bears promise for further investigation into which dimensions of interaction as measured by the NCAST feeding scale are present at the 6 month visit (specifically subscale scores and contingency scores).

Lobo, Barnard, and Coombs (1992) completed a study by prospectively studying 12 infants who were hospitalized for failure to thrive, comparing them to 17 healthy control infants. Using Barnard's ecological model where environment, both animate and inanimate, mother, and child interact and overlap in their interactions as the framework for the study, study infants were compared against videotapes of infants at 4 months of age from the NCAST data bank. Study infants were under one year of age. Results showed that infants with non-organic failure to thrive (NOFTT) had lower social-emotional growth fostering and cognitive growth fostering subscale scores. Infants in the study group were significantly different than infants in the control group (Mann-Whitney test;  $Z = 2.0791$ ,  $p = 0.0376$ ). Mothers of infants with NOFTT were less sensitive to their infant's cues and these infants appeared to give less clear cues to their parents. The study concluded that the NCAST could be a valuable tool for a nursing intervention to teach such behaviors as face-to-face positioning, eye contact, and growth fostering behaviors to enhance the parent-infant interaction.

The NCAST feeding scale was used with mothers between 28-90 hours postpartum in relationship with breastfeeding outcomes at 6 weeks after birth (Brandt, Andrews, & Kvale, 1998). The sample included 42 Latina women, born primarily in Mexico, living in northern California, recruited during the third trimester, with no known complications and intention to breast feed the infant for 8 weeks postpartum. The purpose of the study was to determine if the mother-infant interaction, as measured by the NCAST feeding scale in the first four days of life, would differ between dyads who continue to breast feed at six weeks or wean prior

to six weeks. Data was collected during a home visit by the same researcher for all visits to the home. Data was analyzed by using a one-tailed *t* test to determine differences between the group who had continued to breast feed at 6 weeks and the group of mothers who had weaned the infant prior to the six week data collection visit. The results showed that women who continued to breast feed at six weeks had higher NCAST feeding scale score postpartum,  $t(41) = 2.43, p < .05$ . The researchers acknowledge that the generalizability of these findings was limited by the small sample size and the lack of diversity in the sample. They discuss that mothers who do continue to breast feed may be more aware of their infants' cues and reinforce that women who are having difficulty with the mother-infant interaction postpartum be supported in their attempt to master the tasks of mothering.

Another study which used the NCAST feeding scale was completed by Hofkosh et al (1995). The purpose of the study was to explore differences of maternal characteristics, mother-infant interaction, and infant development within a group of women who used a variety of substances during their pregnancies, including cocaine, alcohol, and tobacco. The sample included 32 mother-infant pairs who were identified through a risk-assessment screen and remained in the program for 1 year. The mothers in this study were black, single, and unemployed. The variables in this study included the NCAST feeding scale, the HOME scale, and the Bayley Scales of Infant Development. The NCAST feeding scale was administered within the first three months after birth by a public health nurse. Associations between maternal and neonatal characteristics and the scores on the

NCAST feeding scale were examined using univariate statistics. Results showed that older mothers, mothers of higher parity, and mothers who demonstrated a higher level of program participation had higher scores on the NCAST feeding assessment. They did not find a relationship between NCAST feeding scores and the developmental status of the child at one year of age. Limitations of the study include that the sample size was small, and for ethical reasons, there was no control group of mothers who did not use drugs during the pregnancy.

Boffman, Clark, and Helsel (1997) used the NCAST (and HOME scales) in a study with 32 newly settled, preliterate Hmong refugees and compared this data against 180 randomly selected white, African-American, and Hispanic families from the NCAST normative data bank. Families in the study were from a convenience sample of Hmong refugees newly settled in northern California and participants of the local health department. Data was collected during a home visit with a trained interpreter present. Data was analyzed using a *t* test to compare the mean scores for the two groups and analysis of variance and the Student-Newman-Keuls multiple comparison procedure was used to compare the four ethnic groups. Analysis of covariance was used to assess for educational level differences. The results parent, child, and combined total score was not significantly different for the Hmong refugees compared to the NCAST normative sample. However, four of the subscales showed significant differences. The Hmong refugees scored higher than the normative sample on sensitivity to cues ( $t = -2.16, p = .04$ ). The Hmong refugees scored lower on three subscales: social-emotional growth fostering ( $t = 2.63, p = .02$ ), cognitive growth fostering ( $t = 2.61, p = .02$ ), and infants were less responsive

to parents ( $t = 2.27, p = .04$ ). Ethnic differences and education differences in study results caused the authors to conclude that the NCAST tools should be used cautiously with the Hmong population and that the HOME scale should be used only as a teaching tool.

Another study which found differences in NCAST scores based on ethnicity was reported by two of the three above researchers. MacDonald-Clark and Harney-Boffman (1994) used the NCAST and HOME scales with Alaska Eskimos. The NCAST feeding and teaching scales were normed with white, black, and Hispanic populations. The authors outline that the culture of the Alaska Eskimos has unique characteristics and is based on survival, sharing, and becoming a good family and community member. Two Alaskan villages were visited by Alaskan public health nurses. A purposive sample was used and infants were between birth and 36 months of age. Thirty feeding scales were completed. The Eskimo data for total score was not statistically significant for differences between Eskimos and the normative sample total score. Eskimos scored significantly higher on sensitivity to cues and parent's response to distress. Eskimos scored lower on cognitive growth fostering. Caregiver education and ethnicity were significant covariates. In Eskimo culture, advanced formal education is not available in the remote villages and learning takes place through participation in the culture. The researchers stated that further study is needed to determine if the lower scores indicate a need for intervention and also to determine if the lower scores for Blacks, Eskimos, and Hispanics are valid.

### *Mother-Infant Interaction Studies with Other Instruments*

Diehl (1997) used the NCAST teaching scale as a measure of mother-infant interaction with adolescent mothers. Her interest in this topic is parallel to my interest in that she states that early mother-infant interaction influences children's developmental, social-emotional and educational outcomes. She also addresses that maternal education level may be more of a factor than maternal age in outcomes. The 36 adolescents in this study attended an alternative education program for pregnant and parenting teenagers. Infants ranged from 1 to 17 months. Mothers were Caucasian, African-American, and Hispanic. A positive relationship was found between maternal education and response to distress and maternal contingency. Another finding of interest is that paternal involvement with the dyad was associated with positive mother-infant interaction, including higher total score, contingency, cognitive growth fostering and social-emotional growth fostering scales. There were no significant findings related to maternal age.

A study by Wendland-Carro, Piccinini, and Millar (1999) included 38 primiparous women who were randomly assigned to experimental and control groups. Neither mother nor infant had any complicating factors. Mothers (and infants) in the intervention group were shown a videotape when their infants were 2-3 days old. The videotape was based on the (Brazelton) Neonatal Behavioral Assessment Scale and showed additional scenes of affectionate handling behaviors of the infant. The video focused on demonstrating the infant's competence in the areas of visual and auditory orientation, consolability, cuddliness, infant states of arousal, and baby's defensiveness to mildly adverse stimuli. The investigator

structured the conversation to ascertain mother's knowledge about infants and to interactional capacity of the newborn. Mothers were given a written list of items demonstrated during the video and mothers were encouraged to recognize these behaviors in their newborn when at home. The control group mothers were shown an alternate video, which focused on basic caregiving and health issues. The video focused on hygiene, skin rashes and diaper changes, infant temperature, oral hygiene, and immunizations. Mothers were encouraged to discuss these topics with the investigator. Mothers were seen one month later in their homes and were observed during free-play and bath time, with the sessions being videotaped. Similar items were coded to items on the NCAST feeding (and teaching) scale(s), including infant vocalizes-mother vocalizes, infant or mother look at each other. Mother's educational level, father's occupation and infant birth weight were covariates. Results included that the enhancement or experimental group showed higher synchrony-asynchrony scores compared to the basic skills group. The items which would be contingency items on the NCAST feeding scale (vocalization, smiling, looking, and touching) occurred more frequently in the experimental group. Researchers stated that the videotape/discussion intervention would be suitable for use in a widespread format with dyads where dysfunction in the relationship may be anticipated.

Weinberg, Tronick, Cohn, & Olson (1999) state that the literature related to differences in response by gender is sparse. They report on a study of gender differences in emotional expressivity and self regulation using a sample of 81 six month old infants who were videotaped using Tronick's face-to-face still-face

paradigm. The purpose of their study parallels some of the questions of this study related to mother-infant interaction. They looked for differences in social-emotional expressivity and self-regulation, as well as gender-related differences in maternal expressive behavior. They also looked at stability of infant expressive behavior among other factors. Results showed that both girls and boys reacted negatively to the mother's still face. Maternal expressivity was characterized by the mother staying the same distance from both genders and calling the infant's name to elicit attention. Boys had more difficulty maintaining affective regulation; boys expressed more anger as well as more pleasure. Boys were more likely than girls to cry. Mothers used more noises to elicit boys' attention. Stability of infant expressivity showed that both boys and girls had stable ways of interacting with their social partner. Their concluding findings are that "capacity for self-regulation may be at the base of gender differences in infant emotional expressivity" (p. 186).

One variable influencing the outcomes of mother-infant interaction during the first six weeks may have been maternal depression. This was not a focus of this study, while the literature is replete with studies of the influence of maternal depression on infant, toddler, preschool and school age child (Dickstein & Martin, 2002; Heneghan, Silver, Bauman, & Stein, 2000 ).

The NCAST feeding scale and other scales, including the NCAST teaching scale, the HOME scale, and the Newborn Behavioral Assessment Scale in video format, among others, have been used to assess mother-infant interaction against several variables, including maternal age, education, income level, race/ethnicity, and employment status. The strongest findings support that maternal education and

associated higher level of income, as well as social support, are key factors related to positive mother-infant interaction.

### *Dyadic Self-Regulation*

Barnard (1999) explained her interest in sleep behavior as growing out of her work with preterm infants to promote mature sleep patterns. Barnard continued on to state that through many years of work she realized that the sleep/wake behavior was the underlying organizational framework for other processes, such as emotional exchanges and engagement and disengagement behaviors. (This author has also spent many years working in neonatal intensive care units [NICU] to promote regulation of not only sleep patterns, but also the range and modulation of states from sleep to quiet alert to enhance the infant's availability for feeding behaviors as well as interaction with parent or caregiver).

Self-regulation "is the inborn capacity to adapt to one's surroundings in a healthy and predictable way" (Barnard, 1999, p. 10), and applies to infants as well as adults. Self-regulation is controlled by both internal systems, such as physiological control of heart rate, respiration, temperature control, and by motor control, or by our senses and ability to interact with the world. External factors, such as sound, light, temperature and persons or objects around us also influence our self-regulatory capacities (Barnard, 1999).

### *Maternal Self-Regulation*

A mother's regulatory patterns can be established before and during a pregnancy by working to achieve a predictable rhythm to her daily routines by eating, resting, sleeping, and having periods of activity, such as through work or

taking care of another child, any nearly the same time every day. By working with a pregnant woman to keep a sleep/activity record for herself, she can monitor her patterns and begin to modify her daily routines to establish a schedule (Barnard, 1999). This is particularly important when one understands the influence of the maternal regulatory patterns on the baby *in utero*. Mirmiran and Lunshof (1996) report that synchronization between the activity of the maternal and fetal biological clocks has been shown in animal studies. They report a circadian rhythm present as early as 30 weeks of post conceptual age in human infants.

Each day our bodies go through cycles, influenced heavily by circadian rhythms and cycles of light. Light regulates hormonal and mineral release, which in turn, regulates our internal cycles. Approximately 3-4 hours prior to waking, the body releases a large surge of the hormone cortisol, which gradually wakes us. When one maintains a regular routine, this cortisol driven cycles occurs at approximately the same time of night (or early morning) each days and sets the stage for a regular cycle of awakening time. If this is followed by regular patterns of eating, activity, and rest, the body becomes a rhythmical unit and the “biological clock” is set (Barnard, 1999).

Pregnant women report disruption of sleep, especially in the advancing stages of pregnancy (Richardson, 1996). However, Richardson reported that the restorative function of sleep is maintained during pregnancy and that woman who report sleep difficulties or have poor sleep habits may need intervention to protect her health and that of her offspring.

### *Infant Self-Regulation*

*Sleep and wake cycles.* Prior to birth, the infant's regulation is influenced by the maternal environment of the uterus, where the warmth and the movement of the environment are regulated by the mother's temperature, patterns of daily activity, including sleep, rest, and motion, as well as the predictability of her cycles. The developing infant is bathed in the maternal pattern of hormone and mineral release as the mother cycles through her sleep/wake cycles (Barnard, 1999). Eliot (1999) states that infants tend to have more regular cycles of activity and inactivity prior to birth because of the mother's own circadian hormone fluctuations. Postnally (after birth) infants must make the transition to developing their sleep-wake cycles based on the external environment (general household rhythms).

McGraw, Hoffmann, Harker, and Herman (1999) monitored one infant from birth to six months with continuous monitoring for temperature, sleep and eating onset and termination, and for salivary melatonin production. They concluded that the onset of circadian rhythms was facilitated by exposure to sunlight and regular social cues. Bronson (2000) states "...external events and internal biological requirements and reflexes (are) setting the stage for organizing, modifying and regulating responses" (p. 2).

Nishihara, Horiuchi, Eto, and Uchida (2002) studied 11 primiparous mothers and infants at 3, 6, 9, and 12 week intervals after birth with for 3-5 continuous days in each week using an actigraph. Their results showed that by the third week of life, the circadian sleep-wake rhythm was being established. They

state that their findings suggest that it is mother-infant interaction that promotes the infants' development of a circadian rhythm.

Barnard (1999) identified three primary concerns for new parents, those being feeding, sleeping and crying. Walker and Menahem (1994) completed a study with 21 infants where mothers kept 24 hour diaries of the infant's sleep, awake time, fussing, crying, and feeding behavior. Recordings were taken at 1, 2, 4, 6, and 8 weeks. Infants in this normative Australian study had a mean sleep time of 16.2 hours at 1 week and 15.5 hours at 8 weeks. They reported a progressive drop in average feeding and crying times by 8 weeks. They addressed the problem with recall diaries being subject to recorder bias that cannot be qualified or quantified. In their study crying peaked at 4 weeks, rather than at the 6 weeks reported in other studies reviewed by them. Their study also showed clear diurnal patterns of behavior (as does the sleep log in Barnard's 1999 book).

*Infant crying.* Leavitt (1998) discusses infant crying by stating that "of all the signals that infants emit, the cry is particularly influential in the developing pattern of mother-infant interaction (p.1247). A mother's perception of the meaning of her infant's cry is filtered by the mother's own experience and her experience with infant crying. He also discusses a mother's ability to successfully manage or terminate her infant's cry is related to the mother's developing a sense of competence. A woman who is successful in soothing a crying child will develop a sense of her own competence. Conversely, when an infant is inconsolable, the mother may see herself as ineffective.

Acebo and Thoman (1995) studied the role of infant crying in the early mother-infant dialogue and observed the behavior of mother-infant pairs in the home at 2, 3, 4, and 5 week old infants with three additional observations when the infants were 1 year old. Each observation was seven hours in length. Using an instrument called the Cry Responsiveness Index they quantified differential crying during each session. Their results indicated that responsive mothers have responsive infants and the responsive infants have responsive mothers. Their conclusion was that crying is not a function of infant behavior by itself, but rather, is reflective of the dynamics of mother-infant interactions.

Miller, Barr, and Eaton (1993) discussed another aspect of mother-infant interactions which my impact infant crying in the first six weeks. Mothers often experience varying levels of postpartum depression following delivery. In a study with 88 completed crying/fussing records and maternal self-report about emotional distress, the researchers found that postpartum distress was significantly related to crying/fussing duration and bout frequency. The type of emotional distress that the mother was experiencing also impacted the crying, with mother who became significantly distressed in the postpartum had infants who cried more than the infants in the other subclassifications of emotional distress.

#### *Home Visitation*

Home visitation has been used as a means for service delivery over many generations and in many countries. Wasik (1993) states that the origin of home visiting in the United States had its beginning in Europe during the Elizabethan era in England. Family members provided care for relatives in the home setting, but

more formal visitation began with church volunteers and nurses. The tradition continued in the United States with nurses visiting immigrants. In the 1970's home visitation became a widely used model for delivery of services to parents and young children, with these services being delivered by many different types of persons: professionals, paraprofessionals, and volunteers.

Models of service delivery have focused on either the child (Bricker & Veltman, 1990) or on the caregiver (Seitz & Provence, 1990). The visitor was to effect change by working with the child or the caregiver. The results of research studies of the 1980's and the 1990's indicate that working with both the child and the parent together has more impact than working with either one alone, especially in the areas of cognitive growth and sustaining the gains over time (Gallagher, 1990).

#### *Nurse Home Visitation*

Olds, Kitzman, Cole, and Robinson (1997) review the theoretical foundation of a home visitation program that has had three randomized trials and is referred to as the Nurse Home Visitation program. They based their work on Bronfenbrenner's theory of human ecology, theories of human attachment and a theory of self-efficacy. The initial goals of the home visitation program were to improve the outcomes of pregnancy, improve qualities of parental caregiving, and improve maternal life course development. The focus of their early research was on the short-term outcomes of the mothers, such as reduction in smoking and fewer deliveries of low-birth weight infants. The long-term outcomes, such as the use of public assistance, fewer subsequent pregnancies, and less involvement for

themselves or their teenage children with the law were measured through their longitudinal research projects (Olds et al., 1999).

The initial program was established as a demonstration project in the 1970's in Elmira, New York. Pregnant women with no previous life births and of less than 26 weeks gestation were recruited from their health care provider. Four hundred women were divided into four groups, with four levels of treatment. Eighty-nine per cent of the sample was white. Group four received both prenatal and postnatal home visits, lasting until the child's second birthday. Results showed improved pregnancy outcomes. Results showed that caretaking was better in group four, as measured by fewer emergency room visits. There were fewer incidents of reported abuse and neglect. Long term results included less involvement with the law, fewer sexual partners, less tobacco and alcohol use for the adolescent children of the mothers in the treatment group (Olds et al, 1999).

The second trial was in Memphis, Tennessee, with a sample of low-income, first time mothers of primarily African-American women who lived in the urban setting, versus the more rural setting of New York. The 1,139 women were divided into four treatment groups, with treatment group 4 receiving the same home visitation protocol for prenatal and postnatal visitation. The Memphis trial did not enjoy the same pregnancy outcomes as the Elmira trial, although they did have similar outcomes for fewer health care visits to the emergency room and better mother-child interactions. In both sites, mothers experienced fewer subsequent births. From these two studies, Olds et al, 1999 concluded that the functional and

economic benefits from the nurse home visitation program were greatest for families who were at greatest risk at enrollment in the program.

The third trial of the nurse home visitation program was conducted in Denver, Colorado in the 1990's (Olds, Robinson et al, 2002). The Denver trial was different in that mothers were seen by either a nurse or a paraprofessional for their home visits. Seven hundred thirty-five women participated in this trial, enrolling at any time prior to delivery. Results included that nurses completed an average of 6.5 visits during pregnancy and 21 visits from birth to the child's second birthday. Paraprofessionals completed 6.3 and 16 visits, respectively. For nurse visited women, this study reported reduced smoking levels, fewer pregnancies, and the women worked more during the second year of life. The NCAST scales were used in this study, with mother-infant dyads who were visited by nurse showing more responsive interaction than the control pair dyad. Nurse home visitors had better outcomes than the paraprofessional visitors on maternal outcomes.

#### *Other Findings from the Nurse Home Visitation Trials*

Cole, Kitzman, Olds, and Sidora (1997) completed a qualitative study identifying family context as a moderator of program effects during the Memphis study. Household configuration impacted both support and conflict in the home. Living with a husband or boyfriend offered the woman more support than if she lived alone, with her mother, or with others.

Kitzman, Cole, Yoos, and Olds (1997) examined the challenges of delivering home visitation services. Nurses identified two target families for whom they kept detailed records and monthly audio recordings about their visits. They

identified nine challenges to the delivery of home visitation services and these include the following: gaining and maintaining access to families, maintaining a level of privacy within the home that would allow for sensitive conversations, engaging the relevant players, delivering the protocol elements, balancing nurse and client responsibility, balancing maternal life course goals, maintaining balance of present and future orientation, managing cultural complexities, and lastly, waiting for the mothers to be ready to change.

Korfmacher, Kitzman, and Olds (1998) examine the fact that the mothers in the nurse home visitation program in Memphis, Tennessee received about one-half of the visits that were to be delivered per protocol. This finding illustrates one of the discussion points in the previous article about delivering the protocol. The study focused on participation, session focus, maternal engagement during the session, and the mother's perception of the relationship. Korfmacher et al reported that while the number of visits was lower than planned, the measure of engagement during the sessions was high. Nurses and mothers had a positive relationship and infants of mothers who were observed, using the NCAST teaching scale, showed clarity of cues. The researchers raise the question of just how much participation in a program is necessary to gain benefit from the program.

The triad of younger maternal age, lower education level, and reduced income or income potential has long been concerns for educators, public health, and public policy officials (Horwitz, Klerman, Kuo, & Jekel, 1991; Kliegman, 1992; Koniak-Griffin, Anderson, Verzemnieks, & Brecht, 2000; vonWindeguth & Urbano, 1989). Horwitz et al (1991) reported on 121 black women who had been

pregnant adolescents in the 1960's and had participated in a Young Mothers Program. The program included obstetric, social services and education components. Twenty years later, 71% had completed high school, 82% were self-supporting and 27% lived in public housing. Sixty two per cent of the women had positive life circumstances at the follow-up, compared to 35% at 26 months postpartum. Factors which contributed to the women's success included a feeling of control of one's life, or self-efficacy, social networks, and program participation in the life skills group sessions. Maternal age at time of pregnancy is less of a factor, while poverty is more of a factor in long-term maternal outcome. The researchers concluded short-term, targeted spending on intervention programs can produce long-term benefits.

Kliegman (1992) addresses the issue of poverty in essay format in relationship to infant health and outcomes, as well as maternal outcomes. Relative to this research project, he supports educational programs to improve success in school, future employment and improvement in financial status as a means of improving the outcomes for child health and to break the intergenerational transmission of poverty and its ensuing, self-perpetuating cycles of poor health and underclass status.

Koniak-Griffin et al (2000) worked through a county health department with a group of pregnant adolescents, randomly assigning young women to either the experimental protocol or the control group. The group of 144 women were mostly minority populations (Latina and African American), low income, unmarried, first time mothers. The intervention program, delivered through home

visitation, focused on preparation for motherhood, health, sexuality and family planning, maternal role, life skills, social support, and infant care. (These elements are similar to the Nurse Family Partnership program of this research project). The control group received traditional public health nursing care. A variety of instruments were used for data collection, including the NCAST teaching scale, a sister scale to the NCAST feeding scale. Outcomes relative to this research project include adolescent mothers in the intervention group had more positive education outcomes; there were no differences on the teaching scale scores for the mothers' subscale scores (caregiver total) or mother-infant total score. Adolescents in the control group showed statistically significant gains in external social competence.

In summary, intervention programs do provide the basis for change in poverty status through increased maternal education and social support to mothers. Employment status is often related to education. The risk factor of maternal age is less of a factor than previously considered to be. Marital status will be considered with social support in a later section.

#### *Support Systems during Pregnancy*

Solchany's (2001) major premise in the theory of understanding the mental health of pregnancy is that the experiences of the expectant mother impact not only her own life course, but the developing relationship with her child. Emphasis used to be placed on the physical outcomes of the pregnancy for mother and child, but more recent interest and research have also focused on the psychological work of the mother during pregnancy to prepare herself and to develop a relationship with the yet-to-be born child. Solchany describes pregnancy

as a vulnerable time of preparation. She expands her focus to the social support system, a necessary element in a psychologically healthy pregnancy. She expressed concern for the loneliness which can ensue if a strong family and friend network is not available. She cites that the phone call from the doctor's office or the nurse home visitor can make a difference to the pregnant woman.

N. Stern (1998) provides insight to the emotional care that the mother needs during pregnancy, as well as the emotional care of the mother and infant following birth. Stern discusses the "imagined baby", which begins even before a child is conceived for the woman. While the mother is physically growing with the advancement of the pregnancy, the psychological growth in preparation for the "real" infant and her maternal role is also important. Stern emphasizes the importance of the supportive, therapeutic relationship and describes that she also uses the Brazelton NBAS as a tool to introduce the mother to the infant's behavior. She states that her role is to "bring about the birth of the infant in the mother's mind and ...promote the birth of the psychological mother" (p. 1281). D. Stern (1998) elaborates that for professionals to be effective in supporting new mothers that a meaningful relationship must be formed.

Miller-Lancar, Erwin, Landry, Smith, and Swank (1998) state that social support has been identified as a buffer against stress. They examine the role of social support relative to ethnicity, using a sample of mother-infant pairs comprised of 53 Anglo American pairs, 50 African American pairs, and 42 Mexican American pairs from a low SES sample. Using the Personal Relationships Inventory they collected data about perceived social support available to mothers and was

completed in the home after an observation of the mother and infant. Controlling for variables of single versus married, and who was available for support, the findings were that mothers reported more satisfaction with support from friends than family. Mexican American mothers had fewer friends and more family in their support systems. Social support was identified as an important factor for families at risk.

Spieker and Bensley (1994) discuss that motherhood includes a myriad of normal stresses, and that support is necessary to alleviate those stresses so that the mother can be available to mother her infant. One hundred ninety-seven adolescent mothers participated in the study, along with the 1 year old infants. The purpose of the study was to determine the role of living arrangement (and social support) on adolescent mothering and infant attachment. Sixty-eight subjects lived with the grandmother of the infant, 64 lived with partners, and 65 lived independent of grandmother or partner. The NCAST teaching scale, the HOME, and the Ainsworth Strange Situation were some of the measures used in this study. Results showed that mothers living with neither the grandmother nor the partner had significantly higher NCAST teaching scale scores. Mothers who live independently were thought to develop into the role of the parent, while mothers who lived with the grandmother tended to complete more education. Mothers who lived with a partner or on their own received high grandmother support, which was believed to be related to the grandmother seeing the daughter in a more adult role.

Spieker, Solchany, McKenna, DeKlyen, and Barnard (2000) discuss that over the past thirty years, many social programs have been developed to address the

adverse effects of poverty for children and families. An element of concern for any intervention program is the retention of clients in programs. They conducted a study with 154 mothers (program and control) to assess the factors relevant to families who had been difficult to engage in the program. The Adult Attachment Interview (AAI) was used with the program families and the results compared to the other participants. Mothers who were difficult to engage had attachment status of unresolved or cannot classify. They found that these women were suffering from unresolved experiences of loss and trauma. The implications for this research are that relationships of trust must be built and that social interaction is difficult for these women. Mental health services become an important part of the support network for many women and may allow them to participate more fully in intervention programs.

#### *Summary of the Review of the Literature*

Mother-infant interaction, including the origins of behavior that have come to be called attachment, have been studied for centuries. More recent research has used instruments, such as the NCAST Feeding Scale to quantify the observations and compare findings among various groups of caregivers and infants, including adolescent mothers, mothers with different levels of education, different levels of income or other forms of support.

Studies of self-regulation in both adults and infants have shed light on how our daily rhythms are established based on hormonal activity, patterns of light, daily activity and eating patterns, as well as the general external environment. Mother

and infant exert an influence on each other over the course of the pregnancy and post-delivery of the infant.

Home visitation is a service delivery model used bringing education programs into the home of the targeted individual. The nurse home visitation program was reviewed, with maternal outcomes varying only slightly between the three trial sites. Mother-infant interaction results were reported with limited detail in the studies reviewed. The role of social support was discussed as a supporting factor in nurse home visitation programs for program involvement and maternal role attainment.

## CHAPTER 3: METHODS

### *Participants*

The 23 mother-infant pairs in this sample were a subgroup of women in a program offered through a local county public health department called Nurse-Family Partnership. They met the state of Colorado income guidelines for low-income status (up to 200 percent of poverty level), had a confirmed pregnancy of less than 28 weeks in gestation (with one exception), and were first time mothers. The women could have been clients of the health department from previous use of services, or could have been new clients referred to the health department by the local B4Babies program, Department of Human Services, or other health related providers or interested parties. All participants were clients of the local county health department. The sample represented the cultural and ethnic population living in a semi-rural, agricultural community combined with a mid-size city community in a western region of the United States; albeit this sample was a low-income sample.

Following the birth of the infant, and including the time until the infant was two weeks old, mothers in the Nurse-Family Partnership were informed by their nurse of the opportunity to participate in a research project studying mother-infant interaction and self-regulation during the first six weeks post delivery. The nurse read the recruitment script to the client or allowed the client to read the script. As stated above, 23 clients agreed to participate in the research project. The nurse then had them read and sign the

informed consent form. A second copy of the consent form was left with the mother. This researcher collected 100% of the data.

The average age of the mothers in the sample was 20.1 years with a range of 17 to 28 years. Fifteen moms were Caucasian and eight were cultural minorities, including six Hispanics, one Native American, and one Korean. Seventeen of the infants were males and six were females.

### *Procedure*

#### *Nurse-Family Partnership*

A requirement for a site to use the Nurse-Family Partnership program is that training and supervision of the nurses and the home visitation curriculum remain true to the protocol of the original work (Olds et al., 1994). Nurses receive a combined total of over four weeks of formal training from the national training site based in Denver, Colorado and from a certified NCAST instructor who continues to work with the site.

The Nurse-Family Partnership program guidelines suggest that participants in the program enroll in the program prior to 28 weeks of pregnancy and receive one visit per week for the first four weeks following enrollment. The pregnant woman is then visited every other week until the birth of the baby. An emphasis is placed on health, nutrition, smoking cessation, life style choices and self-regulation as a means to having an infant that is full-term, self-regulated and available for interaction. Visits are scheduled weekly for six weeks following birth with emphasis on the infant's state control and modulation, behavior cues, sleep-wake cycles, feeding interactions and parenting information. The researcher used the Nursing Child Assessment Feeding Scale at approximately 2 weeks of age ( $M=18.6$  days,  $SD=6.0$  days). Feeding was assessed again, at six weeks of age

( $M=44.9$  days,  $SD=9.0$  days). The Sleep Activity Record was recorded by the mother for 7 days, starting at approximately the fourth week of life ( $M=27.1$  days,  $SD=5.7$  days). The mother was given instruction and practice with the instrument under the supervision of the nurse home visitor or the researcher. Feedback was given after the use of each of the instruments; thus, the materials were used as both an evaluation and as intervention tool resulting in a continuous treatment model. The exit interview form was used at the conclusion of the six week research visit.

The demographic sheet was compiled by Health Department personnel in conjunction with the researcher for release to the researcher of the study. (This Nurse-Family Partnership model continues with biweekly visits until the child nears his first birthday, then visits are held monthly until the second birthday).

#### *Confidentiality*

The NCAST Feeding Scale forms and SAR forms were kept in the client's chart at the local county health department until the six week home visit feeding assessment for this research study had passed. A copy of the forms was then made and coded for release to the researcher. At the end of data analysis, the records were stored according to the prevailing policy of Colorado State University. The researcher signed a contract for confidentiality with the local county health department.

#### *Instrumentation*

##### *Nursing Child Assessment Feeding Scale*

Dr. Kathryn Barnard developed the Nursing Child Assessment Feeding Scale at the University of Washington (Seattle) from her work and that of her research team. From their search of the literature and from working with developmental specialists, they

determined that the caregiver-child interaction could be a potential indicator of future development. The team decided to develop a new instrument and test it for their work on detection of health and developmental problems. The scale was field tested, has undergone revisions and has been used in many research studies at the University of Washington, as well as by other researchers across the United States and throughout the world (Sumner & Spietz, 1994).

The Nursing Child Assessment Feeding Scale (Barnard, 1994) was used to observe each mother-infant dyad at two weeks post delivery and again at 6 weeks by a certified NCAST researcher. The Feeding scale has a total of 76 binary items, divided among six subscales. Four of the subscales describe the caregiver's behaviors and two describe the infant's behavior. There are also three composited total scales: caregiver total, infant total, and caregiver/infant total. Eighteen of these items are contingency items, which measure the interaction between parent and child, based on specific actions (smiling, talking, stroking, or infant vocalization, etc.) in response to the other party's actions. Thus, 18 of the 76 items count both as contingency items and on the subscales and total scales.

*Reliability.* The scale developers (Sumner and Spietz, 1994), using Cronbach's alpha, computed the internal consistency reliability of the subscales. They consider a Cronbach's alpha of .65 or greater as indicating that the scale items correlated well enough to be considered to be measuring a construct. However, most researchers would consider alphas below .70 as only marginally acceptable (Gliner & Morgan, 2000). The Cronbach's alpha's for the Feeding subscales from both the Sumner and Spietz manual and the current study are shown in Table 1.

Table 1

*Internal Consistency Reliabilities from the NCAST Manual and for this Study*

Variable	Number of items	Manual	<u>Current Study</u>	
			2 wks	6 wks
<b>CAREGIVER</b>				
Sensitivity to Cues	16	.60	.06	.63
Response to Child's Distress	11	.69	.00	.19
Social-Emotional Growth Fostering	14	.63	.52	.55
Cognitive Growth Fostering	9	.69	.69	.75
Caregiver Total	50	.83	.73	.83
<b>CHILD</b>				
Clarity of Cues	15	.56	.43	.68
Responsiveness to Caregiver	11	.58	.55	.57
Child Total	26	.73	.68	.81
<b>CAREGIVER/INFANT TOTAL</b>	<b>76</b>	<b>.86</b>	<b>.81</b>	<b>.89</b>
<b>CONTINGENCY</b>				
Contingency Combined Total	18	-	.35	.71

These Cronbach's alpha measures indicate that the internal consistency of the NCAST Feeding Scale for the Sumner and Spietz (1994) norm group varied from unacceptable to good, with the total scales having better reliabilities (.73-.89), in part because they have more items. Alphas for the current study, likewise, varied widely. The very low alphas for sensitivity to cries and response to child's distress were probably due to lack to variability in the responses. Again, the total scale scores produced the best internal consistencies, varying from .71 - .89, except for the 2 week contingency total alphas of .35. For this study I chose to use three "total" scales (caregiver total, infant

total, and contingency combined (caregiver and infant) total as the key measures. Except for the contingency scale at 2 weeks, the alphas for these scales were acceptable.

Several test-retest reliability analyses have been completed and are cited in the *NCAST Caregiver/Parent-Child Manual*. These show that parent behavior scores are more stable than infant behavior. One example, as reported by Sumner and Spietz (1994), is a study of mother-infant synchrony conducted by Quillin. Mothers had an average age of 27 years and had completed high school. These 45 Caucasian mothers and their infants were tested over the first month of life with the first observation at 3 days and the second observation at one month (25 days later). Mean total feeding scores of 61.0 (*SD* 4.7) at 3 days and 63.7 (*SD* 5.6) at one month computed to a test-retest correlation of  $r = .40$ , which indicates only moderate stability across this time of rapid developmental change. In the current study 2-week to 6-week correlations were .42 for the caregiver total score and .21 for infant total scores.

The researcher and the nurse home visitors were certified NCAST testers with interrater reliability greater than 90%, which is required to use the scales for research. The researcher's NCAST scores were used for the study's data, but interrater reliability with the visiting nurses was checked for 6 feeding sessions as a reliability check for the researcher. Percentage of exact agreements ranged from 78% to 97% agreement with a median of 93.5%.

*Validity.* The items for the NCAST Feeding Scale were written to reflect the parent-child- environment interaction as defined by Barnard (1994). A *content validity* study showed a cluster of maternal behaviors emerging as early as four months. These

items were related to the child's intelligence quotient (IQ) at four years of age (Sumner & Spietz, 1994).

*Concurrent validity* studies have shown a correlation between the NCAST Feeding scale and the Teaching scale (also part of the Nursing Child Assessment Satellite Training). The NCAST Feeding Scale also correlates with the HOME Scale developed by Caldwell and Bradley, (1984). Sumner and Spietz (1994) report that caregiver social-emotional growth fostering, cognitive growth fostering, the caregiver total score, and the caregiver/infant total score had the highest correlations (.47, .50, .48, and .54, respectively) with the HOME scale.

*Predictive validity* studies conducted at the University of Washington found that feeding scores predicted later IQ scores, language scores, and problem behaviors. Another study was predictive of attachment security at 13 months as observed in the Strange Situation paradigm (Sumner & Spietz, 1994).

*Construct validity* studies conducted by other researchers are discussed by Sumner and Spietz (1994). Discriminant validity studies found no difference in feeding scores for the treatment or control group in a study designed to teach mothers about infant state and modulation, conducted by Kushner (as cited by Sumner and Spietz, 1994).

In a study of breast-fed versus bottle-fed infants at 1 – 3 months of age, there were significant differences when controlling for maternal education, infant age, and ethnicity (Morgan, 1987). Total scores (63.1 versus 58), caregiver scores 43.3 versus 39.8, and total infant score (20.0 versus 18.3) were significant at the  $p = <.001$ .

A study by von Winegerth and Urbano (1989) compared two groups of 33 mothers each for differences in feeding scores based on maternal age (mean age of 18 versus 27). Both groups of mothers had a mean level of education of 11 years. Older mothers were significantly better on maternal sensitivity to cues (11.39 versus 12.82), cognitive growth fostering (9.91 versus 11.30) and total score (55.52 versus 60.61). Other studies, which evaluated the scales' ability to reflect changes in maternal and child behaviors following interventions, are reviewed in the NCAST Feeding Manual by Sumner and Spietz (1994). One study of parallel interest to this study by Koniak-Griffers and Verzemneiks (1991) reported results from a group of adolescent mothers who were enrolled in a prenatal intervention program. The curriculum focused on maternal role attainment and what an infant would be like. A feeding observation was completed at 4 weeks for 15 mothers in the program and 15 mothers not enrolled in the program. While mothers in the prenatal intervention group scored higher on all subscales, no significant differences were found.

*Scale intercorrelations.* In the current study several feeding scores were quite highly intercorrelated (.5 to .9), so we calculated three of the measures that were important in terms of the literature and at least conceptually quite independent. These three key measures shown in Table 2, were quite highly intercorrelated at both 2 and 6 weeks. Note, however, that there was little relationship between the 2 and 6-week scores, indicating a relative lack of stability in these measures at these ages. That is, those dyads who had high scores at 2 weeks did not necessarily have high scores at 6 weeks.

Table 2

*Intercorrelations of Key NCAST Feeding Variables at 2 and 6 Weeks*

	2 Weeks			6 Weeks	
	Caregiver Total	Infant Total	Conting Total	Caregiver Total	Infant Total
Caregiver total – 2 wks	--				
Infant total – 2 wks	.58	--			
Contingency caregiver/infant total – 2 wks	.74	.70	--		
Caregiver total – 6 wks	.42	.26	.37	--	
Infant total – 6 wks	.29	.21	.05	.76	--
Contingency caregiver/infant total – 6 wks	.27	.08	.19	.82	.80

*Sleep Activity Record (SAR)*

A second instrument developed by Barnard (1999) and her team of researchers is the Sleep Activity Record (SAR). Participant mothers were asked to record their infant's sleep time, feeding episodes, and crying episodes for each 24-hour period for seven days on the Sleep Activity Record form, which was supplied to them by their nurse or NCAST researcher. Mothers were asked to record this log between the third and fourth week of life. Mothers were instructed how to record the information and allowed to practice on a separate form during a teaching episode. However, some discrepancies were noted on the forms from a few mothers, which may lead one to question the accuracy of their recordings.

Barnard (1999) lists the norms for sleep duration and number of feedings in the first year of life, based on data compiled at the University of Washington. For this study the 1 month data collected on 255 subjects is pertinent and showed the following:

Average number of sleep hours in 24 hours = 14,  $SD = 2.03$ , range = 12-16 hours. The average number of feedings in 24 hours = 8,  $SD = 1.88$ , range = 6-10 feedings.

Permission to use the NCAST Feeding Scale and SAR for research was granted by Dr. Kathryn Barnard in personal conversations about this proposed study (August 4 and October 2, 2000 in Seattle, Washington). The researcher is a certified NCAST instructor and teaches the NCAST program under the auspices of the NCAST program through the University of Washington. All scale forms were purchased through the NCAST office to respect the copyright laws.

Table 3 shows the intercorrelations of the three Steep Activity Record variables used in this study: average number and average hours of sleep, number of feedings, and number of one minute or longer cry episodes during the seven-day recording period. Note that the three measures are not significantly intercorrelated.

Table 3

*Intercorrelations of the Sleep Activity Record Variables at Three to Four Weeks*

	Hours Sleep	Feedings	Cry Episodes
Average hours of sleep – 24 hrs	--		
Average feeding – 24 hrs.	-.05	--	
Average cry episodes – 24 hrs.	-.29	.32	--

*Program Utilization and Demographic Form*

This form contains information about the number of visits completed, several pieces of information about the mother, and several about the infant. The local county health department collected this information about their clients at program enrollment and during the treatment time. The form used a code rather than names for

confidentiality. Tables 4 and 5 provide descriptive information about program utilization, mother and baby.

Table 4

*Means and Standard Deviations for Programmatic and Demographic Independent Variables*

Variable	<i>M</i>	<i>SD</i>	Range
No. visits during pregnancy	12.17	3.59	7 – 21
No. visits post birth	4.65	1.80	1 – 8
Mother’s age in years at delivery	20.61	2.57	17 – 28
Weeks pregnant at entry	17.17	6.40	6 – 31
Gestational age at birth	39.59	1.28	37 – 42
Birth weight in grams	3213	420	2494 – 4114

*Numbers of visits during pregnancy.* The average number of nurse home visits was 12.17 with a range of 7-21 visits. At the beginning of the study, the Nurse-Family Partnership program began visiting mothers at about 28 weeks, but later in the study they tried to visit the mothers as early as possible. Thus, the number of visits varied in good part depending on how early in the pregnancy the visits began. However, visits were missed when mothers failed to keep appointments so to some extent the number of visits reflects mother’s interest and an eagerness to participate in the home visitation program.

*Number of visits post delivery.* The average over the six or so week period of this study was 4.65, with a range of 1-8. This number is probably a more direct measure of the mother’s motivation to participate in the home visitation program.

*Mother's age at delivery.* As stated in the participants section the average age was 20.61 years, with 14 of the 23 moms between 18 and 21 years old and only one 17 year old and two over 25. Thus, these are young women, but with no young teens. The Colorado Nurse-Family Partnership average is 19 years of age during a comparable time period as this study (O'Brien et al., 2002).

*Weeks pregnant at entry.* The average entry was 17.17 weeks with a wide range (6-31) and a relatively flat distribution. The Colorado NFP average was 17 weeks (O'Brien et al., 2002).

*Gestational age at birth.* The average was 39.59 weeks and range was 37-42, so these were all essentially full-term infants. Colorado NFP age was 39 weeks,  $SD = 2.6$  (O'Brien et al., 2002).

*Birth weight in grams.* The average was 3213 grams (almost 7 pounds) and the range was 2494 – 4114 (from about 5.4 pounds to almost 9 pounds). Although there is quite a range of weights, none were small for gestational age.

*Educational level of mother.* Thirteen of the 23 mothers were high school graduates or had a GED, some obtained during the pregnancy. Only 3 (13%) had not finished high school, so this sample seems to be better educated than usual for a low income group (see Table 5 for this distribution and those that follow). Nurse-Family Partnership state average equals 11 years (O'Brien et al., 2002).

*Income level.* At program entry, the median (and modal) household income for these women was in the \$9,000-\$12,000 range. The total range was from under \$3,000 to more than \$20,000 in two cases. The Colorado Nurse-Family Partnership state median household income was \$10,500 (O'Brien et al., 2002).

Table 5

*Demographics and Characteristics of Program Participants*

	<i>n</i>	%
<b>Education level of mother</b>		
< High school grad	3	13
High school diploma or GED	13	57
Technical ed. or < 2 yrs. college	6	26
> 2 yrs. college or university	1	4
<b>Income level program entry</b>		
< or = \$3,000	2	9
\$3,001 - \$6,000	3	13
\$6,001 - \$9,000	4	17
\$9,001 - \$12,000	6	26
\$12,000 - \$15,000	4	17
\$15,000 - \$20,000	1	4
\$20,000 - \$30,000	2	9
<b>Employment status at program entry</b>		
Employed	10	44
Not employed	13	56
<b>Marital status at enrollment</b>		
Married	9	39
Single	14	61
<b>Ethnicity/race of mother</b>		
Cultural minority	8	35
Caucasian	15	65
<b>Gender of baby</b>		
Male	17	74
Female	6	26
<b>Work status 6 wks. post delivery</b>		
Return to work	7	30
Remain at home	16	70
<b>Maternal sleep/wake/activity during pregnancy by RN report</b>		
Regular patterns	16	70
Irregular patterns	7	30

*Employment status.* At program entry, 44% (10) of the women were employed and 56% (13) were not.

*Marital status.* At enrollment, 39% (9) were married and 61% (14) were not.

*Ethnicity/race.* The mother's were 35% (8) cultural minorities and 65% (15) Caucasian. Several of the infants were mixed races.

*Gender.* There were 74% (17) male infants and 26% (6) females.

*Work status at 6 weeks post delivery.* Thirty percent (7) were employed and 70% (16) were not. Note that there were at this time three fewer women working than at program entry.

*Maternal sleep/wake activity.* Seventy percent of the mothers had regular patterns and 30% had irregular sleep/wake cycles as reported by their RNs.

#### *Exit Interview*

Following the second feeding observation, when the infant was about six weeks old, I completed the exit interview. This information provided the participant an opportunity to share her remarks with the researcher and provided closure to the research study.

#### *Design and Analysis*

Key independent variables are number of home visits provided by the nurse home visitor during pregnancy and after the birth of the baby. Another independent variable was change in performance over time (from the 2 week visit to the 6 week visit). Because we considered the feedback given to the mother after the first feeding assessment to be an intervention, this part of the study is considered a poor one-group pre-test/post-test quasi-experimental design. One problem we had was that we did not have a group that did not

get the feedback so we did not know for certain if feeding interactions would have changed without the feedback. This part of the design is within subjects. Table 6 provides a schematic diagram of the design. The top line indicates with V's that there was multiple nurse home visits before and after the infant's birth. The bottom line shows the approximate timing of the data collection for this study.

*Data Analysis*

SPSS 11.0 was used for data analyses, with  $p < .05$  used as the cut-off for statistical significance. Research questions 2-16 used associational or comparative, non-experimental, approaches.

1. Is there a change in feeding scores between the 2 week observation and the 6 week observation with the NCAST Feeding Scale for each dyad? Paired-sample *t* tests were used for analyses.

Table 6

*Study Design*

Nurse-Family Partnership						
Pre-delivery	Delivery	2 wk	3 wk	4 wk	5-6 wk	Post 6 wks
VVVVVVVV	V	V	V	V	VV	VV
Research Visits		NCAST Feeding Scale		SAR	NCAST Feeding Scale	D
					EI	

*Note:* V = visits with defined curriculum materials available from the NCAST program  
 SAR = Sleep Activity Record  
 EI = Exit Interview  
 D = Demographics form copied from Department of Health Records

2. Is there a relationship between the numbers of visits completed during pregnancy and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.
3. Is there a relationship between the number of visits completed following the birth of the baby and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.
4. Is there a relationship between the age of the mother and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.
5. Is there a relationship between the years of education of the mother and the initial feeding score, the 6 week feeding score, the feeding change score and the sleep activity record? Pearson product-moment correlation was used for analyses.
6. Is there a relationship between the mother's income status (household income) at program entry and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.
7. Is there a relationship between the mother's weeks of pregnancy at program entry and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.

8. Is there a relationship between the gestational age at birth and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.
9. Is there a relationship between the birth weight and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Pearson product-moment correlation was used for analyses.
10. Is there a relationship between the mother's employment status (yes or no) at entry into the program and the initial feeding scores, the 6 week feeding scores, the feeding range scores, and the sleep activity record? Independent samples *t* tests were used for analyses.
11. Is there a relationship between the mother's marital status (married or single) and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Independent samples *t* tests were used for analyses.
12. Is there a relationship between the mother's race/ethnic status (Caucasian or cultural minority) and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Independent samples *t* tests were used for analyses.
13. Is there a relationship between the gender of the infant (male or female) and the initial feeding scores, the 6 week feeding scores, the feeding change scores, and the sleep activity record? Independent samples *t* tests were used for analyses.
14. Is there a relationship between the return to work status of the mother (yes or no) at 6 weeks and the initial feeding scores, the 6 week feeding scores, the feeding

change scores, and the sleep activity record? Independent samples *t* tests were used for analyses.

15. Is there a relationship between the mother's sleep/wake/activity patterns during pregnancy (regular or irregular) as reported by the RN and the infant's sleep activity record? Independent samples *t* tests were used for analyses.
16. Is there a relationship between NCAST feeding scores and sleep activity record scores? Pearson product-moment correlation was used for analyses.

#### *Selection of Measures for Final Analyses*

The NCAST Feeding Scale has 6 subscales, four of which focus on the caregiver and two which focus on the infant. Totals are calculated for the caregiver (in this study the mother of the infant was the caregiver in each instance), the infant, and then a total score for the dyad is figured. A second set of scores is also calculated for the contingency or interactive behaviors of the dyad.

For the purposes of this study, the caregiver total score was selected to capture the caregiver behavior. Current research, literature, and clinical practice focus on the importance of maternal sensitivity and a nurturing relationship with newborns as setting the foundation for future school and relationship success (Gopnik, Meltzoff, & Kuhl, 1999; Shonkoff & Phillips, 2000).

The infant total scores was chosen to represent both dimensions of infant behavior (clarity of cues and responsiveness to caregiver) to capture the infant's contribution to the dyad. The caregiver/infant contingency factor was selected to illustrate the reciprocal relationship between the mother and infant. Because the contingency items also contribute to the scores for the subscales, the contingency

scales are, of course, related to the subscale and total scores.

The three 24 hour average scores for numbers of hours slept, number of feedings, and number of crying episodes give some insight into the biological rhythms of this sample of infants as supported in a relationship with their caregivers.

## CHAPTER 4: RESULTS

In this chapter I will present the findings of the descriptive statistics for the key dependent variables and then consider the sixteen research questions as previously presented in the introduction and the methods chapter. While many statistics were generated through the data analyses process, few reached statistical significance at  $p < .05$ . The tables also indicate which results had  $p < .10$ , which were not considered to be statistically significant. I will also present findings gathered from the mothers during an exit interview. Mothers shared information about when they wanted information related to pregnancy, infant care and themselves, which topics were of most interest to them, who their support system was during pregnancy and advice for other new parents. They also shared their perception of their sleep/activity patterns during the pregnancy and some mothers asked for more information about child development from this researcher.

### *Descriptive Statistics for the Key Dependent Variables*

Table 7 focuses on the key dependent variables. Mothers displayed attempts to foster social-emotional growth in their infants during feeding at both 2 and 6 week observation times. With 50 possible items, mothers had a mean score of 43.87 at two weeks and 43.79 at 6 weeks. For both times the range was 35-50 of the 50 possible points. The lower number of 35 points would indicate that these items were somewhat difficult for a mother or some mothers at both the 2 and 6 week feeding observation. Likewise, some mothers found caregiving to be a relatively easy task for them to accomplish with their infants because they had the maximum scores.

Table 7

*Descriptive Statistics for Key Dependent Variables*

Variable	<i>N</i>	No. items	<i>M</i>	<i>SD</i>	Range
Caregiver total – 2 wks	23	50	43.87	4.22	35 – 50
Infant total – 2 wks	23	26	17.57	3.07	11 – 25
Contingency caregiver/infant – 2 wks	23	18	14.43	1.90	11 – 17
Caregiver total – 6 wks	19	50	43.79	4.45	35 – 50
Infant total – 6 wks	19	26	17.95	3.92	7 – 22
Contingency caregiver/infant – 6 wks	19	18	14.53	2.27	9 – 17
Change Caregiver total	19	50	-.047	4.69	-11 to 7
Change infant total	19	26	0.37	4.55	-11 to +10
Change contingency caregiver/infant total	19	18	0.16	2.75	-7 to +4
Average hrs. sleep – 24 hrs	15	--	14.26	2.55	7.85 – 17.15
Average feedings – 24 hrs.	14	--	8.22	1.80	6.00 – 11.72
Average cry episodes – 24 hrs.	14	--	2.73	2.18	0.14 – 7.57

Table 7 shows that the infants, however, were less responsive at both 2 and 6 week observation periods, with the mean scores being 17.57 at 2 weeks and 17.95 at 6 weeks out of 26 possible points. This infant total score includes the scores for both the clarity of cues subscale and the responsiveness to caregiver subscale. Both the minimum and maximum scores were somewhat higher at the 2-week feeding observation time (11-25 of 26 possible points) than at the 6-week feeding observation time (7-22 of 26 possible points), but the means were almost the same.

The contingency caregiver/infant score represents the interaction of mother and infant based upon each other's actions. The mean score was 14.43 at 2 weeks and 14.53

at 6 weeks, with the total possible being 18 points. The ranges were 11-17 and 9-17 at 2 and 6-week observations, respectively.

Table 7 also displays the change scores from time one (2 weeks) to time two (6 weeks) for the feeding observations. These will be discussed further with Table 8.

Table 7 shows that infants in this study were sleeping an average of 14.26 hours per 24 hour time period. Infants were eating an average of 8.22 times per 24 hour time period. Both of these numbers represent what is expected for the desirable number of hours of sleep and number of feedings per 24 hours (Barnard, 1999). Infants in this study had an average of 2.73 crying episodes per 24 hour period. Crying is considered the infant's primary means of communicating need at this age. No statistics were found in the literature for an average number of crying episodes per 24 hour period.

### *Research Questions*

#### *Research Question 1*

Table 8 compares the NCAST feeding scores at 2 and 6 weeks using paired sample *t* tests. None of the results reached statistical significance, indicating the infants did not increase or decrease between the two observation times on the average.

The teaching about mother-infant interaction after the initial feeding observation at the 2 week feeding observation did not seem to be effective in altering the dyad's performance at the 6 week feeding observation. Furthermore, the correlations indicated that the scores on these three variables were not very stable between the two observation times.

Table 8

*Paired Samples t Tests comparing NCAST Feeding Scores at Two and Six Weeks – Research Question 1*

Variable	Two Weeks		Six Weeks		<i>r</i>	<i>t</i> (18)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Caregiver total	44.26	4.22	43.79	4.45	.42	.44
Infant total score	17.58	3.29	17.95	3.92	.21	.35
Contingency Caregiver/ Infant total score	14.37	2.06	14.53	2.27	.19	.25

*N*= 19

*Research Questions 2-5*

Table 9 shows there were no statistically significant ( $p < .05$ ) correlations between the number of home visits the mother received during the pregnancy (research question 2) and the dependent variables. The six negative correlations between 2- and 6-week NCAST scores and number of home visits will be discussed in chapter 5.

There were no statistically significant results for the number of visits post birth of the baby and the three key dependent feeding variables nor for the sleep/activity record 24 hour variables (research question 3). The same is true for research question 4, which asked if there was a relationship between the mother's age at the time of delivery and the feeding and sleep/activity record variables.

Table 9 also displays the significant relationships between the level of maternal education at the time of the delivery of the infant (research question 5) and several of the key variables, using correlation statistics for the analyses. Maternal education and the

Table 9

*Correlations of Demographic Questionnaire Variables with NCAST Feeding Variables and Sleep Activity Record Variables – Research Questions 2, 3, 4, and 5*

Variable	Pregnancy visits – RQ2	Post birth visits – RQ3	Age of mother – RQ4	Education mother – RQ5
Caregiver total – 2 wks	-.24	-.07	.17	.61**
Infant total – 2 wks	-.40 <sup>#</sup>	-.02	.21	.47*
Contingency caregiver/infant total – 2 wks	-.36 <sup>#</sup>	-.11	.26	.45*
Caregiver total – 6 wks	-.40 <sup>#</sup>	-.06	-.06	.45*
Infant total – 6 wks	-.29	-.21	-.27	.42 <sup>#</sup>
Conting caregiver/infant total – 6 wks	-.18	-.04	-.30	.26
Chg Caregiver total	-.02	-.10	-.16	-.07
Chg infant total	.14	-.20	-.36	-.00
Chg conting caregiver/infant total	.18	-.00	-.42 <sup>#</sup>	-.16
Average hrs. sleep - 24 hrs.	-.14	-.35	-.27	-.02
Average feedings - 24 hrs.	-.08	.07	.44	.16
Average cry episodes - 24 hrs.	-.15	.15	.24	-.24

\*  $p < .05$ ; \*\*  $p < .01$ ; <sup>#</sup>  $p \leq .10$  (not considered statistically significant).

dependent variable, caregiver total, the 2 week feeding observation showed a statistically significant positive correlation,  $r(21) = .61$ ,  $p = .002$ , which means that the higher the level of maternal education, the better the mother was at providing sensitive and nurturing care to her infant during feeding. Using Cohen's (1988) guidelines, the  $r$  indicates a large effect size; the  $r$  squared indicates that 37% of the variance in the caregiver total can be predicted from the mother's education level. This positive relationship for maternal education and caregiver total remained at the 6 week feeding observation,  $r(17) = .45$ ,  $p = .05$ . Again, the  $r$  indicates a large effect size and the  $r$

squared indicates that 20% of the variance in caregiver total can be predicted from the mother's education level.

Maternal education level and infant total score at the 2 week feeding observation also had a significant positive correlation,  $r(21) = .47, p = .025$ . The  $r$  indicates a medium to large effect size and the  $r$  squared indicates that 22% of the variance in the infant total score can be predicted from the maternal education level. Maternal education level seemed to have an influence on the infant's clarity of cues and responsiveness to caregiver.

A statistically significant positive correlation was also found between the contingency caregiver/infant total at the 2 week feeding observation and level of maternal education existed (Table 9),  $r(21) = .45, p = .032$ . In this measure of reciprocal relationship, mothers with higher levels of education had infants who were more responsive and infants who were more responsive had mothers with higher levels of education. The  $r$  indicates a medium to large effect size and the  $r$  squared indicates that 20% of the variance in contingency caregiver/infant total can be predicted from the maternal education level.

#### *Research Questions 6-9*

Table 10 shows a statistically significant positive correlation between contingency caregiver/infant total at the 6 week feeding observation and the level of household income at program entry,  $r(21) = .54, p = .021$  (research question 6). According to Cohen (1988), the  $r = .54$  is a large effect size. Twenty-nine percent of the variance in contingency caregiver/infant interaction can be explained by the mother's household income at program entry. Mothers who were in households where more income

Table 10

*Correlations of Demographic Questionnaire Variables with NCAST Feeding Variables and Sleep Activity Record Variables – Research Questions 6, 7, 8, and 9*

Variable	Income RQ6	Weeks at entry RQ7	Gestational age RQ8	Birth Wt. RQ9
Caregiver total – 2 wks	-.21	.14	.01	.02
Infant total – 2 wks	-.32	.19	.17	-.07
Conting careg/infant total – 2 wks	-.18	.26	.14	.12
Caregiver total – 6 wks	-.12	.43	.34	.03
Infant total – 6 wks	.23	.23	.18	-.08
Conting careg/infant total – 6 wks	.54*	.25	.41 <sup>#</sup>	.25
Change caregiver total	.15	.08	.29	-.09
Change infant total	.43 <sup>#</sup>	-.04	.02	-.02
Change conting caregiver/infant total	.58*	-.03	.24	.12
Average hrs. sleep - 24 hrs.	.28	-.15	.43	.34
Average feedings - 24 hrs.	.01	-.18	.24	.15
Average cry episodes - 24 hrs.	-.29	.15	.43	-.09

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

was present have an interaction with their infant that is higher in reciprocal interaction.

Table 10 also displays the findings that the change in contingency caregiver/infant total from 2 weeks to 6 weeks is a statistically significant positive correlation,  $r(16) = .58, p = .012$ . The effect size is large and 34% of the variance in the change in contingency caregiver/infant interaction is explained by the household income at program entry. Mothers who were in households with more money had contingent interactions with their infants that increased in their positive nature over time.

Using correlations analyses, there were no results that were statistically significant for research question 7, which asked if there was a relationship between the mother's weeks of pregnancy at program entry and the feeding and sleep/activity record

scores. There were no significant results for research question 8 either, which investigated the relationship between the infant's gestation age and the feeding and sleep/activity variables. Research question 9, which addressed the infant's birth weight in grams, had no statistically significant results.

*Research Question 10*

Table 11 shows that using independent samples *t* tests to analyze for the difference between mother's employment status at program entry and the three key

Table 11

*Means, Standard Deviations, and t Test Comparisons of Employed and Not Employed Mothers of NCAST Feeding Scale and Sleep Activity Record Variables-Research Question 10*

Variable	Employed		Not Employed		<i>df</i>	<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Caregiver total – 2 wks	45.44	4.36	43.20	4.02	17	1.17
Infant total – 2 wks	17.50	3.17	17.62	3.12	21	0.09
Conting caregiver/infant totl – 2 wks	1.10	0.74	1.46	0.52	21	1.38
Caregiver total – 6 wks	45.00	4.30	42.70	4.52	17	1.13
Infant total – 6 wks	19.33	2.50	16.70	4.64	17	1.51
Conting caregiver/infant totl – 6 wks	1.67	0.50	1.50	0.53	17	0.71
Chg caregiver total	-0.44	4.20	0.30	5.26	17	0.02
Chg infant total	1.89	4.08	-1.00	4.71	17	1.42
Chg contingency caregiver/infant total	0.67	2.18	-0.30	3.23	17	0.76
Average hrs. sleep - 24 hrs.	14.28	3.13	14.25	2.15	13	0.02
Average feedings - 24 hrs.	7.90	1.95	8.46	1.78	12	0.56
Average cry episodes - 24 hrs.	2.24	1.61	3.09	2.57	12	0.71

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

dependent variables related to the feeding scale and the three variables from the sleep/activity record, there were no statistically significant differences between the two groups of mothers.

*Research Question 11*

Table 12 shows the results of independent samples *t* tests comparing marital status of mothers (married or single) on the average number of feedings in 24 hours. A statistically significant difference was found,  $t(12) = 2.61, p = .023$ , which indicates that the infants of the married mothers ( $M = 9.27$ ) received more feedings on average in a 24

Table 12

*Means, Standard Deviations, and t Test Comparisons of Married and Single Mothers of NCAST Feeding Scale and Sleep Activity Record Variables-Research Question 11*

Variable	Married		Single		df	t
	M	SD	M	SD		
Caregiver total – 2 wks	45.29	2.81	43.67	4.89	17	.80
Infant total – 2 wks	18.00	4.09	17.29	2.33	21	0.54
Conting caregiver/infant total – 2 wks	1.44	0.73	1.21	0.58	21	0.84
Caregiver total – 6 wks	45.87	3.02	42.58	4.81	17	1.61
Infant total – 6 wks	18.43	3.87	17.67	4.10	17	0.40
Conting caregiver/infant total – 6 wks	1.71	0.49	1.50	0.52	17	0.88
Chg caregiver total	0.57	2.28	-1.08	5.68	17	0.73
Chg infant total	0.29	5.06	0.42	4.46	17	0.06
Chg contingency caregiver/infant total	0.29	2.21	0.08	3.11	17	0.15
Average hrs. sleep – 24 hrs.	14.06	1.59	14.44	3.28	13	0.28
Average feedings – 24 hrs	9.27	1.93	7.18	0.87	12	2.61*
Average cry episodes – 24 hrs.	2.65	2.62	2.80	1.84	12	0.12

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

hour time period than the infants of the single mothers ( $M = 7.18$ ). The 95% confidence interval indicates that the mean difference between married mothers and single mothers in the population is probably between 0.35 and 3.83 feedings. The effect size (approximately 1.49) is very large according to Cohen (1988).

*Research Question 12*

Table 13 illustrates the findings that the independent samples  $t$  tests did not show any statistically significant differences between mothers who were from a cultural

Table 13

*Means, Standard Deviations, and t Test Comparisons of Cultural Minority and Caucasian Mothers of NCAST Feeding Scale and Sleep Activity Record Variables- Research Question 12*

Variable	Cultural Minority		Caucasian		df	t
	M	SD	M	SD		
Caregiver total – 2 wks	44.29	3.09	44.25	4.90	17	0.02
Infant total – 2 wks	18.25	3.37	17.20	2.96	21	0.77
Conting caregiver/infant total – 2 wks	1.50	0.53	1.20	0.68	21	1.08
Caregiver total – 6 wks	45.29	2.87	42.92	5.01	17	1.113
Infant total – 6 wks	18.57	3.91	17.58	4.06	17	0.52
Conting caregiver/infant total – 6 wks	1.71	0.49	1.50	0.52	17	0.88
Chg caregiver total	1.00	3.11	-1.33	5.35	17	1.04
Chg infant total	0.57	4.04	0.25	5.00	17	0.14
Chg contingency caregiver/infant total	0.29	2.06	0.08	3.18	17	0.15
Average hrs. sleep – 24 hrs.	13.63	2.05	14.69	2.88	13	0.78
Average feedings – 24 hrs.	8.79	1.93	7.80	1.70	12	1.02
Average cry episodes – 24 hrs.	2.69	2.62	2.75	1.97	12	0.05

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

minority group or mothers who identified themselves as Caucasian at program entry on any of the three key dependent variables from the feeding observation scale nor for the three 24 hour variables from the sleep/activity record.

*Research Question 13*

Table 14 displays data that shows that the gender of the infant did not prove to make a difference on any of the feeding scale variables, nor for the sleeping, feeding, or crying variables on the 24 hour record.

Table 14

*Means, Standard Deviations, and t Test Comparisons of Male and Female Infants on NCAST Feeding Scale and Sleep Activity Record Variables-Research Question 13*

Variable	Male		Female		df	t
	M	SD	M	SD		
Caregiver total – 2 wks	44.15	4.86	44.50	2.74	17	0.16
Infant total – 2 wks	17.59	2.29	17.50	4.97	5.77 <sup>a</sup>	0.04
Contingency caregiver/infant total – 2 wks	1.29	0.59	1.33	0.82	21	0.13
Caregiver total – 6 wks	42.62	4.54	46.33	3.27	17	1.79 <sup>#</sup>
Infant total – 6 wks	17.92	4.03	18.00	4.05	17	0.04
Contingency caregiver/infant total – 6 wks	1.54	0.52	1.67	0.52	17	0.50
Chg caregiver total	-1.54	4.98	1.83	3.25	17	1.51
Chg infant total	0.31	4.19	0.50	5.68	17	0.08
Chg contingency caregiver/infant total	-0.08	2.93	0.67	2.50	17	0.54
Average hrs. sleep – 24 hrs.	14.97	2.83	13.21	1.80	13	1.34
Average feedings – 24 hrs	7.46	0.98	9.24	2.22	12	2.04
Average cry episodes – 24 hrs.	2.22	2.03	3.40	2.36	12	1.01

<sup>a</sup>. df were reduced when group variances were unequal.

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

*Research Question 14*

Table 15 shows there was a significant independent samples *t* test comparing the return to work status of mothers on the infant change score. The statistically significant difference was,  $t(15) = 2.26, p = .037$ , which indicates that the mothers who remained at home following the birth of the infant ( $M = -1.08$ ) had infants who became less responsive from 2 to 6 weeks compared to infants of mothers who returned to work

Table 15

*Means, Standard Deviations, and t Test Comparisons of Mothers Who Returned to Work and Mothers Who Remained Home on NCAST Feeding Scale and Sleep Activity Record Variables – Research Question 14*

Variable	Return to work		Remain at home		df	t
	M	SD	M	SD		
Caregiver total – 2 wks	43.67	4.46	44.54	4.27	17	0.40
Infant total – 2 wks	16.86	3.18	17.86	3.07	21	0.72
Conting caregiver/infant total – 2 wks	13.86	1.77	14.69	1.96	21	0.96
Caregiver total – 6 wks	44.33	3.77	43.54	4.86	17	0.35
Infant total – 6 wks	19.83	2.32	17.08	4.27	17	1.47
Conting caregiver/infant total – 6 wks	14.67	2.16	14.46	2.40	17	0.18
Chg caregiver total	0.67	3.88	-1.00	5.08	17	0.71
Chg infant total	3.50	4.04	-1.08	4.13	17	2.26*
Chg contingency caregiver/infant total	1.17	2.04	-0.31	2.98	17	1.09
Average hrs. sleep – 24 hrs.	15.33	1.84	13.88	2.73	13	0.97
Average feedings – 24 hrs	7.50	0.67	8.51	2.05	12	0.94
Average cry episodes – 24 hrs.	3.14	2.56	2.56	2.13	12	0.44

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

( $M = 3.50$ ). The 95% confidence interval indicates that the mean difference in the infant's change scores between the mothers who remained at home and those who returned to work is probably between -8.85 and -30 points. The effect size is approximately -1.12, which is very large, according to Cohen (1988).

MANOVAs for questions 10-14, using the six key 2- and 6-week feeding variables as dependents, confirmed the above findings of no significant effect of the five dichotomous independent variables (employment status, marital status, gender of infant, return to work status, and mother's sleep status during pregnancy). That is, none of the five MANOVAs were significant.

#### *Research Question 15*

Table 16 displays the results of the independent samples  $t$  tests which explored the question of whether there was a difference between mothers who had regular versus irregular sleep patterns during pregnancy, as reported by their nurse, and their infant's sleep/activity record variables for the 24 hour recordings at 4 weeks. There were no statistically significant results for this question.

Table 16

*Means, Standard Deviations, and t Test Comparisons of Mothers' Sleep/Wake/Activity Patterns by RN Report on Sleep Activity Record Variables-Research Question 15*

Variable	Regular patterns		Irregular Patterns		$df$	$t$
	$M$	$SD$	$M$	$SD$		
Average hrs. sleep – 24 hrs.	14.89	1.97	13.32	3.20	13	1.19
Average feedings – 24 hrs.	8.41	1.69	7.97	2.08	12	0.44
Average cry episodes – 24 hrs.	3.03	2.47	2.17	1.61	12	0.69

\*  $p < .05$ ; \*\*  $p < .01$ ; #  $p \leq .10$  (not considered statistically significant).

*Research Question 16*

Table 17 shows there was a statistically significant correlation between infant total at 2 weeks and the number of feedings received as recorded on the sleep/activity record,  $r(12) = .54, p = .045$ . The direction of the correlation is positive, which means that infants who have a higher combined score for clarity of cues and are more responsive to the caregiver at two weeks receive more feedings at 3-4 weeks. Likewise, infants who are less clear in their cues and less responsive to their caregiver receive fewer feedings. The  $r$  indicates a large effect size, and the  $r$  squared indicates that 29% of the variance in infant total can be predicted from the average number of feedings that the infant receives in a 24 hour time period over the course of 7 days.

Table 17

*Correlations of NCAST Feeding Variables and Sleep Activity Record Variables at 3-4 Weeks*

Variable	Hours Sleep	Number Feedings	Number Cry Episodes
Caregiver total – 2 wks	.02	.27	-.20
Infant total – 2 wks	.08	.54*	.07
Conting caregiver/infant totl – 2 wks	-.01	.39	-.24
Caregiver total – 6 wks	-.18	-.05	-.29
Infant total – 6 wks	.16	-.18	-.50 <sup>#</sup>
Conting caregiver/infant totl – 6 wks	.27	-.12	-.69**
Chg fostering social/emotion	-.16	-.36	-.21
Chg infant total	.05	-.63*	-.47 <sup>#</sup>
Chg conting caregiver/infant total	.21	-.39	-.39

\*  $p < .05$ ; \*\*  $p < .01$ ; <sup>#</sup>  $p \leq .10$  (not considered statistically significant).

Table 17 also shows a surprising statistically significant negative correlation between infant total change score and the average number of feedings,  $r(12) = -.63, p = .016$ . The  $r = -.63$  indicates a large effect size. The  $r$  squared equals .40, which means that 40% of the variance in the infant total change score can be predicted from the average number of feedings per 24 hours. Infants who were fed more frequently at 3-4 weeks were more likely to have decreased in their clarity of cues and responsiveness to the caregiver at 6 weeks.

There was a statistically significant negative correlation between the contingency caregiver/infant total score at 6 weeks and the average number of cry episodes over 24 hours,  $r(12) = -.69, p = .006$ . This negative correlation indicates in those dyads where there was a highly interactive, reciprocal relationship at 6 weeks had infants who cried less at the 3-4 week time period. Infants who cried more at 3-4 weeks came from a dyad where there was a lower reciprocal (contingent) relationship. The  $r = -.69$  indicates a very large effect size. The  $r$  squared indicates that 48% of the variance in the contingency caregiver/infant total score can be predicted from the average number of cry episodes over the 24-hour period.

#### *Exit Interview Findings*

Mothers contributed to the findings of this research endeavor by answering questions on the exit interview (Appendix F), which was conducted following the 6 week feeding observation. This was their opportunity to share their experiences, thoughts, and feelings about being a participant in the Nurse-Family Partnership program.

Mothers were asked to recall information provided by their registered nurse during pregnancy or by the nurse and this researcher following the birth of the infant.

Mothers identified information shared with them by their nurse during pregnancy about pregnancy was of high value to them. “When I was pregnant—physical and emotional changes and what to expect,” “nutrition for both of us,” “RN made me feel good about being pregnant,” “labor, how will I know?” and “like to quit smoking” were comments they shared when speaking of information learned as part of the program.

Infant care and child development were important topics to the mothers. One mother shared that she appreciated the *Keys to Caregiving* pamphlets given to her by the nurse, which focus on understanding the infant’s cues. Other mothers learned how to hold the infant, how to feed and burp the infant and to place the infant on his back when put to sleep in his crib. Mothers felt reassured by receiving information about the interaction patterns being established. For example, one said “interaction—how well we’re working together.”

Mothers found information about breast feeding invaluable to them, both during pregnancy and following the birth of the baby. Comments included “all of the breast feeding information,” “the breast feeding video,” and “Wanda (her RN) kept me up on my diet for breast feeding.”

Mother’s needed support in the area of general life skills. Nurses provided information about finding a good job, helped with future career goals, and provided information about diet, exercise, and birth control choices. Another area mothers had asked their nurses for help with was how to involve the father of the baby or for relationship advice with other family members or friends.

Exit interview question two asked mothers to tell about their support system, in addition to their nurse, during pregnancy. Mothers identified specific family members,

friends, or professionals who had been a positive influence and supportive to them. They also identified individuals who had not been positive forces during their pregnancy. The father of the baby, whether he was the spouse or not the spouse, was identified by about 60% of the women as being a source of support. One woman mentioned that the father of the baby “was not around,” but that her mother had been a support to her. The mother’s mother was specifically mentioned by about 60% of the women as being a strong source of support. The mother’s father received mention by about 25% of the new mothers as being supportive during the pregnancy. Extended family members, who included grandparents, aunts, uncles, sisters, and brothers of both the mother and the father of the baby’s family, were considered helpful by several. A midwife, a physician’s office nurse, and a Lamaze instructor were each mentioned one time as supportive individuals. Individuals who were not considered to be helpful or were even named as a source of stress included a father of the baby, a stepfather, and the mother’s own mother. This mother identified that her mother was “too busy with her own husband” to be available to her.

Women also mentioned forms of support, which included emotional support, telephone support, individuals coming to visit or the mother being able to travel to be with family, and support for relaxation, such as her husband reading to her.

Question 3 of the exit interview was designed to learn more about which topics the mothers found useful to them from the variety of materials available to the nurses from the curriculum used by the Nurse Family Partnership. On average, women wanted to talk about pregnancy about 37% of the time, about the baby 26% of the time, and about topics related to the mother and infant together the rest of the time. One woman

identified that she would prefer to talk about the pregnancy 100% of the time, as she stated she knew nothing about being pregnant and knew more about infant care.

Question 4 asked mothers to identify when they would like information about the baby shared with them. Women felt that the Nurse Family Partnership information related to infant development and care (included both prenatal and postnatal information) was more helpful to them during their pregnancy and they would like on average 56% of the information shared during this time. Women wanted on average 44% of the information about infant development and care presented to them after the birth of the baby.

Question 5 invited mothers to offer information that might be useful to other new parents. Women offered “enjoy the pregnancy” and “take in knowledge during pregnancy.” Women talked about the need to sleep during the pregnancy and to sleep after the baby was born, including “sleep when the baby sleeps.” Mothers felt strongly about preparing themselves to take care of the infant and stated “get it together for your baby,” “take the selfishness out of every thing—you’re here to take care of the baby.”

Women realized the value in allowing others to help so they could sleep or take a break. “Probably it is okay for somebody else to take care of him and it is okay for me to take a break. Makes it better. Not so stressed out.” Another mother verbalized “Don’t be afraid to ask others for help—so you can have a break. I felt terrible asking—but I felt much better afterwards.” Women expressed the importance of choosing one’s friends, going to college and getting married before having a child, and two mothers shared similar sentiments in the importance of planning for a baby and having love for the baby.

Sixteen mothers were asked to recall their sleeping habits during the pregnancy. Ten mothers rated themselves as having regular sleep patterns and six mothers rated themselves as having irregular sleep patterns. (Of interest is that research question 15 asked the RN to identify her clients' sleep/wake patterns as regular or irregular; fifteen of the sixteen mothers who identified their sleep patterns concurred with their nurse's rating of their patterns).

Mothers who identified regular sleep patterns had patterns that were regular for them. Some pregnant women worked shift work, so their patterns had rhythm to them based on their work schedules. Women identified two schedules—one for work or school and one for days off or weekends. Some women based their sleeping patterns on their husband's work schedule.

Women who identified irregular sleep patterns had difficulty sleeping due to pregnancy related issues, such as discomfort or need to arise to urinate during sleeping time. One woman stated that her boyfriend did not like her to take naps and others noted taking naps at various times of the day or evening.

Exit interview question 7 asked the mothers if they had any questions about child development that they would like this researcher to address. Nineteen mothers completed the exit interview. Nine mothers had no questions. Seven of the mothers requested general child development information, which included when the baby would roll over or crawl, was the baby normal, and requests for information about eating and sleeping. One mother asked a personal health related questions and she was referred to her RN and advised to call her physician. Two women expressed that they learned a great deal from

their nurse, which included one mother from Mexico, who was appreciative for the current medical knowledge available to her through the program

### *Summary*

The tables displayed in this chapter present those findings that were statistically significant at the  $< .05$  level. There were not many statistically significant findings in this study of mother-infant interaction and sleep/activity record variables; only 12 of 180 significance tests or about 7%, proved to be statistically significant. Thus, most of them could be due to chance. Because of the small sample size, almost all of the significant findings had large effect sizes, so may well be worth replicating in a study with a larger sample size. Findings at the  $\leq .10$  level, which do not meet the traditional level of statistical analyses, were not mentioned here but help provoke an overall impression of areas where the relationship may be “real”, so they will be included in the discussion chapter in relationship to the current literature.

Although there were no changes in the quality of feeding between 2 and 6 weeks, a few of the independent variables seem to be related to feeding quality. The number of nurse visits during the pregnancy was generally inversely related to feeding at both 2 and 6 weeks. More educated mothers and their infants seemed to be more skilled in the feeding interaction at 2 weeks and, perhaps, at 6 weeks. Family income was not related to feeding quality at 2 weeks, but appears to be related to contingent responsiveness at 6 weeks and to a positive change in contingent responsiveness from 2 to 6 weeks. Married women appear to do more feedings at the 3-4 weeks, and mothers who returned to work by 6 weeks appear to have infants who are more likely to improve the feeding scores from 2 to 6 weeks.

There seem to be several relationships between the sleep activity record at 3-4 weeks and feeding interaction quality. First, higher feeding quality at 2 weeks may be related to more feedings at 3-4 weeks, and more feedings at 3-4 weeks seems to be related to a decrease in the infant total feeding scores between 2 and 6 weeks. Finally, the number of crying episodes at 3-4 weeks seems to be negatively related to the quality of feeding interaction at 6 weeks.

Through the exit interview format, women expressed appreciation of the information shared by the nurses and their new knowledge about pregnancy, diet, exercise, breast feeding, infant development and care. They found their nurses helpful with basic life skills, such as finding housing and employment and furthering their education. They identified sources of support, which included husbands and the fathers of the babies, their mothers and fathers, as well as extended family members.

While not collected in a formal manner, the Nurse Family Partnership nurses shared both their joys and frustrations of working with the mothers who participated in the program. Joys included being a part of a new family's development and providing both medical support and social/daily life skills support. Frustrations included missed appointments, lack of resources for certain families, or the disappointment and concern for women who chose to leave the program when they returned to work, or of greater concern, recidivism to a lifestyle abandoned during the pregnancy that would not be considered healthy for mother or newborn baby.

Being an advisory council member for the Nurse Family Partnership allows me to have continued contact with the mothers and babies or with their stories of success. Mothers bring their babies to the council meetings and share what the Nurse-Family

Partnership program has meant to them. Again, they express their gratitude for the program during their pregnancy, as well as the months of contact until the infants' second birthday.

## CHAPTER 5: DISCUSSION

Sixteen research questions and seven exit interview responses were investigated in this study. As mentioned in the results section, the discussion section will address patterns of findings, including those which were statistically significant at the  $p < .05$  level as well as between  $p > .05$  and  $p \leq .10$ . Those research questions that did not provide significant results will be discussed as well. While the research questions were addressed in order in chapter four, five thematic groupings will be used for discussion in this chapter. The first section will discuss time of enrollment and number of visits during the program. The second section will discuss the mother-infant relationship and address the lack of change in feeding behaviors between the two observation periods. The third topic to be discussed will be the variables directly related to the mother, such as education and income. The fourth section will address variables related to the infant, including gestational age, birth weight, and gender. The fifth section will focus on the issues of regulation gathered from the sleep activity record. Salient elements from the exit interview questions will be woven into the five major topics above.

Implications for policy and practice in home visitation, specifically Nurse-Family Partnership programs will be addressed, as well as possibilities for future research in the area of mother-infant interaction, home visitation and self-regulation of mothers and infants.

## *Discussion of the Research Questions*

### *Program Enrollment and Home Visitation*

Home visitation had been a topic of discussion in our community for many years. Review of study findings for home visitation programs (Future of Children, 1999) and a presentation from the National Center for Children, Families, and Communities sparked the interest to make application for a Nurse Family Partnership site within our community. Home visitation research reveals that not all models are effective, and the models which are most effective provide services to families who are most in need and have the lowest level of psychological resources (Future of Children, 1999). The Nurse Family Partnership program delivered services to low income, first time mothers, who could certainly fall within the realm of being needy and may have had low psychological resources. Visitation during pregnancy is focused on changing health habits and improving living conditions for pregnant mothers. Since the pregnancy period is a period rich with psychological growth for the mother, beginning visitation during pregnancy serves to provide emotional care for the mother as well (N. Stern, 1998; Solchany, 2001).

Mothers enrolled in this study at an average of 17.17 weeks of gestational age (range 6-31 weeks). Early enrollment in the study did not show any effect on the feeding or self regulation scores. However, mothers in this study received an average of 12 visits during pregnancy, with the range of visits being 7-21. The number of visits during pregnancy was negatively correlated with caregiver total score at 6 weeks at the  $p < .10$ , and with infant total score and mother/infant contingency score at 2 weeks at the  $p < .10$  level. The number of home visits following the birth of the baby until the time of the

second observation did not show an effect on the feeding scores nor the self regulation measures of eating, sleeping, and crying.

My hypotheses that mothers who enrolled earlier in pregnancy and received more visits, especially during pregnancy and to some degree following the birth of the baby, might have strong positive correlations for change in feeding scores did not prove to be so. Mothers had expressed such appreciation about their nurses and the role they had played in their pregnant lives about education not only about the pregnancy but about infant development, reading the infant's cues, and child care that I thought that this outcome might have been different. The negative direction of the findings related to infant total (clarity of cues and responsiveness to caregiver), contingency of the dyad at two weeks and the significant finding of less caregiver total at six weeks may be a sign of stress in the mother's life. Discussion with the nursing supervisor of these findings did not provide additional insight into this surprising result. One might wonder if the neediest mothers received more visits during pregnancy to provide them with information and support. Our analyses did not identify mothers by number of visits and individual outcomes.

N. Stern's (1998) and Solchany's (2001) discussions of the work to be done during pregnancy about the mother developing a sense of the baby, and later in pregnancy, a sense of the baby as going to be separate from her, may provide insight. While the mothers shared during exit interviews that they wanted information about the baby and their relationship during pregnancy, actually without the infant being present to observe those behaviors or "practice" with the infant, the material might not have had as strong of a connection or lasting effect that carried over to the observations during the

feeding time. The negative caregiver total correlation at 6 weeks makes me question if frequent visits during pregnancy may be an early indicator of trouble with the mother-infant relationship and attachment difficulties in the future.

#### *Mother Infant Interaction and Change in Feeding Scores*

The finding that the mothers and infants did not differ in their interaction patterns from two weeks to six weeks was unexpected. While this study had only one group, the Nurse-Family Partnership mothers, with no comparison group available for study, this researcher expected to find a significant difference between the two week observation and the six week observation on the three key dependent variables of caregiver total score by the mother, infant total score, and the measure of reciprocal interaction, the contingency caregiver/infant total score.

Teaching about the items and concepts on the feeding scale followed the first observation at two weeks with the mother and infant. This researcher used her knowledge of the scale items and her many years of clinical work with mothers and infants to highlight any action by either the mother or the infant, or the dyadic interaction of the pair, as an entry point for teaching the key concepts of the NCAST feeding scale. An example feedback scenario with a mother follows:

I noticed how you positioned the baby close to you before you started to feed your baby. You positioned [or held] your face so that your baby could look at you and see your eyes and your face easily. Did you notice how your baby looked up at you when you said her name? [waited for a response]. We know that babies learn so much from their mothers and others who care for them. Many years ago people did not always think that newborn babies could hear and see and learn so much so early. The feeding relationship is really the first relationship for infants. Since you will probably feed your infant about 8 times every day in this newborn period, you get to have a special time with the baby many times each day. (Pause). Can you share with me about things you may have noticed the baby doing when you feed her?

Any observation that the mother shared was used as the springboard for expanding on additional items from the NCAST feeding scale. This researcher made an effort to cover points from each of the six subscales for the mother. For example, when talking with a 19 year old mother post observation of a feeding session and reinforcing her wonderful and rich verbalizations to her son, she ask me with great surprise “You think it makes a difference when I talk to him”? “Yes”, I replied, “talking to your infant builds connections in his brain”. She asked, “Does he understand what I am saying”? And I replied, “Now is the beginning of his understanding of what you are saying”. She lowered her face to look at her infant and beamed at him with great pride.

If the mother was a low responder or could not name any observation that she had made of her infant during the feeding, the researcher would ask about another context, such as “What does he like to do when you give him his bath?” or “ Can you recall something that he did when you changed his diaper?” Anticipatory information about how the infant might change as part of normal growth and development over the next 4 weeks was also included.

By subjective recall, mothers seemed to fall into two categories during the feedback session. Many of the mothers engaged with the researcher and/or their Nurse-Family Partnership nurse about the feeding interaction. They responded to the comments and would offer their own observations and ask for an interpretation or expand on their reflection. On the other hand, a few mothers responded they knew a great deal about infants and did not interact beyond a comment or two. These latter mothers were of concern to me, because the scores of some of the mothers were low when compared to the norms from the NCAST manual (Sumner & Spietz, 1994).

Some explanations for the lack of significant change on these three dimensions might be that continuous reinforcement (daily to weekly) may be needed to effect change. Behavioral research supports the notion that continued reinforcement is necessary to effect change and sustain it. The Institute of Medicine (2001) literature on continuation of behavioral changes made through social programs supports the necessity of adherence to the program and the high level of reinforcement over a protracted period of time to have long lasting effects on a newly learned skill or behavior.

Mothers shared through the exit interview process that information about infants was important to them. They indicated that they wanted more information about the mother-infant relationship (43%), than they wanted information about pregnancy (26%) or about the baby alone (26%). The nursing supervisor and the home visitation nurses provided information about their perceptions of the NFP curriculum and this sample of women. They expressed that the women seemed to be very interested in the lesson materials related to the infant and the relationship. Wendland-Carro, et al. (1999) reported findings from an experimental study designed to influence mothers' responsiveness toward newborn infants during the first month of life by teaching mother's about a newborn's competence to interact and by promoting interaction with the infant. The mothers in the experimental group were shown a video tape of infant behavior based on the (Brazelton) Neonatal Behavioral Assessment Scale and were provided with written material and encouraged to observe infant behaviors and practice affectionate behaviors with their infant. In the experimental group ( $n = 17$ ) where enhancing mother-infant interaction had been the focus mother-infant dyads showed greater frequency in interactions, including vocalizations, looking at the partner and in physical touch.

Mothers were also more sensitive to infant crying. The significant differences produced by this study are of interest since many of the demographics were similar, with the exception that mothers in their study had considerable less education (average of 7 years) than mothers in this study (87% had high school and beyond).

Since teaching about infant behaviors and mother-infant relationship was a major piece of the curriculum during pregnancy and the nurses had a relationship established with the mother, I was counting on a carry-over effect on both counts when I entered the home. I was hoping that the material that had been taught by the nurses and then reinforced by our feedback after the first observation would effect positive change in feeding scores and in self regulation findings. I trusted that the women would feel a positive association with me because the nurses had obtained permission for participation in the research project and, in most cases, I was accompanied by the nurse for the home visitation. D. Stern (1998) supports the need for a meaningful relationship to effect change.

Mothers often appeared tired at the two week visit when compared to their energy level at the six week visit and I had concern about their retention of new information. Barnard (1999) recommends waiting until at least two weeks to use the feeding scale with a dyad for the first time. She stated she thinks new mothers and infants need this long to begin to establish some of their routines. A few mothers expressed feeling inhibited expressing themselves through physical touch or by verbal comments or by the use of verbal endearments in the presence of others. As discussed in the limitations of the study, mothers may not have interacted with their infants in the same manner in the presence of a stranger.

Due to my limited interaction with the mothers on these specific teaching topics and the limited duration of the study, the feedback and teaching may not have been sufficient in quantity or duration to effect change. Limited sample size may have produced a sample with too great of homogeneity and a lack of range in scores to be meaningful.

### *Maternal Variables*

An early transition to parenthood carries associated risks for both mother and infant. Risk factors for mothers are cited as reduced maternal age, lower level of education, and reduced income or living in poverty (Horwitz, et al., 1991; Kliegman, 1992; Koniak-Griffin, et al., 2000).

Research question 4 addressed maternal age and feeding and self regulation outcomes. While there were no significant findings at the  $p < .05$  level, there was a negative correlation of maternal age and the change contingency score at the  $p < .10$  level. Mothers of a younger age may have lower mother-infant contingency scores at six weeks than at two weeks, possibility an indication that the reciprocal relationship is under stress. Younger mothers may still be working on one of the tasks of adolescence, which is the development and refinement of social skills.

Research question 5 investigated the relationship between the level of maternal education and the performance of mothers and infants when observed during feeding times. Sumner and Spietz (1994) reported statistically significant findings from research using the NCAST feeding scale, which are paralleled by this more recent investigation. In their reported findings, adults were defined as individuals between the ages of 19 and 25 years of age. High education adults were defined as women with 12 or more years of

education. In their study, sample sizes included  $n = 125$  for the low education adult group and  $n = 430$  for the high education adult group. There were significant differences between low education mothers and high education mothers on NCAST feeding scores. Mothers with more education in this study showed significant positive correlations for social emotional growth fostering at both two and six weeks, had an infant that was a good signaler and was responsive to its mother at two weeks (as well as showed the same direction at the six weeks time at the  $p < .10$  level), coupled with a strong reciprocal relationship based on the contingency scores at two weeks. In other words, this mother-infant dyad were functioning well on dimensions of feeding interaction from the beginning of the relationship and continuing through the 6 week time period. These moms and babies were signaling and responding to each other. Mothers who had a higher level of household income also showed a positive relationship at 6 weeks based on the contingency score and the change in contingency over time.

In summary, older mothers, mothers with more education, and mothers with more income in the household showed positive correlations with the three key variables of caregiver total, infant total score (a measure of clarity of cues and responsiveness to caregiver) and on contingency of mother-infant interaction. The strong correlations at two weeks and six weeks show that mothers with more education start stronger and continue to advance in the strength of the interaction and relationship. These findings are of special interest for two reasons. One mission of the county health department nurses was to provide support, encouragement, and in some cases, direct tutoring for completion of education. This sample was better educated than the state average (87% had high school equivalent or beyond compared to an average of 11<sup>th</sup> grade level for the state). Early

reciprocal relationships are the cornerstone of development of attachment and often predict the attachment classification at one year (Braungart-Rieker, et al., 2001).

In exit interviews, the women praised their nurses for helping with tasks, such as setting goals, completing school, and building relationships. Through strengthened relationships, many women remained in the residence that provided them with financial support. While this was a low-income sample, each woman had a place to live at the time of my visits. Mothers lived with spouses, with family members of either their family or the father of the baby, with friends, in apartments by themselves or in a supervised group home.

Mothers who were married had infants who had more feedings per 24 hours than infants of mothers who were not married. The social and physical support of the husband may have allowed the mother to spend more time with the infant or the husband may have contributed to feeding the infant at a time that the mother might not have responded, such as to a low cry signal at night. The nursing supervisor related that the fathers who were involved were highly involved in all aspects of the infant's care.

There were no significant differences in the feeding scores and the self-regulation findings between mothers who identified with a cultural minority group and women who identified themselves as Caucasian. Likewise, in the NCAST data base (Sumner & Spietz, 1994), there were no significant differences on the key variables when comparing Caucasian and Hispanic populations.

Mothers who remained at home had infants who were less responsive at 6 weeks, as measured by the infant change score. I would question if this finding were by chance, since most mothers did not return to work until the infant was nearly six weeks of age

and only 30% of mothers had returned to work by six weeks or time of final observation. Seventy per cent of the mothers remained at home at 6 weeks.

### *Infant Variables*

The parameters for participation in this research project included that infants needed to be considered full term infants without complications and discharged home with mother, thus eliminating the need to control for additional perinatal variables. Research question eight addressed infant's gestational age and the dependent variables from the feeding scale and sleep activity record. Of interest, there was a positive correlation at the  $p < .10$  level between mother/infant contingency score at 6 weeks and gestational age. The infants who were older at birth were in somewhat more contingent relationships by six weeks, which may be an indication of being more mature. However, the mean gestational age was 39.59, with a range of 37-42 weeks so these infants were all term and did not vary much. In this cluster, there were no significant results related to birth weight with infants weighing between 5 ½ pounds and 9 pounds. Male infants had more feedings per day than female infants, with this level of significance being  $p < .10$ . These two findings related to the infant may well be due to chance.

### *Self Regulation and Feeding Score Interaction*

Barnard (1999) advocates for the promotion of self-regulation for pregnant women in the areas of regular sleep patterns, scheduled and consistent eating times, maintenance of regular activity throughout the day, including periods of exercise and rest, in an effort to begin to regulate the developing fetus at the biological level. Barnard espouses these principles for two post-delivery reasons as well. She maintains that the pregnant woman and her household may achieve a greater rhythm to their 24 hour

patterns, which will be a framework for the household when the infant arrives. The combination of the infant's biological predisposition to regularity through cortisol and other hormonal influences during pregnancy and household regularity during the newborn period is considered an ideal pairing of conditions for the development of self regulation in the newborn (Gopnik, et al., 1999).

The Nurse-Family Partnership (NFP) nurses learned the *Beginning Rhythms* (Barnard, 1999) curriculum as part of the extensive training required for each nurse prior to receiving clients for a home visitation caseload. Nurses were encouraged to use the full curriculum with the pregnant mother during the home visits. Research question 15 asked if there would be a difference in the sleep, feeding and crying patterns of infants based on the nurses' reports of regular or irregular patterns of activity by the mother during the pregnancy. This researcher was hopeful that they would be a statistically significant difference between the two groups of mothers, but no difference was found. A difference finding would have supported Barnard's position.

While the means for the average number of hours of sleep and the average number of feedings of infants were somewhat higher for the mothers who reported regular patterns, the differences were not significant (Table 16). Infants of mothers with regular patterns slept 1.57 more hours per day on average than infants of mothers with irregular patterns of activity during the pregnancy. Using the standard deviations for each group, the approximate ranges  $\pm 2$  SD's are 12.92 hours to 16.86 hours of average sleep for 24 hours for the infants of mothers with regular patterns and 10.12 hours to 16.52 hours for infants of mothers with irregular patterns. These findings were based on a very small sample size ( $n = 14-15$ ).

An infant who was more clear (higher infant total score) in his signals to his mother at two weeks received more feedings at the 3-4 week time period. This would indicate that the infant could express himself and had “trained” his mother to know that he wanted to be fed. An interesting finding at the  $p < .10$  level is that infants who cried more at the 3-4 week period were less clear signalers, or had a decrease in clarity of cues and responsiveness to caregiver at 6 weeks. While the infant who had clear signals was fed more times per day (and thus may have needed to cry less to get his needs met), the infant who cried more at 3-4 weeks may have been showing disorganization that was measured in less clear signals at 6 weeks. Or the infant who cried more may have had a mother who was less responsive during this time period and this showed up as infant disorganization at 6 weeks.

Pairs that showed a decline in contingency by 6 weeks had infants that cried more at the 3-4 week period. However, the part-whole relationship here explains that while infants who had a higher infant total at 2 weeks were fed more often at 3-4 weeks, these dyads may have shown a decline in their abilities, individually, and dyadically by six weeks in their abilities to read and response to each other. Crying and feeding are related. The infant often uses a cry to indicate a need, and the most common need of an infant is to be fed. Understanding this relationship is important, as a mother may feel a sense of competence or failure through understanding and responding to her infant’s signal (Leavitt, 1998).

#### *Implications for Policy and Practice in the Nurse Home Visitation Program*

What have we learned from the results of this study and how do they apply to the Nurse-Family Partnership program?

Results that directly relate to mothers and infants are that maternal education and income indirectly make a difference for infants and provide the opportunity for the beginning relationship and for the potential of secure attachment. Mothers who have more education, and possibly more income in the household, tend to be older. Older mothers may have mastered the four tasks of adolescence: to form social relationships and learn interactional skills, to complete an education, to have achieved personality development to become an independent person, and to practice life skills within a safety net.

Areas that mothers identified that nurses helped them with were education completion, to be their friend and confidant, and help with basic life tasks, including finding housing and employment. Nurses helped with daily organization by providing clients with calendars and teaching them how to put appointment times on the correct date, including doctor's appointments and home visits. All of these are needed to provide a nurturing and organizing environment for an infant.

Mothers stated they received social support from many sources. Miller-Lancar et al. (1998) state social support is a buffer against stress. They state that while adolescents rely more on family, non-adolescents rely more on partners. Spieker and Bensley (1994) report that studies of adult mothers show that the quality of social support may influence attachment. When I asked them to identify their support system "in addition" to their nurse, they named many categories of individuals. However, when asked to name areas that their nurse had helped them with, they identified many ways the nurse had been helpful. So much so that one comes to understand the role of social support from the nurse. The Nurse Family Partnership was supportive to the women in this study.

Of concern to the nursing supervisor, the nurses, and even under study at the National Center for Children, Families, and Communities is the issue of recruitment into the program and retention in the program at the many points where women currently leave the program: following initial enrollment/prior to the pregnancy, or shortly after the birth of the baby. Kitzman et al. (1997) list nine challenges to recruitment and retention, which include gaining and maintaining access to families, which involves having a place to deliver the service and maintaining a meaningful relationship. Spieker et al. (2000) maintain that women who are most difficult to engage are those with poor developmental histories for attachment and social skill development. Another challenge identified by Kitzman et al. (1997) is delivering the protocol. The local nurses identified that often the immediate needs of the client overrode the planned lesson; a mother faced with no housing has a more pressing need than receiving a lesson on mother-infant interaction.

#### *Future Research*

While the statistically significant results of this study were few, I believe the quantitative results and the exit interview comments suggest that this is an important program to mothers who choose to enroll and continue to participate. Nurses perform multiple roles within this program and provide a broad base of support to the mothers, infants, and families.

A larger sample size is needed to determine if any of the results are due to more than chance. A larger sample size might provide more variability in the independent variables. Since most NFP sites have 100 slots, combining data from multiple sites, controlling for variables, might be a way to gather more information in a reasonable

amount of time. Extending the data collection points over at least one year (limit of the NCAST feeding scale) might provide more reliable data and address the mother-infant interaction through direct teaching and even use of video tape, as the Wendland-Carro et al (1999) study reported using with great success. Further research into the sleep/activity patterns is also of high interest to me and I would like to see more studies address the impact of sleep/wake/activity cycles on maternal regulation and infant self-regulation.

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APPENDIX A  
NCAST Feeding Scale



# NCAST FEEDING SCALE Birth to One Year Only

*Information applies to parent only*  
 Mother's Ethnic Heritage (See back page)  
 Marital/Partner Status  Married  Single

Person Observed _____ Age _____ Educ. _____ <input type="checkbox"/> Mother <input type="checkbox"/> Father <input type="checkbox"/> Other	Setting <input type="checkbox"/> Home <input type="checkbox"/> Clinic <input type="checkbox"/> Other	Child's Name _____ Child's Age (in months) _____ Child's Sex _____ Child's Birth Order (circle) 1   2   3   4   5 or More Child's State at Beginning of Feeding (circle) Quiet Sleep   Active Sleep   Drowsy Quiet Alert   Active Alert   Crying
Major Caregiver <input type="checkbox"/> Yes <input type="checkbox"/> No Type of Feeding <input type="checkbox"/> Breast <input type="checkbox"/> Bottle <input type="checkbox"/> Solid Usual Feeding Time <input type="checkbox"/> Yes <input type="checkbox"/> No Length of Time Feeding (circle minutes) 10 or Less   11-18   20-29   30 or more	Were Others Present? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, specify _____	

### I. SENSITIVITY TO CUES

	YES	NO
1. Caregiver positions child so that child is safe but can move his/her arms.		
2. Caregiver positions child so that the child's head is higher than hips.		
3. Caregiver positions child so that trunk-to-trunk contact is maintained during more than half of the breast or bottle feeding (50%).		
4. Caregiver positions child so that eye-to-eye contact is possible.		
5. Caregiver's face is at least 7-8 inches or more from the child's face during feeding except when kissing, caressing, hugging, or burping the child.		
6. Caregiver smiles, verbalizes, or makes eye contact with child when child is in open-face-gaze position.		
7. Caregiver comments verbally on child's hunger cues prior to feeding.		
8. Caregiver comments verbally on child's satiation cues before terminating feeding.		
9. Caregiver varies the intensity of verbal stimulation during feeding.		
10. Caregiver varies intensity of rocking or moving the child during the feeding.		
11. Caregiver varies the intensity or form of touch during the feeding.		
12. Caregiver allows pauses in feeding when the child shows potent disengagement cues or is in the pause phase of the suck-pause sequence of sucking.		
13. Caregiver slows the pace of feeding or pauses when child shows subtle disengagement cues.		
14. Caregiver terminates the feeding when the child shows satiation cues or after other methods have proved unsuccessful.		
15. Caregiver allows child to suck and/or chew without interruption.		
16. Caregiver only offers food when the child is attending.		
<b>TOTAL YES ANSWERS</b>		

### II. RESPONSE TO CHILD'S DISTRESS

Yes  No (Potent Disengagement Cues Observed)

17. Caregiver stops or starts feeding.		
18. Caregiver changes the child's position.		
19. Caregiver makes positive or sympathetic verbalization.		
20. Caregiver changes voice volume to softer or higher pitch.		
21. Caregiver makes soothing non-verbal efforts.		
22. Caregiver diverts child's attention by playing games, introducing toy, or making faces.		
23. Caregiver avoids making negative verbal responses.		
24. Caregiver avoids making negative comments to home visitor about child.		
25. Caregiver avoids yelling at child.		
26. Caregiver avoids using abrupt movements or rough handling.		
27. Caregiver avoids stepping, hitting, or spanking the child.		
<b>TOTAL YES ANSWERS</b>		

### III. SOCIAL-EMOTIONAL GROWTH FOSTERING

	YES	NO
28. Caregiver pays more attention to child during feeding than to other people or things in the environment.		
29. Caregiver is in "on face" position for more than half of the feeding.		
30. Caregiver succeeds in making eye contact with child once during feeding.		
31. Caregiver's facial expression changes at least twice during feeding.		
32. Caregiver engages in social forms of interaction (plays games with child) at least once during the feeding.		
33. Caregiver uses positive statements in talking to child during the feeding.		
34. Caregiver praises child or some quality of the child's behavior during the feeding.		
35. Caregiver hums, croons, sings or changes the pitch of his/her voice during the feeding.		
36. Caregiver laughs or smiles during the feeding.		
37. Caregiver uses gentle forms of touching during the feeding.		
38. Caregiver smiles, verbalizes or touches child within five seconds of child smiling or vocalizing at caregiver.		
39. Caregiver avoids compressing lips, grimacing, or frowning when making eye contact with child.		
40. Caregiver avoids slapping, hitting, shaking, or grabbing the child or child's extremities during the feeding.		
41. Caregiver avoids making negative comments or uncomplimentary remarks to the child or home visitor about the child or child's behavior.		
<b>TOTAL YES ANSWERS</b>		

### IV. COGNITIVE GROWTH FOSTERING

42. Caregiver provides child with objects, finger foods, toys, and/or utensils.		
43. Caregiver encourages and/or allows the child to explore the breast, bottle, food, cup, bowl, utensils, or the caregiver during feeding.		
44. Caregiver talks to the child using two words at least three times during the feeding.		
45. Caregiver verbally describes food or feeding situation to child during feeding.		
46. Caregiver talks to child about things other than food, eating, or things related to feeding.		
47. Caregiver uses statements that describe, ask questions or explains consequences of behavior, more than commands, in talking to child.		
48. Caregiver verbally responds to child's sound within five seconds after child has vocalized.		
49. Caregiver verbally responds to child's movement within five seconds of child's movement of arms, legs, hands, head, trunk.		
50. Caregiver avoids using baby talk.		
<b>TOTAL YES ANSWERS</b>		

V. CLARITY OF CUES YES NO

51. Child signals readiness to eat.		
52. Child displays a build-up of tension at the beginning of feeding.		
53. Child demonstrates a decrease in tension within a few minutes after feeding has begun.		
54. Child has periods of alertness during the feeding.		
55. Child displays at least two different emotions during the feeding.		
56. Child has periods of activity and inactivity during the feeding.		
57. Child's movements are smooth and coordinated during the feeding.		
58. Child's arm and leg movements are generally directed toward caregiver during feeding (not diffuse).		
59. Child initiates contact with caregiver's face or eyes at least once during feeding.		
60. Child vocalizes during feeding.		
61. Child smiles or laughs during feeding.		
62. Child averts gaze, looks down or turns away during feeding.		
63. Child actively resists food offered.		
64. Child demonstrates satisfaction at end of feeding.		
65. Child has less than three rapid state changes during feeding.		
TOTAL YES ANSWERS		

VI. RESPONSIVENESS TO CAREGIVER

66. Child responds to feeding attempts by caregiver most of the time.		
67. Child responds to games, social play or social cues of caregiver during feeding.		
68. Child looks in the direction of the caregiver's face after caregiver has attempted to alert the child verbally or non-verbally during feeding.		
69. Child vocalizes to caregiver during feeding.		
70. Child vocalizes or smiles within five seconds of caregiver's vocalization.		
71. Child smiles at caregiver during feeding.		
72. Child explores caregiver or reaches out to touch caregiver during feeding.		
73. Child shows a change in level of motor activity within five seconds of being handled or repositioned by caregiver.		
74. Child shows potent disengagement cues during last half of feeding.		
75. Child shows potent disengagement cues within five seconds after caregiver moves closer than 7 to 8 inches from child's face.		
76. Child avoids turning away from caregiver, or averting gaze during first half of feeding.		
TOTAL YES ANSWERS		

Enter the total yes answers from each subscale and compare it with the possible score:

	SUBSCALE Items		CONTINGENCY Items	
	Possible	Actual	Possible	Actual
SENSITIVITY TO CUES	16			
RESPONSE TO DISTRESS	11			
SOCIAL-EMOTIONAL GROWTH FOSTERING	14			
COGNITIVE GROWTH FOSTERING	9			
CAREGIVER TOTAL	50		5	
CLARITY OF CUES	15			
RESPONSIVENESS TO CAREGIVER	11			
INFANT TOTAL	26		5	
CAREGIVER/INFANT TOTAL	76		10	

Check the Potent Disengagement Cues (PDC's) observed during the feeding interaction (excluding initial tension up to a minute into the feeding and any PDC's that terminate the feeding).

- |  |   |
|--|---|
| <input type="checkbox"/> Back arching                  | <input type="checkbox"/> Pale/red skin                      |
| <input type="checkbox"/> Choking                       | <input type="checkbox"/> Pulling away                       |
| <input type="checkbox"/> Coughing                      | <input type="checkbox"/> Pushing away                       |
| <input type="checkbox"/> Crawling away                 | <input type="checkbox"/> Saying "no"                        |
| <input type="checkbox"/> Cry face                      | <input type="checkbox"/> Spitting                           |
| <input type="checkbox"/> Crying                        | <input type="checkbox"/> Spitting up                        |
| <input type="checkbox"/> Fussing                       | <input type="checkbox"/> Tray pound                         |
| <input type="checkbox"/> Hilt hand                     | <input type="checkbox"/> Vomiting                           |
| <input type="checkbox"/> Lateral head shake            | <input type="checkbox"/> Walking Away                       |
| <input type="checkbox"/> Maximal lateral gaze aversion | <input type="checkbox"/> Whining                            |
| <input type="checkbox"/> Overhand beating movements    | <input type="checkbox"/> Withdraw from alert to sleep state |

Ethnic Heritage. Place a checkmark next to the mother's ethnic heritage and write in her specific group identity.

- |   |   |
|---|---|
| <input type="checkbox"/> African-American                   | <input type="checkbox"/> Other Asian                        |
| <input type="checkbox"/> Asian Indian or A.I.- American     | <input type="checkbox"/> Cuban or Cuban-American            |
| <input type="checkbox"/> Chinese or Chinese-American        | <input type="checkbox"/> Mexican, Chicano, or Mex. American |
| <input type="checkbox"/> Filipino or Filipino-American      | <input type="checkbox"/> Puerto Rican                       |
| <input type="checkbox"/> Japanese or Japanese-American      | <input type="checkbox"/> Other Hispanic/Latin               |
| <input type="checkbox"/> Korean or Korean-American          | <input type="checkbox"/> Native American or Alaskan Native  |
| <input type="checkbox"/> Pacific Islander or P.I.- American | <input type="checkbox"/> White/Caucasian (non-Hispanic)     |
| <input type="checkbox"/> Vietnamese or Vietnamese-American  | <input type="checkbox"/> Other                              |
- Specific group identity: \_\_\_\_\_

Clinical Notes:

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NOTICE: IT IS ILLEGAL TO PHOTOCOPY OR OTHERWISE REPRODUCE THIS ASSESSMENT WITHOUT THE PUBLISHERS WRITTEN PERMISSION.

To use this scale for research or clinical practice requires training. For more information write or call:

NCAST Programs  
University of Washington  
Box 357920  
Seattle, WA 98195-7920  
Phone (206) 543-8528 FAX (206) 685-3284

Date of Observation \_\_\_\_\_

Recorder's Signature \_\_\_\_\_

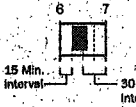
APPENDIX B

NCAST Sleep Activity Record



### Instructions for Completing the Sleep Activity Record

1. Follow the pattern established by the 24 hour recall completed by you and your health care provider.
2. Try to write down what you or your baby is doing every 4-6 hours and keep the record convenient such as posted on your refrigerator or near where you feed your baby.
3. Each hour is divided into 15 minute segments. Try to be as accurate as possible in recording the length of the behavior you have been asked to gather. For instance, if the feeding takes 20 minutes the recording would look like this.
 


4. When gathering crying episodes, place an X for each episode of crying that lasts longer than a minute.
5. For sleep, draw a straight line ——— to indicate the time you or your baby went to sleep and until you or your baby awoke.
6. Seven days of recording is most desirable; your accuracy on this recording will help with the interpretation.
7. If your child is in the care of someone else during the day or night, please have them keep this record as well.

**SHARE THIS BOOKLET WITH OTHERS WHO CARE  
FOR YOUR BABY**

To order more booklets write or call: NCAST Programs, Box 357920  
University of Washington, Seattle, WA 98195-7920, (206) 543-8528.



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## The Sleep Activity Record (SAR)

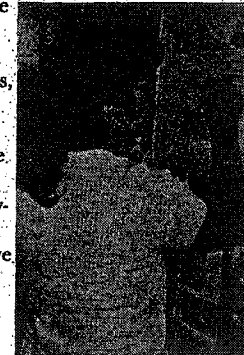
The Sleep Activity Record (inside) is a 7-day, 24 hour diary designed to help you gather information about routine activities during pregnancy and the

first three years of life. Use the SAR to look at any activity such as feeding, sleep, crying, alert periods, and parent-infant activities like outings, bathing, massage, play, holding, exercising, or wearing the baby in a front pack or sling.

Record an activity, event, or behavior that you would like to know more about or with which you have a problem. By doing this you can better understand how often the behavior occurs and the type of events that come before or after.

Many parents find the SAR helps them better understand changes in their child's behavior given the child's age, developmental stage, or changes in the environment.

Ask others involved in the care of your child (mother, father, childcare worker, extended family member) to record and share the sleep, wake, and activity of your child during the time they care for your baby. Instructions for completing the record are on the back page.



**Use the Sleep Activity Record (SAR) to gather accurate data about routine activities during pregnancy and the first three years of life.**

APPENDIX C

Recruitment Scripts

English

Spanish

## Recruitment Script for the Research Study

### Correlates of Mother-Infant Interaction and Self-Regulation In a Perinatal Intervention Program

As a first time mother you are invited to participate in a research study that will observe mothers and their newborn infants as they interact with each other during breast or bottle-feeding. If you want to participate, a nurse or an occupational therapist researcher will come to your home when your infant is about two weeks old and again when the baby is five-six weeks old to watch you feed your baby as you would at any other feeding time. The researcher will not need to touch or hold your baby. She will only observe you feeding the baby. She will take notes about the observation on a pink form that describes common things that mothers and infants do during a feeding time, such as “mother starts or stops the feeding”.

At three weeks you will be taught how to record when your baby is awake, asleep, eating, or crying on a printed gray form. At four weeks your nurse or the researcher will come to your home to pick up this form.

None of these visits will replace the regular care you are scheduled to receive from your nurse, case manager, or other persons from Mesa County Public Health Department. If you choose to be part of the research study and then decide that you do not want to continue in the research study, you can continue to receive your regular services through the Mesa County Public Health Department. Any of the forms used will be assigned a code number by the Health Department before the researcher uses them to analyze the information on them. If you are willing to participate, please read the consent form and sign it. Thank you.

Argumento de reclutamiento para el estudio de investigación  
Correlaciones entre Interacción Madre-Niño y Autorregulación  
En un Programa de Intervención Perinatal

Como primeriza Ud. esta invitada a participar en un estudio de investigación que observará la interacción de madres y recién nacidos durante la alimentación de pecho o biberón. Si Ud. desea participar, una enfermera investigadora o terapeuta ocupacional vendrá a su casa en dos instancias: cuando su bebé tenga alrededor de 2 semanas y luego a las 5 a 6 semanas para observarla a Ud. alimentar a su bebé como lo hace en forma rutinaria. La investigadora no necesita tocar su bebé o tomarlo en brazos. Ella sólo la observará a Ud. alimentar al bebé. Ella tomará notas de la observación en una hoja rosada que describe cosas comunes que las madres y bebés hacen durante la alimentación, tal como "la mamá empieza o termina de alimentar al bebé".

A las tres semanas, a Ud. se le enseñara como registrar cuando su bebé este despierto, dormido, comiendo, o llorando en una hoja gris impresa. A las cuatro semanas, su enfermera o investigadora vendrá a su casa a buscar la hoja.

Ninguna de estas visitas reemplazara el cuidado que Ud. debe recibir de acuerdo al plan y horario de su enfermera, administradora, u otras personas del Departamento de Salud Publica de Mesa County. Si Ud. elige ser parte del estudio de investigación y luego decide que no quiere continuar en este, Ud. puede continuar recibiendo los servicios regulares a través del Departamento de Salud Publica de Mesa County. El Departamento de Salud le asignará un código de números a cada uno de los formularios usados. Si Ud. es una voluntaria participar en el estudio, por favor lea esta hoja de consentimiento y firmela. Gracias.

APPENDIX D

Consent Forms

English

Spanish

COLORADO STATE UNIVERSITY

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT

TITLE OF PROJECT: Correlates of Mother-Infant Interaction and Self-Regulation in a Perinatal Intervention Program

NAME OF PRINCIPAL INVESTIGATOR: George Morgan, PhD

NAME OF CO-INVESTIGATOR: Karen A. Fehringer, PhD(c), OTR

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS:  
Karen A. Fehringer 970-241-0163

SPONSOR OF PROJECT: N/A

PURPOSE OF THE RESEARCH: To learn more about how mothers and newborn babies spend time together during feeding time and how newborn infants organize their sleeping, crying, feeding and awake time in a program of public health care for first time, low income mothers.

PROCEDURES/METHODS TO BE USED: A Mesa County Public Health Department secretary, your nurse, a nurse researcher or this co-investigator will call you to make appointments for home visits after your baby has been born. You will be asked to schedule an appointment for a nurse or this researcher to come to your home with one of your regular care providers when your baby is two weeks and five-six weeks old to watch you feed your baby as you usually do. The visits will be in your home and will last about one hour. The nurse or researcher will watch you feed your baby. She might make some notes on the pink score sheet as you feed the baby. She might change positions in the room so that she can see your face and the baby's face while you feed your baby. When your baby is three weeks old you will be asked to keep a record on a printed form for one week about when your baby eats, sleeps, cries, and is awake. As a participant in the Nurse-Family Partnership Program, the nurse or researcher will share information about feeding and sleeping during and after the visits. The nurse or researcher will ask you some questions from an exit interview form at the end of the five-six week visit. At the end of the second feeding assessment you may put your name and address on the envelope that she will give you if you want to know about the results of this study. The envelope will be kept at the Mesa County Health Department until the study is completed. A copy of the two feeding assessment forms and the Sleep Activity record will be given to the co-investigator (Karen A. Fehringer) by the Health Department. Your name and your infant's name will be removed from the forms prior to release. Your forms will have a code number that is not linked to your name or your infant's name. The Health Department will also complete a form which has the following information: The name of the program that you participate in (Nurse-Family Partnership), the number of visits you received during your pregnancy and since the baby was born, your age, the number of years of your education, if you work outside the home and if you have returned to work, your marital status, and your race or ethnicity. It will also state your income range at the time you entered the program, the number of weeks of pregnancy at the time you entered the program, and the sex, gestational age and birth weight of the baby, as well as about your patterns of sleep regulation. This form will have the same code number as the feeding assessment forms, the Sleep Activity record and the exit interview form.

Page 1 of 3 Participant's initials \_\_\_\_\_ Date \_\_\_\_\_

**RISKS INHERENT IN THE PROCEDURES:** There are no known risks to this study. The feeding of the baby is considered to be something that you do everyday with your infant. The RESEARCHER will not need to touch or hold your baby at any time while she is in your home. If you do not want the researcher to watch you feed your baby or if you think the baby is not eating well because of a stranger in the home, you make ask the researcher to leave.

It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential, but unknown, risks.

**BENEFITS:** The benefit to you will be that the researcher will share information with you about how you and your baby spend time together while you are feeding him or her. The researcher may share information about infant sleep, crying, or awake times. The benefit to others may be that the results of this study may be used to develop programs of care for other mothers and babies.

**CONFIDENTIALITY:** The researcher will have copies of the two pink record forms and the gray sleep activity, as well as have the exit interview form and the demographic form (form with your age, education, and other information as mentioned above). None of these records will have your name, your baby's name, or other personal identifying information about you on it when it is released from Mesa County Public Health Department. It will be assigned a code for research data analyses. This code will not tell anything about you, but will tell the researchers where to put the research information in the large pool of information that will be gathered about everyone who participates in this study. The original feeding assessment form (pink form) and the sleep activity record (gray form) will remain in your chart at the health department. The original consent form and the researcher's copies, which contain no identifying information, will be maintained at Colorado State University following analyses of the data.

The researchers will not share information about you, your baby or your home with others without your permission.

The only exception is the service provider's legal obligation to report suspected child abuse/neglect to the Department of Human Services.

**LIABILITY:** The Colorado Governmental Immunity Act determines and may limit Colorado State University's legal responsibility if an injury happens because of this study. Claims against the University must be filed within 180 days of the injury.

Questions about participants' rights may be directed to Celia S. Walker at (970) 491-1563.

**PARTICIPATION:**

Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participating at any time without penalty or loss of benefits to which you are otherwise entitled.

Your signature acknowledges that you have read the information stated and willingly sign this consent form. Your signature also acknowledges that you have received, on the date signed, a copy of this document containing 3 pages.

\_\_\_\_\_  
Participant name (printed)

\_\_\_\_\_  
Participant signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness to signature (project staff)

\_\_\_\_\_  
Date

Page 2 of 3 Participant's initials \_\_\_\_\_ Date \_\_\_\_\_

PARENTAL SIGNATURE FOR MINOR

As parent or guardian you authorize \_\_\_\_\_ (print name) to become a participant for the described research. The nature and general purpose of the project have been satisfactorily explained to you by \_\_\_\_\_ and you are satisfied that proper precautions will be observed.

\_\_\_\_\_  
Minor's date of birth

\_\_\_\_\_  
Parent/Guardian name (printed)

\_\_\_\_\_  
Parent/Guardian signature

\_\_\_\_\_  
Date

Page 3 of 3 Participant's initials \_\_\_\_\_ Date \_\_\_\_\_

UNIVERSIDAD DEL ESTADO DE COLORADO

CONSENTIMIENTO PARA PARTICIPAR EN UN PROYECTO DE  
INVESTIGACION

Titulo del proyecto: Correlaciones entre Interacción Madre-Niño y Autorregulación en un programa de intervención perinatal

Nombre del Investigador principal: George Morgan, PhD

Nombre del Co-Investigador: Karen Fehringer, PhD(c), OTR

Nombre y teléfono en caso de problemas o preguntas: Karen Fehringer 970-241-0163

Patrocinador del proyecto: N/A

Propósito del proyecto: aprender como las madres y sus recién nacidos pasan tiempo/interactúan durante la hora de alimentación y como sus niños organizan su sueño, el llorar, alimentación y su tiempo despiertos en un programa de Salud Pública para primerizas y madres de bajos ingresos.

Procedimientos/métodos a utilizar: una secretaria del departamento de salud de Mesa County, una enfermera, una enfermera investigadora o la co-investigadora la llamará para hacer citas y así poder visitarla en su casa después de que su bebé haya nacido. Se le pedirá a Ud. que programe una cita para que la enfermera o la investigadora la visite con una de sus proveedoras de salud cuando su bebé tenga dos semanas y luego a las cinco semanas para observar la alimentación de su bebé como lo hace normalmente. Las visitas se darán en su casa y tomarán alrededor de una hora. La enfermera o investigadora observará como Ud. alimenta a su bebé. Ella puede que tome notas en la hoja rosada de registro mientras Ud. alimenta al bebé. Ella puede que cambie posiciones en la habitación para poder ver su cara y la cara del bebé mientras lo alimenta. Cuando su bebé tenga tres meses de edad se le pedirá a Ud. que mantenga un registro en una hoja donde apuntará cuando su bebé coma, duerma, lllore, y este despierto. Si Ud. participa en el programa de "Nurse-Family Partnership", la enfermera investigadora compartirá con Ud. información acerca de la alimentación y sueño del bebé durante y después de la visita.

La enfermera o investigadora le hará preguntas de una forma de entrevista de salida al final de cinco a seis semanas. Al final de la segunda evaluación de alimentación Ud. puede escribir su nombre y dirección en el sobre que ella le dará en caso que Ud. quiera saber los resultados de la investigación. El sobre permanecerá en el Departamento de Salud hasta que el estudio concluya. El Departamento de Salud le dará a la co-investigadora Karen Fehringer una copia de las dos evaluaciones de alimentación y el registro de actividad de sueño. Su nombre y el de su niño serán

Página 1 de 4 Iniciales del Participante \_\_\_\_\_ Fecha \_\_\_\_\_

removidos de los registros previo a la publicación del estudio. Sus registros y formas tendrán un código que no esta vinculado con su nombre o el de su niño. El Departamento de Salud además completara una forma que tiene la siguiente información: el nombre del programa en que participa (Programa "Nurse-family Partnership"), el numero de visitas que Ud. recibió durante su embarazo y después del nacimiento del bebé, su edad, el numero de años de educación, si trabaja fuera de la casa o si trabaja tambien, su estado civil, y su raza o etnicidad declarado por Ud. También declarará su rango de ingreso económico cuando Ud. ingresó al programa, el numero de semanas de embarazo cuando Ud. ingresó al programa, y el sexo, edad y peso de nacimiento del bebe y distribucion de sueño. Esta forma tendrá el mismo numero de código que la evaluación de alimentación, el registro de actividad de sueño y la forma de entrevista de salida.

Riesgos inherentes en el procedimiento: no hay riesgos conocidos en este estudio. La alimentación de su bebe es una actividad diaria de su niño. El investigador no necesita tocar o tomar a su bebe mientras esta en su casa. Si Ud. no quiere que la investigadora la observe a Ud. y bebe mientras lo alimenta, o si Ud. cree que el bebé no esta comiendo bien por que hay un extraño en la casa, Ud. puede pedirle a la investigadora que se retire.

No es posible identificar todos los riesgos potenciales en los procedimientos de investigación, pero el (los) investigador(es) han tomado las precauciones necesarias y razonables para minimizar cualquier riesgo potencial y conocido, pero no los desconocidos.

Beneficios: el beneficio para Ud. es que el investigador compartirá la información con Ud. acerca de como Ud. y su bebe interactuan mientras Ud. lo alimenta. La investigadora puede que comparta información acerca del sueño, del llorar o del tiempo que su bebe permanece despierto. El beneficio para otros es que pueda que los resultados del estudio sean utilizados para desarrollar programas de cuidado para otras madres y bebés.

Información Confidencial: el investigador tendrá dos copias de los registros de la hoja rosada y de la gris de actividad de sueño, además de tener una entrevista de salida y una hoja demográfica (que incluye su edad, educación, y la otra información que se menciona arriba). Ninguno de estos registros tendrá su nombre, el nombre de su bebé, u otra información personal acerca de Ud. cuando se use fuera del Departamento de Salud del Condado de Mesa County. A la información se le asignará un código para análisis de datos de la investigación. Este código no dará información acerca de Ud. pero si dará información necesaria para que los investigadores puedan ponerla en una gran muestra donde se reunirán todas los datos de otras personas participantes del estudio de investigación. La hoja de evaluación de alimentación (hoja rosada) y la hoja de registro de sueño (hoja gris) permanecerá en su registro medico en el Departamento de Salud. La forma de consentimiento original y las copias no contienen información de su identidad y permanecerán en la Universidad de Colorado State para los análisis de datos que le siguen.

Pagina 2 de 4      Iniciales del Participante \_\_\_\_\_ Fecha \_\_\_\_\_

Los investigadores no darán a conocer su información personal, del bebé o su hogar sin su permiso. La única excepción es el caso en que el servicio este obligado a informar sospecha de abuso infantil al Departamento de Recursos Humanos.

Responsabilidad: la ley de inmunidades del Gobierno de Colorado determina y limita la responsabilidad de la Universidad de Colorado State si un daño ocurre por causa del estudio.

Quejas en contra de la universidad debe ser presentado dentro de 180 días desde el daño.

Preguntas acerca de los derechos del participante deben ser dirigidas a Celia S. Walker al: (970) 491-1563.

**Participación:**

Su participación es voluntaria. Si Ud. decide participar en el estudio Ud. puede dejar de participar cuando quiera sin penalización o pérdida de los beneficios a los que tiene derecho.

Su firma acredita que Ud. ha leído la información escrita y que voluntariamente firma esta forma de consentimiento. Su firma también reconoce que Ud. ha recibido, en el día firmado, una copia de este documento que contiene \_\_\_\_ páginas.

\_\_\_\_\_  
Nombre del participante (imprima)

\_\_\_\_\_  
Fecha

\_\_\_\_\_  
Firma del participante

\_\_\_\_\_  
Fecha

\_\_\_\_\_  
Testigo de firma (empleado del proyecto)

Página 3 de 4      Iniciales del Participante \_\_\_\_\_ Fecha \_\_\_\_\_

FIRMA DE LOS PADRES POR EL MENOR DE EDAD

Como padre o guardián Ud. autoriza a \_\_\_\_\_ (imprima nombre) a ser un participante de la investigación descrita. El propósito natural y general del proyecto ha sido satisfactoriamente explicado a Ud. por \_\_\_\_\_ y Ud. esta satisfecho de las precauciones que se tomaran.

\_\_\_\_\_  
Fecha de nacimiento del menor

\_\_\_\_\_  
Nombre del padre/guardián (imprima)

\_\_\_\_\_  
Firma del padre/guardián

\_\_\_\_\_  
Fecha

Pagina 4 de 4 Iniciales del Participante \_\_\_\_\_ Fecha \_\_\_\_\_

APPENDIX E  
Demographic Form

CODE # \_\_\_\_\_

Demographic Form for the Research Study

Correlates of Mother-Infant Interaction and Self-Regulation of Neonates  
In a Perinatal Intervention Program

1. Number of completed nurse visits since birth of baby: \_\_\_ Number of missed visits: \_\_\_
2. Number of completed nurse visits during pregnancy: \_\_\_ Number of missed visits: \_\_\_
3. Age of mother (in exact years) at delivery: \_\_\_\_\_
4. Completed education: Number of years of schooling \_\_\_ High school diploma \_\_\_\_\_  
GED \_\_\_\_\_ Technical education (type & years) \_\_\_\_\_  
College or university (number of years completed) \_\_\_\_\_
5. Employment information: Full time \_\_\_ (36 hrs. or more) Part time \_\_\_ None \_\_\_
6. Marital status: Married \_\_\_ Single \_\_\_ Widowed \_\_\_ Divorced \_\_\_ Separated \_\_\_
7. Race/Ethnic Information: Hispanic \_\_\_ Caucasian \_\_\_ African American \_\_\_  
Native American \_\_\_ Asian/Pacific Islander \_\_\_ Other \_\_\_  
No designation \_\_\_ Multi-racial \_\_\_\_\_
8. Household Income at Program Entry: < or = \$3,000 \_\_\_ \$3,001 - \$6,000 \_\_\_  
\$6,001 - \$9,000 \_\_\_ \$9,001 - \$12,000 \_\_\_ \$12,001 - \$15,000 \_\_\_  
\$15,001 - \$20,000 \_\_\_ \$20,001 - \$30,000 \_\_\_ Over \$30,000 \_\_\_  
Don't know \_\_\_\_\_
9. Weeks pregnant at program entry in exact weeks: \_\_\_\_\_
10. Gender of infant: Male \_\_\_ Female \_\_\_ 11. Gestational age at birth: \_\_\_\_\_ wks.
12. Birth weight \_\_\_\_\_ 13. Returned to work at six weeks? Yes \_\_\_ No \_\_\_
14. Describe mother's sleep/wake activity cycles during pregnancy \_\_\_\_\_

APPENDIX F

Exit Interview

Exit Interview for the Research Study

Correlates of Mother-Infant Interaction and Self-Regulation  
In a Perinatal Intervention Program

Thank you for participating in this research project. You have participated in two feeding assessments and completed the Sleep Activity Record for your infant. Your willingness to share your time and your baby with us will help us understand more about mothers and their infants during the feeding time and also how babies organize themselves for eating, sleeping, crying and being awake in the early weeks of life.

1. Because you participated in the Nurse Family Partnership program, you received information from your nurse or me during and after each session. Do you recall information that has been helpful to you?  
\_\_\_\_\_  
\_\_\_\_\_
2. Tell me about your support system during pregnancy (in addition to your nurse).  
\_\_\_\_\_  
\_\_\_\_\_
3. Your nurse and I have talked to you about each of these three areas: a) your pregnancy, b) your baby, and c) you and your baby together. If you had one hundred minutes, how much of this time would you give to each topic?  
Pregnancy \_\_\_\_\_ min.  
+ Baby \_\_\_\_\_ min. + Mother and baby together \_\_\_\_\_ min.=100
4. We'd like to get some idea when information about your baby would be helpful. If we talked to you for one hundred minutes, how much time would you like during the pregnancy? \_\_\_\_\_ min. How much time would you like after the birth of the baby? \_\_\_\_\_ min.
5. If you could offer advice to other new parents, what would you like to tell them?  
\_\_\_\_\_  
\_\_\_\_\_
6. Tell me about your sleep-wake schedule during your pregnancy.  
\_\_\_\_\_  
\_\_\_\_\_
7. Before I leave, I'd like to answer any questions about infant development that you may have. (Please note the question(s)).  
\_\_\_\_\_  
\_\_\_\_\_

## APPENDIX G

### Exit Interview Data

Question One

Question Two

Question Five

Question Six

Question Seven

Correlates of Mother-Infant Interaction and  
Self-Regulation in a Perinatal Intervention Program

Exit Interview Question Number One

Because you participated in the Nurse Family Partnership program you received information from your nurse or me during and after each session. Do you recall information that has been helpful to you?

1. I didn't know **anything** about how to take care of a baby.
2. I've been around kids a long time. I knew quite a bit.
3. Dealing with stress. Understanding the baby more.
4. Did not complete exit interview.
5. Did not complete exit interview.
6. Out of everything? When I was pregnant—physical and emotional changes and what to expect. Helped me to feel normal. Positive reinforcement. Finding a good job. Keeping my head up and to keep going. After the baby was born how to do things with him. How to hold him. How to burp him. There are so many things.
7. The Sleep Activity Record. I learned so much with you (looking to her NFP RN). How to dress her—I didn't know anything. I just learned so much. I read everything you (RN) gave me. I really liked the Keys to Caregiving papers.
8. Yes. Very helpful
9. My nurse helped me with everything while I was pregnant. Just everything even not about pregnancy. Both of your comments encouraged me to do better with feeding him and stuff.
10. No exit interview. Went back to work and dropped the program for about three months.
11. No exit interview. Medical complications.
12. The SIDS information. I put the baby on his back now. Wanda kept me up on my diet for breast feeding.
13. Throughout pregnancy helped me to drink enough water. To eat well. Taught me to do squats for exercise. How to get Dad involved.

14. A lot of things. Sometimes I don't know what to read. When I was pregnant –  
rhythmical patterns. Judith (RN) told me it was the hiccups. He has hiccups  
now.
15. RN helped with burping. He's better now. Interaction—how well we're working  
together. Relationship advice between his father and me. Basic nutrition and  
elimination.
16. RN helps keep me strong. Your (researcher) information was so reassuring. I  
had such a good night's sleep after you were here.
17. Breast feeding video. Anticipate what was going to happen. Labor—how will I  
know? Nurse's experience with labor was a help to me.
18. All the comments she makes to me. RN made me feel good about being  
pregnant.
19. (XXXXXX). I didn't know nothing. RN taught me everything. Like to quit  
smoking. To eat right. Tried to sleep.
20. Taking care of a newborn. Birth control choices; nutrition for both of us.  
What's normal. Future career goals. Pregnancy. Nutrition. Dehydration,  
vitamins, normal weight gain.
21. Pregnancy—helped learn to eat a healthy diet. I had lots of trouble with  
my bowels. How to gain weight for a healthy baby. Lots of child care stuff.
22. Exercise during pregnancy; pelvic tilts during pregnancy to relieve pain.  
How to take good care of myself; rest. How to care for the baby; feeding and  
sleeping.
23. All the formation. I didn't know anything. Favorite topics—all the breast  
feeding information; baby care; bathing.

Correlates of Mother-Infant Interaction and  
Self-Regulation in a Perinatal Intervention Program

Exit Interview Question Number Two

Tell me about your support system during pregnancy (in addition to your nurse).

1. My mom, father of baby, and his grandmother.
2. My mom. Emotional support. Did not turn against me because dad (fob) was not around.
3. My husband.
4. Did not complete exit interview
5. Did not complete exit interview
6. No answer because not on this early version of the form.
7. Really good nurse (at the doctor's office). Doctor was horrible. My mom and my family. My dad. Father of baby's mom.
8. Not on this version.
9. Not on this version.
10. Went back to work and did not complete exit interview.
11. No exit interview. Medical complications.
12. FOB who is my fiancé. My mom.
13. My husband. My family. Went to (name of hometown where family is located).
14. Not on this version.
15. My parents, FOB, his mom and dad, auntie, brother and sister. My cousins and auntie and my grandparents.
16. My family. My mom is tied up with her husband. My sister and her husband. My sister lives away-she gave me phone support. My friend from Denver came down three times. She came for the baby shower and two times since the birth. She's real supportive. My paternal grandmother. Paternal

aunt and uncle. My dad calls me now.

17. Midwife was awesome. My mom. Husband. Did not have a bad pregnancy. How amniotic fluid was formed. Husband really helped. Lamaze instructor helped.
18. Father of baby.
19. My family I guess. No, not really. My stepdad—I used to work for him. He fired me because I couldn't carry 50 pounds of bricks in the heat up the stairs. My nurse!
20. Husband. All four parents. Extended family!
21. My mom. (even though identifies as a source of stress)
22. My husband. They read a lot together. Helped her to relax.
23. My mother on the telephone. She's in Mexico. My husband.

Correlates of Mother-Infant Interaction and  
Self-Regulation in a Perinatal Intervention Program

Exit Interview Question Number Five

If you could offer advice to other new parents, what would you like to tell them?

1. The first week after birth, you really have to adjust. I didn't sleep. I was worried.
2. Tell them what I've done. Not what I've heard.
3. Enjoy pregnancy as much as possible. Take the selfishness out of everything. You're here to take care of the baby.
4. Did not complete exit interview.
5. Did not complete exit interview.
6. Sleep when he sleeps. I learned the hard way. And probably it is okay for somebody else to take care of him and it is okay for me to take a break. Makes it better. Not so stressed out.
7. Get the baby on a schedule and to meet their needs and to understand them. I learned so much.
8. Don't be afraid to ask others for help—so you can have a break. I felt terrible asking—but I felt much better afterwards.
9. Participant could not think of anything to say even- though she thought about it.
10. Went back to work and did not complete exit interview.
11. No exit interview. Had sx.
12. Get sleep at the end of the pregnancy. Don't be afraid to gain weight.
13. It's just a wonderful feeling—even the pain is worth it.
14. Be ready. Be prepared. Sleep during pregnancy.
15. Sleep when the baby sleeps. Take everything that goes on with the baby and look for the positive.

16. Don't have children until you're married to a man who isn't going to leave you. Go to college first.
17. There's a lot of stuff. When you are holding your baby—relax and be confident. Otherwise they can feel it. Little brother—stiff at first when holding the baby. Baby will feel comfortable.
18. Spend as much time with them as your can. They grow up so quickly.
19. Get it together for your kid. Like (XXXXXXX). You know. You gotta take care of them.
20. No advice.
21. Choose your friends. Take care of your baby. It's just you and him.
22. Take in knowledge during pregnancy—have lots of love for the child and be united as a family. Read and apply all information.
23. Better when a couple plans to have their child. Babies can feel if you love them. Concerned about moms with babies who haven't planned for them.

Correlates of Mother-Infant Interaction and  
Self-Regulation in a Perinatal Intervention Program

Exit Interview Question Number Six

Tell me about your sleep-wake schedule during your pregnancy.

1. I stayed up to 2-3 a.m. and slept to 10 am-12pm. I didn't work so I could have my own schedule.
2. Only woke up when I had to go the bathroom. To bed about 11 p.m. until 5:30. To work at 6:30.
3. Big sleeper. Woke up typically around 9 am. Went to bed around 9 pm.
4. Did not complete exit interview
5. Did not complete exit interview.
6. No answer because not on this version of the form.
7. Slept a lot at the beginning of pregnancy. Morning sickness all 9 months. Woke up 2x a night. Slept until noon or 1 p.m. Go to bed about 10-11 pm.
8. Not on this version
9. Not on this version
10. Went back to work and did not complete exit interview.
11. No exit interview. Had sx.
12. Two schedules. One for school—up at 8 to go to school. Took a one hour nap. If not a school day, up until 1:30 am and then get up at 10 or 11 am.
13. Get up about 5 am to see husband before he leaves for work. Then get up about 8:30 or 9 am. Took an early evening nap.
14. Not on this version.
15. Sleep at 12 or 1 am. Wake up at 9am. (in school at a different location). Different schedule now that I am here. Go to bed 11 or 12 at night (work at 6 a.m.). If not a work day sleep until 11 am. Took evening classes too.
16. Night owl. Go to bed about 1-2 am. Usually up about 5-6am. Then might sleep until 10 am. Boyfriend didn't like me to nap. On bed rest at the end. Sleeping a lot then. At end up urinating and/or eating two times a night.

17. Basically the same as pre-pregnancy. To bed 10:30. Up at 8am. Usually a good napper—or at least rested.
18. Regular. 8 or 9 pm to sleep. Get up 6-8 am. Some naps.
19. I couldn't sleep at all. I'd wake up at night.
20. Watched Jay Leno during pregnancy. Often worked until midnight. So always up at night. Now the baby won't go to sleep until that time too.
21. Went to bed and up at the same time all of the time. Early riser.
22. Nine-ten hours of sleep. Very sleepy. Took a nap. To bed at 9pm. Slept well.
23. Slept well. Met my husband's patterns. Would sleep about 10 pm-1am. Wake up when he came home. Back to sleep until morning.

Correlates of Mother-Infant Interaction and  
Self-Regulation in a Perinatal Intervention Program

Exit Interview Question Number Seven

Before I leave, do you have any questions about infant development?

1. Mother requested more information about sleeping and eating cycles. (Baby underweight and sleeping too many hours by Sleep Activity Record analysis).
2. No questions
3. No questions about the baby. Can you help me with information about fever blisters? (referred her to her NFP nurse).
4. Did not complete exit interview
5. Did not complete exit interview
6. What will he be doing in about six months? (Mom planning to return to University setting about that time).
7. Does she seem normal?
8. When will he start to crawl? How do I stop breast feeding?
9. I have a resource in my nurse.
10. Went back to work and did not complete exit interview.
11. No exit interview. Medical complications
12. No. I'm okay.
13. No.
14. Concerns about burps and hiccups. Putting him on the breast will help it stop (reported by Mom).
15. No questions asked.
16. No questions asked.
17. No questions asked.
18. No questions asked.

19. When's he gonna roll over?
20. No questions asked.
21. Could you get me pictures of what you were doing to help him move?
22. No questions asked.
23. No. Program is important-in Mexico teachings are different. For example, binder for belly buttons so they will stay on for three weeks. Nurses help correct information that is different here.