

AN ABSTRACT OF THE DISSERTATION OF

E. Michelle Pardew for the degree of Doctor of Philosophy in Education presented on April 12, 1996. Title: The Effects of Infant Massage on the Interactions Between High Risk Infants and their Caregivers.

Signature redacted for privacy.

Abstract approved:

  
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The purpose of this research study was to examine the effects of infant massage on the interactions between high risk infants and their caregivers. A population of nine high risk infants who received infant massage was compared to 14 high risk infants who did not receive infant massage. Both groups received intensive home-based services for one year from a public health nurse in Marion county, Oregon. The data collected and analyzed included demographic information, specific risk and environmental factors that placed the population at high risk for developmental delays or sudden infant death, measures of the quality of the caregiving environment (HOME), measures of the quality of interactions between caregiver and infant (NCAST scales), and a follow-up interview of 10 caregivers to answer specific questions concerning the infant's development and the quality of services received in the home.

## AN ABSTRACT (Continued)

This study was designed to answer the research question: what are the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interaction. Statistical analyses (Pearson  $r$  correlations and ANCOVA) tested three hypotheses. Risk variables and the quality of the caregiving environment appeared to be similar for both the treatment and control groups. Results supported the conclusions that there were negative relationships between risk and environmental variables and infant-caregiver interactions; and that the quality of the caregiving environment was positively related to the interactions of infants and caregivers. Finally, the results were suggestive of positive effects for massage treatment on the interactions of caregiver and infant during routine feeding situations. Caregivers reported many positive benefits from massage training and rated the in-home intervention very highly in a telephone interview.

The Effects of Infant Massage on the Interactions Between  
High Risk Infants and their Caregivers

by

E. Michelle Pardew

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Doctor of Philosophy dissertation of E. Michelle Pardew presented  
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E. Michelle Pardew, Author

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## **DEDICATION**

During the completion of my doctoral program and dissertation I have grieved the deaths of my parents, my husband's parents and my husband. While their spirits live on in my life, I miss their presence enormously.

I wish to dedicate this dissertation to the memory of Thomas Pardew, my loving husband for twenty-five years. We met in high school, married after college and enjoyed a full but much too brief marriage. I have deeply missed Tom's physical support over the past two years but am totally convinced that his spiritual presence has guided me to live on alone, to mother and to teach.

# **The Effects of Infant Massage on the Interactions Between High Risk Infants and their Caregivers**

## **INTRODUCTION**

Infants face the risk of developmental delays due to factors occurring before, during or after birth. To address this risk, infants and their caregivers need interventions that will benefit each member of this reciprocal relationship. Caring for a high risk infant can be very challenging. Because of advances in technology, many more preterm, low-birth weight and medically fragile infants are surviving. High risk infant survival creates a critical need for early intervention services to assist these children to overcome the transient delays or permanent effects of their neonatal experiences. Often the same conditions that interfere with healthy infant development also affect the attachment of infant and caregiver.

There has been increased public interest in the subject of infant attachment, particularly in light of the discovery of factors which might impede the healthy development of infant-caregiver attachment. Caregivers and professionals want to know how best to assist high risk infants and what specific interventions will support the critical process of attachment. One such intervention, which has a rich cultural history but is quite new to the field of infant development research, is infant massage. While infant massage is an ageless caregiving practice, only recently have researchers studied and measured the specific effects of massage on infant development.



Data on the positive effects of infant massage come primarily from studies on premature infants. Since the 1970's several investigators have studied the effects of massage on preterm newborns (Barnard, Bee, & Hammond, 1984; Barnard, Booth, and Johnson-Crowley, 1985; Rausch, 1981; Rice, 1977; Solkoff & Matuszak, 1975; White & Labarba, 1976). While the number of studies is small, there have been exciting and statistically significant results on the effectiveness of infant massage in stimulating weight gain, facilitating sleep and reducing days of hospitalization (Field, Schanberg, Scafidi, Bauer, Vega-Lahr, Garcia, Nystrom and Kuhn, 1986; Scafidi, Field, Schanberg, Bauer, Tucci, Roberts, Morrow and Kuhn, 1990; Field, 1995).

Generally, the results reported by infant massage investigators have been positive. A meta-analysis of 19 infant massage studies estimated that 72% of infants receiving some form of massage were positively affected (Ottenbacher, Muller, Brandt, Heintzelman, Hojem and Sharpe, 1987). Most of the infants analyzed in the meta-analysis study showed weight gain and better performance on developmental tests.

The research results briefly reviewed support the positive effects of infant massage in controlled hospital settings. Yet, there was very little research investigating the effects of massage on infant-caregiver relationships, particularly when massage is provided by caregivers in home settings. This study explored whether the use of infant massage techniques in the home will benefit the interactions between caregivers and high risk infants.

## **Contributing Risk Factors for Infants**

Undesirable prenatal or birth conditions can place the infant at risk for developmental delays or disabilities. Prenatal risk factors include maternal disease; maternal use of drugs, alcohol or tobacco; poor nutrition; genetics; and hormone imbalance. Perinatal risk factors, or problems at birth, include premature or postmature delivery; low birthweight; congenital anomalies; obstetric medications or procedures; and trauma. Postnatal risk factors include having a mother who is low income, a teenager, neglectful or abusive, or who may suffer from postpartum depression (Bricker, 1989; Field, 1990).

Risk factors also can interfere with the development of positive interactions between infant and caregiver. Caregivers often need assistance in understanding their infants' cues, particularly when the infant is experiencing developmental difficulties. By becoming sensitive to the infant's subtle cues, the caregiver can learn when is the best time to intervene.

## **Interventions Designed to Minimize the Effects of Risk Factors**

Field (1993) reported on research exploring techniques for enhancing parent sensitivity to their infants. For example, researchers have studied the efficacy of demonstrating newborn assessments, coaching caregivers on their interactions with infants and teaching caregivers infant massage techniques. The research reported here further explored the interactions between high risk

infants and their caregivers when massage training was part of their home-based nursing services.

Infant massage is one way caregivers can provide relaxation for the infant while engaging in a mutually pleasant interaction. Calhoun and Rose (1991) and Drehobl and Fuhr (1991) reported that all infants respond to the ways in which they are touched. They discussed how massage can provide for the child's inborn need for physical contact and can further facilitate motor development for delayed preterm infants.

## **Infant Massage**

Both Field (1993) and McClure (1989) have reported that until recently, the use of massage with healthy babies was virtually unknown in western countries. In contrast, infant massage is a common child care practice in many parts of Africa and Asia. The western world has only recently discovered this practice and begun researching its effects. Individuals who trained in India have developed programs to train individuals to teach caregivers how to massage their infants.

Although infant massage training groups are located in all parts of the United States, very little research has been conducted on the use of infant massage in the home. Yet, anecdotal reports from these training groups suggested that massage (a) helps the bonding process and the development of a warm, positive caregiver-child relationship; (b) reduces stress; (c) reduces colic; (d) reduces pain associated with teething and constipation; (e) helps induce sleep; and (f) makes the caregiver who is massaging the infant "feel good."

Infant massage trainers also offered examples of infants who are blind and deaf, have paralysis or cerebral palsy, or who were born preterm becoming more aware of their bodies as a result of infant massage (Drehobl & Fuhr, 1991; Field, 1993; McClure, 1989).

Infant massage has been studied most frequently with high risk infants in hospital settings and less frequently with infants in home settings. This study offered a unique contribution to infant massage research by investigating infant massage in home settings and focusing specifically on the effects of massage on the interactions between infants and caregivers over time.

### **Purpose of Current Research Study**

This study provided a new look at infant massage by exploring the effects of massage on a population of high risk infants in their home environment. Data were from a study focusing on home-based interventions for infants at high risk for Sudden Infant Death Syndrome (SIDS) in Marion county, Oregon. Some of the caregivers receiving intensive home services were also taught to use massage techniques with their infants. Data also were collected for all the caregivers concerning their interactions with their infants.

The purpose of this study was to explore the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interactions. Specifically, this research was designed to answer the question: what are the relationships between massage, risk and environmental factors and infant-caregiver interaction?

The answer to this question provided insight into potentially effective interventions to use with high risk infants and, more specifically, whether infant massage was a positive intervention to teach caregivers in their homes.

Through follow-up telephone interviews with some of the caregivers receiving services, with and without massage training, a qualitative perspective was gathered concerning their children's ongoing development, caregiver use of massage, and their satisfaction with the services received from the nurse during home visits.

This study represented new research on one of the promising practices in early intervention. It contributed to the very limited empirical knowledge base available on the use of infant massage by caregivers in the home. Researchers who have studied infant massage in hospital settings (Field et al., 1986; Scafidi, et al., 1990) urged continued study of the benefits of infant massage after the infant has left the hospital.

Field (1993) reported preliminary findings of the positive effects of massage on infant-parent relationships. Barnard and Kelly (1991) cited over twenty studies which have demonstrated the strong relationship between caregiver-infant interaction and child competence. The literature review in this study was limited to research that linked intervention to enhancing positive infant-caregiver interactions. Researchers who have studied infant-caregiver interaction (Barnard, Hammond, Booth, Bee, Mitchell & Spieker, 1989) suggested a closer study of the effects of specific intervention strategies on infant-caregiver interaction. This study

examined the intervention strategy of infant massage and its relationship to infant-caregiver interaction. The results of the telephone interview were intended to contribute to an understanding of the efficacy of intensive in-home nursing services for very high risk infants.

## **Summary**

This research study investigated whether infant massage training had an effect on infant-caregiver interactions. Furthermore, the results of the telephone interview of caregivers were intended to indicate whether in-home intensive nursing services were helpful, and specifically whether infant massage training made a difference in the lives of caregivers and their infants.

Throughout the body of this paper specific terminology was used which may create confusion. In order to be clear on the terms which have specific meaning for researchers in the field of early childhood intervention, the following definition of terms is offered.

## **Definition of Terms**

**Caregiver:** primary parent figure. In this research population it was typically the mother, but could also signify father, grandparent, or foster parent.

**High risk infant:** infants at risk for developmental delays, disabilities or death due to a variety of socioeconomic, medical and prenatal factors.

**Infant massage:** also known in some existing literature on the subject as tactile/kinesthetic stimulation. According to Schneider (1996) “massage is generally a manipulation of the body that combines tactile (touch) and kinesthetic (perception of movement) stimulation performed in a purposeful, sequential application” (p. 45). The primary style of infant massage includes Swedish-type massage involving an increasing application of pressure during the rubbing of the infant’s body with oil. Infant massage is a systematic process of rubbing, stroking and kneading an infant’s feet, legs, stomach, chest, shoulders, arms, hands, neck, face, and head. Massage strokes are accompanied by flexing of infant’s arms and legs. Infant massage is fully described and illustrated in the curriculum (McClure, 1988; Drehobl & Fuhr, 1991) available as part of certification training for infant massage instructors by the International Association of Infant Massage Instructors. The investigator for this current study and the nurse providing infant massage training for caregivers are certified infant massage instructors.

**Infant-caregiver interaction:** the interaction of infant and caregiver involves specific behaviors for each partner. For the caregiver, behaviors which demonstrate sensitivity to infant cues, responsiveness to infant distress, and the fostering of social, emotional and cognitive growth in the infant can be observed. For the infant, observations of the clarity of the infant’s cues and the infant’s responsiveness to the caregiver can also be made. These

specific infant-caregiver behaviors can be measured by Nursing Child Assessment Satellite Training (NCAST) Feeding and Teaching scales to yield total scores for infant-caregiver interaction.

**Meta-analysis:** a statistical approach to summarize the results of many studies which have investigated basically the same problem (Gay, 1996, p. 266).

**Sudden Infant Death Syndrome (SIDS):** the sudden and unexpected death of an infant, oftentimes one who is apparently healthy.

**Synchronicity:** refers to the caregiver's ability to monitor the state, mood or needs of the child and to respond in a facilitating manner to the child's needs. This reciprocity of responding establishes a dialogue between caregiver and infant and expands the infant's capacity to contribute to this dialogue.



## **CHAPTER 2**

### **LITERATURE REVIEW**

The following sections of this literature review will survey research in the broad area of infant-caregiver attachment. Under this umbrella of attachment the related areas of touch, infant-caregiver interaction, interaction interventions and infant massage will be surveyed, followed by an overview of the factors contributing to high risk infancy and specifically to risk for sudden infant death syndrome.

#### **Attachment**

Researchers have supported the idea that to develop socially and emotionally an infant needs human contact. Infants learn to recognize the special properties of humans from a very early age as they experience social interactions. They show different emotions and develop social communication skills, such as listening and taking turns, during early interactions. Development of these aspects is enhanced by experience with other people. As Field (1990) pointed out, "the ability to make facial expressions; to discriminate others' expressions, faces and voices; to interact with others; and to develop attachments or relationships are some of the skills necessary for social-emotional development" (p. 61).

Emotional development and mental health are vulnerable to damage in the first three years of life. If healthy attachments are not

formed between infant and caregiver because of temperamentally difficult infants, drug exposed infants, abused and neglected infants, and infants whose parents have severe social and emotional problems, then infants can be placed at high risk for severe social and emotional problems (Colletta, 1992). Magid and McKelvey (1987) provided a thorough examination of high risk children who suffer from attachment disorders. They cited research conclusions that healthy attachment between child and caregiver will help the child to attain their full potential intellectually and socially as well as to develop a conscience, cope with stress and frustration, and become self reliant.

Magid and McKelvey (1987) profiled cases of children who have not formed healthy early attachments and the tragic consequences, both for themselves and the others whom they hurt. While remediation of attachment disordered children is an intensive experience and requires a lengthy therapy process, for infants at risk for attachment disorders the authors recognized infant massage as a promising practice. While they have not conducted their own research on infant massage, Magid and McKelvey considered massage to be a natural way for caregivers to learn synchronicity. In connecting with their infants through massage, Magid and McKelvey believed caregivers could learn to read the cues given by the infant and respond appropriately. Knowing when to give the infant stimulation and when not to do so can further enhance the interaction between caregiver and infant. In their opinion infant

massage training and implementation provides the opportunity to develop critical stimulation and interaction skills.

### **Problems in Forming Healthy Infant-Caregiver Attachments**

Attachment disorders have assumed a high profile in recent years. Substantial research has been conducted to identify the factors which may interfere with a healthy infant-caregiver attachment. For example, Gaensbauer and Harmon (1982) observed the attachment behavior of abused/neglected and premature infants in a structured laboratory design in order to broaden and clarify the concept of attachment. The investigators discussed in the context of clinical cases (a) the strong predisposition of infants to show attachment behavior, (b) the specificity versus generality of attachment behavior, (c) issues of stability, (d) the role of pleasurable interaction in facilitating attachment behavior, (e) and the need to view attachment behavior in developmental perspective. Experience with these clinical populations indicated that while the concept of attachment has validity, attachment behavior as observed in the laboratory may not be a true reflection of the caregiver-infant relationship. Gaensbauer and Harmon suggested that a more direct focus on the emotional interactions occurring between caregiver and child may ultimately be more productive in qualitatively describing infant-caregiver relationships.

Another example of attachment research can be found in the work of Frodi (1981). In her discussion of the contribution of infant characteristics to child abuse, Frodi surveyed research results that supported a link between prematurity, low birth weight and child

abuse. Of the factors which could potentially explain this link, the strongest to emerge was infant crying. Premature infants often have high pitched and arrhythmic cries. “There is a substantial amount of anecdotal evidence suggesting that infant crying often serves as a final spark triggering an abusive outburst by an already aroused caretaker” (Frodi, 1981, p. 343). While abuse is a highly complex phenomenon and multiply determined, focusing on one significant contributor, such as crying, and investigating ways to reduce it could produce positive benefits to infant-caregiver interactions.

High risk infants are particularly vulnerable to attachment disorders. Factors contributing to difficulties in their development and in the ability of their caregivers to care for them can further disrupt a positive infant-caregiver attachment. In addition to providing a description of attachment disorders, researchers have explored an array of interventions.

### **Interventions to Foster Healthy Infant-Caregiver Attachments**

In her overview of research results for attachment interventions, Carmen (1994) wrote that intervention with parents and very young children involves a broad knowledge base of child development theory, behavioral science, therapeutic techniques, adult educational methods and child health maintenance.

Intervention techniques include (a) teaching the parent interactional methods, such as sensitivity to social cues, reciprocity, and enhancement of quiet states; (b) basic child caregiving and guidance; (c) nurturing routines; and (d) enhancement of

development. Carmen (1994) offered a further elaboration of three interactional methods:

**Sensitivity to social cues:** The caregiver's ability to read the infant's nonverbal cues signaling the readiness to engage or disengage is significant in relationship building. If, for example, the caregiver ignores the infant's disengagement cues consistently, the infant may maintain sleep states in an effort to "shut out" over-stimulation. An overtly sleepy, withdrawn infant is less available to the mother to enjoy and is often more difficult to nurse. The ability of the infant to give clear cues certainly assists in relationship building. Attachment difficulties may occur when a sick, neurologically impaired or medically fragile infant is coupled with a low functioning or overwhelmed parent. Neither partner may be adept at reading or conveying clear social cues.

**Reciprocity:** This is the next logical interaction intervention once infant and caregiver become comfortable with social cues. Reciprocity is the turn taking, rhythmic pattern that usually occurs intuitively between attuned caregivers and children. It is important in the infant's development of language because ignoring cues, or "stepping" on cues may hinder emerging vocalizations. Teaching caregivers to be partners with their infants, to take turns, will naturally enhance language development and attachment.

**Enhancement of quiet states:** If the very young, or neurologically impaired, infant is having difficulty with state modulation and becomes easily irritated or quickly withdraws into sleep states, caregiver interaction techniques can enable the infant to maintain a quiet alert state for longer periods, thereby allowing

more opportunities for attachment behavior to. Infants who jump from sleep states to crying states, or the reverse, deny caregivers interactional enjoyment and can hinder attachment.

From his extensive study in this area, Brazelton (1990) concluded with a variety of activities a caregiver can do to reduce distress in infants: (a) reduce lighting, (b) engage infant visually, (c) vocalize softly, (d) place hand firmly but gently on infant's trunk, (e) bundle and rock infant, (f) give pacifier and (g) continue to rock or move infant rhythmically. After the caregiver learns to sensitively read infant cues, to establish reciprocity, and to enhance quiet states, then the infant can gain competency in regulating behavioral states.

### **The Development of Reciprocity Between Caregiver and Infant**

Research literature has supported the assertion that mother and child each come to the interaction with unique characteristics. It is the merging of the parent's and child's individual styles that determines the success of the mother-child relationship. Barnard and Kelly (1991) concluded that caregivers must adopt an empathetic perspective of the infant's behaviors to ensure a meaningful interaction. Stern (1984) labeled this empathetic perspective as "affect attunement," the ability to know what another is experiencing subjectively. The mental state of one partner must first become visible through his or her overt behaviors. Attunement occurs when the other partner perceives this state and produces a meaningful response. For example, a child tenses his or her body to

make the final effort to grab a toy (overt behavior), and the caregiver at this precise time says “uuuuuh.....uuuuuh!” with her vocal effort matching the child’s physical effort. Although affect attunement is a matching process, it goes beyond simple matching and focuses on the internal state of the partner as well (Barnard & Kelly, 1991).

Barnard, et al. gave further elaboration to this matching process by highlighting the necessary features of the mutually adaptive dialogue or “dance” between partners. If either partner lacks important qualities, the dance may be less successful and satisfying. In this dance analogy, Barnard, et al. stated that to be successful, “dance partners must each have specific skills, including the ability to read each other’s signals, to hear the beat of the music, to move the body in time to the beat, to move the feet in specific patterns required by each dance” (p. 42).

Barnard, et al. (1989) further described four necessary ingredients for this dance to be successful and satisfying. First, the dance partners need a sufficient repertoire of behaviors. Among the crucial skills that the child brings are the abilities to see, hear, and visually attend to the mother: to smile, to adapt to holding or movement, to be soothable, and to achieve regularity and predictability of response. The caregiver brings the ability and willingness to read and respond appropriately to infant cues, a repertoire of stimulating skills, including language ability, and the ability to delay responding or stimulating until the infant signals readiness. Second, in this adaptive dance, the partners’ responses must be contingent on one another. In their subsequent research studies, Barnard and Kelly (1991) found this contingent quality to be

significant in the development of an infant's secure attachment to the caregiver and to affect the subsequent development of competence in the child. Third, there needs to be a richness of the interactive content, such as the amount of time the caregiver spends with the child or the range of toys and activities. Finally, the fourth ingredient in this dialogue or dance is that the specific adaptive patterns between caregiver and child must change over time. The stimulation needed by a 2-year-old is much different from the stimulation needed by a 2-month-old. As the child's repertoire of behaviors increases, there is a shift in the burden of responsibility for the interaction pattern as well.

### **Summary**

An overview of some salient issues in infant-caregiver attachment have been explored in this section. The specific interactional processes of sensitivity to social cues, reciprocity and enhancement of quiet states have been studied and validated. These processes become the foundation for healthy infant-caregiver attachment and will be considered further in the next section. What follows is a closer look at literature specific to touch, infant-caregiver interaction, and interventions to enhance this interaction.



## **Touch**

### **A Holistic View of Touch**

For the purposes of this study, touch was considered in the context of infant development. Brazelton (1984) highlighted three interacting systems in infant development. The first is the maturation of the central nervous system, which both drives and limits development. The other two systems fueling development are the internal feedback system and external feedback system. These systems interact, for example, when a newborn infant puts together several reflex behaviors and pulls off a complex behavior, such as sucking a thumb for comfort. The thumb in the mouth completes an internal cycle of behavior for the infant. If the caregiver happens to lean over and touch the infant, affirming their actions, then the external feedback system comes into operation.

This study examined the physical and psychological aspects of touch. Beyond the sensory elements of touch and infant massage, there is an interactional exchange that develops between caregiver and infant. By examining the interaction of infant and caregiver, this study attempts to make some connection between touch through infant massage and enhanced interactions.

According to Brazelton (1984), touch is one of the main intersensory integrators or consolidators of development. Depending on the state of the infant, touch can either enhance or reduce stimulation. For a baby who is losing control, a gentle hand placed on their back can offer the control they vitally needs. Touch can both “instigate and maintain communication between the

outside and inside feedback system “ (Brazelton, 1984, p. xvii). Yet, how touch is received is dependent on the state of the infant and on the quality of touch in terms of location, rhythm and intensity.

Brazelton observed that by six weeks of age, babies learned to tell the difference between the rhythmic touch of their mother, to control, activate and soothe, as distinct from their father, who is more likely to excite and to play.

### **Touch and Skin Research**

Brazelton (1990) defined touch as the first important area of communication between a caregiver and their new infant. He cited research that described the mother's response to upset babies as a type of containment, shutting down on their disturbing motor activity by touching or holding them. By contrast, fathers were more likely to jiggle or rock babies in a playful, rhythmic fashion. Touch is a message system between caregiver and the infant, both for quieting and for alerting and arousing.

Barnard and Brazelton (1984) discovered in their research that a slow patting motion is soothing to the infant, whereas more rapid patting becomes an alerting stimulus, and that the threshold is very specific. With rapid patting the baby becomes upset. As with auditory stimuli, the law of initial values seems to be of primary importance. When babies are quiet, a tactile stimulus serves to alert them and bring them up to an alert state. When babies are upset, a slow, modulated tactile stimulus seems to serve to reduce their activity.

Furthermore, Brazelton (1990) discovered that caregivers need to learn to recognize and predict their infant's states of consciousness in order to know whether he or she will be available for feeding, sleeping or interaction. Brazelton identified six states of consciousness that will be discussed in more detail in a later section on infant-caregiver interaction.

Researchers have also studied skin as it relates to touch and infant development. Montague (1986) stated that the skin is the largest organ system which humans present to the world, and it serves a multitude of functions in protecting the soft tissues of the body. As a sensory system the skin is the most important organ system of the body, and human beings need the functions performed by the skin in order to survive. According to Montague, evidence supported the skin as the sense organ that gives the human infant the most information. In addition, tactile experience is critical for the continued growth and development of the nervous system. The infant will develop a sense of trust or mistrust depending upon sensory impressions, received mainly through the skin.

### **Touch and Attachment**

Since Harlow's classic demonstration of the importance of contact comfort to infant rhesus monkeys, knowledge about the role of touch in early development has been vastly increased. Reite (1984) discussed how animal research delivered new knowledge concerning touch and attachment. If a female rhesus monkey is raised in a cage alone and never allowed to touch another monkey, then she will probably become an abusive or neglectful mother,

refusing to hold or nurse her infant. If mother and infant squirrel monkeys are separated for half an hour, both experience a sharp rise in a stress-related hormone called cortisol. Reunion and physical contact will modulate this hormonal response. Pigtail monkey infants when separated from their mothers at an early age demonstrate behavioral and physiological reactions that resemble human responses to bereavement or separation from a loved one. Reite (1984) concluded that “converging data from many sources implicated touch as central to the development of attachment in primates” (p.59).

Harlow’s classic observations illustrated that infant monkeys valued tactile stimulation more than nourishment. From the study of mammal, monkey, ape and human behaviors, Montague (1986) concluded that touch is a basic behavioral need, much as breathing is a basic physical need; that the dependent infant is designed to grow and develop socially through contact, tactile behavior, and to maintain contact with others throughout life. Furthermore, when the need for touch remains unsatisfied, abnormal behavior will result.

From the animal research that has been conducted on touch and attachment, Reite (1984) believed that there is ample evidence to support the notion that separation and losses, or disruptions in attachment bond, can lead to impaired health. There is also evidence that the presence of attachment promotes health, and that tactile stimulation is important to the development of attachment bonds. Reite concluded that touch is instrumental in the development and maintenance of attachment. The experience of touch in appropriate situations may exert a regulating or signal

influence on physiological systems similar to that afforded by the process of “being attached”.

Much less is known about human beings. Klaus and Kennell (1982) stated the following, after examining observational data from a number of investigators on the patterns and sequences of the way in which mothers touch their newborns:

Thus we have fragmentary evidence for what we believe is a significant principle - that human mothers engage in a species specific sequence of touching behaviors when first meeting their infants, even though the speed of this sequence is modified by environmental and cultural conditions. (p. 73)

Klaus and Kennel (1982) summarized the findings of seventeen studies on delivery practices and the amount of contact between mothers and their newborn infants. From all these studies, they concluded that the groups with early contact, usually within the first thirty minutes, showed significantly more attachment behavior. Babies in this early contact group were found three months later to cry less and smile more and breastfeed longer.

Also relevant is the observation that infants classified as “anxiously attached”, as opposed to “securely attached”, frequently have mothers who demonstrated an aversion to close body contact (Ainsworth, Blehar, Waters & Wall, 1978). These mothers tended to show up disproportionately in samples of abused or neglected children (Gaensbauer & Harmon, 1982).

Montague (1986) summarized the current situation with respect to touch, attachment and human beings:

We do not have much evidence of a direct kind that tactile stimulation or its absence affects the growth and development, physical or psychological, of the human infant. Such direct

evidence is largely lacking for the simple reason that it has never been sought in man. We do, however, have as we have seen, plenty of direct evidence of this sort for non-human animals. Also, we have a great deal of direct evidence in human infants which thoroughly supports the extrapolation that tactile stimulation is at least as important in the physical and psychological growth of the human infant as it is in the non-human infant. (p. 191)

### **Criticism of Bonding and Attachment Studies**

Eyer (1992) urged caution in interpreting research on infant-caregiver attachment. Eyer viewed the term, mother-infant bonding, as an appealing solution, although poorly constructed, to some rather complex problems of hospital childbirth and postnatal care. She presented a lengthy analysis of how research and ideology have become entangled over this bonding concept. She cautioned against any ideology which portrays mothers as the prime architects of their children's lives because that in turn sets them up to be blamed for whatever problems befall them, not only in childhood but throughout their adult lives.

Eyer summarized extensive research literature criticizing the Klaus and Kennell research of a "critical" or optimal period for bonding between mothers and infants based on extensive animal research. The criticism rested on the conclusion that the research of Klaus and Kennell was plagued with flaws in design, yet continued to serve as a model for numerous bonding studies. "The sample sizes were small, the number of variables were large and the statistically significant results few" (Eyer, 1992, p. 2). Furthermore, the fact that medical staff were aware of which subjects were receiving treatment could have confounded the observed differences.

Although the replication studies found positive consequences, these were not on the same measures. Eyer concluded her summary of the literature of criticisms by stating that early contact had no enduring effects on maternal attachment but may have had modest short term effects on some mothers in some circumstances.

While the Klaus and Kennell research influenced the humanization of birthing practices, the weakness in their research design required cautious interpretation. The fact that hospitals responded to their research results by making major policy changes in birth practices, and further recommended the bonding as a preventative against child abuse and neglect has worried a host of researchers, according to Eyer. Above all she considered the most negative result of the Klaus and Kennell research to be the enormous guilt that it placed on mothers who could not accommodate the optimal period of bonding which was recommended.

### **Maternal Aversion to Mother-Infant Contact**

Biggar (1984) explored the issues of mothers who reject the infant's initiation for comfort. By looking at mutual physical contact, Biggar attempted to study reciprocity, the rhythmic or matching behaviors of mother and child. Ainsworth et al. (1978) and Biggar (1984) have shown that mothers' early aversion to physical contact with their infants remains stable over time, which was up to six years according to Biggar's longitudinal research. By this age, the children also have learned to avoid making physical contact with the parent.

Biggar assessed the apparent security of the relationship during a three-minute reunion with the parent after an hour of

separation. At six years old, the children who had been called very secure at one year initiated conversation with the parent, spoke to the parent in a personal way, or were highly responsive conversationally. They initiated some physical contact as well, but verbal communications seemed to substitute for body contact some of the time. The six year olds who had been deemed very insecure as infants showed three main patterns of behavior. One group was linguistically avoidant. These children responded minimally to questions, tried not to engage the parent in conversation, and talked only about things, not personal state. These children were also observed to avoid physical contact with the parent, by crossing the room or moving away. Another group was quite rejecting of the parent, saying "Don't bother me" or "Why don't you go sit over there." The third pattern, which was rare, Biggar called "inappropriate care giving". Children in this group seemed to become parental toward their parents, reflecting another kind or organization of attachment in infancy.

Biggar (1984) concluded her research review with the observation that the physical and tactile accessibility of certain persons is continually monitored by the infant and becomes an organizing principle in infant behavior. Rejection of physical contact by attachment figures has specific consequences in terms of the infant's increased attempts to receive physical contact initially and eventually to the expression of anger and conflict.

Ainsworth, et al. (1978) found a significant relationship between mother's observed aversion to physical contact with the infant and infant conflict behavior. The greater the mother's



aversion to physical contact with the infant at three months, the more anger seemed to direct the infant's moods and activities between nine and twelve months and the more frequently the infant struck or angrily threatened to strike the mother in relatively stress-free situations.

Both Ainsworth, et al. (1978) and Biggar (1984) provided research results on the long term effects of caregivers who avoid physical contact with their infants. Their results support the argument for infant massage training to establish a positive contact between caregiver and infant through touch.

### **Summary**

The importance of touch to infant-caregiver attachment was discussed. Touch research provides a clear justification for early infant massage training and use in order to teach the benefits of healthy touch. Literature pertaining to infant-caregiver interaction will be reviewed next before a more detailed discussion of intervention strategies.

### **Infant-Caregiver Interaction**

Barnard & Kelly (1991) found that early intervention programs continued to recognize the importance of infant-caregiver interaction and to link positive interaction to optimal child development. Brazelton (1990) explained the importance of viewing the interaction system as a reciprocal process in which each member of the dyad sensitively observes and adjusts personal behavior to the other member. Interactions provide the opportunity

and fuel to guide new parents toward mutually rewarding relations with their infants.

• Brazelton (1990) stated that touch is the first important area of communication between a mother and her infant. Touch is a message system between the caregiver and the infant, both for quieting and for alerting and arousal. One of the caregiver's first jobs is to learn to recognize and predict their infant's states of consciousness in order to know whether he or she will be available for feeding, sleeping and interaction. Brazelton identified six states of consciousness: (a) deep sleep, (b) active sleep, (c) drowsy state, (d) awake, alert state, (e) alert, fussy state and (f) crying. The latter three states are closely related to interaction research in terms of teaching caregivers which states are the optimal moments for interaction:

Awake,  
alert state

The infant's body and face are relatively quiet and inactive, with eyes that are "bright and shining" in appearance. Visual and auditory stimuli will bring predictable responses.

Alert  
fussy state

This is a transitional state to crying. Babies are available to external stimuli and can be soothed or brought to alert state by attractive stimuli. If the stimulation gets to be too much, they are likely to break down to fussing again. Movements are jerky, disorganized, and make infants fuss even more when they set off massive startles in themselves.

Crying

Crying serves many purposes for the baby. From the first, it is the most effective mode for attracting a caregiver. Not only are there at least four types of cries (pain, hunger, boredom, discomfort) which are distinguishable early in life, but it seems as if the baby were programmed to try to communicate by crying in these various ways. (p. 63)

Brazelton and other researchers (Barnard, 1989; McClure, 1989) strongly supported the notion that caregivers need to be aware of these six states in order to take advantage of optimal moments for interaction. Understanding these states and being able to read an infant's cues, indicating current state, is a critical skill for caregivers. Successful interactions and the developing relationship between caregiver and infant often rest on this skill. The next section will review literature specifically in the area of infant interaction.

### **Infant-Caregiver Interaction Research**

#### ***Synchronicity***

Brazelton (1990) has been a leader in measuring interaction behaviors. He has revealed trends and established a base for the qualification of many interaction behaviors. He noted the following:

When infants are interacting with their mothers, there seems to be a cycle of attention followed by withdrawal of attention- a cycle used by each partner as he or she approaches and then withdraws and waits for a response from the other participant. Within this cycle, clusters of behaviors, rather than simple behaviors are the stimuli that control the timing of each interactant's response to the other. (p. 102)

The clusters of behaviors identified by Brazelton include such qualitative descriptors of behavior as intrusive, avoiding, hyperactive, or reciprocal.

Brazelton (1990) observed a consistent, and largely qualitative difference between mother-infant and father-infant interaction that was apparent from early weeks. Brazelton believed that these

differences suggest different roles on the part of the adult, "... the mother providing an envelope for interactive behaviors, father a base from which play can emerge" (p. 106). Brazelton stated that these differences were stable over time and were registered in predictable behavioral clusters. They serve as a signal to the adult partner that the infant recognizes him or her and expects a certain pattern of response in return.

According to Brazelton (1990), "by learning the baby's 'language,' as reflected by autonomic, state, motor and attentional behaviors, parents can synchronize their own states of attention and inattention to the baby's. They can help the baby pay attention and then prolong this attention within their interaction" (p. 121).

Brazelton (1990) observed that the adult and infant who can achieve synchrony of signal and response add another dimension to their interaction and they move to a point when they can anticipate each other's responses in long sequences. Having learned each other's requirements, they can set up a rhythm along with a set of rules. Brazelton believed that the power of this rhythm establishes an expectancy, both for the results of complying with the rhythm and for interrupting it. So powerful is this expectancy that it seems to carry each member of the dyad along. This phenomenon has been labeled "entrainment". Each member of the dyad adjusts to the other, so that the infant is not simply matching the adult's cues, but the rhythms of the adult coordinate with the movements of the infant. According to Brazelton, entrainment becomes the fuel for caregiver-infant interaction and a powerful contributor to their attachment.

Brazelton has been a pioneer in the field of infant development research, particularly in terms of infant-caregiver synchronicity. In the 1982 study he described a method to assess the affective communication system which develops between infant and caregiver within the first few months of life. With such a method, Brazelton hoped to understand better the necessary ingredients for optimal infant-caregiver interaction. He was particularly interested in measuring the caregiver's sensitivity to the infant and in identifying failures in communication. Through a process of split screen video analysis, he described the synchronicity of mother and infant in terms of cycles and phases. The phases included initiation, orientation, acceleration to excitement, deceleration and turning away. Partners are considered to be interacting well when their attention and non attention cycles and phases are synchronized.

For infants who have particular attachment disorders, such as failure to thrive or brain damage, caregivers can be taught to identify their infant's unique rhythms and to develop rewarding contact whereby the infant will become more responsive. Videotapes of the infant's "rhythmic availability" helped define the essential interaction and instructed the caregiver on how best to reshape patterns of interaction with their high risk infant, and thereby establish therapeutic attachment (Brazelton, 1982). He concluded his review of synchronicity research with a warning:

...without this kind of attention to a baby's needs for synchrony and facial expression, we may well expect not just a failure in communication and static lack of development, but a real

violation of complex, expected and necessary rules for interaction which are basic to survival, and without them, withdrawal from social interaction and regression of development and physiologic progress. (pp. 53-54)

### ***High Risk preterm infants***

The research on caregiver-infant interaction when the infant is premature indicates consistently that preterm infants have a decreased level of behavioral responsiveness and less organization of sleep-wake activity. Even when caregivers try harder to stimulate their infants, the preterm infants are less responsive. According to a study by Field (1983), high risk infants and their caregivers are described to have less fun during interactions when compared to low risk, typically developing infants. High risk infants spend less time looking at their caregivers, smile and vocalize less, and cry more. These negative affective displays along with elevated heart rates suggest that the interaction may be stressful.

Field concluded that the interaction problems between caregivers and high risk infants related to finding an optimal level of stimulation, since low levels do not elicit responses from these infants and high levels may result in gaze aversion and fussiness. When a caregiver's stimulating behavior results in subtle or potent disengagement cues from the infant, then it is described as overstimulating, overcontrolling, or overdominating. Yet, this caregiver behavior may be due to the lack of readable cues and responses from the infant. What happens is that as the infant contributes less the caregiver contributes more. This lack of

synchronicity in the interaction can lead to more ineffective patterns of interaction over the long term.

Barnard, et al. found that caregiver involvement decreased over time with preterm infants and that this “burn-out” during the first year was confirmed in other research as well. Infants who are especially difficult or irritable become less attractive social partners. Such infants often receive less responsive parental care when, in fact, they probably require even more sensitive care. They eventually receive less care because their irritability and low consolability influence the caregiver to give up, or at least to be less responsive, because they feel that their care giving efforts are not effective.

Barnard, et al. (1989) cited research results for a sample of premature infants, where the mother’s total score from the teaching interaction observation at four months was negatively correlated ( $r = -.39$ ,  $p < .01$ ) with the four months Mental and Psychomotor Development index. That is, among the premature infants, the mothers who exhibited the best teaching behaviors had the least well developing infants. This is consistent with Field’s 1983 study of interactions between premature infants and their mothers. Field observed that when the premature infants were three to four months old, their mothers were more involved and more stimulating than were mothers of full-term infants.

The results of these studies underscore the difficulties that caregivers encounter with premature infants. Research seems to suggest that high risk infants require more involvement from the caregiver and that the balance of behaviors necessary to sustain interactions rest with the caregiver. Yet, when the caregivers offer

more stimulation the infants often respond less. The lack of responsiveness of the infants seems to imply that other caregiver behaviors may be necessary to sustain the interaction. Rather than do more teaching or simply give up, caregivers may need to simply do something different. Infant massage may provide the opportunity to better match caregiver behaviors with high risk infant needs for more positive interactions.

### ***Infants with developmental disabilities***

Barnard and Kelly (1991) surveyed research studies and found that there was a trend toward more mother-directed interactions in groups where the child was disabled (Down syndrome), as contrasted to more child-directed interactions in the non-delayed group. In the group of children with Down syndrome there was less turn taking and more vocal clash. Mothers of children with disabilities were noted to be more dominating and their infants correspondingly seemed less involved, than those in non-delayed child-parent dyads. Barnard, et. al. (1989) discussed the importance of a good repertoire of mother and infant behaviors in order for a comfortable interaction to develop. They suggested that this repertoire seems less reciprocal and more mother-dominated when an infant is delayed because of differences in infant characteristics. Data have supported the assumption that infants with delays exhibit cues less frequently and more subtly resulting in less contingent behavior on the part of the mother.

Tannock (1988) designed a research study to compare the control and reciprocity in mothers' interactions for a group of



children who had Down Syndrome compared to a group of non-disabled children. In her research review, Tannock outlined conflicting research findings for the question of whether mothers were more directive and unresponsive with their children with disabilities compared to mothers of normally developing children. Researchers who failed to replicate the findings of more directive mothers, concluded that these mothers were no more directive or unresponsive than mothers of non-delayed children.

Tannock discovered that conflicting interpretations of the data, methodological issues and unanswered questions characterize much of the research on maternal directiveness. While addressing the methodological limitations previously noted, Tannock's study was designed to investigate whether children with and without developmental disabilities differed in responsiveness or in initiating behavior. Tannock also investigated whether their mothers differed in responsiveness or directiveness. Directiveness was examined along the dimensions of turn taking control, response control, and topic control.

The subjects were 11 children with Down syndrome (15-to-57-months old) and 11 children who did not have disabilities (10-to-22-months-old) and their mothers. Subjects were individually matched for communication level, developmental level, birth order, age of parents and educational level of parents. The procedure was to videotape each mother and child playing for 15-20 minutes in a simulated play room and then to code and analyze the tape transcripts.

Tannock found that mothers of children with Down syndrome were highly directive in terms of topic control, and yet they did not differ from mothers of children who were not disabled in terms of verbal responsiveness; neither did they differ in their use of requests to respond to the focus of the uninvolved child or the topic of the involved child. Tannock concluded that maternal control strategies may be supportive to the developmentally immature child who is acquiring language, and may not be necessarily inhibitive to language development. Tannock discovered that despite the greater control exhibited by mothers of children with Down syndrome, both groups of mothers used conversational control primarily to sustain and engage the child in interaction, and both groups were equally successful in establishing and sustaining topics. These findings suggest that children with developmental disabilities might benefit from interactions that differ markedly from those of normally developing children. Future studies are required to investigate the relationships between the various patterns of early interaction and the child's subsequent development of linguistic and socio-interactive skills.

In their review of infant-caregiver interaction research Rosenberg and Robinson (1988) concluded, "... when compared to non-handicapped peers, young handicapped children are less active, less responsive to their mothers, initiate fewer interactions, and provide fewer communicative and affective cues" (p. 174). According to Rosenberg and Robinson, these differences make it more difficult for caregivers to establish rewarding interactions with their children. Rosenberg and Robinson further concluded that

caregivers of infants with disabilities are more similar than different from caregivers of non-disabled infants. Caregivers of infants with disabilities have learned to adapt to their infants' interactional characteristics, often with higher levels of directiveness and lower levels of enjoyment. Just as with caregivers of premature infants, caregivers of children with disabilities must assume the major responsibility for maintaining the interaction with their infant.

Rosenberg and Robinson (1988) observed that many intervention approaches attempt to redress this imbalance by helping parents secure their children's interest and active participation. The extent to which particular caregiver-infant pairs will have difficulty interacting will vary considerably and, consequently, so will their need for assistance in improving interactions. Children with complex disabilities appear to present substantial challenges to their caregivers' efforts to interact. Interventions that enhance caregivers' interactional skills can affect child involvement in those interactions. Rosenberg and Robinson found that improvement in a mother's interactional skills is associated with increases in child interest in interaction with their mothers.

### **Measurement of Interaction**

Barnard and Kelly (1991) summarized an array of research studies focusing on characteristics of caregiver and infant. For a long time researchers have hypothesized that various child-care practices are determined not only by what the mother feels and does, but also by the specific pattern of behavioral responses that characterize the

individual child. Barnard and Kelly cited research conclusions that individual infant differences at birth may affect later development, including the manner in which different infants will perceive the world around them. For mutuality to develop between the mother and child, the individual infant behaviors must evoke differences in mothering. How the infant adapts to the environment is determined by individual characteristics such as, how much the infant cries, how easily the infant can be soothed and how the infant tolerates sensory stimuli.

In response to research defining the process of mutual regulation and adaptation that occurs in optimal interactions, Barnard, et al. (1989) developed the Nursing Child Assessment Satellite Training (NCAST) scales. These scales were designed to identify discrete elements of the infant-caregiver interaction process and to examine their relation to the development of the infant and the infant-caregiver relationship. The resulting assessment information of strengths and needs of the infant-caregiver relationship could be used to further research efforts and to plan appropriate intervention techniques.

The use of the NCAST scales has been validated by over fifteen years of research. While there are other assessments which specifically target infant-caregiver interaction, none seem to have the extent of research data as the NCAST. The NCAST scales are used to measure infant-caregiver interaction in this study.

### ***Conceptual organization of NCAST scales***

Barnard, et al. designed the NCAST Feeding and Teaching Scales to meet several specific objectives: (a) to be used with good reliability by health professionals as well as psychologists in a variety of settings, after relatively straightforward training; (b) to describe with some specificity both the repertoire of behavior brought to the interaction by both members of the dyad and the contingency of their response to one another, and to describe some less obvious aspects such as positioning of the infant and response to quite subtle negative child cues; and (c) to provide two conceptually parallel looks (feeding and teaching) at the same mother-infant pair, in order to increase the generalizability of the observations across settings, and to give the practitioner flexibility in choosing the observation setting that is most feasible or suitable for a given pair.

The Feeding and Teaching scales are each made up of a number of binary items (76 and 73 respectively) organized into six conceptually derived subscales, four of which describe the adult's behaviors, usually the mother, and two of which describe the child's behavior. These are described in more detail in the next chapter. The Feeding scale allows observation during a feeding situation which is well rehearsed, familiar to both members of the pair, and makes relatively few new demands. According to Barnard and Kelly (1991) the Feeding scale has proven to be a very useful interactive episode for clinical purposes, but can have some drawbacks for research. If the child has already eaten before the home visit then this data can not be collected. The Teaching scale allows observation during a teaching interaction that, in contrast, is quite brief. The

teaching observation is also more novel and unfamiliar for the parent and infant and therefore places some stress on the interactive system. The Teaching scale allows investigators to look at the adaptive patterns of the dyad outside of their well-rehearsed routine.

The tasks for use in the teaching interaction on the Teaching scale have come from primarily motor performance items on the Bayley Infant Scales and at later ages from the Merrill-Palmer and Stanford-Binet Scales. An example of the tasks used at 4 months are “reaching for a cube,” which is an age appropriate task, and “pulling a string to secure the ring” for which the modal age for passing is 5.7 months. The more difficult task generally puts more stress on the interaction system and will more often generate restriction or negative maternal behavior if the child does not perform. Added together, the Feeding and Teaching scales give a richer look at the interactive patterns than either does alone, but each can be used independently when the situation calls for or allows only one (Barnard & Kelly, 1991).

### ***Normative data for NCAST scales***

For both scales there were highly consistent and statistically significant educational differences. The more education a mother has obtained, the higher both her scores and her infant's scores were on the NCAST scales. The mother's marital status was also related in a statistically significant manner to both mother and infant scores. Scores were lower for dyads with unmarried mothers. Infant scores increased with age, suggesting that the infant contributes more to the dyadic interaction as new skills develop.

According to Barnard, et al. (1989), these findings support the concept of optimality of the dyadic partner and optimality of interaction and provide criterion validity to the measurement of parent-child interaction.

### **Summary**

The studies described in this section illustrate the process and measurement of infant-caregiver interaction. Critical elements determine the individual behavioral repertoire of both the infant and caregiver, and the reciprocity that develops as both partners in an interaction respond and adapt to each other. Research has shown that infants come to the interaction with a unique set of characteristics. For a synchronous relationship to develop, these individual characteristics must evoke differences in caregiving.

For example, work with premature infants and their caregivers has demonstrated the necessity for caregivers to adjust the amount of their stimulation to the infant's capacity to handle sensory input (Field, 1983). The individual characteristics of the caregiver which affect the interaction include their awareness of their children's development and abilities and the caregiver's level of energy in using this awareness. Finally, the reciprocity that develops as both partners in an interaction respond and adapt to each other is the basis for a mutually satisfying relationship between caregiver and child.

Barnard, et al. (1989) concluded the following:

The contingent nature of the responses are a critical additional element, and stimuli such as verbal behavior and positive affect contribute to dyadic competency and the child's emerging

competency. Finally the developmental nature of the interaction, where new issues emerge over the rapidly changing course of maturation and development round out a complete picture of caregiver-infant interaction. (p.45)

Researchers have studied and described infant-caregiver interactions for infants, both healthy and at risk. Given that there is substantial evidence that caregiver-infant interaction is a potential problem in at-risk children, interventions to strengthen attachment and interaction are needed. A discussion of specific interventions follows next.

## **Interventions to Strengthen Infant-Caregiver Interaction**

### **Demonstration of the Brazelton Scale**

Field (1993) stated that one of the most effective ways of enhancing parental sensitivity to infant behavior is to make the parents aware of the newborn's capabilities. "Since newborn assessments such as Brazelton Neonatal Behavioral Assessment Scale are increasingly used during the neonatal period, they can just as easily be demonstrated to parents as an educational tool." (p.82) Brazelton and others have argued that demonstration of these assessments to new parents may not only improve their knowledge but also enhance interactions between caregivers and infants.

Field reviewed a research study of a demonstration of the Brazelton assessment for a population of teenage mothers of preterm infants. In this study, 30 healthy preterm infants were randomly assigned either to a control groups or to one of two experimental groups. In the first experimental group the mothers were given a



demonstration of the Brazelton Neonatal Behavior Assessment Scale (BNBAS) and were asked to complete the Mother's Assessment of the Behavior of Her Infant (MABI) at birth and weekly for four weeks after the hospital discharge of their infants. The MABI was a scale that was adapted from the Brazelton; mainly a simplified scale so it could be completed and scored by mothers. The score on the MABI can then be converted to Brazelton equivalent scores so that comparisons can be made between mothers' ratings and examiners' ratings. In the second experimental group, mothers were not given a demonstration of the Brazelton but were asked to complete the MABI scale at birth and weekly for the first month after discharge. Finally, the mothers in the control group did not observe the Brazelton or complete the MABI scale but were instead asked to complete a questionnaire on the developmental milestones of their infants. The mothers and infants were then visited in their homes at 1, 4, and 12 months.

At one month, both experimental groups performed more optimally on the Brazelton scale interactive items. These infants also received superior ratings on videotaped feeding and face-to-face play sequences. By four months the Brazelton group did better than the MABI group. The MABI group, in turn, did better than the control group on developmental assessments and face-to-face interactions. These advantages for both experimental groups persisted at one year on the Bayley Developmental Scales. Seemingly, the mother, via her observation of the Brazelton Scale or her own assessment using the MABI scale, may have become more sensitized to the unique skills of her infant, more interested in observing the infant's development,

and more active in providing appropriate stimulation to facilitate development (Field, 1993).

Field reported that the mothers who observed the Brazelton assessment demonstration frequently expressed amazement that their newborns were capable of following moving faces, looking in the direction of sound, and being so aware of their environment. Having seen this demonstrated by the examiner, they reported feeling encouraged to try it themselves on the MABI scale. Presumably the mothers of the Brazelton and MABI groups continued to perceive their infants as more receptive to stimulation and continued to provide more optimal levels of stimulation. Field suggested a transactional model interpretation for this in that the mothers may have discovered the amazing skills of the newborns, which in turn affected their early interaction behaviors, and these in turn affected their infants' later cognitive skills. Given that the Brazelton assessment is a routinely administered scale, the demonstration for the mother is a cost-effective intervention.

Field reported similar positive findings in research studies with mothers of healthy full term infants, fathers of both preterm and full term infants, adolescent and adult parents, lower and middle class parents, and for full-term and preterm infants. In these additional studies, researchers suggested that these positive findings were related to the caregivers gaining confidence in their parenting skills and learning how to expand on their infants' efforts to solve problems. Also, long-term follow-up effects were noted in superior performance on developmental assessments at three and four years

old for those infants whose parents who received a Brazelton assessment demonstration.

Field concluded that short-term changes in parental attitude and behavior in response to the BNBAS demonstration seem to initiate positive cycles of interaction between parents and infants that then have long-term consequences. Parents appeared to effectively learn handling and interaction techniques from the clinicians as the Brazelton was being demonstrated. Field speculated that parents may unlearn unrealistic perceptions of their infants, or negative attributions that come from conflicts about their own earlier relationships. Whatever the underlying process may be, Field considered the Brazelton demonstration to be a powerful intervention for enhancing parental sensitivity to infant behavior.

### **Interaction Coaching**

Field summarized a series of research studies in which a number of manipulations were designed to enhance behaviors often seen in more harmonious interactions between infant and caregiver. For example, face-to-face play interactions typically featured caregivers (a) taking turns or not interrupting, (b) respecting the infant's occasional breaks from the conversation, (c) slowing down their behaviors, (d) exaggerating and repeating their behaviors, and (e) contingently responding by imitating or highlighting the infant's behaviors. In contrast, the atypical or disturbed face-to-face interaction featured an overactive, intrusive, controlling parent and a gaze-averting, fussing infant.

By focusing on caregiver behaviors, Field was able to improve caregiver interactions with infants. There was a reduction in distress vocalizations and squirming on the part of infant, and the infants engaged in longer periods of eye contact with their caregivers. The most effective manipulations reported have been asking caregivers (a) to count slowly as they interact, (b) to imitate all of their infant's behaviors, (c) to repeat their words slowly, and (d) to be silent during their infant's sucking or looking away periods. Field found that most parents experiencing difficult interactions were willing to try anything to establish a better relationship.

### **Videotaped Feedback and Specific Interaction Coaching Techniques**

Clark and Seifer (1983;1985) used videotaped feedback as a type of interaction coaching. Videotapes were made of mother and infant engaging in spontaneous play. After first studying the videotapes, a speech pathologist then viewed the tapes with the parent and gave reinforcement for good interactions and suggested modifications for improving interactions. Clark and Seifer found in both studies that direct coaching of interactions from the sidelines and from videotapes was an effective intervention.

With or without videotapes, researchers have identified effective interaction coaching techniques to improve caregiver-infant interactions. Increased infant eye contact with mothers was noted when mothers changed their behaviors, specifically, when they slowed down their interactions, repeated their phrases and imitated infant behavior. These behavior changes seemed to eliminate

excessive stimulation and allowed the infant to process information and modulate arousal. Conversely, for a population of depressed mothers, strategies were taught to increase the stimulation by using attention-getting and game playing techniques, thereby improving interactions with their infants (Field, 1993).

### **Intervention Programs for Infants at Developmental Risk**

Mahoney and Powell (1988) designed their Transactional Intervention Program (TRIP) to modify patterns of interaction between parents and their young children with disabilities. They focused on the instructional strategies of turn-taking and interactive match (behavioral style and developmental level, interest and complexity) within the context of daily routines. Their research reported the results of using TRIP with forty-one children (5 to 24-months-old) and their parents in their homes during a 28-month period. The average length of participation in TRIP was 11 months. Videotape analyses of parent-child interactions were conducted every 6 to 10 weeks, and the tapes were coded using measures of turn taking, interactive match and global parental style. A pre-post intervention design (one group) was used to evaluate the effects of TRIP on parents and children. Mahoney and Powell found significant changes in parents' behavior: they were less dominant in their interactions (more responsive) and rated higher on interactive match.

Further analysis showed that the parents who were the most effective at using the TRIP strategies of turn-taking and interactive match were also highly responsive, sensitive and relatively non-

directive in their interactions with their children. The parents' use of these strategies was positively related to their children's developmental gains as well.

Mahoney and Powell (1988) suggested implications for home-based early intervention practices based on their results. They challenged the beliefs that children must receive instruction or therapy directly from service providers to accomplish the goals of intervention. Caregivers improved their interactions with their infants when they employed turn-taking and matching strategies. Mahoney and Powell considered these results to be supportive of a consultant model for home intervention rather than a direct service model. The investigator of this current research study considers their conclusions compatible with the concept of training caregivers to massage their infants rather than have professionals do the massage.

Calhoun and Rose (1991) designed the Charlotte Circle curriculum to foster early social reciprocity between infant and caregiver. They believed that interventions that acknowledge and focus on the reciprocal and circular nature of infant-caregiver interactions improve these interactions, particularly for infants who are at high risk for developmental delays or have disabilities.

In their Charlotte Circle curriculum, Calhoun and Rose focused on increasing the infant behaviors which contribute to positive social reciprocity: (a) smiling, (b) responding appropriately to stimuli offered by caregivers, (c) making eye contact and postural orientation toward parent and (d) vocalizing. At the same time, Charlotte Circle noted that caregivers need to learn ways to

minimize the infant behaviors which interfere with positive interactions, such as, crying, being hard to soothe and passive non-responsiveness. Calhoun and Rose stated that it is often these difficult infant behaviors which discourage the caregiver from pursuing interaction with the infant, and thereby created a cycle of avoidance and neglect. The Charlotte Circle curriculum coupled specific intervention strategies such as (a) having caregivers keep a diary of their infant's crying to identify specific situations related to infant crying, (b) increasing soothability through carrying, rocking and swinging the baby and (c) introducing various soothing sounds, with teaching ways to touch the infant to encourage soothing, such as swaddling and massage.

### **Summary**

Caregivers can be taught a number of different techniques to enhance sensitivity to their infants, and thereby improve the relationship with their infant. Observing developmental assessments increases awareness of infants' motor and communication skills. Interaction coaching teaches caregivers strategies for improving their interactions, such as contingently responding and paying attention to infants' turn-taking signals. For infants with disabilities, caregivers can be taught specific strategies to read infant signals and facilitate more satisfying interactions.

A final technique which can be taught to caregivers for the purpose of increasing their sensitivity to infants' behaviors is massage. Research to support the use of massage with infants particularly high risk infants, is discussed next.

## **Infant Massage**

### **Historical Perspective**

Field's most recent review of massage therapy for infants and children (1995) traces the use of massage for healing back to the Ayur-Veda, the earliest known medical text from India from around 1800 B.C. Along with diet and exercise, massage is listed as a primary healing practice of that time. Over time, massage continued to be used for a long list of medical conditions such as mental illness, heart disease, labor pain and infertility. Generally, massage is thought to improve circulation, help eliminate waste, dissolve soft adhesions, reduce swelling and soothe the peripheral and central nervous system.

Although massage has been used for centuries in many parts of Africa and Asia, it wasn't until recently that infant massage came to the western world. Some individuals who studied in India (McClure, 1989) have developed programs to train individuals to teach caregivers how to massage their infants.

While infant massage training groups are located in all parts of the United States, very little research has been conducted on the use of infant massage (Field, 1993; Field, 1995; Drehobl and Fuhr, 1991). Yet, anecdotal reports from these groups suggest that massage (a) facilitates parent-infant bonding and the development of a warm positive relationship, (b) reduces stress responses to painful procedures such as inoculations, (c) reduces colic, (d) reduces pain associated with teething and constipation, (e) helps induce sleep and (f) makes the caregivers "feel good" while they are massaging



their infants. Infant massage therapists also offer anecdotal reports of the benefits of infant massage for different infants with special needs such as blind and/or deaf infants becoming more aware of their bodies, and infants with paralysis or cerebral palsy and those born preterm developing more organized motor activity.

In the field of touch, massage therapy has received the largest share of attention (Field, 1995). As discussed in an earlier review of touch research (Reite, 1984), touch techniques may signal a physiological mechanism for attachment. Because of its long history, its application to so many conditions and its primary use as a preventative measure to reduce stress, massage therapy holds a fascination for a cross section of health care practitioners.

Massage offers an opportunity to build social communication skills in the infant and attachment between infant and caregiver. The caregiver may develop a sensitivity to infant cues and become more responsive in face-to-face interactions (McClure, 1988). The results of specific research studies in the area of infant massage will be discussed next.

### **Infant Massage in the Hospital**

The data on the positive effects of infant massage come primarily from studies on premature infants. Since the 1970's, several investigators have studied the effects of tactile stimulation on the preterm newborn (Barnard, et al., 1984; Casler, 1965; Groom, 1973; Hayes, 1977; Korner & Thomas, 1972; Kramer, Chamarro, & Green, 1976; Lieb, Benfield, & Guildubaldi, 1980; Powell, 1974; Rausch, 1981; Rice, 1977; Rose, Schmidt, Riese & Wagner, 1980;

Scarr-Salapatek, S., 1973; Solkoff & Matuszak, 1975; White & Labarba, 1976). There have been exciting and statistically significant results on the effectiveness of infant massage in stimulating weight gain, facilitating sleep and reducing days of hospitalization (Field, et al., 1986; Scafidi, et al., 1990; Field, 1995).

Generally, the results reported by all of these investigators have been positive. In his meta-analysis of 19 tactile stimulation studies, testing 103 hypotheses, Ottenbacher, et al., (1987) estimated that 72% of infants receiving some form of tactile stimulation were positively affected. Larger treatment effects were associated with pre-experimental designs and also with studies in which the internal validity was rated as poor. Ottenbacher et al. recommended considerations of specific design variables and study characteristics before making interpretations. From this meta-analysis emerged the call for future research studies based on experimental design and control.

In her conclusion of a review of hospital research, Field (1995) stated that most of the investigators reported weight gain and better performance on developmental tests with the use of infant massage. Field noted that those who did not report significant weight gain used light stroking procedures that she and other researchers have since found to be aversive to babies, because they are experienced as tickle stimuli.

### **Field's Model for Infant Massage Research**

Field, et al., (1986) provided massage to an experimental group of 20 preterm infants and compared their growth, sleep-wake

behavior and Brazelton scale performance with that of a control group of 20 preterm infants. Preterm infants entered into the study when they graduated from the intensive care nursery to the “grower” nursery.

Over 10 days they presented body stroking and passive limb movement for 15-minute periods three times a day. Each massage session was composed of three 5-minute phases. During the 1st and 3rd phases, the newborn was placed in a prone position and massaged in the head and face region, neck and shoulders, back, legs and arms for five 1-minute segments. The researchers explained that this Swedish-like massage was used because the infants preferred some degree of pressure as opposed to light stroking which is too much like a tickle stimulus. The middle phase involved general flexing of the infant’s limbs, much like bicycling motions, while the infant was lying on its back.

When compared to the control group who did not receive the massage program, the babies in the experimental group (a) averaged a 47% greater weight gain per day, even though the groups did not differ on calorie intake; ( b) were awake and active a greater percentage of observation time; (c) showed more mature habituation, orientation, motor and range of state behavior on the Brazelton scale; and (d) their hospital stays were six days shorter, saving about \$3,000 per infant. Follow-up assessment at six to eight months indicated that the experimental group had higher weight and better performance on the Bayley mental and motor scales.

### **Replication of Field's Research**

In 1990, Scafidi, et al. conducted a replication of the Field, et al., 1986 study. A total of 40 preterm infants were assigned to equal number treatment and control groups once they were considered medically stable. Assignments were based on a random stratification of gestational age, birth weight, intensive care duration and study entrance weight. The treatment group infants ( $n=20$ ) received tactile/kinesthetic stimulation for three 15-minute periods during 3 consecutive hours per day for a 10-day period. Sleep/wake behavior was monitored and Brazelton assessments were performed at the beginning and at the end of the treatment period. The treatment group infants averaged a 21% greater weight gain per day (34 vs 28 gms) and were discharged 5 days earlier. No significant differences were demonstrated in sleep/wake states or activity level between the groups. The treatment infants were more active during the stimulation sessions than during the non stimulation observation sessions, particularly during the tactile segments of the sessions.

Scafidi, et al. concluded that supplemental infant massage can improve the clinical course of healthy preterm infants. While the weight gains of the previous studies were replicated, there were some notable differences. First, both the treatment and control infants gained at least 10 gms more per day during the time period of this study than they did in the first study (Field, et al., 1986). Scafidi, et al. explained that formula changes over the four years and changes in sleeping conditions may account for this difference. The sleeping conditions in the replication study had the infants sleeping in a prone rather than supine position. There were blankets

covering the isolettes to reduce excessive light and bunting and nesting blanket rolls were added to the isolettes for tactile stimulation and "containment" of the infants.

Scafidi, et al. reported that the treatment groups' performance was superior on the habituation cluster items of the Brazelton scale to that of the control group. They exhibited fewer stress behaviors such as mouthing, grimacing and clenched fists and their vagal tone and catecholamines increased, specifically, norepinephrine and epinephrine. In a follow-up article, Field (1993) discussed these findings and commented that it is now believed that one of the reasons massage leads to weight gain is that the increase in vagal tone and catecholamine activity associated with stimulation contributes to the release of gastrointestinal food absorption hormones such as gastrin and insulin. In additional research (Field, 1995) an animal model was used to investigate the underlying mechanism for the massage therapy/weight gain relationship and led to the discovery of a growth gene that responds to tactile stimulation, suggesting a genetic origin to this touch/growth relationship.

### **Replications of Field's Research Design to Other Populations**

Since 1990, following the design of previous hospital studies, Field and associates at the Touch Research Institute, at the University of Miami School of Medicine, have studied the effects of infant massage with additional populations of infants. At this time much of this research is unpublished and was reported on in a recent article by Field (1995).

***Cocaine-exposed preterm infants***

In her 1995 study involving cocaine-exposed preterm infants, Field reported similar results to her 1986 and 1990 studies. Repeating the same procedure of massage therapy three times daily for a 10 day period, Field collected data which suggested the same significant effects: (a) the massaged cocaine-exposed preterm infants had fewer postnatal complications and exhibited fewer stress behaviors during the 10-day period; (b) they had a 28% greater daily weight gain; and (c) they demonstrated more mature motor behavior on the Brazelton exam at the end of the 10-day period.

***HIV-exposed neonates***

Field continued to investigate infant massage with a specific focus on whether massage therapy improved immune functioning in HIV-exposed newborns. In addition, Field examined whether massage therapy given by parents could improve the mental, motor and social development of infants as well as provide mothers with a sense of worth and reduce guilt feelings for having transmitted this disease to their infants. In reporting the results of this investigation Field (1995) found almost 100% compliance in administering three massages per day to their infants for the first 2 weeks of life. Data analyses suggested the following significant effects: (a) greater weight gain for the massaged infants, (b) better performance on the orientation and motor clusters of the Brazelton scale and (c) better performance on the stress behavior scale, including alert responsiveness, cost of attention (apparent exhaustion), examiner persistence, state regulation, motor tone and excitability.

### ***Massage therapy with normal infants in the home***

To investigate whether normal full-term infants also benefited from massage, 40 full-term 1-to-3 month-old infants born to adolescent mothers were given 15 minutes of either massage or rocking for 12 days over a 6-week period (Field, 1995). Data analyses of the immediate effects suggested significant results for the massage therapy infants, versus the rocking infants. Compared to the rocking group of infants, the massage infants (a) spent more time in active alert and active awake states, (b) cried less, (c) had lower salivary cortisol during the massage, suggesting lower stress levels and (d) spent less time in an active awake state after the massage session. These results suggested that massage may be more effective than rocking for inducing sleep.

Analyses of the long term effects suggested further significant findings. Over the 6-week period, infants in the massage group (a) gained weight; (b) improved on emotionality, sociability and soothability temperament dimensions; (c) showed better face-to-face interaction behaviors; (d) had decreased urinary stress hormones/ catecholamines (norepinephrine, epinephrine, cortisol); and (e) had increased serotonin levels, suggesting less depression (Field, 1995).

### ***Caregivers massaging their infants***

Field reported that preliminary data on the effects of parents administering massage to their infants suggested that the infants whose caregivers are taught to massage them and who continue to massage them after they are discharged from the hospital show superior weight gain and performance on the Bayley Developmental

Assessments at eight months. Field speculated that these long-term effects are not necessarily the direct results of massage, but are mediated by the improved relationship between the parent and infants. Field also recognized that teaching caregivers to deliver massage therapy to infants results in additional benefits such as cost effectiveness and the mutual benefits for the caregiver and infant relationship.

Field taught depressed mothers to massage their infants (from birth to six months of age) in order to examine the effects of the massage therapy on the infants' interaction behavior and sleep patterns. Depressed mothers often have difficulty interacting with their infants, resulting in less secure attachments for the infants.

Adolescent mothers who scored high on the Beck Depression Inventory, a self-report depression scale, were recruited for this study shortly after their infants were born. The depressed mothers were asked to perform a 15-minute massage daily for a 2-week period. Preliminary data analyses suggested the following significant effects: (a) drowsiness and quiet sleep increased immediately after the massage, and activity decreased; (b) the infants' latency to sleep was shorter after the massage therapy study (by the end of the two-week period, latency to sleep decreased from 22 to 9 minutes); (c) the infants showed increased vocalizations, decreased restlessness and improved affect during mother-infant play interactions, and the mothers' play behaviors became more age-appropriate; (d) the infants' fussiness decreased after the 2-week period; and (e) the infants' depressed mothers perceived their "depressed" infants as being easier to soothe. Following these preliminary results, Field



and associates continue to extend their model to study parents massaging infants with colic and infants with sleep disturbances (Field, 1995).

### ***Grandparent volunteers as massage therapists***

Field reported on results of an unpublished research study that used “grandparent” volunteers as a cost effective way to deliver massage therapy. These were elderly volunteers who wanted the designation as “grandparents” and were not related to the infants. The population for this study was a group of sexually abused infants living in a shelter. The selected “grandparents” were also experiencing touch deprivation as a condition of being alone and elderly. Investigators were interested in reducing touch deprivation for infants and for the volunteers, as well as reducing touch aversion in the abused infants. The infants ranged in age from 3 to 18 months and the volunteers were their primary caregivers in the shelter for the morning hours. Massage therapy sessions were part of a structured program integrated into their daily caregiving routine.

Preliminary data analyses suggested the following significant effects for the infants: (a) drowsiness and quiet sleep increased and activity decreased after massage; (b) after one month of massage therapy, alertness and tracking behavior increased; and (c) behavior observations suggested increased activity, sociability and soothability. Data analyses revealed the following significant effects for the “grandparent” volunteers: (a) they reported less anxiety and fewer depression symptoms and an improved mood after giving the

massage; (b) their stress (measured by cortisol level in their urine) decreased; (c) their lifestyle improved with more social contacts, fewer trips to the doctor's office, and fewer cups of coffee; and (d) they reported improved self-esteem. These effects were significantly greater for the "grandparents" after a month of providing the infants with massage than they were after a month of receiving their own massages. These data highlight the benefits of massage therapy not only for the infants, but for the grandparents who were massaging the infants. This proved to be a cost-effective way to provide infants with massage therapy (Field, 1995, p. 108).

### ***Massaging children with various medical conditions***

Field reported continued positive results when massage therapy is used (a) to improve the classroom behavior of children with autism; (b) to reduce anxiety and pain levels for child burn victims; (c) to reduce anxiety and short term effects of chemotherapy for children who have cancer and to give parents a positive role in their treatment by having them massage the child at bedtime; (d) to reduce stress level in children with dermatitis/psoriasis and reduce parents' aversion level to touching psoriatic skin by having them give the child a massage; and (e) to study the effects of massage for children with diabetes, developmental delays, juvenile rheumatoid arthritis, post traumatic stress disorder and psychiatric problems.

Field is currently conducting a variety of studies where parents are taught to massage their children with various medical conditions. Her intent is to have the parent feel less helpless and more involved

in the child's treatment. Field plans to study the effects of offering parents more positive involvement (massage) while they continue to administer more negatively perceived treatments such as giving shots and monitoring dietary compliance, as in the case of diabetic children.

### **Summary of Field's Research**

Field (1995) stated the following:

Massage therapy may be an effective treatment for high risk infants. The data to date particularly suggest the weight gain benefits for Neonatal Intensive Care Unit (NICU) infants born prematurely. Nurses, parents and volunteer grandparents can facilitate the growth and clinical improvements of these infants by simple body stroking with some pressure. Although the underlying mechanism for the touch stimulation/weight gain relationship is not yet known, some mechanisms show promise, such as the release of food absorption hormones during the stimulation. Impacting on both tactile and pressure receptors, it is perhaps not surprising that many physiological and biochemical changes occur during this central nervous system stimulation. (p. 108)

The amount of new research in the area of infant massage since this current study was begun in 1993 has skyrocketed. Field (1995) cites numerous research studies since 1994, most with results unpublished at this time. The results in individual studies cannot always be generalized beyond their unique population. For example, weight gain is a benefit for preterm infants but may not be as desired an outcome for full-term infants. However, considered as a whole, the consistent positive findings are important. The research studies of Field and her associates have contributed greatly to an understanding of the effects of infant massage over the past eight years and particularly in the last two years. Field and her

associates have created a Touch Institute at the University of Miami School of Medicine and report ongoing research in the areas of newborns, infants, children, adolescents, adults, and elders.

These research results hold long-term significance for improving the quality of infant intervention. They have statistically shown what other cultures have known for ages: there are benefits to massaging infants. The research results also demonstrated to the medical community that massage is not only a "nice thing to do" but has measurable effects on the growth and health of infants, particularly at-risk infants. Field and her associates have contributed enormously to the knowledge of the effects of infant massage and opened the door to the acceptance of massage within medical and educational communities.

While infant massage research studies have increased in hospital programs, the number of studies which are specifically home-based continues to be limited. From Field's most recent literature overview it is evident that more and more studies are extending from the hospital to the home. Yet, in terms of research conducted solely in the home, there is very little.

### **Infant Massage in the Home**

Rice (1979) conducted one of the first studies of caregivers providing infant massage in the home. This study is unique in that the structured massage therapy began after the premature infants were discharged from the hospital and was administered by the infants' mothers. Home visits were made by a public health nurse to an experimental and control group of infants and their caregivers.

For the group receiving massage therapy, there were significantly greater weight gains and greater neurological maturation at four months of age (evidenced in righting reflexes). The infants in the experimental group performed consistently better on Bayley Mental Scale items which required socialization and vocalization. Subjective results indicated that infants receiving treatment were more socially adaptive and the infant-caregiver relationship was enhanced. Rice's study implies that caregivers could play an active role in meeting the developmental needs of their preterm infants.

Barnard, et al. (1985) also investigated massage techniques used by parents in the home. Their study was conducted to determine whether increased physical contact is beneficial for healthy infants. A total of 34 middle-class, full-term healthy infants and their mothers were studied. All the infants were first-born and breast-fed. Pretreatment data was taken at four weeks and post treatment data at 16 weeks. The assessments included the Bayley Scales of Infant Development and the NCAST (Nursing Child Assessment Satellite Training Feeding and Teaching) scales. There were two treatment groups, one using massage and exercise and the other combining the use of baby powder with massage and exercise. The control group had no training in massage and exercise. At 10 months, the mothers were interviewed by telephone. The statistical results did not show a significant difference in experimental and control groups. Yet, subjective results were quite positive. Mothers continued to massage their babies at 10 months and reported more responsive babies. They felt that the massage techniques were "calming."

Barnard, et al. (1985) concluded that teaching the techniques to parents as a method of “state” regulation, based on Brazelton’s six states, allowed the parents to learn how to recognize their infants’ state cues and to use massage and exercise to help the baby move from one state to another.

The short treatment period of 12 weeks may not have allowed enough time to assess change. Possibly, the mothers’ reports of long- term positive effects at 10 months was an indication that follow-up assessment would give clearer insight into the effects of treatment on infant development. The Barnard, et al. study points to a need for longer examination of infants. This present study examined assessment data during the infants’ first year and follow-up interview data for up to three years.

### **Caregivers Massage Infants with Disabilities**

Hansen and Ulrey (1988) studied the reciprocal attachment-separation behavior between parent and infant, particularly infants with neuromotor disabilities. They intended to show significant statistical effects for massage techniques taught to parents on interactions with their infants with disabilities. A group of 19 infants ranging in ages from 3-19 months were studied. They were randomly assigned to either a treatment or a control group and matched for age, socio-economic status and severity of motor delay. Both groups participated in sensory motor activities as part of their early intervention program. In addition, the treatment group received massage therapy from their caregivers who were trained as part of this study. The study specifically looked at whether massage

would affect the infant behaviors and contingent caregiver responses relative to attachment behaviors, as measured on an attachment-separation behavior observation scale (A-S). Specifically, this scale looked at “three categories of behavior which the child might display and the appropriate analogous behaviors which the parent may display that relate to early emotional development and socialization” (p.64). These three categories include sensory cueing, contact with people and behavior organization.

While both groups progressed in contingent attachment-separation behaviors, the treatment group showed significantly more positive discrepancy scores, indicating more compatible and positive interactions between caregiver and infant which could be attributed to massage. This particular research, while limited in sample size, offered a way to measure the critical process of parent-infant reciprocity that is so essential to healthy infant development.

### **Infant Massage Research Conclusions**

This literature review provided research evidence of the effects of infant massage on high risk infant development and, in a few cases, on infant-caregiver interaction. In the field of early intervention, where services are offered in the home, the establishment of experimental and control groups is often difficult and impractical. A strong need exists to confirm that training early intervention personnel to teach caregivers infant massage techniques will have positive outcomes in terms of infant development and infant-caregiver interaction.

Research results pointed to a need for long-term assessment of infant development and infant-caregiver interaction. Follow-up data on the infant's continued development from the perspective of the caregiver is also necessary. This study included follow-up telephone interviews with caregivers two years after home visits were concluded and the primary infant-caregiver data was collected.

- ✱ • The task of caring for a high risk infant can be challenging and stressful. If empirical evidence can be collected that shows training caregivers to massage their infants provides mutual benefits for infant and caregiver, then an intervention strategy which many practitioners already "feel" is worthwhile can be substantiated. High risk infants undergo so many treatments, both in and outside of the hospital. Given this fact, it would be useful to have empirical evidence for an intervention which allows the caregiver to have control over the infant's "treatment," and to build confidence in the developing relationship by learning an intervention strategy that is done "with" the infant, not just "to" the infant.

This study investigated the use of infant massage training for caregivers and their infants for the purpose of providing empirical evidence. A final review of the literature of the high risk population used in this study is given before moving to a discussion of the research design and methodology in the next chapter.



## **Identification of Infants at Risk for Sudden Infant Death Syndrome (SIDS)**

The population used for this study of infant massage was considered at very high risk for Sudden Infant Death Syndrome (SIDS). The infants and their families were part of a three year intervention project to reduce the rate of infant deaths in Oregon, specifically in the pilot community of Marion county. The Oregon SIDS rate (2.8 per 1000 live births) consistently ranks in the five worst states. The project hoped to reduce Oregon's SIDS rate to meet the national average of 1.4 per 1000 live births (Higginson, 1989).

Sudden Infant Death Syndrome (SIDS) is responsible for the death of 10,000 infants annually in the United States. SIDS (referred to as "cot death" in Great Britain) is characterized by the sudden and unexpected death of an infant, often times one who is apparently healthy. Although SIDS is the subject of various investigations, the precise cause of SIDS remains unknown. SIDS has been considered a separate cause of death since 1974 . Since 1979, Oregon SIDS rates have exceeded the national average. One of the explanations for this higher rate is that Oregon has a statewide medical examiner's system which assures more accurate diagnosis as to cause of death than many other regions in the United States. However, when compared to other Northwest states, Oregon consistently ranks higher for post-neonatal infant death.

In the United States, SIDS rates progressively increase from east to west and from south to north. This was demonstrated in a study (Spiers, 1983) that used data from six metropolitan areas and

two states with similar medical examiner systems, to control for diagnostic bias. For example, the SIDS rate for whites in Oregon is more than three times the rate in Miami, Florida.

Within the state of Oregon, SIDS rates also vary dramatically. Using five year rates (1983-1987) and looking only at counties with more than 200 annual births, the SIDS rates ranged from 1.3 to 5.5 per 1000 live births. Of Oregon's five largest counties, those with more than 3000 births per year, Marion county had the highest SIDS rate. Marion county's SIDS rate of 3.4 per 1000 live births was 25% above the next highest county, Multnomah (2.7 per 1000 live births), and was nearly two and a half times the national SIDS rate of 1.4 in 1986. While 8.5% of the state's births occur in Marion county, over ten percent of SIDS cases occur in this county (Higginson, 1989).

### **Contributing Factors to SIDS**

While the cause of SIDS is not known, a review of relevant literature (Bartholomew & MacArthur, 1988; Bentele & Albani, 1988; Guntheroth, 1982; Peterson, 1988) revealed that much is known about when SIDS deaths are likely to occur and the maternal/infant risk characteristics associated with the Sudden Infant Death Syndrome. The diagnosis of SIDS is a diagnosis by exclusion. Through a process of elimination of causes, factors are found that can be compatible with the disorder (Guntheroth, 1982). Peterson (1988) pointed out that the process of diagnosis by exclusion results in a conclusion based on negative evidence which will naturally create less confidence than one based on positive findings. According to Higginson (1989) infants who die from SIDS

are clearly a heterogeneous group, which is why finding a specific cause has eluded researchers

This syndrome occurs in a predictable age group. The majority of infants who die from SIDS are between one and six months of age. Ninety percent are under 25 weeks at death, with the majority from two to four months. Approximately ten percent occur outside these age ranges. Deaths from SIDS occur throughout the year, though they are rare in summer and common in winter. The majority of these babies die during the rainy and runny-nose season, November through April.

Maternal/infant factors can usually be broken into three categories: existing medical factors, existing socio-environmental factors, and transient health related factors.

### ***Medical factors***

One existing medical factor is prematurity measured by low birth weight. A low birth weight infant (less than 2500 gm) is at more than three times the risk for SIDS than is a normal weight infant (Black, David, Brouillette, & Hunt, 1986). Infants born to women who received inadequate prenatal care are nearly twice as likely to die from SIDS. Infants born of multiple gestation or of high birth order are more likely to die of SIDS. Other existing medical factors which also increase the risk that women will bear a child who will die of SIDS include inadequate spacing between pregnancies, smoking during pregnancy and drug and alcohol abuse during

pregnancy (Bauchner, Suckerman, McClain, Frank, Fried & Kayne, 1988; Chavez, Ostrea, Stryker & Smialek, 1979; Pierson, Howard & Kleber, 1972).

In a recent meta analysis of risk factors for SIDS, DiFranza and Lew (1995) attributed a number of outcomes to the use of tobacco in pregnant women. Pooled risk ratios were used to determine the population's attributable risk. DiFranza and Lew concluded, "....tobacco use is annually responsible for an estimated 1900 to 4800 infant deaths resulting from perinatal disorders, and 1200 to 2200 deaths from sudden infant death syndrome (SIDS) " (p. 385).

Kinney (1995) reported very recent identification of a specific abnormality in brain chemistry in SIDS infants. A chemical defect was discovered in the part of the brain stem that appears to control breathing during sleep.

### ***Socio-environmental factors***

According to Higginson (1989), non-white mothers have a greater than 50% likelihood of having a child experience a SIDS death. Unwed mothers and young mothers are also more likely to give birth to infants who will die of SIDS. Most studies show that 60% of SIDS babies are male and 40% female. SIDS may occur in families from any socio-economic strata or educational level, but it occurs more commonly in families with low educational attainment who live at low socio-economic status (Higginson, 1989).

### ***Transient health related factors***

The cause of Sudden Infant Death Syndrome is not known. However, SIDS is currently associated with a variety of health related factors that of themselves should not cause death. Nearly half of SIDS infants had a respiratory infection in the last two weeks of life (Guntheroth, 1982; Reid, 1987). Viral cultures isolated at autopsy show no consistent virus. However, rhino viruses and adeno viruses tend to predominate suggesting that a viral infection is not the cause of SIDS, but may be one of several triggering factors in these cases (Higginson, 1989). Some authors suggested that the terminal events in SIDS are precipitated by a volatile toxin formed from the products of bacterial putrefaction of digestive origin ( Murrell, Ingham, Moss & Taylor, 1987; Lee, Barson, Drucker, Morris & Telford, 1987). As with viral infections, the presence of enterotoxins is thought to be a trigger rather than a causative factor.

Guntheroth (1982) concluded that sudden infant death may result from the infant's inadequate maturation of the mechanisms that permit resumption of breathing once apnea has started, and that this maturation vulnerability lasts for about six months. The single most common factor which he found was the presence of a relatively mild infection, usually upper respiratory. Other associated factors include post-neonatal weight loss (Carpenter, Emery, Taylor, 1986; Moore, 1987; Spiers, 1983), fussy eater (Bartholomew & MacArthur, 1988; Cunningham, 1987), growth retardation, persistently dislocated hip, sleepiness, irritability (Bartholomew & MacArthur, 1988), SIDS-afflicted siblings, and infants with near misses for SIDS episodes (Bentele & Albani, 1988).

Montague (1986) believed that tactile stimulation plays an important role in the development of postnatal breathing. For many SIDS babies, the factors of inadequate maternal care and the resulting failure of adaptation to postnatal breathing exist.

Abnormal feeding practices or patterns are also associated factors with SIDS and include improper feeding such as over-strength milk formula and insufficient water intake (Reid, 1987), insufficient time between meals and length of time between evening meal and breakfast (Reid, 1987; Kibblewhite, 1984) and bottle-feeding in general (Cunningham, 1987).

Health-related environmental factors are varied. Examples include fear paralysis reflex (Kaada, 1987), injuries (Buehler, Strauss, Hogue, Smith, 1980), hyperthermia during the winter months, (Kibblewhite, 1984) and accidental or deliberate asphyxia (Bass, Kravath & Glass, 1986; Morris, 1985). Guntheroth (1982) concluded that these associative factors increase the vulnerability of the infant and therefore increase their chances of dying of SIDS.

### **Screening for SIDS Risk**

While many epidemiological studies have led to the identification of the above risk factors, the predictive value of any one risk factor is very low. However, using risk factor scoring systems, researchers have been able to identify over 50% of eventual SIDS cases in a high risk cohort of less than 10 percent of all births (Higginson, 1989).

The Marion County SIDS project developed a SIDS risk screening based on these research findings and provided in-home

nurse assessment and intervention to identify abnormal or unusual practices, such as feeding mismanagement, over-blanketing and failure to adequately hydrate during illness, as well as to teach skills to the family that would lead to improved health care practices and hopefully translate into fewer post-neonatal deaths. Through weekly home visits, the nurses assisted the family to overcome some of the triggering factors for SIDS.

The SIDS risk screening instrument developed for this project reflected the factors identified as being associated with SIDS (see Appendix B). In addition the NCAST screening system for assessing mothers and their infants was used to identify and deal with deficits in parenting skills thought to be associated with the factors that precipitate SIDS (Higginson, 1989).

From the previous discussion, it is obvious that, while some of the risk factors contributing to SIDS are not preventable, many can be targeted for prevention by improving infant care practices. The argument for providing home nursing services is reasonable. Claflin and Meisels (1993) stated the following:

Parents report that one of the most stressful aspects of having a very low birth-weight infant is the contact which is required with health care providers. Parents were distressed by the lack of communication, lack of knowledge of later infant development, and dismissive attitudes they encountered from hospital staff. (p. 77)

They suggest an increased need for social support for these families who have extended contact with hospital staff. The SIDS project provided a model for services which would extend support for families as they adjust to having their high risk infants at home. This

study provided results on whether having a health care professional in the home had positive effects on the interaction between caregivers and their infants, and presented telephone interview data on caregiver satisfaction with these services.

## **Summary of Literature Review**

This literature review has traced relevant research under the broad umbrella of infant-caregiver attachment. Specific research in the areas of touch, infant-caregiver interaction, interventions to enhance infant-caregiver interactions, and finally, specific factors that place infants at risk for developmental disabilities and SIDS were discussed.

The literature review demonstrates a variety of relationships between certain caregiver characteristics, infant development and interaction. For example, that the lower the mother's education, the lower her scores on the NCAST Feeding and Teaching Scales will be. Furthermore, home intervention has been shown to raise these scores. Relationships have also been found between socioeconomic status, such as being a single parent, and infant-caregiver interaction. There is substantial literature to support the negative effects of prematurity on infant development and infant-caregiver interaction.

From the infant massage research results with high risk infants in hospitals, it might be expected that infants in the home would show some positive physiological differences in areas such as sleep and weight gain, when massage techniques have been taught to and used by their caregivers. Positive physiological changes have been



documented. What are not clear are the effects of infant massage on infant-caregiver interaction when the caregiver has been taught specific massage techniques. There are many published opinions on the benefits of infant massage on the infant-caregiver interaction and relationship. Yet, there is sparse evidence to show the effects of teaching caregivers to massage their high risk infants on their mutual interactions.

This study provided a new look at infant massage intervention by examining the effects of massage on a population of high risk infants in their home environment. The next chapter discusses the design and methodology for this research study.

## **CHAPTER 3**

### **DESIGN AND METHODOLOGY**

This chapter outlines the design and methodology of the present study. Descriptions of the population of high risk infant families, the home based intervention, the selection procedures for the group receiving infant massage instruction and the comparison group not receiving massage instruction will be offered. The data collection instruments and procedures will be discussed next, followed by a description of the research question, hypotheses and data analysis procedures.

#### **Purpose**

The purpose of this study was to explore the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interactions. Specifically, the research question addressed was: What are the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interaction? The answer to this question adds insight into potentially effective interventions to use with high risk infants and, more specifically, whether infant massage is an effective intervention to teach parents.

Through a telephone interview employing structured questions, a selected subsample of the families receiving services, with and without massage training, provided a qualitative perspective concerning their children's development, their use of massage and

their satisfaction with the services received from the nurse during home visits.

## **Setting**

Two public health nurses were assigned to very high risk infants and their families as part of the federally funded Sudden Infant Death Syndrome (SIDS) Prevention Project to study the efficacy of public health nursing home visits and the relationship between intensive structured visits and improved child health outcomes. The project was designed to demonstrate that Oregon's excessive post neonatal mortality rate could be decreased by identifying infants at higher risk for SIDS and by providing intensive home-based services (Skeels, 1993).

The nurses monitored the infants for a year, making home visits based on specific protocols for health education, case management and emotional support. Until five months of age the babies were visited weekly. Between five and eight months of age, they were visited bi-weekly, and between eight and twelve month they received visits once a month. During their visits, the nurses provided screening, assessment and intervention services (see PIMS Assessment and Education Flow Sheet, Appendix A). The flow sheet illustrates what would occur during the visit. For each visit there were scheduled assessments and discussion of educational topics. For example, in addition to an observation of infant-caregiver interaction (i.e., NCAST Feeding), the nurse discussed specific caregiving education topics with the caregiver, such as a feeding care plan, safety and creating a nurturing environment.

Both nurses received the Nursing Child Assessment Satellite Training (NCAST) to conduct the NCAST Assessment Scales. Following their training, they had to make five different home visits using the NCAST Feeding and Teaching scales and ten home visits using the Home Observation for Measurement of Environment (HOME) scale in order to determine inter-rater reliability. They had to demonstrate inter-rater reliability of .85 for the NCAST Feeding and Teaching Scales and .90 for the HOME scale in order to be certified to use these observational instruments. The NCAST Feeding and Teaching Scales examine the characteristics of the interaction for caregiver and infant under familiar (feeding) and novel (teaching) situations, and the HOME measures the quality of the caregiving environment. These scales are discussed in greater detail later in this chapter.

The SIDS Risk Assessment (Appendix B) was used to identify 102 eligible infants, 51 of whom received a full year of intensive in-home services. Both nurses kept the same data records on the infants and their families and followed the same intervention schedule of assessments and educational topics (see PIMS Assessment and Education Flow Sheet in Appendix A). Only one nurse received additional training, in February 1992, as an infant massage instructor. She offered this massage training to the families whom she visited between February and November, 1992. Once the massage strategies were taught and used by the caregiver, the nurse continued to provide follow-up assistance until the end of the project in November, 1992.

## **Sample of High Risk Infants**

Between September, 1990 and November, 1992, 1077 infants were referred and screened using the SIDS risk assessment. Initially, hospital nursing staff referred infants to the statewide high risk infant tracking program ("Babies First!") and these families were visited by a Marion County health care nurse. During this initial visit the "Babies First!" nurse used the SIDS risk assessment for each newborn. The infants ( $n=133$ ) receiving a cutoff score of 6 or greater, became eligible for the SIDS prevention project and were referred to this program. As the names of these infants were sent to the Marion County Health Department SIDS prevention program, they were alternately assigned to the two nurses for follow-up contact. The nurses (nurse B or nurse K) would call the families and offer them the opportunity for in-home nursing services for a year. A number of these families either declined services, moved after services had begun or were lost to follow-up. Of the 102 remaining newborn infants in Marion County, screened for being at risk for sudden infant death and receiving home-based nursing services, 51 subjects actually received home-based services for a full year over the course of the two-year project. The infants ( $n= 51$ ) who did not receive services for the full year were either unavailable to contacts made by nurses, had moved from the area, refused services, or joined the project late.

One group of subjects ( $n=31$ ) was randomly assigned to a public health nurse (nurse B) who, in addition to the standard treatment protocol, also taught caregivers ( $n=13$ ) infant massage techniques. The other group of subjects ( $n=20$ ) was randomly

assigned to a public health nurse (nurse K) who did not teach massage techniques. Other than the massage techniques, the treatment protocol for both groups was the same.

Because of incomplete data, the subjects assigned to nurse K had to be eliminated from the study. Out of the 20 families visited by nurse K, there were files for only 13. The missing files had been transferred to another health department or were closed because the families had discontinued services. Out of 13 files examined for nurse K, there were only three files that had pre/post assessment data for infant-caregiver interactions during feeding. Comparisons between nurses B and K could not be made with such a small sample of pre/post assessment data for nurse K.

Out of the 31 files examined for nurse B, there were complete data sets for 23 subjects. The no massage intervention (control) group numbered 14 (9 females and 5 males). For the group who received infant massage intervention (treatment group), there were 9 subjects (4 females and 5 males). This study was interested in measuring interaction before massage treatment and at the end of home visit intervention. Therefore, only assessments recorded at the beginning and end of the home visit period were included in the study. Some infants not included in the sample had pre and mid-test data, but no posttest data.

All the families who received services for this SIDS project were mailed letters from the Health Department requesting their permission to be interviewed by telephone (51 letters sent). Due to confidentiality issues, only families responding to the letter (17 responses) could be contacted and interviewed by the investigator.

A total of ten (8 from the massage group and 2 from the no massage group) telephone interviews were conducted in early 1995 and required 30 to 40 minutes for completion. Attrition in conducting all interviews was due to families moving from area ( $n=6$ ) or not responding to multiple telephone messages ( $n=1$ ). Telephone interview responses were summarized and compared in the qualitative section of this study.

The Oregon State University Institutional Review Board (IRB) for the use of human subjects in research approved the treatment of the subjects in this current study. The IRB reviewers were satisfied that all necessary precautions were taken by the investigator.

### **Treatment Plan**

The public health nurse providing the treatment intervention of infant massage instruction was certified by the International Association of Infant Massage Instructors. She completed a four day training program (McClure, 1989) in which she learned to teach a five-session course for caregivers and their infants, ages three weeks to crawling. During this course, caregivers learned about the benefits of nurturing touch in addition to step-by-step massage and relaxation techniques. Instructor training involved in-class practicum experience in teaching a group of caregivers and their infants, a written examination and a practical phase of providing instruction to five caregivers and infants before certification was earned.

The infant massage instructor's main role is to facilitate and help enhance the reciprocal relationship between caregiver and

infant. Infant massage instructors continually emphasize the relationship of caregiver and infant while demonstrating massage techniques with a doll. Instructors do not massage the infant. Their instruction is focused entirely on teaching the caregivers to use massage strategies with their infant. Caregivers are encouraged to maintain eye contact and verbal communication with their infants during massage. With the focus entirely on the infant-caregiver interaction, the caregivers can develop skill and confidence from having exclusive contact with their infant.

Caregivers of high risk infants are placed frequently in the position of observing their children being treated and handled by experts. Infant massage instruction offers a totally different opportunity for caregivers to gain control of the parenting roles and to develop positive infant-caregiver interactions.

### **Treatment Fidelity**

Yeaton and Sechrest (1981) have written that the strength, integrity and effectiveness of treatment are central characteristics of any intervention strategy. Therefore this research study has attempted to employ strength, integrity and effectiveness as critical parts of the design.

The strength of this treatment program for high risk infants has been enhanced by a detailed treatment protocol stipulating the precise conditions under which very specific interventions and assessments were to occur. The training of the professional to administer the assessments and interventions further added to this strength. The nurse was trained to use the HOME and the NCAST



scales and had to reach inter-rater reliability for certification based on home visits with another nurse: .90 on the HOME scale (for 10 families) and .85 on the NCAST scales (for five families) contributing to the strength of data collection. These assessment scales have reliability and validity data to further add to the strength of measurement and analysis. Additionally, the nurse also completed certification as an infant massage instructor. These factors all contributed to the strength of the treatment being studied.

The integrity of the intervention refers to the degree to which treatment is delivered as intended. The protocol for home visits involved a monitoring system of assessments and educational topics that were completed during visits (see PIMS Assessment and Education Flowsheet, in Appendix A). The multiple activities conducted during the home visits were documented to insure treatment integrity. The massage program for the caregiver and infant was presented in a standard format to insure accuracy and success (McClure, 1989; Drehobl & Fuhr, 1991). Nurse B kept case records on a form to track infant massage instruction (see Infant Massage Instruction Flowsheet in Appendix C).

The strength and integrity were further enhanced by the fact that both treatment and control groups received the same treatment plan except for massage. Each group received the same number of visits from nurse B assuring that both groups received the same protocol of assessments and educational information. The massage instruction and treatment was the only difference.

Treatment effectiveness was the major outcome measure for this research study and the interaction of strength, integrity and

effectiveness was addressed throughout the analysis of the massage intervention. Because there are many variables in field research which are impossible to control, particular attention was placed on designing a study which capitalized on strength and integrity while at the same time measured the effectiveness of the intervention.

## **Independent Variables**

### **Independent Variable One: SIDS Risk Assessment and Environmental Factors**

Staff from the Oregon Health Division and the Marion County Health Department developed the SIDS risk assessment tool to screen high risk infants for their home-based prevention project (Skeels, 1993). An advisory committee of neonatologists, pediatricians, public health nurses and representatives of the Oregon SIDS foundation developed the SIDS risk assessment based on research literature for sudden infant death and their collective experiences. **Figure 1** gives the risk assessment factors and sample assessment questions that were identified as predictors for SIDS .

The risk assessment answers were weighted, based on the research literature and SIDS incidence data, with a maximum of 47 points (see SIDS risk assessment tool in Appendix B). Infants determined to be at very high risk for SIDS had to score 6 points or above. It was very unlikely that an infant would score 46, given the exclusiveness of certain categories.

**Figure 1. SIDS Risk Assessment Factors****Past History:**

Was there previous neonatal loss for the mother or a previous birth within the past 18 months?

**Socio-Economic:**

Was the mother less than 17 years old, completed less than 10th grade education or a single parent?

**Prenatal History:**

Was there no or little prenatal care? Did the mother smoke or use drugs while pregnant? Did the mother have a perinatal infection, hypertension, anemia, syphilis or other sexually transmitted diseases?

**Immediate Post Partum Medical:**

Did the baby weigh less than 2000 gms or was baby small (< 3 standard deviations) for gestational age? Was the infant's APGAR less than 5 at five minutes after birth? Was baby discharged from hospital with supplementary oxygen?

**Other Medical Factors:**

Did the infant experience an apparent life threatening event (ALTE)? Did the infant have a positive apnea work-up, experience neonatal seizures or failure to thrive?

At the end of the SIDS prevention project a comparison was made between risk scores and high risk infant tracking program results. During the time period that the SIDS risk assessment was used to screen very high risk infants, there were 16 infant deaths in Marion County attributed to SIDS. Four of these infants had been referred to the “Babies First !” program. Based on their risk score, three of these four infants who died were eligible for the SIDS prevention project but never received in-home services. Based on these results with a limited number of infants, Skeels (1993) cautiously concluded that the SIDS risk assessment tool was “fairly accurate in determining very high risk infants” (p. 3). At the same time the limited number contributed to a false positive rate.

In addition to the risk and environmental factors assessed in **Figure 1**, this research study also looked at other variables that may relate to infant caregiver interactions and the fidelity of the treatment intervention:

1. Gender
2. Number of siblings
3. Number of home visits
4. Number of months visited
5. Number of visits per month

**Independent Variable Two: Home Observation for Measurement of the Environment (HOME)**

HOME is a measure of the caregiving environment determined by sampling both the quality and quantity of social, emotional and cognitive support that is available to a young child (birth-three years

old) in the home (Caldwell and Bradley, 1978). The inventory is obtained through an observation of the child in the home environment and also by interviewing the caregiver. **Figure 2** provides sample items from the HOME scales.

Reliability data for internal consistency was .89 (for total score) based on a sample of 174 families from both welfare and nonwelfare backgrounds. Test-retest reliability based on a study of 91 families on three occasions, child at 6 months, 12 months and 24 months, indicated coefficients of .62 to .77 for total score (Barnard, et. al., 1989; Bee, Barnard, Eyres, Gray, Hammond, Spietz, Snyder & Clark, 1982).

Validity studies showed that the HOME scores were significantly related to early measures of cognitive development. HOME scores at 24-months correlated .72 with 36-month Stanford Binet IQ scores. Among the subscales, Appropriate Play Materials and Maternal Involvement were correlated most strongly with cognitive measures. Validity was supported through discriminant analysis of 6-month HOME scores in identifying retardation on 36-month Stanford Binet IQ scores. The HOME correctly identified children scoring below IQ 70 at age three 71% of the time and 62% of the time those scoring at IQ 90 or above. Changes in test performance were also predicted, further supporting the conclusion that the HOME had adequate predictive power to identify home environments associated with delayed development. Validity was also supported through several studies showing that the HOME discriminated between homes in terms of developmental delays of

**Figure 2. Sample Items for the HOME Scale (45 items)**

### **EMOTIONAL AND VERBAL RESPONSIVITY OF THE MOTHER**

Parent responds to the child emotionally and verbally during the visit  
 Parent talks to the child and labels objects in the environment  
 Parent permits the child to occasionally engage in messy play  
 Parent gives and receives positive statements about the child

### **AVOIDANCE OF RESTRICTION AND PUNISHMENT**

Parent does not shout out, spank or slap child during visit  
 Parent does not interfere with child's actions or restrict child's movement more than three times during visit  
 Child is allowed access to books and toys.

### **ORGANIZATION OF THE ENVIRONMENT**

Child's play environment appears safe and free of hazards  
 Child gets taken out of the house at least four times a week

### **PROVISION OF APPROPRIATE PLAY MATERIALS**

Materials are developmentally appropriate for fine and gross motor play  
 Toys are available for eye-hand coordination and imaginative play

### **MATERNAL INVOLVEMENT WITH CHILD**

Mother is attentive to child and encourages developmental advancement  
 Mother provides structured play opportunities and appropriate play materials

### **OPPORTUNITIES FOR VARIETY IN DAILY STIMULATION**

Father provides some caretaking every day  
 Family visits or receives visits from relatives (approx. once a month)  
 Child has three or more books of his or her own

children and was associated with language disability and with cognitive measures (Boehm, 1985).

### **Implications of HOME for Current Study**

Of the 51 families involved in this current research study there were pretest-posttest HOME scores for 23 families. Since HOME is designed for children aged birth to 3, and all of the subjects were assessed during their first year, some of the items designed for older children were not as relevant to measuring the effects of intervention as the NCAST Feeding and Teaching scales designed for infants birth to one year (the duration of data collection for this current study). Other than knowing that nurse B had achieved inter-rater reliability on the HOME, no other reliability data was collected for this assessment in this current research study.

The total HOME scores were analyzed as a measure of the quality of the caregiving home environment. The differences in control and treatment groups were studied and the total HOME score was considered as a potential covariate for infant-caregiver interaction scores to account for differences in the degree of quality in the home.

### **Independent Variable Three: Massage Intervention (Treatment)**

#### ***Treatment and control group assignment***

For the population of high risk infants for SIDS, the home-based nursing services were offered from September 1990 to November 1992. Nurse B was trained to be an infant massage

instructor in February 1992. Therefore the families who received infant massage instruction, the treatment group, were limited to those born the second year of the project. All other families visited became the control group. The deciding variable for massage intervention treatment was based on parent interest in learning to massage their infant and limited to when the child was born. This was a quasi-experimental nonequivalent control group design (Gay, 1996).

### ***How caregivers were trained to massage their infants***

During the regular home visit, nurse B followed the education and assessment protocol and also allowed 20 to 30 minutes to instruct the caregiver on how to massage their infant. Nurse B followed the infant massage instructor curriculum learned in her training for certification (McClure, 1989; Drehobl & Fuhr, 1991).

Nurse B used a doll to demonstrate the different prescribed massage strokes and the caregiver imitated the strokes on her infant. The first session taught the caregiver to massage the infant's legs and feet. The caregiver also was taught to ask the infant's permission before beginning the massage. While rubbing oil into her hands, the caregiver would ask if the infant was ready to begin the massage. The caregiver would look for positive cues from the infant to indicate a willingness to continue the massage. For example, the infants often smiled, made comfort sounds or kicked their legs in response to the caregiver's question and actions signaling the start of the massage session.



The caregiver was given a week to practice the demonstrated strokes and then during the second session repeated them, followed by instruction on the next series of strokes for the stomach, chest and arms. The third session concentrated on a review of the strokes learned and the addition of strokes for the back. In the fourth session the strokes were again reviewed, and the final strokes for the face and head were taught. The fifth and final session was a total review of all the strokes for a full baby massage as well as exercises that the caregiver and infant could do together. This five-week process allowed for additional discussion of appropriate materials for massaging infants, such as types of massage oils to use, specific questions concerning the execution of the strokes and the infant's and caregiver's reactions to infant massage.

### **Missing Data**

In the measurement of the caregiving environment (HOME scores), there were missing data for two sample cases. Because of the small sample size, a decision was made not to eliminate these cases. Tabachnick and Fidell (1983) offered several options for dealing with missing data. The most conservative option was to replace individual scores with means for the entire data set which was followed.

### **Power**

Given the exploratory nature of this study and the small sample size, the questions of the level of alpha risk and power sought were critical. Cohen (1990) suggested that in the establishment of an

alpha level of .05, it is important to consider this as a “convenient reference point along the possibility-probability continuum” (p.1311). Bullis, Bull, Johnson and Peters (1995) discussed the delicate balance between committing Type I errors, in which the researcher rejects a null hypothesis that is really true, and Type II errors, in which the researcher fails to reject a null hypothesis that is really false. They suggested that looking at “p values greater than .05 (.06 to .15) may be suggestive of important relationships in the data” (p.410), particularly in exploratory studies.

In consideration of these opinions concerning the significance level this study chose a per-comparison alpha of .05. In the discussion of the results p values of .06 to .15 were included.

### **Intercorrelations**

An examination was conducted of the intercorrelation matrix of the independent variables of risk factors, HOME mean scores and massage treatment, in order to determine significant relationships for further comparisons between the massage group and the no massage group. Because of the small sample size, a limited number of variables were selected for further analysis (Tabachnick & Fidell, 1983), and this selection was based on the alpha of .05.

## **Dependent Variables**

### **Infant-Caregiver Interaction During Feeding and Teaching**

Infant-caregiver interaction assessment data were collected for all families using the Nursing Child Assessment Satellite Training

(NCAST) Feeding and Teaching Scales (Barnard, 1979; Barnard, 1989). The NCAST Feeding and Teaching Scales are global observation scales of parent and child behaviors and can be used in clinical settings to plan individual intervention strategies and measure their outcomes. The scales are used in research to advance important theoretical notions about caregiver infant interactions as measures of pre/post intervention (Barnard & Kelly, 1991). **Figure 3** provides sample items in the six subscale areas of interaction for both scales.

The format is a binary checklist where specific behaviors are observed. These interaction assessments are designed to identify problems at a point before they develop and when intervention would be most effective (Barnard, 1989). In this study, assessment data were collected at pretest, the beginning of home-based intervention and posttest, before terminating home services.

The authors based these scales on the assumption that parent-child interaction is reciprocal, with distinct parent and child contributions to the interaction (Barnard & Kelly, 1991). Several items on both of the scales measure the amount of responsive behavior exhibited by the caregiver and child, behavior that occurs in response to an action of the other member of the dyad. Observations are based on two quite different situations, one familiar and the other novel. The first observation context is the familiar situation of feeding and the observed time varies per dyad. Feeding occurs at least five or six times each day and represents the longest interaction opportunity in the early months of life.

**Figure 3. Sample Items from NCAST Feeding and Teaching Scales**

<b>Feeding Scales</b>	<b>Teaching Scales</b>
<b>I SENSITIVITY TO CUES</b>	
Parent comments verbally on child's hunger cues before beginning feeding	Parent gets child's attention before beginning the task
Parent positions infant so that eye-to-eye contact is possible	Parent positions child so that child can reach and manipulate materials
Parent does not offer food when the child looks away, looks down, turns away or turns around	Parent changes position of child and/or materials after unsuccessful attempt by the child to do the task
<b>II RESPONSE TO DISTRESS</b>	
Stops or starts feeding in response to the child's distress	Makes soothing nonverbal response to child's distress
Changes voice volume to softer or higher pitch in response to child's distress	Changes voice volume to softer or higher pitch in response to child's distress
<b>III SOCIAL-EMOTIONAL GROWTH FOSTERING</b>	
Parent is in en face position for more than half the feeding	Parent laughs or smiles at the child during the teaching
Parent praises child or some quality of the child's behavior during the feeding	Parent makes constructive or encouraging statement to the child during teaching
Parent uses gentle forms of touch during the feeding	Parent does not make negative or uncomplimentary remarks about the child
<b>IV COGNITIVE GROWTH FOSTERING</b>	
Parent talks to the child using at least two words at least three times during the feeding	Parent describes perceptual qualities of the task materials to the child
Parent encourages and/or allows the child to explore the breast, bottle, food, cup, bowl, or the parent during feeding	Parent uses explanatory verbal style more than imperative style in teaching child
<b>V CLARITY OF CHILD'S CUES</b>	
Child signals readiness to eat	Child widens eyes and/or shows postural attention to task situation
Child has periods of alertness during the materials feeding	Child vocalizes while looking at task
Child makes contact with parent's face or eyes at least once during feeding	Child grimaces or frowns during the teaching episode
<b>VI RESPONSIVENESS TO PARENT</b>	
Child responds to games, social play , or social cues of parent during feeding contact	Child looks at the parent's face or eyes when parent attempts to establish eye-to-eye
Child vocalizes or smiles within 5 s of parent's vocalization	Child smiles at parent within 5 s after parent's vocalization
Child shows a change level of motor activity within 5 s of being handled or repositioned by parent	Child gazes at parent's face or task materials after parent has shown verbal or nonverbal alerting behavior (Barnard et al., 1983)

Caregivers often view feeding as a central issue in their developing relationship with their infants.

The second observation context involves a novel situation in which the caregiver is asked to “teach” the child two tasks, one at the child’s age level and one at about one and a half months beyond the expected ability of the child. The observation is made after three to five minutes of teaching. Since caregivers often are unaware of their continuous instruction of their child, asking them to teach specific skills can create a stressful situation for them. They see the teaching episode as an unusual demand on them and their infant.

Consequently, with the teaching observation, investigators can look at adaptive patterns outside of their well-rehearsed routines, as in feeding (Barnard & Kelly, 1991; Barnard, et al., 1989; Barnard, et al., 1983).

For both scales, there are several scores generated that can be used to describe the caregiver infant interaction: (a) a total score, calculated from the number of yes items received out of the potential total of 76 or 73 items; (b) a separate score of yes items for the caregiver on subscales I-IV; (c) a separate score of yes items for the child on subscales V-VI; and (d) a score on each separate subscale. For research studies, the authors advise analyzing total scale scores rather than subscale scores, which this current study followed.

The Feeding and Teaching Scales have been used extensively by interventionists, such as public health care nurses and teen parent educators, to provide a process for systematic assessment and intervention with high risk infants and families including families where abuse and neglect have occurred. The specificity of the

assessment allows it to become an effective feedback system for families and a measure of positive infant-caregiver changes (Barnard & Kelly, 1991).

### **Reliability and Validity of NCAST Scales**

The NCAST Feeding Scale and Teaching Scale measure infant caregiver behaviors and interaction. Internal consistency, as measured by Cronbach's alpha, was .85 for the Teaching scale, based on 404 sample observations, and .86 for the Feeding scale, based on 630 sample observations.

The measurement for test-retest reliability (three month separation over twelve months) was based on a group of 30 cases from the Nursing Child Assessment Project longitudinal study. The statistics reflect the stability of the scores over all ages studied. Caregiver scores showed more stability or consistency (.85 for teaching scales and .75 for feeding scales), than that of the infant scores ( .55 for teaching scales and .51 for feeding scales). The authors believed that these results provided evidence of the "... considerable stability of the scores, with greater stability for the caregiver than the infant. Because measures obtained at 3-to-4 month intervals reflect developmental change as well as test-retest reliability, this degree of consistency is notable" (Barnard, et al., 1989, p. 52).

Validity for the NCAST was determined in several studies by using a multiple regression analysis to compare the feeding and teaching scales with several outcome measures (Bayley Scale of Infant Development, the Preschool Behavior Questionnaire, HOME,

Sequenced Inventory of Communication Development, McCarthy Scales of Children's Ability, and the Stanford Binet Intelligence Test). Bee, et. al. (1982) conducted a four year longitudinal study with a sample of 193 infants. Positive and statistically significant correlations ( $<.01$  level) were found between the Feeding Scale at eight months and the 24 month HOME inventory (.72), and the Feeding Scale at 24 months and the 36 month HOME inventory (.79). The validity study results indicated that assessments of mother-infant interactions during feeding were accurate predictors of quality of caregiving environment (HOME).

In a study using 185 multiple-risk mothers (low education, medical risk prenatally, and/or low income), Barnard, et al. (1989) gathered information on the concurrent relationship between the teaching and feeding scales and the Mental and Psychomotor Development Index (MDI and PDI) from the Bayley scales. The correlations between the total parent score for the feeding and teaching scales, respectively, and the 3-month MDI were .28 and .26, both of which were significant at  $p<.001$  for samples of 116 and 150, respectively.

For predictive validity, Barnard, et al. (1989) had to use a smaller sample since revised versions of the scales were introduced during their longitudinal study. Small subsamples were videotaped during teaching and feeding interactions. In the preterm sample, mothers and infants were observed at 4 months and 8 months. In the full term sample, mothers and infants were observed at 1, 4, 8, and 12 months. For the full term sample, feeding and teaching subscales at each age were entered into multiple regression

equations predicting Bayley MDI at 12 and 24 months, expressive and receptive language scores at 36 months, Binet IQ at 48 months and problem behavior at 36 months. Researchers reported that because the sample size was very small for these analyses ( $n=22-29$ ), only a few of the correlations obtained reached acceptable levels of significance. The one month and the four month Teaching Scale scores were significantly predictive of expressive language at 36 months ( $R_s=.71$  and  $.76$  respectively). The twelve month Feeding Scale scores were significantly predictive of the concurrent Bayley MDI ( $R=.67$ ).

Barnard, et al. (1989) reported on another study where correlations between 24-month Bayley MDI and Feeding and Teaching Scales were calculated. Total scores from the 10-month feeding scales ( $n=45$ ) and 3-and-10-month teaching scales ( $n=58$ ,  $n=55$ ) were significantly ( $p<.01$ ) related to the MDI, with respective correlations of  $.46$ ,  $.23$  and  $.34$ . When multiple regression analyses were performed, using the six subscales as predictors, the multiple  $R$  was significant for the 10-month feeding ( $.59$ ,  $p<.01$ ) and teaching ( $.48$ ,  $p<.05$ ) scales. The scores for fostering of cognitive growth from the 10-month feeding ( $.50$ ,  $p<.01$ ) and teaching ( $.37$ ,  $p<.01$ ) scales showed the highest correlations of any subscale with the child's MDI at 24 months. These results supported the idea that some measures of parent-infant interaction are associated with later child performance.

Results also supported the ability of the scales to discriminate among subgroups that would be expected to differ in interaction style, such as abusive and non-abusive mothers. According to the



authors, statistically significant differences were found in five of the six subscales on the teaching scale for groups of abusive caregivers when compared to a non-abusive group (Barnard, et al., 1989).

Statistically significant differences were found in five of six subscales for preterm and term infants on both scales (Barnard, et al., 1983).

In both these studies, the response-to-distress scale did not discriminate between the two groups primarily because a large number of infants showed no distress and thus did not require any special treatment by the parent. Barnard, et al. (1983) also found a trend for the feeding scale discriminating between failure-to-thrive infants due to interactional problems, from infants whose failure-to-thrive had an organic etiology.

### **Missing Data**

The intent of this study was to examine infant-caregiver interaction data from both the NCAST Feeding and Teaching scales. This data was collected during observations conducted at the beginning of home-based services (pre-treatment) and at the completion of the year of home-based services (post-treatment). However, missing data became a problem. Of the 23 subjects who had complete pre/post data on the Feeding scale, only 15 had pre/post data on the Teaching scale. Since the design of this study called for pre/post interaction data, it was not appropriate to replace data.

Therefore, because of the low number of subjects with complete pre/post data for the Teaching scale ( $n=15$ ), a decision was made to eliminate this scale from the study. Only the Feeding

scale scores pre/post ( $n=23$ ) were examined to test the significance of difference for the treatment and control groups on infant-caregiver interaction.

### **Qualitative Information From Caregiver Interview**

Caregivers communicate excitement over learning massage techniques and using these techniques with their infants. Often, after using massage, caregivers report that their infant sleeps and eats better; is relieved of digestive discomfort; and the caregivers also believe that they can read their infant's cues more accurately (McClure, 1988; 1989). This study used a telephone interview questionnaire that allowed caregivers to discuss their perception of changes for themselves and their infant because of massage intervention in the home.

A telephone interview was designed to be administered to all families receiving home-based services in the SIDS risk prevention project. A copy of the interview questions can be found in Appendix D. Recommendations by Dillman (1978), for conducting telephone interviews were followed while designing the interview. Sources for the specific questions included The Charlotte Circle Project (Calhoun & Rose, 1991) for early social reciprocity interventions; The Early Coping Inventory (Zeitlin, Williamson & Szczeparski, 1988); and International Association for Infant Massage Instructors /Parent Feedback Form (McClure, 1988). Specifically, questions 15 to 32 were inspired by Calhoun and Rose (1991) and McClure (1988). Questions 33 to 50 were adapted from the Early Coping

Inventory (Zeitlin, et al., 1988) and questions 51-60 were adapted from McClure (1989).

All 51 families were sent a letter from the Marion County Health Department asking for them to send back a response in a self-addressed stamped envelope if they were willing to be interviewed by the investigator over the telephone. See letter in Appendix E. Only caregivers who responded to the written request were interviewed. Of the telephone interviews for the caregivers using massage ( $n=8$ ), five had complete assessment data and were included in the quantitative analyses in this research study. Three had incomplete data and could not be included in the massage treatment group for statistical analysis. There were also interviews conducted with caregivers ( $n=2$ ) who did not receive massage training and were part of the control group (no massage treatment) for statistical analysis.

This information was collected to capture the caregiver's perspective of the impact of infant massage on their relationship with their child and their assessment of their infant's development. This interview process provided an opportunity to hear from families receiving massage instruction as well as those who did not. It provided a perspective on infant development and home-based services which was different from the nurse's observations reflected in quantitative data. Caregivers could determine if the in-home services had an effect on their relationship with their infant, and could discuss their satisfaction with the services provided.

Dillman (1978) discussed the strengths of using telephone interviews, both in the ease of collecting information and the

anonymity for the interviewee. Dillman's Total Design Method for conducting mail and telephone surveys became a model for marketing and social science researchers. Frey (1989) stated that Dillman's Total Design Method "...combines the principles of exchange theory with those of management and administration to produce well-conceived and systematic telephone surveys with high response rate and accurate data within an acceptable time frame" (p. 27). Frey further supported the strength of Dillman's model for telephone surveys when he cited research that demonstrated that:

...the social context or demand characteristics of the personal interview were adversely affecting data quality, such as social desirability in answers. The telephone survey offered an alternative that was less demanding on resources, though no less complex, but that could produce data of equal or higher quality than those generated in the traditional face-to-face household interview" (p. 28).

Frey's discussion of the strengths of telephone interviews as first established by Dillman, is further supported in the writings of Lavrakas (1987).

Dillman (1978) recommended that practice telephone interviews be given in order to have questions flow more easily in the actual interview. The investigator conducted two practice interviews with caregivers whom she had trained in infant massage in March 1992. Dillman also recommended that the interviewer should take the time to edit all comments for completion and accuracy following each interview. The investigator followed this recommendation and found it to be valuable considering the duration of time it took to complete all interviews.

## **Data Analyses**

### **Quantitative Analyses**

Before testing specific research hypotheses, the investigator first examined the treatment and control groups on a number of risk and demographic variables to determine their equivalency.

Following this preliminary descriptive analysis, specific hypotheses on the relationships between high risk infant characteristics, quality of caregiving environment, massage and infant-caregiver interaction could then be stated and statistically tested.

### ***Equivalency of groups to determine analyses***

In a quasi-experimental nonequivalent control group design, where there is no random assignment of subjects, it is important to make sure the groups are as equivalent as possible in other respects. This current comparison of group characteristics is an effort to determine group equivalency (Gay, 1996). The final research sample ( $n=23$ ), treatment ( $n=9$ ) and control ( $n=14$ ), of infants and their caregivers analyzed in this study were compared on a number of risk factors and demographic characteristics. These variables were taken from the SIDS risk assessment total score, selected subscale scores and other environmental factors. **Figure 1** (p. 84) outlined all the factors contributing to the total SIDS risk score. While all of these risk factors were determined in the literature to be possibly related to SIDS risk, only the factors which showed good distribution for the sample were included in this analysis. Those factors which were skewed (appeared in only a few cases) were eliminated immediately.

For example, some of the risk factors associated with the mother's health, such as the presence of perinatal infection, hypertension, anemia or sexually transmitted diseases, were not analyzed because they appeared in only a few of the sample cases. When there is a restricted range in sampling resulting in a small number of cases for statistical analysis, then the statistical significance is suspect and Type I errors (rejecting a null hypothesis that is really true) can occur (Tabachnick & Fidell, 1983).

In addition to risk factors, other demographic factors concerning the number of home visits and gender were also studied as possible confounding variables to the determination of group equivalency. Univariate comparisons were conducted to explain differences in the treatment and control groups for these selected risk and demographic variables. **Table 1** summarizes the risk variables and **Table 2** the demographic variables for the massage treatment group and the no massage control group and the significance of their differences based on  $\chi^2$  or  $t$  test results.

Table 1

**Summary of Risk Variables for Two Groups**

<b>Variables</b>	<b>Massage (n=9)</b>	<b>No Massage (n=14)</b>	<b><math>\chi^2</math> / t-Test</b>
<b>SIDS risk total score</b>			
mean	7.0	9.35	$t = 2.14$
sd	3.93	1.0	$p = .049^*$
range	6-9	6-17	
<b>Birth weight &lt; 2000g</b>			
No	5 (55.6%)	9 (64.3%)	$\chi^2 = .175$
Yes	4 (44.4%)	5 (35.7%)	$p = .675$
<b>Mother's Education less than 10th grade</b>			
No	6 (66.7%)	8 (57.1%)	$\chi^2 = .208$
Yes	3 (33.3%)	6 (42.9%)	$p = .647$
<b>Mother's age at birth</b>			
mean	20.59	21.61	$t = .46$
sd	6.18	4.90	$p = .65$
range	15.75-32.50	14.4-32.3	
<b>Mother's age &lt; 17</b>			
No	5 (55.6%)	12 (83.4%)	$\chi^2 = 2.58$
Yes	4 (44.4%)	2 (16.6%)	$p = .107$
<b>Single parent</b>			
No	2 (22.2%)	4 (28%)	$\chi^2 = .114$
Yes	7 (77.8%)	10 (71.4%)	$p = .735$
<b>Prenatal smoking &gt; 1/2 pack/day</b>			
No	5 (55.6%)	7 (50%)	$\chi^2 = .067$
Yes	4 (44.4%)	7 (50%)	$p = .794$
<b>Drug exposed infant</b>			
No	8 (88.9%)	13 (92.9%)	$\chi^2 = .108$
Yes	1 (11.1%)	1 (7.1%)	$p = .741$

Table 2

**Summary of Demographic Variables for Two Groups**

<b>Variables</b>	<b>Massage (n=9)</b>	<b>No Massage (n=14)</b>	<b><math>\chi^2</math> / t-Test</b>
<b>Gender</b>			
male	5 (55.6%)	5 (35.7%)	$\chi^2 = .877$
female	4 (44.4%)	9 (64.3%)	$p = .348$
<b>Number of siblings</b>			
mean	.11	1.14	$t = 3.28$
sd	.33	1.09	$p = .005^{**}$
range	0-1	0-3	
<b>Any siblings</b>			
None	8 (88.9%)	6 (42.9%)	$\chi^2 = 4.87$
Any	1 (11.1%)	8 (57.1%)	$p = .027^*$
<b>Number of home visits</b>			
mean	26.33	26.14	$t = -.08$
sd	6.12	5.77	$p = .94$
range	17-37	15-37	
<b>Number of months visited</b>			
mean	9.55	10.85	$t = 1.21$
sd	2.92	1.70	$p = .25$
range	4-13	8-13	
<b>Number of visits/month</b>			
mean	2.97	2.43	$t = -1.76$
sd	.99	.49	$p = .157$
range	1.92-4.60	1.25-3.08	



There were many similarities between the two groups on risk and demographic variables. It is particularly noteworthy to examine the number of visits for each group. The data was almost identical. Both groups received the same number of home visits (Massage group mean is 26.33 and No Massage group mean is 26.14). The statistical test for the difference between the means ( $t = -.08$ ,  $p = .94$ ) did not show a significant difference. Given that the massage treatment group consisted of families visited in the final year of the project, it is important that they received the same frequency of home-based services.

For the variable of mother less than 17 years old, the massage group had 44% of the caregivers being less than 17. The no massage group had 17% of the caregiver being less than 17. The  $\chi^2$  of differences between the means was 2.58,  $p = .107$ . While the small number of subjects in the samples for analysis made statistically significant differences difficult to find, just simply examining the means indicated that the massage group had a higher percentage of younger mothers.

There were only two factors that emerged as significantly different for the two groups: the SIDS risk assessment total score and the number of siblings. The SIDS risk assessment total scores were different in a statistically significant way ( $t = 2.14$ ,  $p = .049$ ) for the two groups. The total score is based on the factors described in **Figure 1**. Procedures for weighting and scoring the risk factors can be found in Appendix B. In examining the data for total scores on the SIDS risk assessment there was a range of scores from 6 to 17 (out of a possible score of 1-47). In all cases of high scores (greater

than 10) the subjects ( $n=5$ ) were in the control group. The control group appeared to be at higher risk than the treatment group. For the five cases of scores over 10, all were due to an incidence of apparent life threatening event (ALTE). Two of the cases were twins born prematurely and both experienced ALTE. On the SIDS risk assessment (see Appendix B), any incidence of ALTE received a score of 10, the highest weighted item on the risk scale.

When the investigator examined the data for group differences in the sample there appeared to be a logical explanation. While the control group was different than the treatment group on the SIDS risk total score it was probably due to one event at birth rather than ongoing environmental risk variables. The investigator decided that examining the individual factors which contributed to the total SIDS risk assessment would explain any differences between groups better and in more detail. **Table 1** summarizes the variables analyzed for this sample that comprise the SIDS risk total score, and none of these contributing factors were different in a statistically significant way for the two groups.

In terms of other demographic variables, **Table 2** summarizes gender, number of siblings and number and frequency of home visits. The variable of siblings was the only other significantly different variable for the sample (number of siblings  $t = 3.28$ ,  $p = .005$ ; any siblings  $\chi^2 = 4.87$ ,  $p = .027$ ). In examining the data, the investigator discovered that all the subjects with more than one child joined the SIDS project before February 1992, when the massage intervention was unavailable. Also, with the higher percentage of caregivers less

than 17 years old in the treatment group, a smaller number of siblings would be expected.

The equivalency of the treatment and control groups based on sample characteristics was examined in order to make decisions for further analyses. When there were significant differences in the two groups on particular variables, the investigator could isolate the variables to control before analyzing differences based on treatment.

The investigator concluded that the treatment and control groups were equivalent on a number of demographic and risk factors and that an examination of relationships between variables and the significance of the effects of infant massage treatment could proceed.

### ***Research question***

This research study attempted to answer the question, what are the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interactions? In the results section this question will be answered by testing three null hypotheses.

### ***Hypotheses***

**Null hypothesis 1:** Infant-caregiver interactions are not related negatively to risk factors and are not related positively to the quality of the caregiving environment.

**Null hypothesis 2:** Massage treatment is unrelated to the quality of the caregiving environment.

**Null hypothesis 3:** Massage treatment does not have a positive effect on infant-caregiver interactions during routine feeding situations.

### ***Analysis of covariance (ANCOVA)***

The first step in examining these hypotheses was to compute Pearson  $r$  correlations to explore the relationships among the dependent (infant-caregiver interactions) and independent variables (massage treatment, risk and environmental variables and quality of the caregiving environment). Any variables which showed statistically significant relationships ( $p < .05$ ) were considered for further analyses.

According to the literature, risk factors are expected to relate to lower scores on measures of the quality of the caregiving environment (HOME) and infant-caregiver interactions. For example, research literature reported that the lower the mother's education the lower the NCAST Feeding and Teaching scale scores. Relationships were also found between single parent status and lower interaction scores. Literature also has described specific positive changes in the quality of care and interactions when the caregiver uses infant massage. Based on these literature results supporting the negative effects of risk factors and the positive relationship between massage, quality of caregiving environment and infant-caregiver interaction, 1-tailed tests of significance were conducted.

Following a look at the relationships between risk variables, quality of the caregiving environment and infant-caregiver

interactions, this study next explored if the group receiving massage treatment differed from the control group in terms of the quality of the caregiving environment (HOME). Finally, the focus narrowed to a specific investigation of the effects of infant massage on infant-caregiver interactions.

When a statistically significant correlation was found between pre and post tests, the Analysis of Covariance (ANCOVA) was used to adjust for pre-test differences on the post-test variables. The ANCOVA is a statistical method for equating randomly and non-randomly formed groups on one or more variables. In essence, ANCOVA adjusts scores on a dependent variable for initial differences on some other variable, such as pretest scores. It is an appropriate analysis for studies in which already formed, not necessarily equal groups are involved (Gay, 1996).

### **Qualitative Analyses**

The telephone interview with caregivers was designed to answer specific questions. These questions were written to address specific issues concerning infant massage and child development. The results section will summarize the interview data.

### **Qualitative questions**

What changes did caregivers report in their ability to interpret their child's conditions, to distinguish their child's expressions, the quality of their child's sleeping and eating habits, and their child's response to touch because of the home-based intensive treatment program (both with and without massage)? What are the caregiver's

perceptions of their child's current coping skills? What is the caregiver's level of satisfaction with the in-home intensive treatment program? What is the caregiver's level of satisfaction with infant massage instruction?

### ***Collection of qualitative data***

Caregivers' answers were recorded for each question of the telephone interview questionnaire and edited for accuracy at the conclusion of each interview (see Appendix D). Summary data was calculated for each interview and will be reported in the next chapter and discussed in the final chapter.

### **Summary**

The stated purpose of this study was to explore the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interactions. Data used for the study was taken from the Marion county SIDS prevention project. Risk and environmental factors were assessed with observation tools and caregiver interviews using the SIDS risk assessment and HOME scale. Infant-caregiver interaction was measured with the NCAST Feeding and Teaching scales, global observations of infant-caregiver behaviors. A follow-up telephone interview was conducted with caregivers willing to discuss their children's development and their satisfaction with the home-based services. Information regarding methodology and design of this research was presented and problems relating to missing data were discussed. A discussion of sample characteristics was

presented. Finally, data analysis procedures were described for testing the null hypotheses. The next chapter reports on the statistical analyses of the data using the methods described above.

## CHAPTER 4

### RESULTS

This chapter reports the results from the present study. The purpose of the study was to explore the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interactions. The null hypotheses were statistically tested and a description of data analyses used and results found is given first. Next, a summary of the qualitative interview data collected by the research investigator through a telephone interview is presented. Summary statements, discussion and interpretations of the data are addressed in the next chapter.

### **Quantitative Results**

#### **Intercorrelations Among Independent Variables**

**Table 3** presents correlations ( $r$  values) among the independent variables of massage treatment, environmental and risk factors and quality of caregiving environment (HOME). There were strong intercorrelations among environmental risk factors. Although not statistically significant, the HOME mean scores measuring the quality of the caregiving environment, were inversely related to a number of risk variables as would be expected from literature review.



**Table 3****Intercorrelations Among Massage Treatment, Risk Variables and HOME Scores**

Independent Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Massage	--	.03	-.33 *	.19	.03	.02	-.06	-.05	-.06	-.12	.46 **	-.36 *	-.35 *	-.02	.42 *
2. HOME Mean	.03	--	-.07	-.06	-.29 a	-.08	.09	.21 a	-.27 a	.01	-.17	-.31 a	.06	-.20	-.21
3. Total SIDS Risk	-.33 *	-.07	--	.30 a	-.25 a	.29 a	.22 a	-.19	-.11	-.03	.51 **	.41 *	.02	-.00	-.08
4. Wt < 2000 gms	.19	-.06	.30 a	--	-.46 **	.52 **	.57 **	-.59 **	-.54 **	-.34 *	.30 a	.44 **	.04	-.05	.04
5. Mothers Ed < 10th	.03	-.29 a	-.25 a	-.46 **	--	-.42 *	-.54 **	.12	.41 **	-.34 *	-.08	-.04 a	-.25 a	-.17	.15
6. Mothers Age Birth	.02	-.08	.29 a	.52 **	-.42 *	--	.86 **	-.41 *	-.02	.36 *	.31 a	.44 **	-.21 a	-.21	.12
7. Mother < 20 yrs	-.06	.09	.22 a	.57 **	-.54 **	.86 **	--	-.39 *	-.08	.39 *	.42 *	.48 **	-.00	-.21 a	-.09
8. Single Parent	-.05	.21 a	-.19	-.59 **	.12	-.41 *	-.39 *	--	.31 a	.26 a	-.28 a	-.36 *	-.30 a	-.06	.13
9. Prenatal Smoking	-.06	-.27 a	-.11	-.54 **	.41 *	-.02	-.08	.31 a	--	.39 *	.05	.01	-.07	-.33 *	-.23 a
10. Drug Exposed	-.12	.01	-.03	-.34 *	-.34 *	.36 *	.39 *	.26 a	.39 *	--	-.02	-.15	-.06	-.04	-.06
11. Number Siblings	-.46 **	-.17	.51 **	.30 a	-.08	.31 a	.42 *	-.28 a	.05	-.02	--	.91 **	.14	-.26 a	-.28 a
12. Any Siblings	-.36 *	-.31 a	.41 *	.44 **	-.04	.44 **	.48 **	-.36 *	.01	-.15	.91 **	--	-.03	-.25 a	-.05
13. Number of Visits	-.35 *	.06	.02	.04	-.25 a	-.21 a	-.00	-.30 a	-.07	-.06	.14	-.03	--	.43 **	-.75 **
14. Number of Months Visited	-.02	-.20	.00	-.05	-.17	-.21	-.21 a	-.06	-.33 *	-.04	-.26 a	-.25 a	.43 **	--	.22 a
15. Visits per Month	.42 *	-.21	-.08	.04	.15	.12	-.09	.13	-.23 a	-.06	-.28 a	-.05 a	-.75 **	.22 a	--

\* p<.05 1-tailed    \*\* p<.01 1-tailed    a = approaching significance    p = .06-.15

### **Null Hypothesis 1**

Infant-caregiver interactions are not related negatively to risk factors and are not related positively to the quality of the caregiving environment.

The results for the comparison among the risk and demographic variables, quality of caregiving environment (HOME) and the measures of infant-caregiver interaction (**Table 4**) indicated a relationship between the risk variable of prenatal smoking and infant-caregiver interaction during feeding. When the mother smoked, the scores on the feeding interaction were lower at pre-treatment feeding ( $r = -.35$ ,  $p = .049$ ) and at post-treatment feeding ( $r = -.40$ ,  $p = .028$ ). This result is consistent with research documenting the adverse and inverse relationship between smoking and positive caregiving.

The risk and demographic variables showed many fewer statistically significant relationships in posttest feeding interaction scores (three statistically significant correlations) than in pretest scores (seven statistically significant correlations). This could certainly reflect the maturation of the infant-caregiver relationship and the positive effects of the home-based intervention services.

Results also indicated statistically significant correlations between the infant-caregiver interaction during feeding post-treatment scores and measures of the quality of the caregiving environment. HOME mean scores were related in a statistically significant and positive manner to feeding post-treatment scores ( $r = .58$ ,  $p = .002$ ).

**Table 4****Intercorrelations Among Massage Treatment, Risk Variables, HOME Scores and Infant Caregiver Interaction**

<b>Independent Variable</b>	<b>Infant Caregiver Interaction Feeding Pretest <math>\underline{n} = 23</math> <math>\underline{r} =</math> <math>\underline{p} =</math></b>	<b>Infant Caregiver Interaction Feeding Posttest <math>\underline{n} = 23</math> <math>\underline{r} =</math> <math>\underline{p} =</math></b>
<b>Massage</b>	.05 .41	.37 .04*
<b>HOME Mean</b>	.27 .11	.58 .00**
<b>Wt &lt; 2000 gms</b>	.37 .04*	.20 .18
<b>Mothers Ed &lt; 10th</b>	-.43 .02*	-.21 .17
<b>Mothers Age Birth</b>	.50 .01*	.12 .29
<b>Mother &lt; 20 yrs</b>	.53 .01*	.23 .15
<b>Single Parent</b>	-.16 .23	-.13 .28
<b>Prenatal Smoking</b>	-.35 .05*	-.40 .03*
<b>Drug Exposed</b>	.02 .46	-.01 .49
<b>Number of Siblings</b>	.45 .02*	-.01 .48
<b>Any Siblings</b>	.42 .02*	-.13 .27
<b>Number of Visits</b>	-.18 .20	-.09 .34
<b>Number of Months Visited</b>	-.17 .21	-.06 .39
<b>Visits per Month</b>	.09 .34	.13 .28

\*p&lt;.05 1-tailed

\*\* p&lt;.01 1-tailed

Results supported rejecting the null hypothesis and concluding that there are negative relationships between risk variables and infant-caregiver interactions that can fade over time. A further conclusion is that the quality of the caregiving environment is related positively to the interactions of infants and caregivers during posttest feeding. These results are consistent with the literature and allowed the investigator to narrow the analysis further, leading to the final examination of the relationship between infant massage treatment and infant-caregiver interaction.

### **Null Hypothesis 2**

Massage treatment is unrelated to the quality of the caregiving environment.

The measure for the quality of the caregiving environment, HOME mean (across three measures), was 37.13 for the Massage group (sd= 2.33, range= 33-40) and 36.43 for the No Massage group (sd=2.96, range=28-42). There was no statistically significant difference ( $t=-.60$ ,  $p=.28$ ) between the massage treatment group and the no massage control group for measures of caregiving environment (HOME).

Given these results, null hypothesis 2 cannot be rejected. By not rejecting this null hypothesis, the investigator could proceed to narrow the research investigation to infant-caregiver interaction and massage treatment. Except for the risk assessment total scores, the individual risk variables and the quality of the caregiving environment appear to be similar for the two groups. In a previous discussion of the equivalency of the groups (see p. 106) the

investigator explained why the groups may have differed on total risk scores. The group that received massage treatment was similar to the control group in terms of common risk factors, demographic characteristics and the quality of the caregiving environment. This result eliminated variables that could confound the study of the relationship between massage and interaction.

### **Null Hypothesis 3**

Massage treatment does not have a positive effect on infant-caregiver interactions during routine feeding situations.

This final hypothesis allowed for the testing of relationships between the infant massage treatment and infant caregiver interaction. Descriptive statistics for the two groups indicated that for the massage group the pretest mean on the infant-caregiver interaction (Feeding total score) was 58.89, the standard deviation was 5.75 and the range was 51-65. For the posttest massage group, the mean was 65.33, standard deviation was 4.47 and range 58-70. For the no massage group the pretest mean was 58, the standard deviation was 10.48 and the range was 31-69. Finally, the posttest mean for the no massage group was 61.71, the standard deviation was 4.86 and the range 50-67.

Specifically, the treatment variable of massage showed a statistically significant relationship to the infant-caregiver interaction scores on the feeding posttest ( $r=.37$ ,  $p=.043$ ). There was also a statistically significant relationship between infant-caregiver feeding scores for the pretest and posttest ( $r=.53$ ,  $p=.005$ ).

In order to increase the power of the test of the independent variable of massage treatment, the statistical method for removing predictable variance from the error term (analysis of covariance) was used. The goal of statistical analysis is to test the null hypothesis that difference in treatment (massage/no massage) had no effect on infant-caregiver interaction (posttest feeding scores) after adjusting for preexisting differences in interaction (Tabachnick and Fidell, 1983). By holding potentially influential variables constant (in this case pretest feeding scores) the ANCOVA statistically adjusted for any systematic differences in scores that may be associated with those variables (i.e., covariates). In this study, the ANCOVA tested for treatment differences between feeding posttest scores and massage treatment with feeding pretest scores used as the covariate.

**Table 5** summarizes the ANCOVA results for the effects of massage treatment on infant-caregiver interaction during routine feeding situations. Massage may demonstrate a positive effect on infant-caregiver interaction during routine situations of feeding ( $F=3.78$ ,  $p=.066$ ) with the effects of initial interaction differences removed. The null hypothesis could not be rejected at the .05 alpha level. It should be noted, however, that the  $p$  value was .066, which approaches statistical significance and is suggestive of the effect of infant massage on the interaction between caregiver and infant.

Table 5

**ANCOVA Table for Massage Treatment and Feeding Interaction**

<b>Source of Variation</b>	<b>Sum of Squares</b>	<b><u>df</u></b>	<b>Mean Square</b>	<b><u>F</u></b>	<b>Significance of <u>F</u></b>
<b>Covariates Feeding Pretest</b>	<b>149.64</b>	<b>1</b>	<b>149.64</b>	<b>9.15</b>	<b>.007</b>
<b>Main Effects Massage</b>	<b>61.83</b>	<b>1</b>	<b>61.83</b>	<b>3.78</b>	<b>.066 <sup>a</sup></b>
<b>Explained</b>	<b>211.47</b>	<b>2</b>	<b>105.73</b>	<b>6.46</b>	<b>.007</b>
<b>Residual</b>	<b>327.14</b>	<b>20</b>	<b>16.36</b>		
<b>Total</b>	<b>538.61</b>	<b>22</b>	<b>24.48</b>		

a = approach significance at  $p < .05$

## **Qualitative Results**

The telephone interview was designed to collect caregiver report on a variety of issues concerning infant massage, child development and satisfaction with services. The results were limited to caregivers who responded to the Health Department letter (see Appendix E). The issues addressed were as follows: What changes occurred in the areas of interpreting child conditions, distinguishing child expressions, child sleep and eating habits, and child response to touch because of an intensive treatment program (with and without massage)? What are the caregivers' perceptions of their child's current coping skills? What is the caregivers' level of satisfaction with the in-home intensive treatment program? What is the caregivers' level of satisfaction with infant massage instruction?

A complete summary of the individual results from the follow-up telephone interview and caregiver comments are written on the sample interview in Appendix D . There were eight telephone interviews for caregivers who received infant massage training and two telephone interviews for caregivers who did not. The frequency data was tabulated and summarized for each caregiver response. All the comments have been reported. What follows are the highlights of the summary of interview data.

### **Family Characteristics**

#### ***All families***

The number of male (50%) and female (50%) infants were the same for both groups. At the time of the telephone interview, the



children were no longer infants and ranged in age from 3 to 5 years old. Each group had a child with developmental disabilities: from the results of mother's drug use (massage group) and fetal alcohol affects, prematurity (no massage group).

### ***Massage group***

Half of the caregivers massaged their infants once a week, and the other half massaged their infants daily. The range in age for stopping massage was seven months to three years old. Two caregivers continue to use massage. While six caregivers reported that they no longer continued to do full infant massages, certain techniques continued to be popular. Caregivers reported using massage strokes for the back (n=3) and for the legs and feet (n=4). All caregivers reported that the mothers were the only ones to use massage with the infant and that other family members were supportive. Three caregivers have used massage with other children in the family. When the child was sick, seven caregivers reported continuing to use massage, and these caregivers found a variety of strokes helpful. Only one caregiver reported that a physical problem limited massage for the infant, and that was the apnea monitor getting in the way. When the child was distressed (colic or fussiness), three caregivers reported that massage calmed down their infant; two continued to massage through the fussiness, but the infant was not totally calm; and one caregiver (foster mother) massaged her drug- affected infant in the bath during moments of distress and reported that this setting worked well.

Finally, when caregivers were asked if they thought that asking the baby permission before beginning the massage had any effects on their relationship, two did not know, two reported that they could not recall, and four reported that it did have an effect in terms of gains in mutual respect and communication.

### **Caregiver Interpretation of Child Condition**

\* The caregivers ( $n=8$ ) who used massage reported that they could interpret more conditions from their child's cry, particularly with less obvious conditions, such as crying for attention. Caregivers reported a variety of strategies as helpful in soothing their child. Since using massage, two caregivers reported that their ability to interpret their children's conditions was about the same, and six caregivers reported that they were more accurate in interpreting their child's condition. For the two caregivers who received services from the nurse (but no massage training), one reported their ability to interpret child condition was about the same and the other reported that they were more accurate.

### **Caregiver Ability to Distinguish Child Expressions**

Both groups of caregivers were able to distinguish a variety of child expressions, such as happiness, fear, and stranger anxiety. Since using massage, two caregivers reported that their ability to distinguish their child's expressions was about the same, and six caregivers reported that they were more accurate in distinguishing their child's expressions. For the two caregivers who received services from the nurse (but no massage training), one reported her

ability to distinguish child expressions was about the same, and the other reported that her ability improved.

### **Child's Night Sleeping Habits**

Caregivers in both groups did not report any unusual sleeping conditions for their children, and infants in both groups showed a positive development in sleep habits. Since using massage, five caregivers reported their children were sleeping more and three reported their children sleeping about the same amount. Several comments were made about how massage relaxed the child for sleep. For the two caregivers who received services from the nurse (but no massage training), one reported her child sleeping about the same and the other reported her child was sleeping more.

### **Child's Response to Touch in General**

Caregivers in both groups were able to distinguish between the child's body feeling relaxed and tense. Since using massage, seven caregivers reported their ability to distinguish their child's response to touch as more accurate, and one reported their ability about the same. For the two caregivers who received services from the nurse (but no massage training), both report their ability to distinguish their child's response to touch as about the same. While this latter group learned from the visiting nurse strategies to relax their infants, they did not feel differently about their ability to distinguish their child's response to touch.

### **Child's Eating Habits**

Caregivers in both groups were mixed on their assessments of their child's eating habits and reported a full range of appetite and feeding problems. Since using massage, a majority of caregivers ( $n=6$ ) reported their ability to distinguish appetite as about the same and only two reported being more accurate. Both caregivers who received services from the nurse (but no massage training) reported their ability to distinguish appetite as about the same.

### **Caregiver's Assessment of Child's Ability to Cope**

Across a variety ( $n=18$ ) of child coping skills, all 10 caregivers rated (on a scale of 1 to 4) their children as effective, either situationally (3) or consistently (4). Only the infants who were developmentally delayed due to alcohol or drug abuse scored below the effective range of three or four.

### **Caregiver's Satisfaction with Infant Massage Instruction ( $n=8$ )**

Caregivers were unanimous in their satisfaction with infant massage instruction, with overall ratings of excellent ( $n=7$ ) and good ( $n=1$ ) for the instruction in general. Their comments (see Appendix D) report an appreciation of the nurse's skill in communicating, demonstrating and answering questions. Several of the caregivers reported that massage really helped them connect to their infants who were resistant to cuddling or difficult to get to know. Several of the caregivers have had another baby since they used massage with their infants involved in this project, and report that they are using massage with their newborns.

**Caregiver's Satisfaction with Health Services in their Home (n=10)**

On a scale of 1 to 4, all 10 caregivers interviewed by telephone rated the services and information, in general, that they received from the public health nurse as excellent (4). They all reported excellent (4) ratings for the nurse's ability to communicate, demonstrate child care tips and to discuss and answer questions. The caregivers rated the nurse's understanding of the subject as either good (n=2) or excellent (n=8). Again their comments were helpful in describing the impact which this project had on their lives. Except for one caregiver (no massage group) who was frustrated that the nurse did not have children of her own (but still rated her high), all the caregivers reported very positive comments. Several of the caregivers reported that the nurse gave them the confidence to get through a very difficult time in their lives (e.g., "she saved me!"). The nurse served as a liaison for the caregiver and other health professionals and found answers to their questions. Caregivers reported that her competence gave them confidence.

**Summary**

Statistical analyses tested three null hypotheses. Infant caregiver interactions appeared to be related negatively to risk factors and positively to the quality of the caregiving environment. The quality of the caregiving environment appeared to be similar for both massage treatment and control groups. The results were suggestive of positive effects for massage treatment on the interactions of caregiver and infant during routine feeding situations. In a telephone interview caregivers reported many positive benefits from massage training and rated the in-home intervention very highly.

## **CHAPTER 5**

### **DISCUSSION**

The purpose of this study was to explore the relationships between risk and environmental factors, quality of caregiving environment, infant massage intervention and infant-caregiver interactions. This study used data from the Marion County SIDS Risk Prevention Project. The data were collected by the visiting nurse from caregivers participating in the intensive home-based project. Qualitative interview data were collected by the research investigator through a telephone interview.

This final chapter describes and summarizes the results and discusses the implications of those results. Next, the chapter discusses the limitations of this study, and concludes with suggestions for further research in the use of infant massage as a regular intervention to enhance infant-caregiver interactions.

### **Implications of Results**

#### **Equivalency of Groups**

From the analysis of group differences on risk and demographic variables, it is clear that both groups of caregivers experienced multiple risk factors for their infants. When these individual variables were examined the number of siblings was the only significantly different variable for the sample. This difference in the number of siblings was probably a function of when the family joined the SIDS project. Families who joined after February 1992,

when the massage intervention became available, were the logical candidates for massage training and unanimously accepted this training. Therefore, the issue of more siblings in the control group can be viewed as an issue of date of birth rather than any differences in the groups in terms of willingness to use massage.

The implications of the analysis of risk and demographic variables are that both groups were very similar. Of particular importance to the investigator was the fact that subjects in both groups received the same number of visits. Nurse B did an excellent job of following the assessment and education protocol as established by the SIDS risk project. From the correlational analysis of demographic and risk variables, the investigator concludes that the treatment and control groups were equivalent on a number of risk and demographic factors at risk and that an examination of the relationship between variables and the significance of the effects of infant massage treatment could proceed.

### **Research Question and Hypotheses**

This research study attempted to answer the question, what are the relationships between risk and environmental factors, quality of the caregiving environment, infant massage intervention and infant-caregiver interactions?

### ***Intercorrelations of independent variables***

As expected, environmental risk factors were intercorrelated. The HOME mean scores, measuring the quality of the caregiving environment, were inversely related to a number of risk factors



including mother's education as less than 10th grade ( $r=-.29$ ,  $p=.08$ ) prenatal smoking ( $r=-.27$ ,  $p=.09$ ) and number of siblings ( $r=-.31$ ,  $p=.06$ ). If the mothers smoked, or left school before 10th grade, or had more than one child, then the scores on the HOME were lower. These relationships approached statistical significance and supported the literature findings of lower education level, smoking and multiple siblings creating more stress on the caregiving environment. In this population, the focus was on risk for SIDS. In terms of providing an environment which fosters positive infant caregiving, the presence of siblings, maternal smoking and lack of education are all factors which are expected to have a negative impact.

The SIDS risk assessment offered a screening instrument for identifying high risk families. The use of the HOME observation scale offered a way to observe the quality of the caregiving environment and measure the impact of risk variables on the caregiving environment. The HOME offered supporting data to say that the risk factors did relate to the quality of the caregiving environment.

### ***Null hypothesis 1***

Infant-caregiver interactions are not related negatively to risk factors and are not related positively to the quality of the caregiving environment.

The relationships between risk factors, the quality of the caregiving environment and infant-caregiver interactions were tested in this null hypothesis.

Of all the risk factors, prenatal smoking was the one that continued to show a statistically significant negative relationship with infant-caregiver interaction during feeding from pretest to posttest. All other risk factors which showed statistically significant correlations with infant-caregiver interaction during feeding at pretest were not correlated in a statistically significant way at posttest. Home-based intervention seemed to affect the quality of infant caregiver interactions except for the variable of smoking.

Again, the implications were that risk factors relate negatively to the quality of infant-caregiving interactions. For the caregivers who smoked, the scores on infant-caregiver interactions during feeding were lower. It was possible to speculate that when the caregiver is smoking the infant is not receiving quality care. Smoking introduces distractibility to the interaction. If the caregiver left the infant to smoke so as not to expose the infant to secondary smoke, then that created distance between the caregiver and infant.

Results also indicated statistically significant correlations between the infant-caregiver interaction during feeding post-treatment scores and measures of the quality of the caregiving environment. HOME mean scores were related in a statistically significant and positive manner to feeding post-treatment scores ( $r=.58$ ,  $p=.002$ ).

Results supported rejecting the null hypothesis and concluding that there were negative relationships between risk variables and infant-caregiver interactions. A further conclusion was that the

quality of the caregiving environment was related positively to the interactions of infants and caregivers during posttest feeding.

Given this backdrop of the relationships between risk factors, quality caregiving environment, and infant-caregiver interactions during feeding, the obvious final question was, what effects does infant massage have on infant-caregiver interactions given a similar caregiving environment?

### ***Null Hypothesis 2***

Massage treatment is unrelated to the quality of the caregiving environment.

This hypothesis addressed differences in the treatment and control groups on the variable of the quality of the caregiving environment. The HOME scale was used to measure the caregiving environment and there was no significant difference between the groups for this variable. The implications of these results were that the caregiving environment was similar for both groups, and massage treatment was provided to a group that shared a similar caregiving environment with the control group. The HOME scores represented a composite of the quality of the caregiving environment. Certainly with intensive home-based services we could expect the caregiving environment to improve. Both groups received the same home-based services except for massage treatment.

The focus of this study was the effects of massage treatment on the infant-caregiver interaction. Factors contributing to the quality of the caregiving environment were variables which the investigator wished to hold in check in order to focus on massage treatment.

The investigator hoped to not reject this null hypothesis and concluded from the statistical analyses that the effect of massage treatment on infant-caregiver interactions could be examined independently from the level of the caregiving environment.

### ***Null hypothesis 3***

Massage treatment does not have a positive effect on infant-caregiver interactions during routine feeding situations.

Correlational analysis of the data showed a statistically significant relationship between massage and infant-caregiver interaction scores on the feeding posttest. There was also a statistically significant relationship between infant-caregiver feeding scores for the pretest and posttest ( $r=.53$ ,  $p=.005$ ). Further analysis using the analysis of covariance (ANCOVA) to test for treatment differences between feeding posttest scores and massage treatment was warranted. The difference for the treatment and control groups on interactions during feeding approached statistical significance ( $p=.066$ ). The implications of these results were that given an intensive home-based nursing program for all subjects, the subjects receiving additional massage treatment exhibited more positive interactions during feeding situations.

## **Relationship of Results to Literature**

### **Literature to Support Quantitative Results**

The population of high risk infants was expected to exhibit risk variables and these risk variables were expected to impact the quality of the caregiving environment. The population was expected to benefit from intensive home based services. The interactions between infants and caregivers improved for both groups and even more for the group receiving massage treatment.

There was substantial literature to support these results. Magid and McKelvey (1987) recommended infant massage for caregivers to develop the stimulation and interactions skills so critical for healthy attachments with their infants. Carmen (1994) stated the importance of looking at interventions which teach sensitivity to social cues, reciprocity and enhancement of quiet states. Mahoney and Powell (1988) recommended that caregivers be taught to massage their infant directly. Massage training taught caregivers to develop these specific skills (McClure, 1988; 1989). Furthermore, from the literature (Brazelton, 1990; Barnard, et al., 1989) it was clear that these were the specific skills that form a foundation for healthy attachments between infant and caregiver. Reite (1984) and Montague (1986) presented clear evidence for the importance of touch and skin communication which is so central to infant massage. Biggar (1984) indicated the damage which was done to healthy child outcomes when the mother avoided touching her infant. This study focused specifically on training caregivers to massage their high risk infants in order to enhance their

interactions and potentially avoid the negative outcomes of poor attachments.

Gaensbauer and Harmon (1982) gave early support to research designs that studied attachments with at risk infants outside of the hospital, and in the home, where naturally occurring interactions take place. This study was specifically interested in the quality of infant-caregiver interactions in the home during regular routines, such as feeding. Over the past 20 years, the extensive research of Barnard and associates has contributed greatly to the development of a measurement of infant-caregiver interaction. The NCAST scales were selected by the SIDS risk prevention project for interaction assessments, and the investigator considered them a sound measure of the dependent variable of infant-caregiver interaction for this study.

Barnard, et al. (1985) conducted a 12-week study of the effects of massage on interaction with full term healthy infants in the home. The conclusion of their study was that 12 weeks was not long enough to measure effects. This current study measured the infant over one year and the caregiver interview provided follow-up to three years.

There was research to support the study of the effects of specific interventions on infant-caregiver interaction. This study narrowed the focus to high risk infants, in their homes, with infant massage provided by the caregiver as the primary interaction intervention.

### **SIDS Risk Prevention Project Results**

The SIDS risk prevention project provided valuable intensive home-based services to very high risk infants, but the project staff did not analyze any of their collected data. They intended to have a data system in place in 1994 to analyze the results but have not done so at this time. Their final report stated that the program did seem to have a positive impact on other child health outcomes, with 94% of the infants having adequate immunizations at one year of age, less than 8% of the mothers experiencing a second pregnancy by the infant's first birthday, and at least 80% of the infants having normal growth and developmental levels by one year of age (Skeels, 1993). Of the original 102 infants screened to be at very high risk for SIDS, three died from SIDS. The only risk factor found common among these three infants was prenatal maternal smoking. As presented in the literature review for this current study, maternal smoking continues to present a strong link to SIDS.

None of the 51 infants in this intensive in-home project died. While the SIDS prevention project could not make any substantiated claims on the effects of their project, the Health Department reported that the rate of SIDS in Marion county dropped dramatically in the 1992 census (available in 1994). The nurse providing the services in this study explained that the health care community's "best guess" for this change was the consistent urging of caregivers to have their infants sleep on their sides or backs rather than their stomachs. Considerable media attention has been given to this recommendation in the past several years, and she believes it may have made a difference in SIDS rates in general. Just

as it was difficult to pinpoint causes for SIDS it was also difficult to explain trend reversals. But to have the yearly county rate drop from 12 to 6 cases of SIDS was striking. At this time, there is no additional census data to show if the downward trend has continued.

### **Statistical Versus Practical Significance of Results**

Since the investigator set the significance level at .05, the null hypothesis of no difference between the treatment and control groups cannot be rejected. Given the exploratory nature of this research, it would have been acceptable to set the alpha level at .10. Cohen (1990) added further insight and humor into significance level in the following quote:

The prevailing yes-no decision at the magic .05 level from a single research is a far cry from the use of informed judgment. Science simply doesn't work that way. A successful piece of research doesn't conclusively settle an issue, it just makes some theoretical proposition to some degree more likely. Only successful further replication in the same and different settings (as might be found through meta-analysis) provides an approach to settling the issue. How much more likely this single research makes the proposition depends on many things, but not on whether  $p$  is equal to or greater than .05; .05 is not a cliff but a convenient reference point along the possibility-probability continuum. There is no ontological basis for dichotomous decision making in psychological inquiry. The point was neatly made by Rosnow and Rosenthal (1989) last year in the American Psychologist. They wrote 'surely, God loves the .06 nearly as much as the .05' (p. 1277) to which I say amen! (p. 1311)

While statistical significance at the .05 alpha level for the effects of massage was not achieved in this study, the results were very suggestive of a positive impact for infant massage. Sample size was a contributing factor. "Given that smaller sample sizes mean



less power, and given that a greater mean difference is probably required for rejection of the null hypothesis, more observed relationships are probably practically significant than if larger samples were involved.” (Gay, 1996, p.521) Gay pointed out that lack of power may keep researchers from finding some important relationships. Both the size of sample and the number of completed data sets in this current study had an impact on power and were beyond the control of the investigator. Loss of subjects and incomplete data are a reality in field research, but the practical significance of the results cannot be overlooked.

This study found an important relationship between infant-caregiver interaction and massage, that approached statistical significance (.066). Given the sample size and the treatment conditions the investigator is very encouraged. Both groups of families who received intensive home-based treatment services from the county health care nurse improved their interactions during normal feeding situations. Furthermore, the smaller subgroup of caregivers who received massage training within that total treatment sample improved their interactions even more. Infant-caregiver interactions improved and, more importantly, the caregivers interviewed were unanimously approving of the positive effects of massage. The practical significance of this impact and improvement in infant-caregiver interaction is encouraging to the continuation of massage training in early intervention.

## **Implications of Qualitative Information**

For the investigator, the interview information from the families was enlightening and overwhelmingly supportive of the services which they received. While some may have been hesitant to have a nurse visit their home, by the end of the year they were calling her their “lifeline”. The services provided by this nurse, were in their own words, “excellent”. Given the consistency of their positive evaluations, the statistical evidence for the additional gains for infant-caregiver interaction with massage shined brighter. The nurse clearly did her job in providing education, support and liaison services for the caregivers and their infants’ complex medical needs.

All the caregivers were given an opportunity to participate in the interview process. The results were limited to caregivers who responded to the Health Department request. It can be argued that only caregivers who were happy with services would respond to the request to be interviewed. Yet, often people with an ax to grind will seize the opportunity to complain. The investigator considers the interview process simply as a way to gain a unique perspective of home based services from the caregivers’ point of view versus simply analyzing the nurse’s observations.

## **Discussion of the Limitations and Challenges of Research in Home Settings**

Because of the nature of this exploratory field research, the decision was made to examine both quantitative and qualitative data. Collecting both kinds of data adds more credibility to the design (Gay, 1996). Because the investigator had no control over sample size

or participation, an in-depth interview was added to allow the investigator to talk with self-selected caregivers to acquire another perspective of the intensive nursing services offered. Particularly, the investigator was interested in recording parent perceptions of their infant's development, their experiences and satisfaction with massage intervention, and their ratings of the public health care nurse.

Unlike many field sites in early intervention, this special SIDS project had a standardized protocol for home visits and offered the investigator a chance to look at massage treatment in the context of a standardized home intervention. Families were assigned alternately to each nurse and contacted to invite them to participate in the project.

The many factors which classified an infant at high risk for SIDS were also factors that make home-based intervention services a challenge. What the two nurses set out to accomplish was very ambitious. The fact that both nurses received a commitment from caregivers to accept services was the first of many obstacles to overcome. Having a child born early and with complications is a very emotional experience for families. For some caregivers, the thought of a stranger entering their home on a weekly basis can be quite threatening. Usually caregivers overcome their initial hesitancy, and when treated with respect and care, they eventually consider these services as supportive and in some cases as a "life-line". This research study discovered that all caregivers interviewed by telephone rated their in-home services very high.

Of the initial 51 families who accepted services from the Marion County Health Department, only 23 could be analyzed for this study. All 51 families received some degree of services. Some moved before final assessments could be conducted. Others presented day-to-day difficulties which made ongoing NCAST observations very challenging. For many of the families, there was significant support in the way of grandparents to help out with caregiving and literally provide a place to live. Sometimes this dimension of support presented additional challenges in the form of tension between the caregiver and in-laws. For some, this erupted into custody battles. One teenage caregiver was living in her parents' home along with nine younger siblings. Another caregiver was living with a sister who also had a baby at the same time and there were considerable arguments over whose baby was developing better. For other caregivers, there was the ongoing struggle of abuse from current or former boyfriends, some of whom were fathers of the infants.

One infant participating in the project lived the first year of life in four different environments, with a foster care placement finally accomplished after 18 months of turmoil. The nurse's case notes record that one of the home environments, in which the infant lived, was permeated with the strong odor of animals, as 29 cats and 5 dogs also lived there. Often when the nurse visited the expected home the baby was elsewhere.

In other families, the infant was reported in and out of the home due to drug or substance abuse problems for the primary caregiver. One caregiver was continually in and out of residential

drug treatment programs over an 18 month period, and the nurse still continued to visit the infant in both the home and foster care settings (over 40 visits).

The difficulty in conducting a formal observation of primary caregiver and infant interaction when the baby is not with a primary caregiver is obvious. Life for some of these infants was marred with cruel beginnings.

The investigator was very impressed with the nurses' outstanding job of keeping records of all their contacts, and fully aware of the difficulties in assisting caregivers and families to adjust to their high risk infants. There were numerous records of repeated phone calls and visits to unanswered doors. Both nurses continued to do their jobs with varying degrees of success.

The fact that nurse B, who also offered infant massage training, was able to record pre/post observation data for 23 of her 31 families is miraculous. Nurse K also had thorough records and multiple visits, but only showed complete pre/post observation data for three families.

The investigator gained additional respect for the difficulty of the nurses' tasks when she set out to conduct the 17 telephone interviews. It took five months to complete the interview process. For six of the willing families, the investigator discovered disconnected telephones or different families with the old phone number. For several of the interviews the investigator was asked to call back numerous times because of family crises (the most was ten times for one interview). Because of the time difference between when they initially received services and when they were

interviewed, several of the families had given birth to additional infants. One gave birth to two more children, making a total of five children in six years.

## **Effects of Uncontrolled Variables on Results\_**

### **Design**

This study was a quasi-experimental research design and exploratory in nature. There was a mixture of qualitative, descriptive, correlational and causal-comparative data inviting many limitations. The relationships between variables were examined based on literature and past research that found specific variables to have an effect on the quality of the caregiving environment and infant-caregiver interaction. Variables were not manipulated experimentally and results were discussed based on relationships and on the effects of massage treatment. A limitation of this type of research is that, while relationships can be established, cause may not (Gay, 1996). In the examination of relationships the investigator made no statement of causes.

According to Gay (1996), more structured qualitative research has become a major trend in research design with an increased application of both qualitative and quantitative inquiry strategies in the same study. Gay stated that the combination of collecting both qualitative and quantitative data strengthens the research design. The investigator recognized early in her research design that with the inherent limits to statistical exploration, the qualitative

caregiver interview would be a positive addition, and she was not disappointed.

### **Population**

This population was selected because they were high risk infants who received home-based services under a standardized assessment and education protocol. While home based services for at-risk infants usually follow a typical set of activities, this particular group received more standardized and frequent assessments. The investigator believed that this population of high risk infants offered the best possible home setting to examine infant massage and infant-caregiver interactions at home.

### **Sample**

For this type of research it was ethically valid to provide home-based nursing treatment to all families, with the addition of infant massage offered to families within the time period of availability (after nurse B received training). The sample of 51 infants experienced the loss of subjects due to a variety of factors. The final research sample was 23 caregiver-infant dyads. The investigator originally intended to compare infant-caregiver interaction for samples from both nurses. Upon examining the files the investigator discovered that the analysis was going to be strictly a within group design for nurse B. While the sample size became smaller, the size was balanced by the strength in examining data collected by the same nurse.

**Reliability of Research Study**

In a previous discussion of the qualities of strength, integrity and effectiveness in the chapter on design, the investigator highlighted the attempts made to strengthen treatment fidelity. Research conducted outside of the control of strict experimental design is difficult. The investigator attended to as many variables as possible to assure the reliability of this study. The design of the SIDS project assured more control of treatment than is usually possible in field research. When nurses do home visits, they usually follow a protocol for assessment and education but not to the degree found in this study. By examining existing data the investigator was limited to the analysis of relationships and effects.

**Validity of Research Study**

The pretest-posttest control group design controls for internal validity. Maturation and testing are controlled in that they should be manifested equally in the treatment and control groups. (Campbell & Stanley, 1963).

Because of the small sample size, the investigator decided to use the NCAST Feeding scale scores as the sole dependent measure for infant-caregiver interaction. NCAST Teaching scale pre/post scores were only completed for 15 subjects. This was considered too small a sample to provide evidence for comparison of groups on interaction during unfamiliar situations. Nurse B reported that it was difficult to collect teaching interaction data because it required setting up an artificial teaching situation. Given the chaos of some of



the homes, it was more natural to observe infant-caregiver interactions during routine feeding times.

Campbell and Stanley (1963) stated that researchers must defend why certain hypotheses are ruled out, such as for insufficient data, and why others are retained, “because their plausible impact appeared to be large enough to account for all the observed effect” (p.201). The investigator followed this advice in choosing data to test the effects of massage on infant-caregiver interaction during feeding routines and not during teaching situations. The ANCOVA statistical analysis with 20 degrees of freedom met the criteria for robustness in small samples as discussed by Tabachnick and Fidell (1983).

### **Generalizability of Research Results**

The results should be interpreted with the understanding that the study took place in Marion county, Oregon. While care should be taken in generalizing the results to dissimilar geographic regions, the results can be generalized to infant populations sharing the risk factors identified in this study.

What can be said, is that, for this high risk population sample ( $n=23$ ), intensive home-based nursing services demonstrated a positive effect on infant-caregiver interaction, particularly when massage was taught as an additional caregiving skill.

### **Implications and Recommendations for Future Action and Research**

There were practical implications from this research study which can guide the practice of early intervention for high risk

infants and their caregivers. Infant massage training for caregivers of high risk infants may provide positive effects on the quality of their interactions, and caregivers find this training very helpful.

In his summary of the major findings of a series of longitudinal studies of the effects of early intervention, Anastasiow (1993) concluded, "what seems to matter in the long run is the quality of physical and emotional care. Lack of money, poor housing, large families, cognitive limitations and adverse life events can be overcome by good care" (p. 3). Providing home-based nursing services for high risk infants and their caregivers achieved positive outcomes in this research study. Nurse B provided ongoing education and support, resulting in enhanced infant-caregiver interactions. These interactions seemed to be further strengthened by the caregivers' use of massage.

The results of this study added to the growing body of research conducted by Field and associates at the University of Miami Medical School, Touch Institute. When the investigator wrote to this program, in June of 1995, she was encouraged by the number of new research studies currently underway. Field and associates have expanded their original research model for premature infants in the NICU to populations representing a cross section of medical conditions and disabilities. Their research (most in progress) also extended their study of infant massage to mothers and foster grandparents delivering massage intervention to high risk infants. The preliminary data for these studies was included in the review of the literature reported in this study. The data collected in this study added new information to the field of infant massage research by

extending research study to high risk infants in home settings and in examining gains strictly in terms of infant-caregiver interactions. The addition of qualitative data also supported the positive effects of infant massage on the continued infant-caregiver relationship.

If this study were replicated, the investigator would want to exercise more control by teaming with the nurse interventionist to collect more consistent assessment data. In this study, when a choice had to be made between assessment and education, the nurse ethically chose education and the provision of services. More assistance in measuring outcomes would have made a big difference in the sample data for analysis reported here.

Replication of this current research is recommended. While exploratory field research is a challenge, it represents the reality of early intervention. The usefulness of results gathered in the home under typical daily interactions is obvious. Future research could target the interaction during teaching episodes with a concentration on a larger sample size.

In her curriculum for infant massage training, McClure (1989) teaches caregivers to ask permission of their infant before beginning the massage. This is an unusual behavior for most caregivers and warrants further investigation. In the telephone interview, the investigator asked if this caregiver behavior had an effect on the relationship with the infant. Caregivers interviewed reported that it enhanced their respect for the infant. This has intriguing consequences for areas, such as child abuse prevention. The quality of infant-caregiver interaction could be enhanced by use of this permission-seeking behavior.

It took a long time for infant massage to cross the ocean and land in the United States. The tremendous growth in research over the past two years is very encouraging. Infant massage research has not appeared exclusively in professional journals. Popular magazines, news broadcasts and lectures have shared the results of Field's exciting research. Classes to teach caregivers to massage their infants have appeared in many hospitals and health department programs. This study is part of a new field of research and hopefully will encourage the use of massage training in early intervention.

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## **APPENDICES**

**APPENDIX A**

**Postneonatal Infant Mortality Study (PIMS)  
Marion County Health Department High Risk Program  
Assessment and Education Flowsheet**

Name \_\_\_\_\_ DOB \_\_\_\_\_ Corrected DOB \_\_\_\_\_  
(Nurse: Date and Initial at time of visit)

Visit No.	ASSESSMENT	Date/Initial	EDUCATION	Date/Initial
1.	Initial High Risk Inf. Assessment PIMS Screening Tool			
2.	Feeding/Sleeping		Feeding Care Plan	
	Assign NCASA			
3.	Home Environment		Clothing Care Plan	
	NCASA			
4.	Sleeping		Sleeping Care Plan	
	Review NCASA			
	NCAST Feeding			
5.	Parenting		G & D, expectations	
6.	NCAST HOME		Infant Stimulation	
7.	Emotional Tolerance		Infant Cues	
8.	Health Management		Well Child/Immuniz. (2 mo.)	
9.	NCAST Feeding		Feeding Care Plan	
10.	Nutr., Elim., Sleep, Growth		Feeding Care Plan	
11.	Role/Rel., Coping/Stress		Safety	
12.	NCAST Teaching		Infant Stimulation/Cues	
13.	Health		Illness	
14.	NCAST HOME		Family Planning	
15.	Emotional		G & D, expectations	
16.	RDSI/IMS/Hearing/Vision (4 mo.)			
17.	NCAST Feeding		Feeding Care Plan	
18.	Nutrition/Growth		Intro. of Solids	
19.	Parenting/Family		Nurturing Environment	
20.	Emotional		Building Self Esteem	
21.	Health		Well Child/ Immun. (4 mo)	
22.	Nutrition/Growth		Appetite Changes	
23.	Parenting/Family		Safety	
24.	NCAST Teaching		Autonomy/Motor/Language Dev.	
25.	Emotional		Family Dynamics	
26.	Nutrition/Growth		Dental	
			Feeding/Sleep Changes	
27.	Parenting		Nurturing Skills	
28.	NCAST HOME		Infant. Stimulation (play)	
29.	RDSI, IMS, Hearing, Vision (8 mo.)			
30.	NCAST Feeding		Self Feeding	
31.	NCAST Teaching		New behaviors	
32.	NCAST HOME		Safety	
33.	RDSI/IMS/Hearing/Vision (12 mo.)			



**APPENDIX B**

**SIDS Risk Assessment Tool**  
**Oregon Health Division - Marion County Health Department**

**PAST HISTORY**

Previous neonatal loss (1-27 days)	1 <u>      </u>
Previous post-neonatal loss (28 days - 1 year)	3 <u>      </u>
Previous birth within 18 months of this birth	1 <u>      </u>

**SOCIO-ECONOMIC**

Maternal age less than 17 years old	1 <u>      </u>
Maternal education less than 10th grade	1 <u>      </u>
Single parent	1 <u>      </u>

**PRENATAL HISTORY**

No prenatal care	2 <u>      </u>
Some but inadequate prenatal care (4 or less visits, or started in 3rd trim.)	1 <u>      </u>
Prenatal smoking at least 1/2 pack per day	2 <u>      </u>
Drug exposed infant (cocaine, amphetamines, opiates)	2 <u>      </u>
Perinatal infection (TORCH)	2 <u>      </u>
Gestational hypertension (by Hb)	2 <u>      </u>
Prenatal anemia (by Hb)	1 <u>      </u>
Syphilis	2 <u>      </u>
Other STDs	1 <u>      </u>

**IMMEDIATE POSTPARTUM MEDICAL**

Birth weight less than 2000 gms	2 <u>      </u>
Small for gestational age (< 3 standard deviations)	2 <u>      </u>
APGAR less than 5 at 5 minutes	2 <u>      </u>
Discharged on oxygen from hospital	4 <u>      </u>

**OTHER MEDICAL FACTORS**

Apparent life threatening event (ALTE)	10 <u>      </u>
Positive apnea workup (excluding apnea of prematurity)	3 <u>      </u>
Neonatal seizures	1 <u>      </u>
Failure to thrive	1 <u>      </u>

**TOTAL**

          

Score of 6 or more includes family into project.

**APPENDIX C**

**Marion County Health Department  
Infant Massage Instruction Flowsheet**

SESSIONS	DATE	COMMENTS
Introduction		
Legs and Feet		
Stomach		
Chest and Arms		
Face and Back		
Exercises		

**APPENDIX D**

## SUMMARY OF RESULTS

### CAREGIVER TELEPHONE INTERVIEW INFANT MASSAGE

**Total received letters: 55**

**Total responded: 17** (when contacted 7 were unavailable due to moving; no longer at phone #)

**Total interviewed: 10** (8 massage; 2 no massage)

**At the beginning of interview say:**

I want to thank you for responding to Barb Edward's letter from the Marion County Health Department. I appreciate your willingness to discuss your child's development with me. Is this a convenient time to answer questions for about 10 minutes? I want you to know that I will be writing your answers on a form with a code identifying whether Barb or Karen was your visiting nurse and if you received instruction to massage your infant. I will not be writing your name on the form. The information which I report in my study will not use your name. Do you understand how I will use this information? Do you have any questions before we start?

**\_\_\_\_\_ Code for family**

**Massage group (n=8):**

**BM4,BM18,BM43,BM54,BM55 (in analysis)**

**BM6,BM32,BM33 (not in analysis, incomplete data)**

**No Massage group (n=2):**

**B3, B9/10 (twins)**

1. **Sex of child :** **Massage group (n=8): 4 females/4 males**

**No Massage group (n=2): 1 female/ 1 male**

2. **Current age of child:** **Massage group (n=8):**

**3 yr = 4**

**3.5 yr= 2**

**4 yr = 2**

**No Massage group (n=2):**

**4 yr = 1**

**5 yr = 1**

3. Does child have any disabilities?

**Massage group (n=8): 7 NO 1 YES**

If yes, what are they? **Drug affected infant (foster care until 6 mo)**

**No Massage group (n=2): 1 NO 1 YES**

If yes, what are they? **Vision due to ROP; early intervention services; suspected to be ADHD**

4. Did you receive training to massage your infant?

**2 NO(0) 8 YES (1)** if no, then skip to question # (p.3)

5. When you began massaging your child, what was child's age?

**2 mo: 2**

**4 mo: 4**

**6 mo: 1**

**Don't remember: 1**

6. How often did you massage your infant?

**4 Daily 4 Weekly Less**

For how long? **Stopped at: 7 mo, 12 mo, 14 mo, 15 mo, 2 yr, 3yr**

**Continue to use: 2**

7. What massage techniques do you continue to use?

**Back strokes: 3**

**Legs & feet: 4**

8. Who in your family massages your infant? **Mom= 8**

9. What was your families response to infant massage?

**Supportive= 8**

10. Do you use massage other children in family? **5 NO(0)**

**3 YES (1)**

11. When your child is sick, do you (or did you) massage your child?

**1 NO(0) 7 YES. (1) ;**

Which strokes have been helpful?: **milking of legs and arms=3; back strokes: 2; chest=1; face=1; stomach=2; feet=1**

12. Does your child have specific physical problems which limit your use of massage?

7 NO(0) 1 YES (1) Apnea monitor

13. How did your baby respond to massage during distressful situation (e.g. colic, fussiness)?

**Calmed down= 3**

**Did not calm him but massaged through it or stopped= 2**

**Worked through it in warm water bath (drug baby)= 1**

14. You were taught to ask permission of your baby before beginning massage. Has this had any effect on your relationship with your child or your attitude about your child?

**Don't recall= 2**

**YES = 4 (more at ease; worked rapidly; read cues; set up mutual respect when mom would ask and he would smile or react to first stroke)**



**Say to caregiver:**

The following questions will be from your memory of your infant during the first year of life. I am interested in the general impressions which you have of your child's development.

**CAREGIVER INTERPRETATION OF CHILD CONDITION**

15. Which of the following conditions could you interpret from your child's cry:

**No Massage      Massage**

1	8	Crying when tired
2	8	Crying when hungry
1	5	Crying from internal discomfort (physical condition)
2	7	Crying from anger
1	4	Crying from fear
2	7	Crying from pain or injury
0	4	Crying for attention
0	2	Others conditions?
(Foster child cried when forced to interact and not be isolated; came angry and frustrated)		

What strategies did you find most effective to soothe your infant?

**Talk to her; sing; movement and colors; hugs; rocking & singing; carry around; hold and massage back and arm; held tight and talk gently and soothingly; listen to Mom's heart beat; pick up and nurse; put pillows around premie baby's body in crib; holding, nursing and talking.**

For those families using massage ask:

16. Since using massage with your child how would you rate your ability to interpret your child's conditions?

<b>1</b>	<b>2      (2)</b>	<b>3      (6)</b>
<b>Less Accurate</b>	<b>About the same</b>	<b>More Accurate</b>

**Comments: Really helped to understand what she was communicating; more in tune, 1:1 time with no interruptions; gave Mom something to do to calm him down;**

**For those families NOT using massage ask:**

17. Since receiving services from the county public health care nurse, how would you rate your ability to interpret your child's conditions?

<b>1</b>	<b>2 (1)</b>	<b>3 (1)</b>
<b>Less Accurate</b>	<b>About the same</b>	<b>More Accurate</b>

**Comments:**

**CAREGIVER ABILITY TO DISTINGUISH CHILD'S EXPRESSIONS**

18. Which of the following expressions could you distinguish for your child?

**No Massage    Massage**

2	8	Happiness/joy
2	7	Response to the expressions of others (parent smiles, etc.)
1	6	Attention (e.g. smile to get someones attention)
2	7	Comfortable feeling (relaxed)
1	8	Stranger's presence (stop smiling, blank look)
1	7	Fear
2	8	Wants to be touched, held or picked up
2	8	Secure

**For those families using massage ask:**

19. Since using massage with your child how would you rate your ability to tell what child's expressions mean?

<b>1</b>	<b>2 (2)</b>	<b>3 (6)</b>
<b>Less Accurate</b>	<b>About the same</b>	<b>More Accurate</b>

**Comments:**

**Foster child (drug baby) learned to trust at 4 mo which was a real breakthrough;  
Didn't really think of massage as making her more accurate- just a way to spend quality time with baby.**

**For those families NOT using massage ask:**

20. Since receiving services from the county public health care nurse, how would you rate your ability to tell what child's expressions mean?

<b>1</b>	<b>2      (1)</b>	<b>3      (1)</b>
<b>Less Accurate</b>	<b>About the same</b>	<b>More Accurate</b>

**Comments:**

**DESCRIBE YOUR CHILD'S NIGHT SLEEPING HABITS IN GENERAL :**

21. How would you describe child's sleep during the first six months ?

**No Massage      Massage**

1	2	Long lasting sleep span ( 5 or more hours)
1	5	Moderate sleep span (2-4 hours)
0	1	Short sleep (1-2 hours)
0	1	Disturbed sleep (less than 1 hour)
2	7	Child seems relaxed during sleep
0	0	Child seems tense or anxious (facial expression, a lot of moving)
0	0	Not sure

22. How would you describe child's sleep during second six months (6-12 months)?

**No Massage      Massage**

2	7	Long lasting sleep span ( 5 or more hours)
0	0	Moderate sleep span (2-4 hours)
0	0	Short sleep (1-2 hours)
0	0	Disturbed sleep (less than 1 hour)
2	7	Child seems relaxed during sleep
0	1	Child seems tense or anxious (facial expression, a lot of moving)
0	0	Not sure



**27. DESCRIBE YOU CHILD'S RESPONSE TO TOUCH IN GENERAL:**

**No Massage      Massage**

1	7	Child's body feels relaxed, enjoys touch and cuddles
1	3	Child's body feels tense; child rejects touch
1	4	Certain muscles or areas seem tense or sensitive
0	4	Child anticipates touch (body movements, vocalizing, smiling or eye contact)
0	0	Not sure

**For those families using massage ask:**

28. Since using massage with your child how would you rate your ability to distinguish your child's response to touch?

**1**

**2      (1)**

**3      (7)**

**Less Accurate**

**About the same**

**More Accurate**

**Comments:**

**For those families NOT using massage ask:**

29. Since receiving services from the county public health care nurse, how would you rate your ability to distinguish your child's response to touch?

**1**

**2      (2)**

**3**

**Less Accurate**

**About the same**

**More Accurate**

**Comments: Taught ways to relax**

**30. DESCRIBE YOUR CHILD'S EATING HABITS IN GENERAL****No Massage      Massage**

1	3	Extremely good, sufficient appetite
0	3	Average appetite
1	2	Below average appetite
1	3	No feeding problems
1	3	Specific feeding problems

**For those families using massage ask:**

31. Since using massage with your child how would you rate your ability to distinguish your child's appetite or eating habits (hunger or full signal) ?

<b>1</b>	<b>2      (6)</b>	<b>3      (2)</b>
<b>Less Accurate</b>	<b>About the same</b>	<b>More Accurate</b>

**Comments:**

**For those families NOT using massage ask:**

32. Since receiving services from the county public health care nurse, how would you rate your ability to distinguish your child's appetite or eating habits?

<b>1</b>	<b>2      (2)</b>	<b>3</b>
<b>Less Accurate</b>	<b>About the same</b>	<b>More Accurate</b>

**Comments:**

### **CAREGIVER'S ASSESSMENT OF CHILD'S ABILITY TO COPE**

Using the following scale please rate your child's behavior on the following 4-pt scale:

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Not effective</b>	<b>Minimally effective</b>	<b>Situationally effective</b>	<b>Consistently more often across</b>
<b>situations</b>			
<b>ITEM AVERAGES</b>			
<b>No Massage</b>	<b>Massage</b>		
<b>4.0</b>	<b>3.6</b>	33. Child responds to different sounds (voices, loud and soft)	
<b>4.0</b>	<b>3.5</b>	34. Child responds to a different things seen (people, objects, patterns)	
<b>4.0</b>	<b>3.9</b>	35. Child reacts to different kinds of touch experiences (holding,water play, clothing)	
<b>3.5</b>	<b>3.6</b>	36. Child adjusts to changes in touch (e.g. light to firm)	
<b>4.0</b>	<b>3.6</b>	37. Child tolerates being in a variety of positions (back, stomach, side)	
<b>4.0</b>	<b>4.0</b>	38. Child accepts warmth and support from familiar persons	
<b>3.0</b>	<b>3.6</b>	39. Child reacts to feelings and moods of other people	
<b>4.0</b>	<b>4.0</b>	40. Child demonstrates pleasure after doing something well	
<b>3.5</b>	<b>3.8</b>	41. Child can give and take in social interactions (waving Hi or Bye; play time)	
<b>2.5</b>	<b>3.3</b>	42. Child is aware that how he behaves has an effect on people and objects.	
<b>3.0</b>	<b>3.1</b>	43. Child adjusts to daily routines and limits set by caregiver	

<b>No Massage</b>	<b>Message</b>
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<b>3.5</b>	<b>3.3</b>	44. Child adjusts to changes in the environment
<b>3.5</b>	<b>3.3</b>	45. Child bounces back after stressful situations
<b>4.0</b>	<b>3.8</b>	46. Child expresses likes and dislikes
<b>4.0</b>	<b>3.8</b>	47. Child starts interactions with others (will say Hi first, smile first)
<b>4.0</b>	<b>3.8</b>	48. Child gives warmth and affection to others
<b>4.0</b>	<b>3.6</b>	49. Child expresses a range of feelings
<b>3.3</b>	<b>4.0</b>	50. Child enters new situations easily or cautiously as the occasion demands.

**Individual Total Score (Mean)**

<b>No Massage</b>	<b>Message</b>
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<b>3.8</b>	<b>3.9</b>
<b>3.5</b>	<b>3.8</b>
	<b>3.8</b>
	<b>3.8</b>
	<b>3.8</b>
	<b>3.8</b>
	<b>3.7</b>

**2.4 (drug affected foster child)**



**CAREGIVERS SATISFACTION WITH INFANT MASSAGE**  
**INSTRUCTION N=8**

51. In general how would you rate the instruction you received in infant massage?

needs to improve	fair	good	excellent
1	2	3	4
		<b>(1)</b>	<b>(7)</b>

The instructor's:

52. Understanding of subject	1	2	3	4
			<b>(2)</b>	<b>(6)</b>

53. Ability to communicate	1	2	3	4
				<b>(8)</b>

54. Ability to demonstrate techniques	1	2	3	4
			<b>(1)</b>	<b>(7)</b>

55. Ability to discuss and answer questions	1	2	3	4
			<b>(2)</b>	<b>(6)</b>

Comments:

- \* **Barb was just learning to teach infant massage and was more than willing to find answers to questions she could not answer**
- \* **Barb was GREAT, wish all the nurses were like her!**
- \* **I had already used massage with my other children (foster mom) but Barb was able to explain benefits to me. I became very tuned into my foster child and I fully believe that touch and skin contact was essential to his recovery (drug affected) and development. At 4 months he experienced a real breakthrough and by the time his mother took him away he was smiling and thriving (6 months). I have no idea where he is now.**
- \* **This was a really nice service, I hope they continue this program for other families**
- \* **Barb really encouraged me**
- \* **Really enjoyed it!**
- \* **This is a wonderful program; wish it were available to general public. My daughter was premature and I desperately needed to learn strategies for us to bond. I didn't nurse her and I wanted a way to feel close since she wasn't cuddly. Massage really helped.**
- \* **This was very useful and helpful to get to know my baby**

## CAREGIVERS SATISFACTION WITH MARION COUNTY HEALTH DEPARTMENT NURSES' SERVICES

N=10

56. In general how would you rate the services and information which you received from your public health nurse?

needs to improve 1	fair 2	good 3	excellent 4 (10)
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The nurse's:

57.	Understanding of subject	1	2	3 (2)	4 (8)
58.	Ability to communicate	1	2	3	4 (10)
59.	Ability to demonstrate child care tips	1	2	3	4 (10)
60.	Ability to discuss and answer questions	1	2	3	4 (10)

Comments:

- \* **The services were very helpful. I used drugs during my early pregnancy and I was very concerned about the possible effects on my baby's development (I stopped drugs when I realized I was pregnant). Home nursing services were so helpful in giving me the information and confidence I needed for both my children.**
- \* **You should have more nurses like Barb, she helped me learn about child development!**
- \* **Barb did an excellent job. Yet, I was frustrated with her not having her own children. If she had she would have understood the pressure I felt when my baby didn't gain weight. Barb was always very concerned when my baby didn't gain weight and I felt very pressured. She was great at sharing child care tips and helping me to understand. Barb is a congenial person and excellently prepared.**
- \* **I was really pleased with services.**

- \* I am a recovering alcoholic and I couldn't have made it without her. Barb gave me strength; I borrowed her enormous strength to get me through. She made the difference for me. Any questions which I had she would find out the answers for me; call the doctor and agencies for answers for me. She saved me!**
- \* I appreciated her ability to flow with what my household needed. At first I needed more help so she came more often; she was available and able to make visits fit my needs. She gave me lots of information concerning AIDS to allay our family concerns. Barb was very informative. She helped me with my frustrations over accepting a foster child. This was my first foster child and Barb helped me sort out my feelings. She made me feel important. She was respectful and kind and helped me learn.**
- \* I loved everything about Barb. She was more willing to help, explain and give reasons for what my baby was doing. Another nurse visited in her place one time and wasn't as knowledgeable. Wish others nurses were as competent as Barb. I am so glad I had the opportunity to meet her.**
- \* I thought Barb was so helpful. When she first called to explain services I wasn't very open to the idea. But once she came I loved her so much it made it much easier to accept someone in my home. She was able to answer any question which I had. Barb's calm manner really made mothering work for me as a first time Mom with a fragile baby. I realized that I needed someone to touch base with, to answer my questions and calm my fears. I now have a second baby (3 weeks old) and plan to use massage with her as well.**

**APPENDIX E**



# **Marion County**

## **OREGON**

### **HEALTH DEPARTMENT**

**BOARD OF COMMISSIONERS**  
Randall Franke  
Gary Heer  
Mary Pearmine

**ADMINISTRATOR**  
Jeffrey R. Davis

**ADMINISTRATION**  
(503) 588-5357  
FAX (503) 364-6552

**CHILD MENTAL HEALTH SERVICES**  
(503) 588-5352  
FAX (503) 588-5433

**COMMUNICABLE DISEASE & CLINIC SERVICES**  
(503) 588-5342

**DRUG TREATMENT**  
(503) 588-5358

**ENVIRONMENTAL HEALTH**  
(503) 588-5346

**FAMILY PLANNING & PRE-NATAL**  
(503) 588-5355

**MENTAL HEALTH COMMUNITY SUPPORT, CRISIS & PRECOMMITMENT**  
(503) 588-5351  
FAX (503) 585-4908

**MENTAL RETARDATION/ DEVELOPMENTAL DISABILITIES**  
(503) 588-5288  
FAX (503) 588-5290  
TTY (503) 585-4905

**REFUGEE SERVICES**  
(503) 588-5308

**SCHOOL IMMUNIZATION**  
(503) 588-5011

**TTY/TTD**  
(503) 588-5400

**VITAL STATISTICS**  
(503) 588-5406

**WOMEN, INFANTS & CHILDREN (WIC)**  
(503) 588-5057

**Dear Parent:**

I am sending this letter to you on behalf of Mickey Pardew who wants to ask for your help in some research she is doing on how infant massage helps babies. During 1991 and 1992 you were visited by a public health nurse, either me or Karen Bain. I taught some of you how to do infant massage. Mickey wants to talk with both families who used massage with their infants and families who did not. We can use this information to help other families who get our services.

Mickey has been working in the area of child development for over twenty years, both as a teacher and counselor. She now works for Western Oregon State College and is going to school to complete her PhD degree. Infant massage is her special area of study.

I am writing to ask your permission for Mickey to call you on the telephone to ask you some questions about your child's development. She will be asking you about feeding, sleeping, and growth patterns for your child. She also will ask you about how you talk with your child and any changes in your child's behavior. What you tell her will be kept confidential and no names or personal details will be in her study report. Mickey will only call families who send back the permission form.

What you tell us will help us decide if we should train all public health nurses how to do infant massage.

I hope you will send the bottom half of this letter back telling me that Mickey can call and talk with you about you and your child. Please send the form back today in the enclosed envelope. We thank you for your help and would love to share what we have learned with you when Mickey's study is done.

Sincerely yours,  
Signature redacted for privacy.

Barbara Edwards, RN

\*\*\*\*\*

Please check below:

\_\_\_\_\_ Yes, I would be willing to talk with Mickey on the telephone.

The best time to call me is \_\_\_\_\_

My telephone number is \_\_\_\_\_

I do not have a phone but can be reached at \_\_\_\_\_

Signature \_\_\_\_\_

\*\*\*\*\*

\_\_\_\_\_ No, I would not like to be called.

Return today in the enclosed envelope. THANK YOU!