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EFFECTS OF INFANT MASSAGE ON ASPECTS OF THE PARENT-CHILD
RELATIONSHIP: AN EXPERIMENTAL MANIPULATION

by

Vonda K. Jump

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Family Life / Family and Human Development

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ABSTRACT

Effects of Infant Massage on Aspects of the Parent-Child Relationship:
An Experimental Manipulation

by

Vonda K. Jump, Doctor of Philosophy
Utah State University, 1998

Major Professor: Lori A. Roggman, Ph.D.
Department: Family and Human Development

Benefits of attachment security have been demonstrated in the realm of socioemotional development. Studies have investigated some of the antecedents associated with the development of secure attachments. This study looked uniquely at the impact of touch, and more specifically, infant massage, on the development of attachment security in infants.

Fifty-seven mother-infant dyads were randomly assigned to either a treatment or control group. Infants were less than 8 months of age at the time of recruitment. The treatment group received training in infant massage as well as education about infant development. The control group received similar education about infant development. Mothers completed a set of questionnaires prior to the intervention and when their infants were 12 months old. In addition, attachment security was assessed using the Attachment Q-set at the 12-month followup.

Comparisons indicated that mothers who massaged their 12-month-old infants more than one time per week had infants who were statistically significantly more securely attached than infants of mothers who massaged their infants less than once per week, and were more securely attached than infants in the control group. Underlying mechanisms of change were not detected through the questionnaires used in this study.

(151 pages)

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Finishing my Ph.D. has at times seemed impossible as well as undesirable. But I am here. As I reflect on my career as a student in Utah, I have so many people to thank for helping to make it possible.

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Vonda K. Jump

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CHAPTER I

INTRODUCTION

The formation of attachments, which begins at birth and solidifies toward the end of an infant's first year of life, is an important phenomenon occurring in the realm of social-emotional development in early childhood. Securely attached infants have been found to be more socially competent, more sympathetic, and more effective in asking and receiving help than their insecurely attached counterparts (Crockenberg, 1981). In contrast, insecurely attached children seem to be at higher risk for later psychopathology (Belsky & Cassidy, 1994). Insecurely attached children also often become easily upset, are poor problem solvers, and are less skilled in interpersonal relationships (Shaver, Collins, & Clark, 1996). These characteristics have important ramifications for a child's social functioning, with insecurely attached children at a seeming disadvantage.

Approximately two-thirds of American infants become securely attached to their primary caregivers (Belsky & Rovine, 1987; Egeland & Farber, 1984). Is there anything that can increase the likelihood of more children becoming securely attached to their primary caregivers? Indeed there seems to be. Research on antecedents of secure attachment suggest there exists a mechanism by which some children become securely attached and some do not: sensitive, consistent, and responsive care (Crockenberg, 1981; Egeland & Farber, 1984). Isabella (1993) found that mothers whose infants were likely to be classified as secure at 12 months responded sensitively to their infants in the early months of life. In contrast, mothers whose infants were likely to be classified as insecure

at 12 months were inconsistently insensitive and rejecting of their infants across the first year of life.

Unfortunately, the process or processes by which this mechanism works is often overlooked in American society. Many contemporary authors cite the necessity of consistent and responsive care, but do not look at the specific factors responsible for the formation of secure attachments. However, classic work by researchers such as Harlow and Zimmermann (1959) indicates that physical contact or touch may be one of the crucial ingredients in the formation of attachment in primates. In addition, the serendipitous finding that lack of touch caused the phenomenon of marasmus in the early 20th century pointed out the importance of touch for human infants (Montagu, 1986).

However, this work is almost ignored in practice today, as seen by current American childrearing practices. We are increasingly becoming a "hands-off" society in dealing with our children. Many professionals and laypersons alike now shy away from physical contact with young children, partially due to the resurgence in child abuse reports. Teachers are discouraged from using physical contact with young children (Bernal, 1997; Field, 1995a). We continue to develop baby carriers that discourage physical contact between parent and child. We use plastic baby carriers that one can also use as car seats so that we can put the infant in the carrier, go to the car, take the carrier out of the car at the store, go back to the car, and take the carrier out of the car at home without touching the baby (Montagu, 1986). Where is physical contact in this description?

In addition, the notion that one can spoil infants by picking them up when they cry in their early months is still a common belief among many Americans (Garner, 1996), although research has shown that infants who are picked up when they cry in the first 6 months of life are less likely to cry in the second 6 months of life (Bell & Ainsworth, 1972). Attitudes that one can spoil infants by paying too much attention to them are not serving our infants well (Garner, 1996).

One way to promote attitudes that are more supportive of caregiving that leads to secure attachment may be to encourage strategies of caregiving that afford substantial physical contact (Anisfeld, Casper, Nozyce, & Cunningham, 1990). The use of massage with infants increases appropriate physical contact between parent and child (McClure, 1989). This increase in contact, which is contingent upon the child's acceptance, may foster responsiveness by the parent (Evans, 1990; McClure, 1989). This may, in turn, increase the secure feelings and sense of control experienced by the baby as the parent attends to the baby's cues of engagement and disengagement (Evans, 1990; McClure, 1989). These experiences may support the emergence of a secure attachment relationship between the infant and parent.

As a parent touches the infant for a prolonged amount of time, changes may also occur in the parent. Through having increased physical contact with one's infant and being reinforced for it by the infant, the parent's perception of relationships may be modified in a positive way (Durana, 1996; Hegarty & Gale, 1996). A parent's internal working model of relationships influences how one interacts with others (Rutter, 1995). Parental perceptions are strong and appear to influence child outcomes (Crockenberg,

1981), so improvements in these perceptions may positively affect interactions and attachment outcomes. In addition, parents with infants with temperament characteristics reflecting negative emotionality, which is a risk factor for insecure attachment, may reframe their impressions of their infants as well as learn how to respond appropriately to their infants' additional needs (Van den Boom, 1994).

Infant massage may provide one vehicle for improving the number of children who become securely attached to their primary caregivers in this study. However, research in the area is lacking. Field (1995b) stated that, "very little research has been conducted on the use of infant massage with healthy infants. Nonetheless, the infant massage training groups have anecdotally reported that massage 'facilitates the parent-infant bonding process in the development of warm, positive relationships'" (p. 106). Infant massage encourages primarily the use of nurturing and respectful touch, as well as eye contact and talking with babies, and in addition, teaches parents to pay attention to infant cues of engagement and disengagement (McClure, 1989). However, touch seems to be more important to babies than eye contact, smiling, or cooing (Pelaez-Nogueras et al., 1996). Touch and its associated variables are believed to be important in the formation of attachments by some researchers (Harlow & Zimmermann, 1959; Montagu, 1986).

In conclusion, an understanding of the mechanisms by which secure attachments are formed will clarify ways to increase the probability of those mechanisms being in place for infants. The purpose of this study is to further investigate the role of physical contact in the formation of secure attachments. The primary hypotheses are (a) that

mothers who attend a class on infant massage will be more likely to have infants who are more securely attached and (b) that mothers who attend a class on infant massage will be more likely to have more positive attitudes about their infants and about parenting. If physical contact is found to be an important mechanism which facilitates the development of secure attachments, inexpensive interventions can be developed to increase the likelihood of developing secure attachments between parent and child. These interventions can focus on a nurturing relationship with touch as a major component.

Definitions

The nominal definitions utilized in this study are as follows:

Infant: a child that is under the age of 2.

Parent: a person responsible for the physical, emotional, and psychological well-being of offspring.

Attachment: an enduring, emotional bond between parent and child.

Parenting stress: tension or strain that can be attributed to the parenting role.

Internal working model: a person's knowledge of how relationships proceed; this knowledge affects how one reacts to others and the amount of trust and effort one puts into relationships.

Temperament: emotionality or behavior style of an individual.

Touch: "to be, or to come, in contact with; to approach in some good quality; to handle" (Webster's New Dictionary and Thesaurus, 1990, p. 579).

Massage: "a kneading and rubbing of the muscles to stimulate the circulation of the blood and make them work better" (Webster's New Dictionary and Thesaurus, 1990, p. 334).

Assumptions

The assumptions of this study include the following:

All parents touch their infants to some extent, in some form.

All parents experience some level of stress due to the parenting role.

All parents have an internal working model of close relationships which guides their interactions with others, including their infants.

Research Questions

1. Are infants whose mothers have attended a class on infant massage more likely to be securely attached to their primary caregivers at 12 months of age than control infants?

2. Are mothers who have attended a class on infant massage likely to improve their attitudes toward parenting more than control mothers, as evidenced by perceptions of parenting stress, perceptions of close relationships, and perceptions of infant temperament?

CHAPTER II

REVIEW OF LITERATURE

The review of literature will be organized into three major sections. The first section will outline the conceptual framework utilized in this study. Remaining sections will address attachment and touch. Associated topics which will be reviewed under the attachment section include outcomes related to attachment security, parental perceptions and attitudes, and internal working models. Animal studies involving physical contact and infant massage are discussed under the touch section.

Conceptual Framework

The conceptual framework underlying this study is Bowlby's (1969) attachment theory, which has recently been enhanced by Kraemer's (1992) psychobiological theory of attachment. In addition, Montagu's (1986) theory of touch builds on Harlow and Zimmermann's (1959) demonstration that physical contact overrides lactation in the formation of affectional responses and is critical in this discussion because the current study hypothesizes that physical contact is an important and often overlooked modality through which secure attachments are formed.

Briefly, Bowlby (1969) theorized that all infants form expectations and emotional bonds with adults, regardless of culture. According to Bowlby, humans and other primates are designed to form attachments. These attachments serve to give young humans a type of security blanket so that they may go explore their world and extend

themselves a little further than they normally might, with a safe person to whom they can return. Attachments are normally formed by the end of the first year, according to Bowlby (1969). The type of attachment that an infant forms is believed to have a significant impact on the infant's later social-emotional functioning. Infants are hypothesized to develop secure attachments to primary caregivers who have been consistently responsive during the first months of life and insecure attachments to caregivers who have been unresponsive or inconsistent in their care.

Kraemer's (1992) psychobiological theory of attachment supports Bowlby's attachment theory and extends Bowlby's undeveloped hypothesis that attachment systems are neurobiological in nature. Kraemer presents evidence from studies with rhesus monkeys that indicates that sensorimotor systems responsible for attachment develop in relation to the monkey's caregiver. If an infant monkey does not have a responsive adult monkey to help regulate his neurochemical processes, the sensorimotor systems may not develop in an organized fashion and the monkey may develop an insecure attachment, which can negatively affect his social interactions throughout life. However, rhesus monkeys raised with peers have sensorimotor systems which have not developed in an organized fashion, but show no signs of impaired social interactions unless they are exposed to some type of stressor. Thus, rhesus monkeys who have suffered "caregiver" deprivation but not peer deprivation seem to develop normally, but they do not cope as well as monkeys raised with a caregiver when exposed to stressful situations. Kraemer emphasizes the importance of the mother or "caregiver-icon" as the most important aspect of the environment in the development of rhesus monkeys. According to Kraemer, this

"caregiver-icon" facilitates the maturation of neurobiological processes which will enable the individual to exhibit attachment behaviors. In other words, characteristics of the caregiver help the infant to maintain homeostasis and to develop neurobiologically.

Thus, infant monkeys develop an internal working model of how things should be and strive to maintain that level of homeostasis. It is infant rhesus monkeys who are not raised with this "caregiver-icon" who develop a scrambled working model. These monkeys are genetically programmed to maintain homeostasis, but the regulatory mechanisms need to develop in relation to an external object or caregiver to be most effective (Kraemer, 1992).

Kraemer's work offers an explanation for Harlow and Zimmermann's results with rhesus monkeys. Harlow and Zimmermann (1959) designed a study in which infant monkeys were raised by surrogate cloth or wire monkeys. Some monkeys were exposed to both cloth and wire monkeys (dual condition) and some were raised with just one or the other. Monkeys raised in the dual condition were fed by only one of the surrogates. Harlow and Zimmermann found that monkeys raised in the dual condition preferred the cloth monkey, even if it did not feed them. These monkeys spent progressively more of their time on the cloth monkey, rather than the wire monkey. When the monkeys became stressed, those raised with only a cloth monkey ran to her and clung to her for comfort. Those raised with only a wire monkey ran to the wire monkey and clung to themselves for comfort (Harlow & Zimmermann, 1959). These results led the researchers to conclude that "feeding or nursing facilitates the early development of responses to the mother but ... without the factor of contact comfort, these positive responses are not

maintained" (p. 425). In addition, Harlow and Zimmermann (1959) stated that "without the factor of contact comfort, only a weak attachment, if any, is formed" (p. 428).

Perhaps the mechanism by which rhesus monkey mothers help regulate their infants, in Kraemer's theoretical model, is through contact comfort. It could be that contact comfort from peers does not regulate infants in a satisfactory way, and thus these monkeys became unpredictable when stressed.

Montagu (1986) supports Harlow and Zimmermann's contention that physical contact, including simple touch, is crucial in the development of behavioral responses. Montagu cites research conducted on monkeys, rats, and humans to assert the importance of touch in the development of appropriate human responses. According to Montagu, "The communications we transmit through touch constitute the most powerful means of establishing human relationships, the foundation of experience" (Montagu, 1986, p. xv). In other words, it is through appropriate touch that we develop our attachments to caregivers and our ability to respond in a healthy manner to others.

Attachment

Harlow and Zimmermann (1959) addressed the issue of attachment in subhuman primates but it was Bowlby (1969) who popularized and explained in detail the term and its implications in the human species. Bowlby asserted that remaining in close proximity with a mother figure provides an infant with protection as well as opportunities to learn from the mother figure. Bowlby made it clear that a very young infant is not yet attached to the mother figure, but is, rather, dependent on her. Conversely, a toddler is not as

dependent on the mother, but has developed an attachment to her. Bowlby asserted that infants form affectional ties to a mother figure within the first 12 months of life. In addition, Bowlby (1969) saw the attachment system as a behavioral system that develops in relation to the environment, and more specifically, the mother-figure. The type of attachment that an infant forms was hypothesized by Bowlby and reinforced by other researchers (Isabella, 1993) to be dependent upon the type of care received from the primary caregiver. For example, Ainsworth, Blehar, Waters, and Wall (1978) reported that mothers of avoidantly attached infants avoided physical contact with their infants. This hypothesis is supported by Kraemer's (1992) work discussed in the conceptual framework, which demonstrated negative effects for monkeys raised without a mother-figure.

Outcomes Related to Attachment

Attachment security is an important construct because of its relationship to several child outcomes. Some researchers have explored the relationship between attachment security and later social competence (Easterbrooks, Davidson, & Chazan, 1993; Greenberg, Speltz, Deklyen, & Endriga, 1991). Many researchers assert that developing competence in social interactions with peers is one of the most important accomplishments of childhood (Hartup, 1989). According to existing research, social competence may be compromised in children who are insecurely attached to their primary caregivers. Easterbrooks et al. (1993) found that 7-year-old insecurely attached children had more behavior problems than same-age securely attached children. Shaw

and Vondra (1995) reported that insecure infants at 12 and 18 months were more likely to have behavior problems when they were 3 years of age than securely attached infants followed for the same time period. Many other researchers have found an association between attachment security and later social competence and/or behavior problems (Booth, Rose-Krasnor, & Rubin, 1991; Greenberg et al., 1991; Lyons-Ruth, Alpern, & Repacholi, 1993; Suess, Grossman, & Sroufe, 1992; Wartner, Grossman, Fremmer-Bombik, & Suess, 1994).

Researchers investigating attachment mechanisms and outcomes with low-income families have reported results which indicate that such populations may profit from intervention (Anisfeld et al., 1990; Van den Boom, 1994). Low-income mother-infant dyads who do not receive some type of intervention seem to be at higher risk of continuing insensitive parenting practices and forming insecure attachments than their counterparts who do receive some type of intervention (Van den Boom, 1994; Van IJzendoorn, Juffer, & Duyvesteyn, 1995). Although low-income populations may be at higher risk of several negative outcomes, moderating effects can offset the barriers present due to poverty and its associated experiences. Morisset, Barnard, Greenberg, Booth, and Spieker (1990) found that although low-income status and decreased psychosocial adjustment of mothers in families increased the risk of slow language development, secure attachment offset the risk and served as a protective factor. Easterbrooks et al. (1993) also observed that security of attachment may be a protective factor for a child, regardless of environmental risk. The combination of increased risk of insecure attachment in disadvantaged populations with importance of the potential

buffering effect of secure attachments suggests that work is needed in such populations to increase the likelihood of secure attachments.

Researchers have explored children's responses to peers to determine whether securely attached children behave differently than insecurely attached children (Kestenbaum, Farber, & Sroufe, 1989). Some research has indicated that securely attached children are more likely to respond empathically to others than insecurely attached children. Kestenbaum et al. (1989) found that infants who were securely attached were more likely to respond in a caring and empathic manner to distressed children in a free play environment. Kestenbaum et al. (1989) hypothesized that all of the children had derived expectations about relationships with others that drove their respective reactions to children in distress (insecure children would not respond empathically while secure children would). In other words, secure children had been responded to and, thus, felt compelled to respond, whereas insecure children had not been responded to and did not feel compelled to respond.

Additional negative outcomes associated with insecure attachments have been found. Waters, Wippman, and Sroufe (1979) reported that children who are insecurely attached to their primary caregivers do not have the same level of competence in peer interactions and differ in levels of ego strength when compared to their securely attached peers. Arend, Gove, and Sroufe (1979) have associated insecure attachments in infancy with lower ego-resiliency and curiosity at age 5. Finally, in their review of current research, Cohn, Patterson, and Christopoulos (1991) concluded that there are significant associations between the quality of parent-child relationships and peer relationships as

well as associations between low-income status and difficulties in peer relationships. Thus, it appears as if an insecure attachment places one at risk for impaired social functioning.

Several parental factors appear to be related to infant attachment outcomes. These include parenting sensitivity, parental perceptions and attitudes, and parental internal working models.

Parenting Sensitivity

Research evidence supports Bowlby's (1969) hypothesis that caregiving quality and attachment security are related. Teti, Nakagawa, Das, and Wirth (1991) reported that mothers with insecurely attached children were less sensitive than mothers with securely attached children. Isabella (1993) reinforced this concept when he reported the inconsistency, rejection, and insensitivity demonstrated by mothers whose infants became insecurely attached. In addition, Egeland and Farber (1984) found that mothers of 12- and 18-month-old securely attached infants were more consistent, cooperative, and sensitive to their infants' needs than mothers of insecurely attached infants. Mothers whose infants changed from an insecure to secure attachment rating seemed to become more competent as parents and to respond to their infants' needs over time (Egeland & Farber, 1984). Thus, mothers who are initially less competent in the parenting role can positively affect their infants' attachment classification through improved parenting skills (Egeland & Farber, 1984). Crockenberg (1981) reinforced this concept. "Securely attached infants are confident of, insecurely attached infants anxious about their mothers'

availability and responsiveness" (p. 857). Isabella (1993) followed his sample from 1 to 12 months of age and noted that mothers of insecurely attached infants became more sensitive and less rejecting over the second half of the infants' first year of life. He noted that the inconsistency experienced by the infants appeared to play a role in the formation of insecure attachments in these infants. These mothers appeared anxious in the first months of their infants' lives, but began to cope with and perhaps become more proficient at the parenting role as time progressed. Thus, it certainly appears as if maternal factors can influence infant attachment security outcomes. Mothers must adapt to their changing roles and the changing needs of their infants if attachment security of their infants is to be assured (Isabella, 1993).

Some researchers have investigated the role of responsivity or sensitivity to infant cues and found responsivity to be a stronger predictor of attachment than temperament. Susman-Stillman, Kalkoske, Egeland, and Waldman (1996) reported that sensitivity of mothers when their infants were 6 months of age predicted attachment security and subcategory of attachment at 12 months of age. Mothers' perceptions of infant irritability at 6 months of age did not predict attachment at 12 months of age. However, mothers' sensitivity at 6 months of age appeared to mediate the relationship between perceptions of infant irritability at 6 months of age and attachment classification at 12 months of age (Susman-Stillman et al., 1996). In other words, infant irritability influenced the way that a mother responded to her infant, and the relationship between attachment and irritability exists through the sensitivity of the mother.

To further support the hypothesis that a lack of responsivity can lead to a less than adequate relationship pattern, research with disadvantaged populations will be briefly discussed. Disadvantaged populations are sometimes found to have an increased risk of insecure attachment, perhaps due to a lack of parenting knowledge in combination with other contextual factors. In fact, some researchers have found negative associations between living in low-income environments and child outcomes. Easterbrooks et al. (1993) found that 7-year-old children from low socioeconomic status homes had higher proportions of insecure attachments than children living in middle class homes. Pederson et al. (1990) found that mothers with low educational attainment were less sensitive to their 12-month-old infants' needs, and in turn, that lower maternal sensitivity was related to insecure attachment. Perhaps the stress inherent in a poverty environment, contextual factors, and a lack of knowledge of infant development contributed to the formation of insecure attachments in these infants. Jacobson and Frye (1991) reported that low-income parents who received support and information regarding their infants had infants who were more securely attached than low-income parents who did not receive support. Other research supports the hypothesis that social support positively influences attachment. De Wolff and Van IJzendoorn (1997) conducted a meta-analysis of 66 studies and reported that maternal sensitivity is an important, but not the only, factor relating to attachment security. Rather, the authors found that emotional support experienced by mothers also played a role in the formation of attachment security.

Parental Perceptions and Attitudes

Some researchers assert that attachment is influenced by an infant's temperament, typically assessed from parent perceptions (Rutter, 1979), suggesting that it is the parents' perceptions of their infants that are related to attachment. Indeed, some researchers contend that there are interactions among environmental factors (such as maternal stress) and infant characteristics which produce various attachment classifications. For example, Crockenberg (1981) found that stressed mothers with irritable babies were more likely to have insecurely attached infants if their social support was perceived as low. Conversely, their infants were more likely to be securely attached if social support systems were in place. Crockenberg (1981) raised the issue of whether the social supports (such as family members) could have served as buffers against the effects of stress on the formation of attachment for the irritable infants. Further, Crockenberg found that easy babies were likely to become securely attached regardless of the stress level of the mother. This finding raises the question of how much an infant's temperament contributes to the attachment process and how much parent perceptions contribute to the attachment process. The evidence presented suggests that temperamental qualities which may place the infant at risk for an insecure attachment can be moderated by other buffering variables such as social support (Crockenberg, 1981). Belsky (1996) investigated the mechanisms affecting attachment in 126 father-son pairs and reported that social support positively influenced the attachment relationship, but infant temperament was not related to attachment.

Vaughn, Lefever, Seifer, and Barglow (1989) presented findings which contradict the above findings. These researchers found that temperament measures do not predict attachment security, but they postulated that perhaps the Strange Situation results may reveal both attachment security and temperamental emotionality. The authors clarified that

this hypothesis is based on our understanding of crying in the reunion episodes of the Strange Situation as one of the criteria used for scoring Ainsworth's resistance scale and is, therefore, an index of attachment security, whereas crying during the separations is not directly considered when raters determine the child's resistance score or attachment classification and is not an index of attachment security (Vaughn et al., 1989, p. 730)

Vaughn et al. concluded that while temperament and attachment are not directly related to each other, perhaps during the course of development, they do overlap. Perhaps aspects of temperament are reflected in attachment security in some cases but not in others.

Belsky and Rovine (1987) have further investigated the relationship between temperament and attachment and found that temperament and attachment interact with each other. The authors examined the role of temperament in the formation of attachment and found that temperament affects how attachment security is expressed but does not affect the development of attachment security. Thus, temperament appears to have minimal influence on the development of attachment security, but it does appear to play a role in how one's security is expressed. In other words, actions or emotions expressed by children may be different according to an interaction between attachment security and

temperament, but the actual development of attachment does not interact with temperament. These results are supported by the findings of Susman-Stillman et al. (1996) discussed above.

In addition to temperament, other parental perceptions are also related to attachment. Teti et al. (1991) found an association between maternal perceptions of child characteristics on the Parenting Stress Index (Abidin, 1986) and attachment as measured by the Attachment Q-sort (Waters & Deane, 1985). These results confirmed the authors' hypothesis that less securely attached children would be perceived more negatively by their mothers. In addition, Jarvis and Creasey (1991) found that 12-month-old infants who were insecurely attached had parents who reported higher levels of overall parenting stress. These results indicate that parental perceptions of stress may be related to infant attachment security. Interventions that affect attachment may also affect these related parental perceptions of infant temperament and parenting.

Internal Working Models

Much research has been devoted to the area of attachment relationships that infants form with their primary caregivers. It has been hypothesized that the level of security of attachment that one forms with the primary caregiver will greatly affect one's actions, reactions to others, and interpersonal relationships throughout life. Recent research indicates that attachment classifications are likely to be stable intergenerationally as well (Benoit & Parker, 1994). The rationale for such findings according to attachment theory is that infants develop internal working models of relationships due to their

relationships with a primary attachment figure (Bowlby, 1969). In other words, infants develop beliefs about how relationships work and these beliefs guide their everyday interactions with others (Cohn, Cowan, Cowan, & Pearson, 1992). "Infants appear to learn what to expect from their world through their experiences with their primary caretaker" (Crockenberg, 1981, p. 857). Thus, how these infants perceive the world and what they expect from the world has been established due to their early interactions.

Some research supports this theory of internal working models. Cohn et al. (1992) found that insecurely attached children were less warm and showed more negative affect than securely attached children. Perhaps both securely and insecurely attached children have learned how to interact with others through their interactions with their parents. Likewise, the researchers found that insecurely attached children were more likely to have parents with insecure working models of attachment. Thus, insecure working models of attachment placed the parents at risk of ineffective parent-child relationships. Other researchers have found a relationship between a mother's adult attachment measured prenatally and the subsequent infant-mother attachment (Fonagy, Steele, & Steele, 1991). These findings give support to the theoretical notion that interactions affect internal models of relationships and that these models of relationships affect the abilities, proficiency, and expectations of present and future interactions with others.

Other Possible Methods of Increasing the Likelihood of Secure Attachments

Perhaps guided interactions between mothers and infants can help to increase a mother's level of skill and feeling of competence with her infant, which may increase the likelihood of a secure attachment. Van den Boom (1994) investigated the effect of guided interactions in an experiment with lower-class mothers whose infants were assessed as irritable on the 10th and 15th days after birth. Van den Boom randomly assigned the 100 mother-infant dyads to experimental and control groups. The experimental manipulation consisted of tri-weekly home visits when the infant was 6 months old until the infant was 9 months old to assist mothers in reading and appropriately responding to their infants' cues. When the infants were 9 months old, the intervention mothers were more stimulating, visually attentive, and responsive with their infants than control group mothers. The intervention mothers also had infants who were more securely attached at 12 months of age than the control group mothers (31 versus 11). Thus, 39 control infants were insecurely attached versus 19 intervention infants. These results indicate that intervention programs can have success in changing parental behaviors to facilitate the formation of secure attachments.

By assisting parents in developing a positive relationship early with their infants, perhaps some of the disadvantages associated with insecure attachments may be avoided. Indeed, it certainly seems easier to begin a relationship on a positive note than to change behaviors once habits and relationship dynamics are entrenched. Some research indicates that the type of attachment classification that a child forms to primary caregivers is stable

over time, which suggests that changing relationship patterns may not be a likely phenomenon as a child begins to get older. Main and Cassidy (1988) found attachment security was stable from infancy to age six in 84% of their American sample. Likewise, Wartner et al. (1994) found that secure-insecure attachments were stable from infancy to age six in 89.7% of their German sample. Other researchers have reported lower rates of concordance in attachment security. Egeland and Farber (1984) reported that 60% of their sample of high risk mother-infant dyads had stable attachment classifications from 12 to 18 months of age. The authors reported that 74% of the secure infants remained secure while only 45% of the avoidant and 37% of the resistant infants remained consistent in attachment classification over time. A large percentage of the avoidant and resistant infants were securely attached at 18 months of age. The authors asserted that mothers gaining skills and confidence in the parenting role contributed to the shift to a secure attachment for these infants. On the other hand, for infants changing from secure to insecure, mothers were likely to be more hostile and suspicious and find their parenting role less delightful when their infants were 18 months old. Thus, it appears as if changes in parental attitudes and caregiving can affect child attachment security, but infant attachment classifications are likely to remain stable without such change. And, as discussed above, positive change is not likely to occur in relationship patterns without some sort of intervention.

Touch

The importance of touch has been recognized by Bowlby (1969). Briefly, Bowlby's (1969) attachment theory evolved from a belief which supported four principles. First, infants develop attachments to mothers because mothers meet their needs, such as food and warmth. Next, infants become attached to a mother's breast and eventually develop an attachment to her as well. Next, infants need to be touched and to be in contact with a human being. Finally, infants want to return to the womb. Upon reflection on the four principles, Bowlby (1969) determined that the attachment to the mother's breast and the need for touch were the most likely factors present in the formation of attachments. In other words, the formation of attachment occurs amidst physical interaction between parent and child. In the absence of nurturing touch, Bowlby's assertions would indicate that an insecure attachment (if any at all) would be formed between mother and infant. Harlow and Zimmermann's (1959) results with rhesus monkeys support this assertion.

One naturalistic study on the phenomenon of marasmus implicates the importance of touch in development. Marasmus, or wasting away, of infants occurred regularly during the 19th century and continued early in the 20th century (Montagu, 1986). The childrearing advice of the time was not to pick up a baby who cried and not to spoil it by handling it too much (Montagu, 1986). Almost 100% of babies under one year of age in institutions died (Montagu, 1986). Even infants who lived in the best homes with sterile environments died fairly often. However, infants who lived in underprivileged homes

that were quite unsanitary seemed to thrive. It was not until after World War II that, quite serendipitously, the cause of marasmus was understood. The babies in poor homes were more likely to receive "mother love" and be handled than babies in affluent homes (Montagu, 1986, p. 99). According to Montagu (1986):

What the child requires if it is to prosper, it was found, is to be handled, and carried, and caressed, and cuddled, and cooed to.....It is the handling, the carrying, the caressing, the caregiving, and the cuddling that we would here emphasize, for it would seem that even in the absence of a great deal else, these are the reassuringly basic experiences the infant must enjoy if it is to survive in some semblance of health. Extreme sensory deprivation in other respects, such as light and sound, can be survived, as long as the sensory experiences at the skin are maintained. (pp. 99-100)

As demonstrated by this example, the importance of touch cannot be overemphasized. In fact, it appears as if infants who suffer from touch deprivation may suffer adverse consequences, the most severe being death (Montagu, 1986). This implies that infants who are touched derive some sort of benefit from the use of touch (Montagu, 1986).

Indeed, experimental evidence indicates that the use of touch may be a factor in the development of attachment security. Anisfeld et al. (1990) found a strong relationship between increased physical contact between mother and infant and subsequent attachment security in low-income, inner city families. Subjects in this study were randomly assigned into a treatment group (and received a soft "Snuggli" baby carrier

as a gift) or a control group (and received a plastic infant seat as a gift). Results showed that 83% of the treatment infants became securely attached to their mothers while only 38% of the control infants became securely attached to their mothers. Anisfeld et al. indicated that there may be a causal relationship between the two. In addition, several researchers have found that stress in infants can be mediated through the use of touch by mothers (Stack & Muir, 1990, 1992). Pelaez-Nogueras et al. (1996) reported that infants, during a face-to-face interaction with adults, reacted more positively by smiling and cooing more when they were touched and looked at than when they were not touched but were being looked at. Ottenbacher et al. (1987) conducted a meta-analysis of studies using tactile stimulation (touch) on premature infants and concluded that the use of touch certainly facilitated the increasing well-being and growth of the infants. Thus, the use of touch appears to be powerful with human infants. Perhaps future intervention programs would be well-advised to incorporate aspects of touch for improved social and physical development of infants.

Researchers have also found a relationship between the use of touch and the development of infants. Solkoff and Matuszak (1975) found that premature infants who were stroked for 7 1/2 minutes each hour for 16 hours over the course of 10 days had positive changes on 11 scales of the Neonatal Behavioral Assessment Scale (NBAS; Brazelton, 1973).

Compared to their prestimulation performance, they now habituated more rapidly to light and sound, were more alert throughout the duration of the examination, had improved general body tonus, had better head control in response to a pull to

sit, were more consolable, responded with more rapid avoidance to noxious stimuli, changed states more often, and, finally, demonstrated greater hand-to-mouth facility. (Solkoff & Matuszak, 1975, p. 35)

Control infants who received no extra stimulation for the 10 days changed on two scales of the NBAS, one of which is important for the purposes of this study. They "were less able to quiet themselves during an aroused state, and their defensive movements in response to a diaper placed over their faces were more efficient" (Solkoff & Matuszak, 1975, p. 35). Of course, one does not know if these results translated to permanent differences between the two groups, but any advantage that a premature infant can have may offset the risk of later problems.

Animal studies often serve as an indicator of mechanisms by which similar phenomena occur in humans, and thus are often useful in the search for human processes. Perhaps the most well-known studies were completed on primates by Harlow and his colleagues in the late 1950s and early 1960s. Harlow and Zimmermann asserted that the results of their studies indicate that contact comfort is a more important variable than lactation in the formation of affectional responses and they even hypothesized that nursing exists so that infants have frequent body contact with their mothers (Harlow & Zimmermann, 1959).

Further examination of Harlow and Zimmermann's research only strengthens the hypothesis that touch is an extremely important variable in the development of rhesus monkeys. Harlow and Zimmermann (1959) introduced a fear stimulus to monkeys who had been raised with either a cloth surrogate mother or a wire surrogate mother. Infant

monkeys who had been raised with a cloth mother ran to the mother and clung to her for comfort. Then the monkeys used their mothers as a base and began exploring the fear stimulus, sometimes even picking it up. However, if the cloth surrogate mother was not present when the fear stimulus was introduced, these monkeys would become frantic, either crouching or running around the room clutching themselves. Conversely, infant monkeys raised with a wire surrogate mother did not go to the mother upon presentation of the fear stimulus, but they were highly emotional. If the infants did go to the wire surrogate mother,

they did not clutch and cling to their mother as did the infants with cloth mothers; instead, they sat on her lap and clutched themselves, or held their heads and bodies in their arms and engaged in convulsive jerking and rocking movements similar to the autistic behavior of deprived and institutionalized human children. (Harlow & Zimmermann, 1959, p. 426)

These results imply a severe emotional deficit in monkeys who were deprived of contact comfort.

Harlow and Zimmermann continued their work with the infant monkeys by separating them from their surrogate mothers after about 6 months of age. They then checked to see whether the affectional bond would hold up over the course of the next year by reintroducing them to each other every 30 days (Harlow & Zimmermann, 1959). Infant monkeys raised with a cloth surrogate did have an enduring bond, while those raised with a wire surrogate did not. Harlow and Zimmermann concluded from their studies that:

without the factor of contact comfort, only a weak attachment, if any, is formed...but enough evidence is available to indicate that the attachment formed to the cloth mother during the first 6 months of life is enduring and not easily forgotten. (1959, p. 428)

These results indicate that physical contact is an important mechanism through which attachments are formed.

The work of Schanberg (1995) further supports the importance of touch in development. Schanberg used rat pups as subjects in his maternal separation studies and found that rat pups that had been separated from their mothers went from the growth mode to survival mode. In other words, only survival functions were operating in the rat pups. The rat pups were found to be secreting an abnormally low level of growth hormone, just as nonorganic failure-to-thrive infants secrete an abnormally low level of growth hormone. These effects were reversed upon stroking the rat pups with a small wet paintbrush and the rat pups began to thrive once again, with the secretion of the growth hormone and other important enzymes returning to normal. Schanberg (1995) again relates the similarity to humans by acknowledging that nonorganic failure to thrive infants begin to thrive when they receive the loving care of pediatric nurses. These results also relate to the phenomenon of marasmus, discussed above, whereby infants deprived of touch died in institutions (Montagu, 1986).

Schanberg (1995) then continued to investigate the mechanisms by which rat pups are affected by maternal separation and found that increased beta-endorphin seems to mimic the effects of maternal separation. When Schanberg injected beta-endorphin in the

brain, they found that ornithine decarboxylase levels in the heart, liver, kidney, and brain were lowered (1995). According to Schanberg, "We hypothesize, then, that beta-endorphin is a central mediator of the touch deprivation syndrome" (1995, p. 73). In other words, increased beta-endorphin levels due to touch deprivation of the mother inhibits the production of ornithine decarboxylase. These effects seem to hold even when growth hormone is injected into the animal to attempt to artificially induce growth during maternal separation (Schanberg, 1995).

Previous studies had indicated to Schanberg that touch was the critical factor in physiological functioning in rat pups. Wang, Bartolome, and Schanberg (1996) verified the previous results by letting rat pups either have access to maternal milk but no touch, maternal touch but no milk, or a normal mother (with access to both milk and touch) to assess the effects on rat functioning. Having access to milk but not maternal touch compromised the physiological efficiency of the rat pup, with ornithine decarboxylase levels decreasing, along with the proto-oncogenes *c-myc* and *max*, despite being injected with prolactin to increase ornithine decarboxylase levels. However, rat pups that had access to touch but no milk or access to both touch and milk had no deficits in ornithine decarboxylase, *c-myc*, and *max* levels after being injected with prolactin. These results clearly implicate touch as an extremely important variable in physiological functioning in rats. The authors link the importance of their results with results of human studies. "Because we have demonstrated that supplementation of tactile stimulation to touch-deprived premature human infants markedly increases weight gain and neurobehavioral maturation, it is clear that elucidating the subcellular mechanisms by which

environmental input alters the expression of individual gene response to trophic hormones like prolactin and growth hormone during mammalian development is of great clinical import" (Wang et al., 1996, p. 841). Thus, these researchers emphasized the importance of touch in growth and development, and more importantly, emphasized researchers' need to discover how touch affects the physiology of humans.

Touch and the Immune System

Several researchers have investigated the role of touch in immune functioning. Laudenslager, Rasmussen, Berman, Suomi, and Berger (1993) found that a rhesus monkey's ability to produce antibodies after a tetanus shot was affected by the amount of physical contact and grooming the monkey received during the first 6 months of life. Von Hoersten, Dimitrijevic, Markovic, and Jankovic (1993) reported that maternally deprived rats had a much lower plaque-forming cell (antibody) response to an injection of sheep red blood cells than control rats that had been raised with their mothers. Interestingly, the authors found that male rats that had been maternally deprived but handled by a human had a significantly higher plaque-forming cell (antibody) response than rats that had been maternally deprived but not handled. However, the handled male rats still had a significantly lower antibody response than control rats. In females, the authors found that the rats that had been maternally deprived but handled were not significantly different from the control females in antibody production, but they did have significantly higher antibody production than the female rats that had been maternally deprived but not handled. The authors emphasized the importance of looking at gender

as a variable in how one responds to a lack of touch as well as the response of the immune system to touch deprivation (von Hoersten et al., 1993). Finally, Laudenslager, Capitanio, and Reite (1985) found that monkeys that lost their mothers in infancy had reduced immune functioning following the loss. Some evidence indicates that the growth hormone affects the immune system (Kelley, 1990), which implies that future research should capitalize on the work of Schanberg and his colleagues (Schanberg, 1995; Schanberg & Field, 1987; Wang et al., 1996) to design a study to look more closely at the process by which growth hormone, maternal deprivation, and immune functioning are related.

The studies concerning physiological functioning reviewed above are tangential in some aspects to the study at hand; however, they provide a basis for understanding part of the rationale for this study. Previous research has indicated that touch is a major factor in the growth and development of animals and humans alike. However, the effect of touch on socioemotional development has been largely neglected. Although this study is not measuring physiological functioning, Kraemer's (1992) work provides evidence that physiological mechanisms are at work in the development of socioemotional functions. The studies reviewed above do support the hypothesis that touch is a basic need in humans, and that interventions that support touch interactions may affect physiological functioning and social behavior.

Touch and Stress

Many studies have looked at how the phenomenon of touch affects the stress level

of individuals. However, before proceeding, it is important to be aware that much controversy has arisen on the concept of stress. Gunnar (1987) outlined some of the disagreements that have been related to research on stress, including differences on the definition of stress, how to most effectively measure it, and what discrepancies in different physiological systems in regard to stress indicate. Rather than seeing these discrepancies as a barrier, perhaps these divergent avenues of research may eventually converge so that we have a much more comprehensive understanding of stress. In her conclusion, Gunnar agreed somewhat with this view and emphasized that we should use both behavioral and physiological elements to help us better understand stress and to develop interventions, such as those involving touch, which lower stress levels.

Bearing this controversy in mind, several studies will be reviewed. Reite, Short, Kaufman, Stynes, and Pauley (1978) investigated the effects of separation from mothers in pigtail monkey infants and found that separated infants reacted with an agitation reaction, which is a reaction that indicates stress, by increased motor activity and distress vocalizations. The monkeys also had increased heart rates on the first day, which is a characteristic of the agitation reaction. The day after separation, the monkeys displayed depressive behavior, a decrease in play behavior, and a sharp decrease in heart rate. These effects, with the exception of a decreased heart rate, continued to persist until the monkeys were reunited with their mothers. The authors raised an interesting question in the discussion section of their report: "An important question is whether these findings should be interpreted as representing a stress-induced maladaptive disorder of function, or whether indeed they may be a manifestation of an adaptive coping mechanism" (Reite et

al., 1978, p. 103). Regardless of how one views the findings, they do indicate that "separation from the mother is a stress that entails both physical and psychological elements" (Reite et al., 1978, p. 103) and as such, the concept of stress deserves further inquiry.

Other researchers have also found that maternal deprivation is a stressor which causes both behavioral and physiological changes in infant behavior. Cirulli, Santucci, Laviola, Alleva, and Levine (1994) reported that infant mice who were separated from their mothers had higher levels of corticosterone secretion than nondeprived infant mice, and when they were introduced to a novel situation (being placed in a glass dish), the separated infants had 6 times the level of corticosterone secretion than infant mice who were not separated from their mothers. The authors indicated that mothers had some influence on corticosterone secretion as part of the hypothalamic-pituitary-adrenal axis (Cirulli et al., 1994). "Maternal presence contributes in part to maintaining the infant mouse HPA axis in an inhibited state" (Cirulli et al., 1994, p. 314). In addition, the researchers found that maternally deprived mice had elevated levels of locomotion in comparison to maternally raised mice. Other researchers have reported similar results in rats, with the additional finding that lactating mothers could suppress the stress responses, and concluded that "contact per se may in this case be the critical maternal variable" (Rosenfeld et al., 1991, p. 670).

Other researchers have used the above information as a base from which to explore further the effects of touch deprivation on stress in animals. Rosenfeld, Wetmore, and Levine (1992) investigated the effect of repeated and cumulative maternal

separation in infant rats. The researchers found that short periods of maternal separation do not have a cumulative effect and that rats who are deprived of their mothers for between 8 and 24 hours have lasting negative effects on the adrenocortical activity of the rat, with hyperresponsivity to stress lasting 4 days after reunion (Rosenfeld et al., 1992).

Other researchers have found that infant rats that had been separated from their mothers for 24 hours had at least double the plasma corticosterone levels compared to rats that had been separated from their mothers for 8 hours or less (Levine, Huchton, Wiener, & Rosenfeld, 1992). This increase in plasma corticosterone levels persisted across the various treatment groups, including the no treatment, novel situation, saline injection, and corticotrophin injection. Finally, the authors found that the changes in plasma corticosterone levels were age dependent; more specifically, the younger the pups, the fewer changes seen in the plasma corticosterone levels (Levine et al., 1992). The authors attributed this surprising result to the decreased capacity of the adrenal gland at younger ages and that maternal factors serve to inhibit the action of the adrenal gland, but after prolonged deprivation, adrenal activity increases. The authors concluded that "these results indicate that the infant is capable of mounting an integrated neuroendocrine response to seemingly mild environmental challenges when the inhibitory influence of maternal factors is no longer present" (Levine et al., 1992, p. 556). This statement leaves open the question posed by Reite and his colleagues (1978), whether the response should be perceived as maladaptive or as a coping strategy. Obviously, we have much to learn about the effect of stress on individuals and how touch serves to ameliorate the situation. Although these studies investigated the effect of touch on offspring, physical contact may

also reduce stress for the mothers. This study investigates whether increased contact affects mothers' perception of stress.

Touch and Later Behaviors

Some studies have indicated that a lack of contact during infancy may negatively impact maternal behaviors later in life. Ruppenthal, Arling, Harlow, Sackett, and Suomi (1976) discovered that adult female rhesus monkeys who were raised without mothers had impaired parenting behaviors upon giving birth to their first infant. Monkeys raised with a wire or cloth surrogate mother were much more likely to be inadequate mothers to their firstborn offspring, with the wire-raised monkeys the most likely to be abusive. Monkeys raised with peers were more likely to be adequate mothers, but much less likely than monkeys raised by mothers. The researchers found that if monkeys (in any category) were exposed to their firstborn offspring for more than 2 days, their parenting with subsequent offspring was likely to be adequate. One other finding of note from this study is that monkeys raised by a surrogate mother (cloth or wire) were likely to be less proficient in infant handling and carrying than those raised by their own mothers (Ruppenthal et al., 1976). These results indicate that a phenomenon similar to internal working models in humans exists in animals as well.

Other research points to the factor of experiences with mother monkeys as a variable in future relationships in vervet monkeys. Fairbanks (1989) found that "females who spent less time in contact with their mothers as infants tended to spend less time in contact with their infants as mothers, and females with an early experience of more

mother-infant contact spent more time in contact with their infants" (p. 674). The effects still remained after partialling out the influence of genetics, shared environments, and contact when the infant was a juvenile. Thus, Fairbanks concluded that "individual differences in mothering behavior in one generation can be passed on to the next generation" (1989, p. 677). He does, however, caution that plasticity is still a possibility. "Females increase and decrease the amount of mother-infant contact in response to circumstances, but each female appears to operate around her own set point, or average value, which is established in early infancy" (1989, p. 677). Much like the attachment research demonstrating that attachment classifications are surprisingly stable intergenerationally, Suomi (1995) has found that one can predict how much time a mother rhesus monkey will spend in contact with her infant by looking at how much time her mother spent in contact with her. These findings are quite powerful and imply that internal working models as well as attachment concepts are influential in animal species as well.

Massage

New and innovative approaches to increasing nurturing touch have recently been implemented in the United States, although they have existed in other countries for generations (Bernal, 1997; McClure, 1989). For example, women in Mithila (South Asia) are expected to massage their infants daily because massage is believed to facilitate attachment between mothers and infants (Reissland & Burghart, 1987). Mothers who do not massage their infants are likely to be censored by the government (Reissland &

Burghart, 1987). According to Field (1996), massage is one of the oldest touch therapies and it is one of the most popular because it is easily used by individuals as both a preventative and recuperative measure. Although relatively new to the research arena, infant massage studies have produced compelling results. Infant massage incorporates several elements of "bonding (eye to eye contact, touch, odor, verbal communication, and biorhythmicity)" into a structured program of parent-child interaction (Evans, 1990, p. 75).

Researchers have investigated the effects of infant massage on premature infants and found impressive results. Scafidi et al. (1986) randomly assigned 40 stabilized premature infants to either a treatment (massage) or control group. The treatment group received a 15-minute massage each hour for three consecutive hours over a 10-day period. The control group received standard care. Treatment infants averaged a 47% greater weight gain each day, performed better on Brazelton's (1973) Neonatal Behavior Assessment Scale, and were released from the hospital 6 days earlier than the control group (Scafidi et al., 1986). When the study was replicated, Scafidi et al. (1990) found that treatment infants averaged a 21% greater weight gain each day, performed better on the Neonatal Behavior Assessment Scale, and were released from the hospital 5 days earlier than the control group. Other studies have produced similar results. Field, Scafidi, and Schanberg (1987) conducted a study with 40 preterm infants utilizing the same methodology outlined in the previous paragraph. Their results showed that infants averaged a 47% greater weight gain each day and performed better on the Neonatal Behavior Assessment Scale at the end of the 10-day period. In addition, treatment infants

performed better on the mental and motor scales of the Bayley Scales of Infant Development and maintained their weight advantages over the control infants at the 6-month followup (Field et al., 1987). Thus, massage seems to have more than just a temporary effect on premature infants. Rather, the positive effects appear to continue well into infancy.

Massage has also been shown to facilitate growth in preterm cocaine-exposed infants. Wheeden et al. (1993) conducted a study with 30 preterm cocaine-exposed infants. The infants were randomly assigned to either a treatment (massage) or control group. The treatment group received a 15-minute massage each hour for three consecutive hours over the course of 10 days. The control group received standard care. Treatment infants averaged a 28% greater weight gain per day, had fewer complications and stress behaviors, and performed better on the Neonatal Behavior Assessment Scale (Brazelton, 1973) at the end of the 10-day intervention than control infants.

Massage has also been used with term infants in a variety of ways. Scafidi and Field (1996) conducted a study with full-term infants of HIV-positive mothers. The 28 infants were randomly assigned into either the treatment (massage) or control (no massage) condition and were given massages three times a day for a period of 15 minutes for 10 days. Again, massaged babies performed better on the Neonatal Behavior Assessment Scale at the end of the 10 day intervention and while the massaged babies gained weight each day, the control infants lost weight (Scafidi & Field, 1996).

Some researchers have designed studies so we might better understand the mechanisms important in massage and whether some infants are more likely to benefit

from a massage intervention. Scafidi, Field, and Schanberg (1993) conducted a study to try to identify which premature infants benefit most from a massage intervention. They randomly assigned 93 premature infants into either a treatment (massage) or control group and provided the treatment infants with a 15-minute massage each hour for three consecutive hours over the course of 10 days. The control group received standard care. Results indicated that 70% of the treatment infants were high weight gainers versus 40% of the control infants. Massaged high weight gainers had experienced more complications prior to the study while control high weight gainers consumed more calories and spent more time in intermediate care. The results indicate that premature infants with more complications may benefit even more from massage therapy than infants without complications.

Other researchers have looked at different populations to determine whether they might also benefit. Field, Grizzle, Scafidi, Abrams, et al. (1996) combined physiological and physical variables into a creative study with full-term infants of depressed, low socioeconomic status adolescent mothers. Infants of the adolescent mothers attended daycare and were randomly assigned to either a massage or a rocking condition at the daycare. The massage babies received a 15-minute massage 2 days per week while rocking babies were rocked in a rocking chair for 15 minutes 2 days per week. The mothers and all the staff were blind to the purpose of the research. Findings indicated that massage had positive benefits to the infants, as seen by greater weight gain, improved temperament, and less secretion of stress hormones. More specifically, massaged infants improved significantly statistically in the areas of emotionality, sociability, and

soothability, as rated by the teachers (not the person who massaged them). In addition, massaged infants were more likely to fall asleep after a massage session while rocked infants were less likely to fall asleep after a rocking session (Field, Grizzle, Scafidi, Abrams, et al., 1996). Thus, the evidence indicates that full-term infants with at-risk mothers also benefit from a massage intervention.

Massage has also been used with children with a variety of ailments, and positive results have been reported. Field et al. (1997) studied the effects of massage by parents on children with mild to moderate juvenile rheumatoid arthritis. Subjects were randomly assigned to either a treatment (massage) or control (relaxation therapy) group. Children in the treatment group were massaged for 15 minutes each evening for 30 nights, while control children engaged in relaxation therapy for each of the 30 nights. Massaged children had lower stress cortisol levels, had lower perceived pain, lower assessments of pain by their physicians and parents, and fewer pain-limiting activities than children in the relaxation therapy group (Field et al., 1997). In addition, children with autism, diabetes, and asthma all have significant gains in a variety of areas including joint attention and improved social behaviors (autism), decreased glucose levels (diabetes), and increased performance on all clinical variables (asthma) (Field, 1998).

Massage has also been studied with adults, with a variety of outcomes. Field, Grizzle, Scafidi, and Schanberg (1996) investigated the effects of massage on depressed adolescent mothers. The authors randomly assigned 32 mothers to either a massage (treatment) or relaxation therapy (control) group. The treatment mothers received 10 sessions of massage therapy and the control mothers received 10 sessions of relaxation

therapy over the course of 30 days. Mothers in both groups reported feeling less anxiety after the first and last therapy sessions. However, only mothers in the treatment condition had a decrease in anxious behavior, a decreased pulse, and lower salivary and urinary stress hormone levels (Grizzle, Scafidi, and Schanberg, 1996). In addition, Field, Ironson, Scafidi, and Nawrocki (1996) investigated the effects of massage in the workplace and found that adults who were massaged, as opposed to adults who were given the opportunity to relax for the same amount of time, had decreased alpha and beta power (suggesting increased alertness), increased speed and accuracy on math computations, had lower anxiety levels, and had fewer salivary cortisol stress hormones (Field, Ironson, Scafidi, and Nawrocki, 1996). Furthermore, Field (1998) discussed the benefits of massage on pregnant woman, including decreased salivary cortisol stress hormones, decreased norepinephrine (a physiological indicator of decreased depression), decreased perceived depression, decreased sleep disturbances, decreased pain, and decreased obstetric and postnatal complications.

Some evidence exists which suggests that both the recipient of massage and the person who gives massages may experience benefits. Field (1995b) discussed an as yet unpublished study with grandparent volunteers who both received massages and gave massages to unrelated abused and neglected infants. The results of this study indicated that massaged grandparents were less depressed, had fewer stress hormones present, had fewer doctor visits and more social contacts, and had increased self-esteem. After a month of receiving massages, the grandparents gave massages to the infants. Results indicated that all of the above results were even more pronounced after giving the

massages. In addition, the abused and neglected infants had increased alertness and tracking behaviors, slept more after the massages, and had experienced increased activity, sociability, and soothability (Field, 1995b). Thus, both the massager and person being massaged appear to derive benefits from massage. The current study proposes to look at mother and infant data to determine whether massage can make a difference in the parent-child relationship as well.

Some evidence already exists which indicates that massage can improve the parent-child relationship. Scholz and Samuels (1992) discovered that fathers who massaged their 1-month-old babies for 8 weeks showed greater involvement with their infants in a 10-minute observation period than fathers who did not massage their babies. Infants who were massaged had more eye contact, vocalizing, smiling, reaching, and orienting responses toward their fathers than infants who were not massaged.

Synthesis of the Literature

As illustrated in this review, attachment is an important construct in the development of human relationships, and touch appears to play an important role in the formation of attachment. Results from studies with humans and animals alike attest to the importance of physical contact when looking at other aspects of the well-being of an individual. Animal studies have shown the importance of touch in many aspects of well-being. Infant massage research has focused on the effects of massage on infants with various complications. All of these lines of research converge to indicate that touch is an important modality that supports both directly and indirectly the formation of secure

attachments. The systematic but responsive touch involved in the techniques of infant massage is likely to provide the kind of touch that would support the development of secure attachments. However, this line of investigation has not been pursued in other studies. In this study, the effects of massage using healthy infants in order to determine whether attachment relationships are indeed enhanced through massage were investigated.

CHAPTER III

METHODS

Research Hypotheses

The research questions outlined in Chapter I were investigated using the following two research hypotheses.

Hypothesis 1

Attachment security scores will be significantly higher for the treatment group than the control group. The dependent variable in this hypothesis is attachment security and the independent variable is the group in which the dyad participates.

Hypothesis 2

Treatment mothers will improve their attitudes toward parenting more than control mothers, as evidenced by perceptions of parenting stress, perceptions of close relationships, perceptions of infant temperament, and attitudes toward childrearing. The dependent variables in this hypothesis are parental stress, perceptions of close relationships, perceptions of infant temperament, and parental attitudes. This hypothesis was broken into several components.

Hypothesis 2a: Parenting stress scores will be lower for the treatment group than for the control group.

Hypothesis 2b: Relationship attitudes security scores will reflect higher security and lower anxiety for the treatment group than for the control group.

Hypothesis 2c: Infant temperament will be perceived as less difficult by mothers in the treatment group than by mothers in the control group.

Hypothesis 2d: Parental attitude scores will be higher for the treatment than control group.

Design

An experimental design was used in this study. Families with an infant under the age of 8 months who agreed to participate in the research were randomly assigned to either the treatment or control group and signed the informed consent form (see Appendix C). The treatment and control groups met once each week for 4 weeks. The treatment group learned techniques of infant massage as well as received information about infant development. The control group received similar information about infant development. A battery of questionnaires was given to all participants before the intervention. In addition, background information such as age and education of parents, employment status of mothers, and number, age, and gender of other children in the home was collected. After the 4-week intervention period, a posttest battery of questionnaires was given to all participants (these data are not part of this study). When the infants were 12 months old, parents were asked to complete the battery of questionnaires again and, in addition, to complete the Attachment Q-set (Waters, 1987). When the infants were 12 months old, mothers were also asked if they breastfed their babies and for how long, and whether they massaged their infants and if so, how many times per week.

Sample

A total sample of 57 mother-infant dyads was obtained. The original intent was to obtain a sample entirely of Head Start parents, but there were not enough infants born to this population in this area to do so. Thus, although the majority of the sample ($n = 48$) came from a Head Start population, additional mother-infant dyads ($n = 9$) were obtained from the birth announcements in the newspaper. Questions about family income were not asked of the additional study subjects. Forty-eight parents in various Head Start programs such as center-based, home-based, and parent-child centers in northern Utah and southern Idaho were recruited to participate in the study and were randomly assigned into either the treatment ($n = 23$) or control group ($n = 25$). Families who were obtained from the birth announcements were also randomly assigned into either the treatment ($n = 4$) or control group ($n = 5$). The total number in the treatment ($n = 27$) and control ($n = 30$) equaled 57 participants. All participation was voluntary. Head Start subjects were compensated monetarily in order to increase participation, but the parents obtained from birth announcements were not. This project was funded nationally by the Head Start program, and only Head Start parents were allowed to be paid.

Demographic Characteristics of the Sample

Characteristics of the control and treatment groups were similar in most respects, with no statistically significant difference between the two groups (see Tables 1 and 2). Treatment mothers averaged 6.66 hours working per week, with a standard deviation of

15.23, while control mothers worked an average of 3.20 hours per week, with a standard deviation of 8.05.

Mothers' work status, number of hours worked per week, marital status, and infant characteristics, such as gender and the number of siblings, are given in greater detail in Table 2, as are the education of both mothers and fathers, religiosity, and involvement in religion. In Table 2, it should be noted that 20 control and 20 treatment mothers did not work at all, 4 control mothers worked part-time, and 4 treatment mothers worked full-time. Thus, while both groups have the same number of mothers working, mothers in the treatment group were likely to work full-time if they worked and mothers in the control group were likely to work part-time if they worked, although this difference between the

Table 1

Pretest Demographic Information for Control and Treatment Groups

	Control group		Treatment group		t	p
	Mean	SD	Mean	SD		
Background information						
Baby age in months	4.56	2.40	4.44	2.40	.13	.90
Age of mother	27.56	5.63	29.37	5.20	-1.11	.27
Education of mother	13.75	1.95	13.28	1.86	.90	.37
Age of father	30.12	6.75	32.38	7.15	-1.03	.31
Education of father	14.23	2.69	14.04	2.14	.27	.79
Number of siblings	1.86	1.41	2.11	1.62	-.61	.54
Hours spent in religious activity (per week)	4.32	3.16	3.67	3.35	.72	.48
Hours worked per week	3.21	8.05	6.66	15.23	-.98	.33

Table 2

Background Information

Characteristic	Control group	Treatment group	Chi-square (df)	p
<u>Parental Education</u>				
Mothers			3.70 (7)	.81
9th grade	1	1		
10th grade	0	1		
11th grade	2	1		
12th grade	5	8		
13 years	5	4		
14 years	5	6		
15 years	1	2		
16 years	9	5		
Fathers			6.40 (9)	.70
9th grade	1	1		
11th grade	1	1		
12th grade	8	4		
13 years	1	3		
14 years	4	6		
15 years	1	2		
16 years	6	4		
17 years	2	2		
18 years	0	1		
20 years	2	0		
Hours mother worked per week			8.00 (5)	.16
0	20	20		
1 to 20	3	0		

(table continues)

Characteristic	Control group	Treatment group	Chi-square (df)	p
21 to 32	1	0		
33 to 40	0	4		
Marital status of mother			.77 (3)	.68
Single	3	5		
Married	22	20		
Religion			1.18 (3)	.76
None	3	4		
LDS	20	18		
Christian	2	4		
Native American	1	2		
Hours spent in religious activities per week			8.40 (9)	.49
0	4	9		
1-3	8	5		
4-6	8	11		
7-9	2	0		
Infant gender			.42 (1)	.52
Male	11	13		
Female	18	15		
Number of siblings			2.30 (5)	.81
0	6	6		
1	6	5		
2	8	5		
3	5	7		
4	3	2		
5	1	3		

two groups was not statistically significant. There are more female infants than male infants in both groups. In addition, both groups are similar in the number of siblings reported, with the majority of study infants having three or fewer siblings. Both groups consist of a large number of respondents reporting involvement with the LDS or Mormon church. This is not surprising, because a large percentage of people in the area belong to the LDS church. Some respondents reported that they belonged to another Christian church, others reported involvement with the Native American religion, and others reported no involvement with religion.

Measurement

For purposes of this study, infant and mother variables were measured twice: at the inception of the project and when infants were 12 months of age. Parents were given a choice to fill out the questionnaires on their own or with the researcher, either over the phone or in person. With the exception of one parent at the pretest (but not the posttest), mothers chose to complete the questionnaires on their own in their homes.

As previously stated, demographic information such as age and gender of the infant, number, age, and gender of other children in the home, marital status, religiosity and involvement in religion, age and education level of both parents, and work status of the mothers was obtained from mothers as they were recruited into the project (see Tables 1 and 2 for results of demographic information; for the questionnaire which obtained the information, see Appendix A).

Attachment Security

Attachment security was measured using the Attachment Q-set (AQS; Waters, 1987). Mothers completed the Q-set on their 12-month-old infants. As explained in the review of literature, infants form attachments over the course of the first year of life, and attachment is typically measured when infants are approximately 1 year of age. Previous research indicates that the Attachment Q-set completed by observers correlate with those obtained from the Strange Situation (Vaughn & Waters, 1990; Waters & Deane, 1985). Ainsworth et al. (1978) completed in-home observations of mothers with their infants to validate important maternal and infant behaviors related to attachment. Pederson and Moran (1996) reported an 84% concordance rate between attachment behaviors exhibited at home and in the Strange Situation in a laboratory. Teti and McGourty (1996) reported that mothers' and observers' Q-set measures were significantly intercorrelated, and indicated that mothers may be more qualified to complete Q-sets on their children than observers. To get reliable data from mothers, Teti and McGourty (1996) advised that mothers should be adequately prepared to complete the Q-sort by being sent a list of the items on the Q-set so that they could be paying more attention to their infants' behaviors before completing the Q-sort. Mothers in this study were mailed the Attachment Q-List approximately 2 weeks before completing the Attachment Q-set so they could observe their infants' behaviors that may have reflected attachment security. The Q-List lists the 90 items that are included in the Q-set. Mothers completed the Q-List during the 2-week interim and then completed the AQS with guidance from an assistant who is trained in the procedures of the AQS. The research assistant was available to the mothers to clarify the

task and to assist the mothers in the actual card sort. Mothers were instructed to first place the 90 cards into piles indicating "like my child," "unlike my child," and "neither like nor unlike my child." Next, they were instructed to take the cards from the like-their-child pile and rank them in order of most like to least like their child. Next, they were instructed to take the cards that were unlike their child and rank them from most unlike to least unlike their child. Finally, they were asked to rank the neither-like nor unlike-their-child cards into piles that they observed are the most like and the least like their child. Attachment security was scored as a continuous variable, by correlating the mothers' sorts with expert sorts of the prototypical securely attached child, as instructed by Waters (1987).

Parental Stress

Parental stress was measured using the Parenting Stress Index (PSI), which measures a parent's subjective level of stress due to the parenting role (Abidin, 1986). The 120-item measure uses a 5-point Likert scale, with items ranging from strongly agree to strongly disagree. Examples of items include "My child makes more demands on me than most children," "I enjoy being a parent," and "When I run into a problem taking care of my children I have a lot of people to whom I can talk to get help or advice." In previous research, internal reliability coefficients using Cronbach's alpha were .95 for overall parenting stress and range from .55 to .80 for the scales, which include child variables adaptability (.66), acceptability (.63), demandingness (.62), mood (.66), distractibility (.66), and reinforces the parent (.70), and parent variables depression (.80),

attachment (.55), restrictions of role (.79), sense of competence (.73), social isolation (.70), relationship with spouse (.70), and parent health (.66) (Abidin, 1986). For analysis purposes, the child and parent variables were analyzed separately in their respective scales as well as combined into composite child and parent scores. Higher scores indicate higher levels of stress for each scale. For purposes of analysis, each of the scales was analyzed separately and the internal consistency of each scale was obtained. Internal consistency is important to measure to ensure that the various items of a scale are correlated with each other (Hatcher & Stepanski, 1994). If they are, the likelihood that they are all measuring the same construct increases (Hatcher & Stepanski, 1994). Coefficient alpha is a popular method utilized to measure internal consistency of scales and questionnaires, perhaps because it provides the most conservative estimate of reliability that one can expect for a questionnaire (Hatcher & Stepanski, 1994). In this sample, internal consistency of the entire instrument was .94. Internal consistency reliability estimates of each of the scales are presented in Table 3 and range from .48 to .92. Intercorrelations between the scales, means, and standard deviations of each scale are also presented in Table 3. The concurrent and construct validity of the Parenting Stress Index have been demonstrated in several studies comparing the Child Scale with the Child Problem Checklist and the Parent Scale with the State-Trait Anxiety Scale, as described by Abidin (1986).

Table 3

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability Estimates for the Parenting Stress Index.

Scale	n	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1. Child	35	122.91	20.27	(.87)															
2. Distractibility	51	23.98	4.56	.56	(.48)														
3. Reinforces parent	52	8.67	2.66	.47	.33	(.53)													
4. Mood	55	9.35	2.61	.57	.09	.15	(.63)												
5. Acceptability	51	11.18	3.34	.68	.31	.37	.54	(.69)											
6. Adaptability	49	24.27	5.36	.77	.34	.17	.48	.49	(.70)										
7. Demandingness	43	15.61	4.61	.69	.19	.14	.31	.37	.45	(.65)									
8. Parent	49	100.71	20.51	.25	.10	.15	-.06	.06	.27	.20	(.92)								
9. Sense of competence	51	30.96	5.36	.61	.14	.25	.17	.28	.40	.46	.65	(.65)							
10. Attachment	51	11.96	3.24	.47	.10	.40	.25	.38	.42	.21	.40	.40	(.63)						
11. Restrictions of role	56	20.29	5.55	.35	.24	.18	.08	.17	.35	.27	.82	.48	.27	(.81)					
12. Depression	54	21.32	5.44	.29	.13	.04	-.03	.15	.28	.30	.88	.64	.32	.62	(.78)				
13. Relationship with spouse	54	18.48	5.27	.12	.06	-.00	-.13	-.07	.23	.12	.89	.54	.22	.67	.75	(.76)			
14. Social isolation	55	14.43	4.33	.04	.00	.00	-.20	-.09	-.00	.02	.76	.59	.20	.50	.56	.63	(.76)		
15. Health	56	14.23	3.33	-.23	-.18	-.18	-.26	-.31	-.14	-.14	.57	.17	-.09	.33	.43	.53	.38	(.55)	

Note. Coefficient alpha is in parentheses. Reliability estimates appear on the diagonal.

Adult Attachment

Adult attachment style was measured using the Relationship Survey, developed by Simpson, Rholes, and Nelligan (1992). The 13-item survey uses a 7-point Likert scale format, ranging from strongly agree to strongly disagree. Examples of items include "I'm not very comfortable having to depend on other people," "I rarely worry about being abandoned by others," and "I find it relatively easy to get close to others." The two scales of the Relationship Survey, avoidant and ambivalent, were analyzed separately. A high score on the avoidant scale indicates higher avoidance, while lower scores reflect greater security (Simpson et al., 1992). A high score on the ambivalent scale indicates higher levels of anxiety (Simpson et al., 1992). Simpson et al. (1992) reported that Cronbach's alpha was .81 on the avoidant/secure scale and .61 on the ambivalent scale. Coefficient alpha was used to assess internal consistency in this study (see Table 4). Intercorrelations, means, and standard deviations of each subscale are also presented in Table 4. The correlation between the secure/avoidant and ambivalent scales indicates that avoidance and ambivalence were correlated with each other in this study. Simpson et al. demonstrated the discriminant validity of the secure/avoidant scale, but not of the ambivalent scale (1992).

Infant Temperament

Infant temperament was measured using Rothbart's (1981) Infant Behavior Questionnaire (IBQ). Rothbart's questionnaire asks parents about specific behaviors characteristic of their infants during the past week in order to increase the reliability of

Table 4

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha ReliabilityEstimates for Relationship Survey

Scale	<u>n</u>	Mean	<u>SD</u>	1	2
1. Avoidant/secure	55	34.01	8.96	(.84)	
2. Ambivalent	53	24.39	5.68	.51	(.60)

Note. Coefficient alpha is in parentheses. Reliability estimates appear on the diagonal.

parent report. The 94-item, 7-point Likert scale has been used for infants and young toddlers, and has test-retest reliability coefficients ranging from $r = .67$ to $r = .85$ (Rothbart, 1996, personal communication). This range in reliability is typical of instruments measuring temperament (Goldsmith et al., 1991). Examples of items include "After sleeping, how often did the baby: fuss or cry immediately? play quietly in crib?," "How often during the last week did the baby: cry or show distress at a loud sound (blender, vacuum cleaner, etc.)?, startle at a sudden change in body position?," and "When being held, how often did the baby squirm, pull away or kick?" The IBQ has been found to be moderately correlated with other measures of infant temperament, with coefficients ranging from $r = .51$ to $r = .73$ (Goldsmith et al., 1991). The temperamental dimensions obtained from the IBQ, with reliability coefficient alpha from previous research in parentheses, include activity level (.73), smiling and laughter (.84), distress to limitations (.84), soothability (.84), fear (.80), and duration of orienting (.72) (Rothbart, 1996, personal communication). Internal reliability using coefficient alpha was obtained with (see Table 6) and without (see Table 5) deleting scales with missing variables by the

casewise method. The rationale for such a move was because this measure had a large amount of missing data due to pages of some questionnaires missing for a number of subjects because of mistakes in copying the questionnaire. Thus, an insufficient amount of cases were used to compute coefficient alpha. Intercorrelations, means, and standard deviations of each scale are also presented in Table 5.

Parental Attitudes

Parental attitudes were measured using the Parental Attitudes Toward Childrearing (PACR) questionnaire, which measures several important parental attitudes, such as affection, discipline, and child expression of emotions (Goldberg &

Table 5

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability Estimates for the Infant Behavior Questionnaire

Scale	Mean	SD	1	2	3	4	5	6
1. Activity level	3.93	1.09	(.86)					
2. Distress	3.22	.75	.28	(.75)				
3. Fear	2.60	.72	.14	.26	(.74)			
4. Duration of orienting	3.49	1.32	.23	-.27	.22	(.76)		
5. Smiling	4.57	1.41	.59	-.06	-.02	.44	(.94)	
6. Soothability	5.30	.86	-.05	-.09	-.04	.19	.38	(.80)

Note. Activity level $n = 41-55$; Distress $n = 27-55$; Fear $n = 26-56$; Duration of orienting $n = 32-52$; Smiling $n = 29-55$; Soothability $n = 46-55$.

Coefficient alpha is in parentheses. Reliability estimates appear on the diagonal.

Table 6

Coefficient Alpha Using "Nomiss" Option in SAS

Scale	<u>n</u>	1	2	3	4	5	6
1. Activity level	32	(.88)					
2. Distress	14		(.80)				
3. Fear	10			(.76)			
4. Duration of orienting	25				(.78)		
5. Smiling	16					(.95)	
6. Soothability	17						(.87)

Note. Coefficient alpha is in parentheses.

Easterbrooks, 1984). The 51-item questionnaire uses a 6-point Likert scale format ranging from strongly agree to strongly disagree. Examples of items include "I feel a child should be given comfort and understanding when (he) (she) is scared or upset," "I find some of my greatest satisfactions in my child," and "I respect my child's opinions and encourage (him) (her) to express them." Scales (with coefficient alpha from previous research in parentheses) include warmth (.58), encouragement of independence (.69), strictness (.67), and aggravation (.69) (Goldberg & Easterbrooks, 1984). The four scales were analyzed separately in this study and coefficient alphas, which ranged from .64 to .76, are reported in Table 7. The overall coefficient alpha obtained was .84. Intercorrelations, means, and standard deviations of each scale are also presented in Table 7.

Table 7

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha ReliabilityEstimates for Parental Attitudes Toward Childrearing Questionnaire

Scale	<u>n</u>	Mean	<u>SD</u>	1	2	3	4
1. Warmth	57	53.05	4.49	(.64)			
2. Encouragement of independence	47	42.19	7.45	.43	(.76)		
3. Strictness	48	39.61	9.25	.06	.25	(.74)	
4. Aggravation	50	60.05	10.80	.05	.06	.49	(.71)

Note. Coefficient alpha is in parentheses. Reliability estimates appear on the diagonal.

Procedures

Approval was granted to complete the proposed study by the Institutional Review Board at Utah State University (see Appendix B). The researcher contacted various Head Start centers in the southeastern Idaho and northern Utah area to obtain permission to include their centers in the proposed study. After approval from the policy councils of the centers, the researcher asked Head Start teachers for the names, addresses, and phone numbers of Head Start families who had infants under the age of 8 months. Head Start is a national program which delivers comprehensive services to the entire family, not just the child eligible for the program. Thus, Head Start services extend from the center into the home, where the entire family often receives services. Family incomes must be below the federal poverty guidelines in order to qualify for Head Start services.

The researcher and associates recruited Head Start mothers to participate in the

study through telephone calls and home visits to homes without telephones. In order to increase sample size, parents who had had babies and whose birth announcements were in the newspaper were contacted if they had phone numbers in the phone book. The research team explained all procedures to mothers as part of recruitment. Mothers of newborn to 8-month-old infants who were willing to participate in the research project were randomly assigned to one of two groups by a coin flip. The treatment group received training in infant massage techniques and information about infant development, and the control group received only the information about infant development. The procedures followed for each group are explained in greater detail below.

The researcher scheduled the groups around mothers' schedules. Mothers who agreed to participate were mailed the set of questionnaires approximately 1 week before the group began, unless they indicated a preference to complete the questionnaires over the phone or in person with the researcher. All names were replaced with identification numbers in order to protect confidentiality. Mothers were asked to complete the questionnaires and bring them to the first session. Only the researcher and associates had access to the questionnaires.

Prior to the intervention, it was decided that treatment and control group sizes would be limited to eight mother-infant dyads to increase the likelihood of discussion between participants, as well as to maintain an adequate level of stimulation in the massage group. However, the reality of the situation was that due to the lower number of Head Start parents with infants of the appropriate age than expected, groups rarely had more than three mother-infant dyads. Toys were provided for older children of mothers

without child care services to decrease the likelihood of interruption. Both groups welcomed children warmly so that parents without child care felt welcome and not a burden to other participants.

The massage group met once per week for 4 weeks and received standard infant massage training. The 45- to 60-minute sessions provided information regarding infant development, support, and massage techniques. Each group met at the same prearranged time at either the Head Start center in the community or the Health Department. The "massage" room was a comfortable room, with subdued lighting, a warm temperature for the infants' comfort, and a pleasant odor (from a scented candle, potpourri, etc.). Parents were greeted warmly by a certified infant massage instructor, and encouraged to have a snack while completing the transition to the massage environment. After the warmup time passed, participants followed the instructor in relaxation techniques and then began the massage. Participants were encouraged to sit in a circle with their babies. The goal was to make both baby and parent as comfortable as possible. Soft music played in the background as the instructor demonstrated the strokes for parents to perform. Strokes for the legs were taught the first week, stomach and chest strokes the second, arm strokes the third, and face and back strokes the last week. Each week, the instructor briefly practiced the strokes from the previous weeks with the participants so that by the end of the 4 weeks, the participants were very familiar with the massage strokes. In addition, participants were encouraged to practice the strokes at least once daily between sessions. Parents were given a copy of Nurturing Touch: Instruction in the Art of Infant Massage

(Babeshoff & Dellinger-Bavolek, 1993), which contains pictorial examples of the massage strokes to refresh their memory.

Topics concerning infant development were presented informally and in a non-threatening manner each week during the course of the massage instruction. Specific topics included physical, social, language, and cognitive development of infants. Participants were given brief handouts concerning each of the above topics. In addition, the instructor was available to provide support and encouragement as well as answer any questions from the participants.

The control group met each of the 4 weeks to obtain information regarding infant development and to discuss developmental issues that were relevant. As with the treatment group, topics concerning infant development were presented informally and in a nonthreatening manner each week. Specific topics included physical, social, language, and cognitive development of infants. Participants were given brief handouts concerning each of the above topics. In addition, the instructor was available to provide support and encouragement as well as answer any questions that arose from the participants. The 45- to 60-minute sessions were held in the local Head Start center or the Health Department. The "control" room was as friendly as possible and parents were greeted by a facilitator well-educated in the area of child development. Parents were greeted, encouraged to have a snack, and made to feel welcome.

At the end of the 4-week sessions (which ran concurrently), parents were given the followup battery of questionnaires, which included the same questionnaires as those given before the intervention. Mothers were given addressed and postage paid envelopes

in which to place the questionnaires and mail to the researcher. Upon receipt of the questionnaires, the researcher mailed out a small monetary gift of appreciation for participation.

When the infants were 12 months old, the researcher contacted the family and asked for their continued participation in the study. Upon agreement to participate, the researcher scheduled a convenient time for the mother to meet to complete the Attachment Q-set (Waters, 1987) and mailed out the same battery of questionnaires previously completed, as well as the Q-sort list. The Q-sort list is a list of the items from the Attachment Q-set (Waters, 1987) and the rationale for sending it to parents is so they can be familiar with the items on the AQS. The researcher or research assistant met the parent in whatever locale they felt most comfortable, such as the Head Start center, a restaurant, Utah State University, the mother's home, and so forth. Mothers were asked to bring the completed questionnaires with them to the appointment. When the mother and researcher or research associate met, friendly greetings and casual conversation were made, the mother sorted the 90 cards from most like her infant to most unlike her infant with guidance, the mother was asked if she breastfed her infant and if so, for how long, and the mother was asked if she massaged her infant and if so, the frequency she has done so. Mothers were again sent a small monetary gift of appreciation. At the conclusion of the project, mothers who wish to receive results indicating the outcome of the study will be sent a summary of the results written in an easily read fashion.

Data Reduction and Transformation

Quantitative measures were employed to minimize bias and because they have established reliability and validity which will lend credibility to the research. Because the researcher administered the written measures and analyzed the results, quantitative measures were more appropriate and reduced experimenter bias.

Data from the questionnaires were entered into a computer twice, once by the researcher and a second time by an undergraduate student. Files were compared to check accuracy of data entry. All questionnaire information was entered as continuous variables ranging from a minimum of 1 to a maximum of 7. Opposite-worded items (to avoid response bias) were coded appropriately by reversing the order of the numbers. In addition, length of breastfeeding, massage frequency per week, number and age of other children, marital status, number of hours the mother worked, number of hours spent in weekly religious activities, and age and education level of both parents were treated as continuous variables. Work status was treated as a dichotomous variable. Breastfeeding was an important variable because of the physical contact involved between parent and child. Correlations between breastfeeding length and attachment security were obtained to ensure no contamination of results. Marital status, age, education level, and work status were also important variables to measure because they may influence a parent's perception of stress and attitudes about parenting. Data from the Attachment Q-set (Waters, 1987) were entered into the computer as instructed by Waters (1987) and resulting scores reflecting level of security were treated as continuous variables.

Plan of Analysis

All data were analyzed using the SAS analysis software program. Data were analyzed with a series of t tests to affirm that groups were equivalent on the demographic variables and questionnaires at the pretest. The background variables were analyzed to validate equivalency of groups assumed by random assignment and to describe characteristics of the sample. The internal consistency and test-retest reliability of each measure was also assessed. Correlations of outcome measures were calculated on length of breastfeeding and the demographic variables. Correlations of $r = .60$ or higher were added to the hypothesis testing process as covariates.

CHAPTER IV

RESULTS

This chapter will include results obtained through analysis of survey responses and the Attachment Q-sort. The measures utilized to investigate the research questions were outlined in Chapter III. The results for each research hypothesis will be presented in this chapter. Discussion of the results obtained in this chapter will be discussed in Chapter V.

Attrition

This study measured parent and infant variables over the course of time in a longitudinal study. A threat to the internal validity of longitudinal studies is attrition, the loss of subjects over the course of time (Dooley, 1990). If the subjects who drop out of longitudinal studies are different from those who stay, study inferences may be limited. In this study, a longitudinal experiment was conducted to assess the effects of infant massage on subsequent attachment security. Fifty-seven subjects were randomly assigned into either the treatment ($n = 27$) or control ($n = 30$) group. When infants were approximately 12 months old (mean = 14.04, $SD = 1.8$ months), the followup was conducted. Twelve subjects were lost over time, accounting for a 21% attrition rate. Several subjects moved out of the area, and the Head Start they were served by did not have forwarding information on their locations. One treatment group subject moved to Australia and called the researcher before going, but it was too early to conduct the

followup because her infant was less than 8 months of age at that time. Treatment and control groups lost 6 subjects each at the followup assessment: the treatment group had 21 respondents continue the study and the control group had 24 respondents continue. However, one of the 6 subjects lost from the treatment group was deliberately removed from the study, because the infant had several major surgeries over the course of her first year of life due to a congenital birth defect.

Demographic data of the subjects who left were compared with data of the subjects who stayed according to group assignment to determine whether subjects who left their respective groups were significantly different than those who stayed in those groups. Dooley (1990) specified that "if the dropout rate is higher in the experimental group and if the 'leavers' are different on the pretest measure from the 'stayers,' any between-group differences are suspect" (p. 188). Despite the fact that Dooley assured researchers that the two conditions must be met in order to threaten the results of a study, two-way ANOVAs with two between-groups factors (leave versus stay and treatment versus control group) were performed to ensure that there were no significant differences between the various subgroups that could affect inferences drawn from the study. Findings indicated that treatment and control mothers who left the study were less educated than the treatment and control stayers (mean education levels were 11.91, $SD = 1.76$ versus 13.91, $SD = 1.73$, $p = .002$), but there were no effects of experimental group. In other words, there were no differences in education level between the treatment and control group members who left. There was an interaction between the leavers and stayers by experimental group on the age of the mother (the control and treatment

mothers who left were 31.76, $SD = 5.13$, and 27.39-years-old, $SD = 6.54$, respectively; the control and treatment mothers who stayed were 25.99, $SD = 5.09$, and 30.09 years-old, $SD = 4.95$, respectively, $p = .026$). Infants who left the study were younger than those who stayed (2.76 months, $SD = 1.92$, versus 5.04 months, $SD = 2.28$, $p = .006$), but there were no effects of experimental group. In other words, there were no differences in infant age between the treatment and control group members who left. Perhaps the sample was somewhat mobile, and the longer the passage of time, the higher the likelihood of a family moving. Thus, while some differences were present between the leavers and the stayers (age of infant and maternal education), the treatment and control groups were alike on most of the demographic characteristics, with maternal age as the only significant difference between those who left and those who stayed in their assigned groups.

To ensure that any differences on the demographic characteristics did not translate into differences on the pretests, two-way between group ANOVAs were conducted on the pretest questionnaires. Findings indicated that those who left were more securely attached on the Relationship Questionnaire than those who stayed (those who left averaged 29.29 on the secure/avoidant subscale, and those who stayed averaged 35.56, $p = .02$), with no significant interactions between group assignments and leavers and stayers. Lower scores on the secure/avoidant subscale indicate higher security while higher scores indicate more avoidance. There was an interaction between those who left and those who stayed according to their group assignment on the Smiling Scale of the Infant Behavior Questionnaire (those who left the treatment group, mean = 4.37, $SD =$

1.45, those who left the control group, mean = 4.58, $SD = 2.03$; those who stayed in the treatment group, mean = 3.44, $SD = 0.94$, those who stayed in the control group, mean = 5.26, $SD = 1.05$, $p = .027$). Overall, these differences were minimal, and should not be strong enough to influence the results of this study.

Manipulation Check

A surprising finding was that seven mothers in the control group reported that they massaged their infants two or more times per week. This finding was surprising because only treatment mothers were expected to report that they massaged their infants because they had learned massage techniques in a class. Control mothers may have read books about massage, considered simply rubbing infants' bodies as massage, or taken another class on infant massage and thus have reported that they massaged their infants. Due to the phenomenon of members of both groups reporting engaging in massage with their infants, previous research would support the use of frequency of massage as a variable to be considered in evaluating attachment security because of the increase in physical contact inherent in massage.

Because the purpose of the intervention was to promote infant massage, one would expect a difference in the frequency of massage according to experimental group. Because there was great variability in the number of times per week that mothers reported massaging their infants, this variable was broken into two levels: 0-1 time per week and 2 or more times per week. This breakdown is supported logically and statistically. Logically, mothers who reported massaging their infants more than once per week may

be increasing the amount of physical contact with their infants. Those who massaged their infants once or fewer times per week would not appear to be following through with the intervention and may not have increased the amount of physical contact between mothers and infants. Statistically, about half of the total sample reported massaging their infants more than once per week, and half reported massaging their infants once or less each week. The hypothesis that there would be a difference in the groups was tested with the chi-square test of independence, and the results are presented in Table 8. These results were significant using the chi-square statistic (chi-square = 8.01, $p = .005$). Thus, as would be expected, the two groups were differentiated by how often they massaged their infants.

Because massage frequency is an index of the continuation of the intervention, analyses beyond those originally proposed were explored using massage frequency as an additional between-group factor. The rationale for this approach was that the frequency of massage was the most direct measure of the hypothesized cause of improved outcomes. Although the intervention had a significant effect on massage frequency, not all mothers in the treatment group continued massaging their infants and some control

Table 8

Chi-Square Test of Independence of Frequency of Massage Means

Group	1 or fewer days per week	2 or more days per week
Control	17	7
Treatment	6	15

mothers did. This crossover phenomenon could potentially confound the results. Therefore, incorporating the frequency of massage into the analyses was important for clarifying the results. These exploratory analyses will be reported only when the results using the massage frequency factor were statistically significant.

Hypothesis Testing

Hypothesis 1: Attachment security scores will be significantly higher for the treatment group than the control group.

The first step in testing this hypothesis was determining whether attachment security was highly correlated with any of the demographic variables. Prior to the study, a decision was made to include covariates of demographic variables, breastfeeding (due to the nature of physical contact involved), or number of times per week that a mother massaged her baby if they had correlations of $r = .60$ or higher with attachment security. The results of correlation testing are presented in Table 9. As can be seen, there were several significant correlations between attachment security and the demographic variables age of mother, number of siblings, gender of infant, and frequency of massage. However, no variables met the required correlation level of $r = .60$ to be included as covariates.

The first test of this hypothesis consisted of a one-way ANOVA, between-groups design. Experimental group, a categorical variable which assumed two levels, treatment and control, was treated as the independent variable in this ANOVA. Attachment security, which was measured on a continuous level, was treated as the dependent

Table 9

Pearson Correlations Between Attachment Security and Demographic Variables

Demographic variables	Pearson correlation
Gender of infant (1=female, 2=male)	-.35*
Number of siblings of infant	.41***
Age of infant	-.08
Education of mother	.08
Education of father	-.06
Work status of mother	-.15
Hours mother works per week	-.10
Age of mother	.55****
Age of father	.15
Hours in religious activities	.00
Length of breastfeeding	.25
How often mother massages infant	.34**

* $p < .05$ ** $p < .01$ *** $p < .005$ **** $p < .001$

variable. This analysis failed to reveal a significant effect for experimental group, as seen in Table 10. Thus, the treatment did not appear to affect attachment security, although the means were in the expected direction, as seen in Table 11.

To test the hypothesis that this experimental group difference in message frequency affected attachment security, a two-way ANOVA was used, with two between-group factors, experimental group and frequency of message. Attachment security remained the dependent variable. This analysis revealed a significant experimental group

Table 10

Summary Table for One-Way ANOVA Testing Effects of Group on Attachment Security

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>	<u>R-square</u>
Group	1	0.03	0.03	1.24	.27	0.03
Within groups	43	1.19	0.03			
Total	44	1.23				

Note. N=45.

Table 11

Summary Table of Attachment Security Scores by Group

Group	<u>n</u>	Mean	<u>SD</u>
Control	24	0.34	0.14
Treatment	21	0.40	0.19

by frequency of message interaction, $F(1, 31) = 5.28, p < .03$ (see Table 12). The nature of this interaction is presented in Figure 1.

Subsequent analyses indicated that there was a simple effect for frequency of message for the treatment group, $F(1, 41) = 19.48, p < .001$, but not for the control group, $F(1, 41) = 0.16, p > .05$. This indicates that only for mothers who had infant message classes, the more message they did with their infants, the more securely attached the infants were.

Table 12

ANOVA Summary Table Investigating the Relationship Between Message Frequency,Group, and Attachment Security

Source	df	SS	MS	F	R-square
Message frequency (A)	1	0.24	0.24	12.32**	0.20
Group (B)	1	0.00	0.00	0.09	0.00
A X B interaction	1	0.17	0.17	8.78*	0.14
Within groups	41	0.81	0.02		
Total	44	1.23			0.34

Note. N=45.

*** $p < .005$ **** $p < .001$

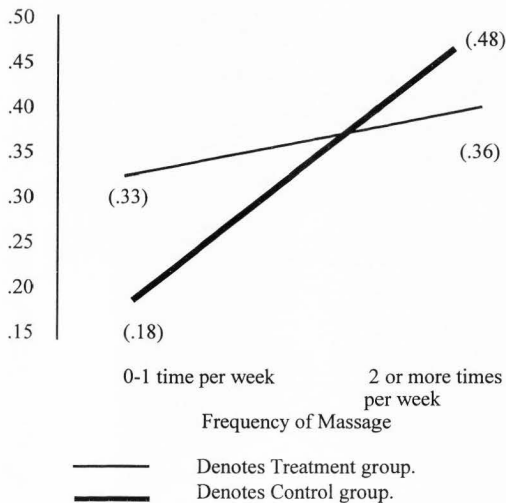


Figure 1. Association between attachment security, message frequency, and group.

Further t test analyses indicated that treatment mothers who massaged their 12-month-old infants were likely to have infants who were more securely attached (mean = .48, SD = .14) than control mothers who did not massage their infants (mean = .33, SD = .15, t = -2.90, p = .007) and control mothers as a group (mean = .34, SD = .14, t = -3.06, p = .004), but not statistically more than control mothers who massaged their 12-month-old infants (mean = .36, SD = .13, t = -1.94, p = .066), as seen in Table 13. The low number of control mothers who massaged their infants compared to the number of treatment mothers who massaged their infants appears to have contributed to the lack of statistical significance of the t test seen in the table. Although it has been demonstrated that treatment mothers who massaged their infants were more likely to have securely attached infants than treatment mothers who did not massage their infants, a t test comparing the two is reported in Table 13 so the reader can see the means and standard deviations of the two.

Table 13

Means, Standard Deviations, and t-Test Results of Analyses Comparing Treatment Massagers with Control Massagers and Non-Massagers, and Treatment Non-Massagers

Group	n	Mean	SD	t	p
Treatment massagers	15	.48	.14		
Control non-massagers	17	.33	.15	-2.90	.007
Control massagers	7	.36	.13	-1.94	.066
Control group	24	.34	.14	-3.06	.004
Treatment non-massagers	6	.18	.13	-4.45	.000

Although it appeared that massage frequency affected attachment security, other variables were even more strongly correlated with attachment security. Those variables were the gender of the infant, the number of siblings the infant had, and maternal age. A multiple regression was performed to determine the effect of massage on attachment security independent of the other factors. The multiple regression procedure was limited by only 30 maternal ages being reported. Standardized regression coefficients, the regression coefficients obtained if each of the variables were standardized (also called beta weights), are presented in Table 14, as are the squared partial correlation coefficients, or the unique variance of each variable in the regression model after taking into account the variance explained by each of the other variables (Hatcher & Stepanski, 1994). As can be seen, maternal age accounts for the greatest amount of variance in

Table 14

Beta Weights and Partial Correlation Coefficients Obtained in Multiple Regression Analyses Predicting Attachment Security

Predictor	Beta weights		Partial correlations	
	Beta	t	Partial r	F
Maternal age	.51	3.41**	.20	11.61**
Massage frequency	.42	3.22**	.18	10.35**
Number of siblings	.12	.82	.01	.59
Gender of infant	-.22	-1.67	.05	2.94

Note. N = 30.

**p < .01.

attachment security in this sample, accounting for 20% of the variance in attachment, beyond the variance accounted for by the other three independent variables. However, the independent effect of massage frequency, which accounts for 18% of the variance in attachment, remained significant even when the other variables are included.

Hypothesis 2: Treatment mothers will improve their attitudes toward parenting more than control mothers, as evidenced by perceptions of parenting stress, perceptions of close relationships, perceptions of infant temperament, and attitudes toward childrearing.

This hypothesis was tested by repeated measures ANOVAs with time as the within-group factor and experimental group as the between-group factor and each attitude measure as the dependent variables. For each analysis, the results supporting the hypothesis would be a significant interaction of time and experimental group, reflecting an improvement in parental attitudes over time within the group that received the intervention but not within the group that did not. A series of t tests was used to determine if any differences between the experimental groups in the pretest existed at the beginning of the study. Only subjects who completed the pretest and the followup were included in these analyses. The only significant difference between the treatment and control groups was the amount of infant smiling mothers perceived, with treatment mothers perceiving their infants as smiling more (mean = 5.26, SD = 1.05) than control mothers (mean = 4.37, SD = 1.45). The results of the t tests are seen in Table 15.

Hypothesis 2a: Parenting stress scores will be lower for the treatment group than for the control group.

Table 15

Pretest Results of t Tests Comparing Groups on Each Measure

Scale	Control		Treatment		t
	Mean	SD	Mean	SD	
Parenting Stress Index ($N = 44$)					
Child	119.08	19.69	126.65	17.84	1.32
Parent	101.92	16.86	95.00	19.27	-1.27
Total Stress	221.00	26.09	221.65	32.89	0.07
Relationship Survey ($N = 43$)					
Avoidant/Secure	35.09	8.31	36.10	10.08	0.36
Ambivalent	25.78	6.39	23.80	5.52	-1.08
Infant Behavior Questionnaire ($N = 42$)					
Activity level	4.09	1.16	4.13	1.10	0.11
Distress to limitations	3.21	.90	3.31	.71	0.37
Fear	2.68	.66	2.46	.73	-1.03
Duration of orienting	3.22	1.53	3.94	1.11	1.69
Smiling	4.37	1.45	5.26	1.05	2.19*
Soothability	5.29	.91	5.47	.61	0.74
Parental Attitudes toward Childrearing ($N = 43$)					
Warmth	54.09	3.01	52.80	3.24	-1.35
Encouragement of independence	42.48	9.04	43.10	4.85	0.27
Strictness	39.61	8.89	38.70	7.20	-0.36
Aggravation	59.87	9.67	60.70	10.56	0.27

* $p < .05$

Perceptions of parenting stress were tested by three repeated measures ANOVAs using the Parenting Stress Index (child scale, parent scale, and total scale) with time as the within-group factor and experimental group as the between-group factor. The Parenting Stress Index scores were the dependent variables. Correlations were examined to ensure that no demographic variables had correlations of $r = .60$ or higher with the Parenting Stress Index scores. Results of the correlation analyses are presented in Appendix D. There were no correlations greater than .60 of parenting stress due to the child, the parenting role, or overall parenting stress with the demographic variables. The results of the repeated measures ANOVA for the child scale of the Parenting Stress Index are presented in Table 16. Significant effects of both time and experimental group

Table 16

ANOVA Summary Table for Investigating the Change in the Child Scale of the Parenting Stress Index over Time

Source	df	SS	MS	F
Between subjects	39	17321.75		
Group (A)	1	3001.79	3001.79	7.97**
Residual between	38	14319.96	376.84	
Within subjects	40	13949.00		
Time (B)	1	3025.80	3025.80	10.68***
A X B Interaction	1	155.29	155.29	.55
Residual within	38	10767.91	283.37	
Total	79	31270.75		

Note. N = 40.

p < .01. *p < .005.

existed, indicating that stress due to children increased over the course of time, and the treatment group had higher mean scores for stress at both times (mean = 131.47, SD = 15.93 at the pretest and mean = 140.53, SD = 15.46 at the posttest) than the control group (mean = 116.26, SD = 21.15 at the pretest and mean = 130.97, SD = 18.29 at the posttest). The interaction term was not significant; that is, there was no experimental group difference in changes of stress over time.

The results of the repeated measures ANOVA for the Parent Scale of the Parenting Stress Index are presented in Table 17. There were no significant main effects or interaction effects for this scale.

Table 17

ANOVA Summary Table for Investigating the Change in the Parent Scale of the Parenting Stress Index over Time

Source	df	SS	MS	F
Between subjects	39	17526.43		
Group (A)	1	.12	.12	.00
Residual between	38	17526.43	461.22	
Within subjects	40	4740.30		
Time (B)	1	95.68	95.68	1.57
A X B Interaction	1	16.48	16.48	.27
Residual within	38	2314.07	60.90	
Total	79	22266.73		

Note. N = 40.

The results of the repeated measures ANOVA for the Total Stress Scale of the Parenting Stress Inventory are presented in Table 18. Significant effects of time existed, indicating an increase in mothers' perceived levels of stress over time, but there were no significant differences in the two groups over time. Treatment mothers' stress levels increased from 218.43, $SD = 24.80$ to 230.00, $SD = 32.91$, while control mothers' stress levels increased from 232.64, $SD = 26.11$ to 240.41, $SD = 25.47$. The interaction term was not significant.

Hypothesis 2b: Relationship attitude scores will reflect higher security and lower anxiety for the treatment group but not the control group mothers.

Table 18

ANOVA Summary Table for Investigating the Change in the Total Scale of the Parenting Stress Inventory over Time

Source	df	SS	MS	F
Between subjects	39	47287.80		
Group (A)	1	2963.50	2963.50	2.54
Residual between	38	44324.30	1166.43	
Within subjects	40	13949.00		
Time (B)	1	1826.19	1826.19	4.84*
A X B Interaction	1	70.59	70.59	.19
Residual within	38	14323.36	376.93	
Total	79	61236.80		

Note. $N = 40$.

* $p < .05$.

Perceptions of close relationships were tested by two repeated measures ANOVAs of the Relationship Survey scores, with time as the within-group factor and experimental group as the between-group factor. The anxious/ambivalent and secure/avoidant scales of the Relationship Survey were the dependent variables in the ANOVAs. Correlations were examined to ensure that no demographic variables had correlations of $r = .60$ or higher with the outcome variables of the Relationship Survey scales. Results of the correlation analyses are presented in Appendix D. Higher scores on the scales indicate higher avoidance and higher anxiety, while lower scores on the Secure/Avoidant Scale indicate higher security. No variables met the criterion of having a correlation of $r = .60$ or higher. But of interest is the significant negative correlation of massage frequency with the Ambivalent Scale, indicating that mothers who were less ambivalent were more likely to massage their infants.

Results of the repeated measures ANOVA for the Secure/Avoidant Scale are presented in Table 19. No main effects or significant interactions were found. The results of the repeated measures ANOVA for the Ambivalent Scale were also not statistically significant, as seen in Table 20.

Hypothesis 2c: Infant temperament will be perceived as less difficult for the treatment group than for the control group mothers.

Perceptions of infant temperament was tested by running several repeated measures ANOVAs with the scales of the Infant Behavior Questionnaire with time as the within-group factor and experimental group as the between-group factor. The scales, Activity Level, Distress to Limitations, Fear, Duration of Orienting, Smiling, and

Table 19

ANOVA Summary Table for Investigating the Change in the Secure/Avoidant Scale of the Relationship Survey over Time

Source	df	SS	MS	F
Between subjects	36	4395.13		
Group (A)	1	129.73	129.73	1.06
Residual between	35	4265.40	121.87	
Within subjects	37	674.01		
Time (B)	1	0.87	0.87	.04
A X B Interaction	1	0.02	0.02	.00
Residual within	35	673.12	19.23	
Total	73	5069.14		

Note. N = 37.

Table 20

ANOVA Summary Table for Investigating the Change in the Ambivalent Scale of the Relationship Survey over Time

Source	df	SS	MS	F
Between subjects	36	2074.48		
Group (A)	1	20.79	20.79	.35
Residual between	35	2053.69	58.68	
Within subjects	37	302.09		
Time (B)	1	4.04	4.04	.51
A X B Interaction	1	21.61	21.61	2.74
Residual within	35	276.44	7.90	
Total	73	2376.57		

Note. N = 37.

Soothability, of the Infant Behavior Questionnaire were the dependent variables.

Correlations were examined to ensure that no demographic variables had correlations of $r = .60$ or higher with the Infant Behavior Questionnaire scales. Results of the correlation analyses are presented in Appendix D. There were no correlations of $r = .60$ or higher between the variables.

Results of the repeated measures ANOVA for the Activity Level Scale are presented in Table 21. No main effects or significant interactions were found.

The results of the repeated measures ANOVA for the Distress to Limitations Scale are displayed in Table 22. Significant effects of time existed, but there were no

Table 21

ANOVA Summary Table for Investigating the Change in the Activity Level Scale of the Infant Behavior Questionnaire over Time

Source	df	SS	MS	F
Between subjects	39	48.44		
Group (A)	1	1.79	1.79	1.46
Residual between	38	46.65	1.23	
Within subjects	40	30.57		
Time (B)	1	.93	.93	1.24
A X B Interaction	1	1.27	1.27	1.70
Residual within	38	28.37	.75	
Total	79	79.01		

Note. $N = 40$.

Table 22

ANOVA Summary Table for Investigating the Change in the Distress to LimitationsScale of the Infant Behavior Questionnaire over Time

Source	df	SS	MS	F
Between subjects	39	27.39		
Group (A)	1	.02	.02	.03
Residual between	38	27.37	.72	
Within subjects	40	29.62		
Time (B)	1	6.43	6.43	10.55***
A X B Interaction	1	.02	.02	.03
Residual within	38	23.17	.61	
Total	79	57.01		

Note. N = 40.

***p < .005.

significant differences in the two groups over time. In other words, mothers perceived their infants to be more distressed when their activities were limited at the posttest than at the pretest. The interaction term was not significant.

The results of the repeated measures ANOVA for the Fear Scale are presented in Table 23. Once again, significant effects of time existed, but there were no significant differences in the two groups over time. Thus, mothers perceived their infants as more fearful at the posttest than at the pretest. The interaction term was not significant.

The results of the repeated measures ANOVA for the Duration of Orienting Scale are presented in Table 24. No significant differences were found over time, and the

Table 23

ANOVA Summary Table for Investigating the Change in the Fear Scale of the Infant Behavior Questionnaire over Time

Source	df	SS	MS	F
Between subjects	39	25.47		
Group (A)	1	.10	.10	.14
Residual between	38	25.37	.67	
Within subjects	40	15.68		
Time (B)	1	5.05	5.05	18.78****
A X B Interaction	1	.42	.42	1.59
Residual within	38	10.21	.27	
Total	79	41.15		

Note. N = 40.

****p < .001.

Table 24

ANOVA Summary Table for Investigating the Change in the Duration of Orienting Scale of the Infant Behavior Questionnaire over Time

Source	df	SS	MS	F
Between subjects	39	108.38		
Group (A)	1	.96	.96	.34
Residual between	38	107.42	2.82	
Within subjects	40	32.86		
Time (B)	1	1.27	1.27	0.21
A X B Interaction	1	.92	.92	1.14
Residual within	38	30.67	.81	
Total	79	141.24		

Note. N = 40.

interaction term was not statistically significant.

The results of the repeated measures ANOVA for the Smiling Scale are presented in Table 25. Once again, there was a main effect of time, and there was a significant interaction of time and experimental group, as seen in Figure 2. Subsequent analyses indicated that there was a simple effect over time for the control group, $F(1, 21) = 16.09$, $p < .001$, but not for the treatment group, $F(1, 14) = 0.80$, $p > .05$. Control mothers increased their perceptions of their infants' smiling (mean = 4.32, $SD = 1.44$ at the pretest; mean = 5.50, $SD = 0.64$ at the posttest) more than treatment mothers (mean = 4.89, $SD = 1.11$ at the pretest; mean = 5.20, $SD = 0.74$ at the posttest) in this sample.

Table 25

ANOVA Summary Table for Investigating the Change in the Smiling Scale of the Infant Behavior Questionnaire over Time

Source	df	SS	MS	F
Between subjects	39	49.42		
Group (A)	1	.36	.36	.28
Residual between	38	49.06	49.06	
Within subjects	40	48.40		
Time (B)	1	10.95	10.95	12.36****
A X B Interaction	1	3.77	3.77	4.25*
Residual within	38	33.68	.89	
Total	79	97.82		

Note. N = 40.

* $p < .05$. **** $p < .001$.

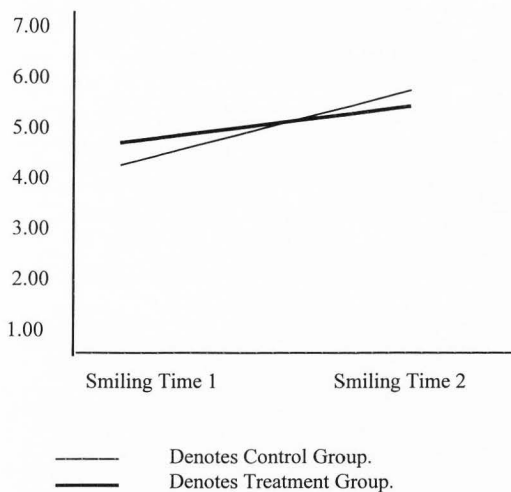


Figure 2. Interaction between group assignment and change over time in the Smiling Scale of the Infant Behavior Questionnaire.

The results of the repeated measures ANOVA for the Soothability Scale are presented in Table 26. No significant differences were found over time, and the interaction term was not significant.

Hypothesis 2d: Parental attitude scores will be higher for the treatment group than for the control group mothers.

Attitudes toward childrearing were tested by four repeated measures ANOVAs using each of the four subscales of the Parental Attitudes Toward Childrearing Scale with time as the within-group factor and experimental group as the between-group factor. The subscales of the PACR Questionnaire, Warmth, Encouragement of Independence,

Table 26

ANOVA Summary Table for Investigating the Change in the Soothability Scale of the Infant Behavior Questionnaire over Time

Source	df	SS	MS	F
Between subjects	39	39.63		
Group (A)	1	.32	.32	.31
Residual between	38	39.31	1.03	
Within subjects	40	19.50		
Time (B)	1	.30	.30	.62
A X B Interaction	1	.53	.53	1.08
Residual within	38	18.67	.49	
Total	79	59.13		

Note. $N = 40$.

Strictness, and Aggravation, were the dependent variables. Correlations were examined to ensure that no demographic variables had correlations of $r = .60$ or higher with any of the scales. Results of the correlation analyses are presented in Appendix D. There were no variables with correlations of $r = .60$ or higher.

The results of the repeated measures ANOVA for the Warmth Scale of the Parental Attitudes Toward Childrearing Questionnaire are presented in Table 27. There were no significant main effects or interaction effects for this scale.

The results of the repeated measures ANOVA for the Encouragement of Independence Scale of the Parental Attitudes Toward Childrearing Questionnaire are

Table 27

ANOVA Summary Table for Investigating Change in the Warmth Scale of the Parental Attitudes Toward Childrearing Questionnaire over Time

Source	df	SS	MS	F
Between subjects	36	630.46		
Group (A)	1	30.37	30.37	1.77
Residual between	35	600.09	17.15	
Within subjects	37	327.58		
Time (B)	1	.21	.21	.02
A X B Interaction	1	.75	.75	.08
Residual within	35	326.62	9.33	
Total	73	958.04		

Note. $N = 37$.

presented in Table 28. There were no significant main effects or interaction effects for this scale.

The results of the repeated measures ANOVA for the Strictness Scale of the Parental Attitudes Toward Childrearing Questionnaire are presented in Table 29. There were no significant main effects or interaction effects for this scale.

The results of the repeated measures ANOVA for the Aggravation Scale are presented in Table 30. There was a significant effect of time, and there was a significant interaction between the two groups over time, as seen in Figure 3. Subsequent analyses indicated that there was a simple effect over time for the treatment group, $F(1, 13) = 12.82$, $p < .005$, but not for the control group, $F(1, 19) = 0.00$, $p > .05$. Treatment

Table 28

ANOVA Summary Table for Investigating Change in the Encouragement of Independence Scale of the Parental Attitudes Toward Childrearing Questionnaire over Time

Source	df	SS	MS	F
Between subjects	36	2042.38		
Group (A)	1	15.36	15.36	0.27
Residual between	35	2027.02	57.91	
Within subjects	37	1135.79		
Time (B)	1	16.27	16.27	.51
A X B Interaction	1	11.73	11.73	.37
Residual within	35	1107.79		
Total	73	3178.17		

Note. N = 37.

Table 29

ANOVA Summary Table for Investigating Change in the Strictness Scale of the Parental Attitudes Toward Childrearing Questionnaire over Time

Source	df	SS	MS	F
Between subjects	36	3093.87		
Group (A)	1	.78	.78	.01
Residual between	35	3093.09	88.37	
Within subjects	37	1000.56		
Time (B)	1	14.43	14.43	.52
A X B Interaction	1	11.51	11.51	.41
Residual within	35	974.62	27.85	
Total	73	4094.43		

Note. N = 37.

Table 30

ANOVA Summary Table for Investigating Change in the Aggravation Scale of the Parental Attitudes Toward Childrearing Questionnaire over Time

Source	df	SS	MS	F
Between subjects	36	5842.41		
Group (A)	1	13.91	13.91	.08
Residual between	35	5828.50	166.53	
Within subjects	37	2298.28		
Time (B)	1	389.50	389.50	8.33**
A X B Interaction	1	271.88	271.88	5.81*
Residual within	35	1636.90	46.77	
Total	73	8140.69		

Note. $N = 37$.

* $p < .05$

** $p < .01$.

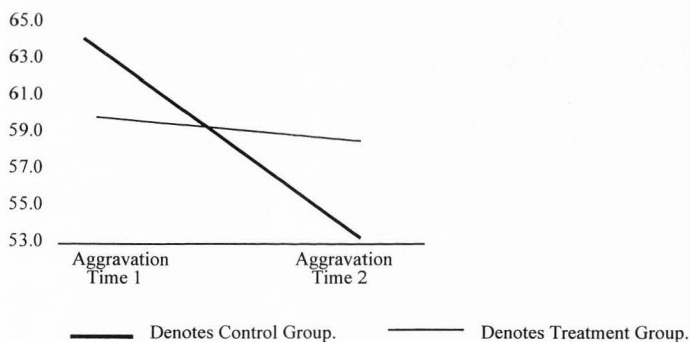


Figure 3. Interaction between group assignment and change over time in the Aggravation Scale of the Parental Attitudes Toward Childrearing Questionnaire.

mothers decreased their levels of aggravation (mean = 64.13, SD = 9.86 at the pretest; mean = 55.63, SD = 10.87 at the posttest) more than control mothers (mean = 59.38, SD = 11.43 at the pretest; mean = 58.62, SD = 11.40 at the posttest) in this sample.

Summary of Results

The findings of this study are summarized as follows.

Attachment Security

Infants in the treatment group were not more securely attached than those in the control group. However, within the treatment group, but not the control group, infants who were still receiving massages from their mothers were likely to be more securely attached than those who were not. Massage frequency was a stronger predictor of attachment than the number of siblings an infant has or the gender of the infant, but maternal age was a slightly better predictor of attachment than massage frequency.

Parental Attitudes

Both groups had higher levels of stress due to the parenting role at the posttest than at the pretest. Treatment mothers had higher levels of stress than control mothers at the posttest, but control mothers increased more in mean levels of stress. Treatment mothers who did not continue massaging their infants reported higher levels of stress than those who did continue massaging their infants. Control mothers improved their perceptions of how often their infants smiled more than treatment mothers, but treatment mothers decreased their levels of aggravation over time, while control mothers did not.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Summary of Research Questions

Infant massage was hypothesized to be a vehicle for improving parent-child relationships. Bowlby's (1969) theory of attachment and Harlow and Zimmermann's classic work with infant monkeys (1959) laid the groundwork for the study, particularly their hypothesis that touch is a major factor in the formation of affectional responses. Recent research in the area of touch with animals, as well as compelling studies investigating the relations between infant development, well-being, and infant massage, built on the foundation provided by Bowlby (1969) and Harlow and Zimmermann (1959). However, many of the recent studies focused on physiological changes occurring due to the presence or absence of touch and related variables.

This study used the wealth of research on touch as a base from which to build new links to socioemotional development in infants. The focal question of this study was whether infant massage could positively affect the parent-child relationship and the subsequent formation of attachment security in infants. In order to understand more completely the answer to the focal question, other questions were posed to try to understand the mechanisms at work in the development of attachment security. More specifically, this study sought to answer whether perceptions of parenting stress, parental internal working models, perceptions of infant temperament, or parental attitudes might be affected by the use of massage.

Findings supported the assumption that mothers who learned infant massage would continue the technique with their infants after the intervention. The majority of mothers in the control group reported that they massaged their infants one or fewer days per week, while the majority of mothers in the treatment group reported that they massaged their infants two or more days per week.

The primary question addressed by this study was whether mothers' participation in an infant massage class could positively affect infant attachment security. Findings only partially supported this hypothesis. Analyses indicated that mothers who said they massaged their infants more than one time per week were likely to have infants who were more securely attached. However, this was true only for mothers who were taking a class to learn techniques for massaging their infants. Several members of the control group reported that they massaged their infants two or more days per week, but in that group, frequency of massage did not affect attachment security. Thus, mothers who have learned infant massage and continue the process are more likely to have infants who are more securely attached than mothers who learned infant massage but did not continue it. In addition, mothers who learned infant massage as part of this study and continued the process were more likely to have securely attached infants than control group mothers. Furthermore, those mothers who did not learn infant massage as part of this study did not appear likely to have their infants' attachment security affected by massaging their infants. The increase in physical contact through infant massage appeared to be the mechanism for the increased attachment security for treatment mothers who continued

massaging their infants. These findings support those of Anisfeld et al. (1990), who also found that increased physical contact positively affected attachment security.

Thus, it appears as if participation in an infant massage class can positively affect attachment security, but only if mothers continue massaging their infants. Perhaps the difference found between the control and treatment mothers who say they massage their infants more than 2 days per week can be explained by the fact that the treatment mothers felt more capable in their touch interactions because mothers who learn infant massage learn a prescribed set of strokes. Perhaps learning these "certain techniques" made them feel more qualified to interact with their infants in a physical manner. Or perhaps it helped them feel more comfortable with their babies' bodies. It is also possible that they found the physical contact with their infants reinforcing, and thus continued. It may also be that physiological changes in mothers and/or their infants may have affected the results. Or it is possible that other factors not measured by this study could have influenced the results. The random assignment into treatment groups attempted to decrease the likelihood of other factors influencing attachment differences between the two groups.

As for the treatment group mothers who have discontinued the massage, they were much less likely to have infants who have developed secure attachments, and their infants' mean security scores were considerably lower than the security scores obtained by those whose mothers continued to massage them. Perhaps there is something different about the mothers who have learned massage and chosen to discontinue the process. Correlation analyses indicated that mothers who were more ambivalent were less likely to

massage their infants. In addition, mothers who discontinued the massage experienced higher levels of parenting stress at the followup assessment. Another possible explanation for the differences is that mothers who stop massaging their infants, despite the positive reception demonstrated by their infants, are more likely to avoid physical contact with their infants. Or maybe these mothers may have had a lower sense of self-efficacy and felt less motivated to continue the massage. Perhaps these differences contributed to the differences in attachment security in their infants. Unfortunately, this question could not be answered conclusively in this study. Future research should include videotaping mother-infant interactions to determine whether treatment mothers who discontinue massaging their infants interact differently with their infants than treatment mothers who continue massaging their infants.

In the regression model, maternal age was a powerful predictor of attachment security, accounting for 20% of the variance in attachment in that model. However, massage frequency accounted for almost as much variance in the model (18%). Thus, while maternal age predicted attachment in this sample, frequency of massage was almost as powerful after partialling out the effects of the other variables in the model. One cannot manipulate age, but one can manipulate massage frequency merely by teaching parents massage, since it appears that mothers in the treatment group were quite likely to continue massaging their infants months after the intervention.

Other variables investigated in the regression model included the number of siblings a study infant had and the gender of the study infant. The results of this study suggest that being a female minimally increased one's likelihood of developing secure

attachments, and having more siblings also minimally affected attachment security. However, it should be noted that massage frequency positively affected attachment security, regardless of the number of siblings or the gender of the infant. In other words, whether an infant had no siblings or was a male, the likelihood of increasing secure attachments was affected by whether one's mother took a massage class and massaged her infant more than once per week. These findings indicate that interventions could be developed for first-time mothers (who, in this sample, were more likely to develop less secure attachments with their infants) and for mothers of male infants to increase their attachment security.

These results indicate that one can indeed develop inexpensive interventions to increase attachment security. The current study investigated the results of a 4-week intervention on attachment security months later, and the results indicated that indeed, this short and inexpensive intervention increased the likelihood of promoting attachment security. However, more research must be conducted to determine if these findings are generalizable to other populations. Perhaps the findings are applicable only to this population. Combined with previous research on the effects of touch, these results suggest that infant massage can positively affect parent-child relationships when mothers continue massaging their infants after the class has ended.

This study hypothesized that there would be a difference in attachment security between those infants who were massaged and those who were not. That hypothesis was supported. But the study also hypothesized differences in underlying mechanisms of maternal attitudes that might be responsible for the changes in the mother-infant

relationship. Unfortunately, the measures of attitudes used in this study were not strong enough to clearly support any mechanism of underlying change in the mothers. Mothers in the treatment group who continued massaging their infants after the intervention had the same level of stress due to the parenting role as mothers who did not receive the treatment but reported that they massaged their infants. Regardless, all mothers increased their mean levels of stress over time. It is apparent that dimensions of parenting change, and the reality of having a 12-month-old infant who can get around is quite different from having a younger infant who is much less mobile.

One result that was interesting was the finding that control mothers believed their infants smiled more over the course of time than treatment mothers. After a closer examination of the results, however, their mean levels of smiling were quite close, indicating that both groups of mothers felt that their infants smiled at them almost equally at the posttest. A surprising finding was that mothers did not perceive their infants as more active or as having a longer attention span over the course of time. Due to the increased mobility of a 12-month-old infant, one might have expected a change in their activity levels.

Another interesting finding was that treatment mothers felt that their infants were less aggravating than did control mothers over the course of time. Again, the final means were not very different, but treatment mothers perceived their infants as more aggravating at the inception of the project. Perhaps their perceptions were affected by the massage process, but they could have been affected by other factors as well. Regardless, their

perceptions of how aggravating their infants were at 12 months of age were not different from control mothers' perceptions at that time.

Neither group of mothers changed their perceptions of relationships over time, according to the measure used to assess relationship styles. Therefore, either mothers did not change or the measure was not strong enough to detect any discrete changes over time.

Thus, the only substantial difference in parental attitudes between the various groups appeared to be in the area of stress, and only for mothers who did not massage their infants. Mothers who did massage their infants were quite similar to each other, regardless of group. Perhaps the measures used in this study were not strong enough or were targeted at the wrong constructs to detect change. Another possibility is that a more global process is operating to create change. Or maybe there were not other changes in mothers who massaged their infants. Perhaps the act of massaging one's infant was strong enough to enable stronger attachment relationships, independent of other factors. In other words, the act of increasing touch in a prescribed manner may be enough to promote secure attachment. Research presented in the review of literature would support the statement that touch alone can affect many variables, including parent-child interactions.

However, it seems as if other factors are related to the increase of touch as well. Perhaps the increase of touch affects the mother's responsivity and sensitivity to infant cues. This variable was not measured in this study, but will be important to investigate in the future, through videotaped interactions between mothers and their infants. Perhaps

other possible mechanisms at work may be found through observational studies of behaviors of mothers who do and mothers who do not massage their infants.

This study demonstrated that treatment mothers who massaged their infants had stronger attachment relationships with their infants. While the mechanism of touch could alone predict such a finding, future investigations should endeavor to discover if there are other mechanisms at work as well, and to continue to investigate the role of touch in the development of attachment security.

Limitations

Conclusions drawn from this study are limited by several factors. First, only 57 mother-infant dyads began the study, which is a relatively small sample size. Moreover, only 45 subjects were involved in the followup assessment. The loss of 12 subjects over time compromises the results obtained because the power of the experiment was diminished. Although random assignment to an experimental group and a lack of pretest differences decrease the likelihood of this occurrence, the results obtained may have been different if the full sample had been included in the followup assessment.

The fairly homogenous sample population included in this study limits the generalizability of results to other populations, as does the nonrandom sample obtained. While Native American, Hispanic, and European American populations were represented in this study, the small subset of each of these populations limits the generalizability of results to the sample at hand. The findings in this study will have to be replicated in order to draw the conclusion that touch can directly affect attachment security. However,

the findings in this study support other findings implying that touch influences attachment security (Anisfeld et al., 1990).

Finally, the use of self-report measures, which investigated perceptions of various realms of parenting and relationship attitudes, limited the ability of the researcher to uncover any causal mechanisms underlying the changes in the treatment group mothers who continued to massage their infants. Future studies should incorporate observational techniques to expose mechanisms at work in treatment mothers who continue to massage their infants.

Implications

The implications of this study are far-reaching. Most importantly, increasing physical contact in a prescribed manner can affect subsequent attachment security, as seen in this sample. Moreover, inexpensive interventions can be developed to encourage physical contact between mothers and their infants in order to promote secure attachments and the potential benefits that go along with secure attachments. Regardless, the practice of infant massage should be encouraged as a tool that can positively affect parent-child communication and relationships.

In a more global perspective, perhaps when mothers feel that they are able to positively affect their infants, they may be more likely to feel empowered, and thus strive to continue the action that they feel positively affects their child. In this vein, we should continue empowering parents in the parenting role, and continue introducing them to new

skills to promote nurturing responsive touch that supports the developing parent-child relationship.

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APPENDICES

Appendix A
Demographic Questionnaire

ID # _____

INFANT NAME _____ DATE OF BIRTH _____

PARENT'S NAME _____

ADDRESS _____

HOME PHONE _____ WORK PHONE _____

When is a good time to contact parents? _____

Other children in the home:

Birthdates: _____ Sex of child _____

The following questions are optional questions. If you do not feel comfortable, you do not need to answer them.

What religion do you affiliate with? _____

How many hours per week do you spend in church or church related activities?

Are you: Married Divorced Single Remarried Widow

Your date of birth _____

Your husband's date of birth _____

Are you employed outside of the home? _____

If yes, how many hours per week? _____

What is the highest level of education you obtained? _____

What is the highest level of education your partner obtained? _____

Appendix B
Institutional Review Board Information

Utah State UNIVERSITY

VICE PRESIDENT FOR RESEARCH OFFICE

Logan, Utah 84322-1450

Telephone: (801) 797-1180

FAX: (801) 797-1367

INTERNET: lpgentry@clump.usu.edu

5/3/96

MEMORANDUM

TO: Lori A Roggman
Vonda K. Jump

FROM: True Rubal, Secretary to the IRB

SUBJECT: Enhancing Positive Child Outcomes through Touch

The IRB has received your revised informed consent and the above referenced proposal was approved by the IRB on May 3, 1996. You may consider this letter to be your approval for your study.

Any deviation from this protocol will need to be resubmitted to the IRB. This includes any changes in the methodology of procedures in this protocol. A study status report (stating the continuation or conclusion of this proposal) will be due in one year from the date of this letter.

Please keep the committee advised of any changes, adverse reactions or the termination of this study. I can be reached at x71180.

Appendix C
Informed Consent Form



DEPARTMENT OF FAMILY AND HUMAN DEVELOPMENT
 College of Family Life Phone: (801) 797-1501
 Logan, UT 84322-2905 FAX: (801) 797-3845

INFORMED CONSENT FORM

Utah State University
 Enhancing Positive Child Outcomes through Touch
 Vonda K. Jump
 Department of Family & Human Development
 (801) 797-3578

Name of Subject _____

Purpose of the Study: This study will investigate the effects that play and touch have on the parent/child relationship.

Procedures and Duration: Participants will be assigned to one of two groups. Both groups will meet for 4 weekly sessions, which will include either child development knowledge or learning new ways of playing with infants. The play sessions will be videotaped. Each session will last for approximately 60 to 90 minutes. All participants will be asked to complete several questionnaires a total of four times. The first time will be prior to the weekly sessions and the second time will be after the weekly sessions have been completed. When the babies are approximately 12 months old, parents will be asked to complete the questionnaires for a third time. Finally, when the babies are approximately 18 months old, parents will be asked to complete the last set of questionnaires.

Transportation will be provided if necessary.

Risks: There are no risks involved in this study.

Benefits: Potential benefits of this study include learning new ways of playing and interacting with infants, meeting other parents with a Head Start child and an infant, and obtaining additional information about infant development.

Compensation: Parents will be compensated \$10. for completing each of the three phases of the project.

****Confidentiality of subjects will be maintained.** Names will be replaced with identification numbers to protect identities of subjects. All information will be kept in a locked file cabinet in a locked room. Only Vonda Jump and Dr. Lori Roggman will have access to the files. Videotapes of the play sessions will be kept for one year and then discarded. If you have questions regarding the research at any time, you may contact Vonda Jump (797-3578 or 755-0356) or any associates knowledgeable about the study at Utah State University.

****Participation in this research study is completely voluntary.** You may withdraw from this study at any time without penalty.

I consent to participate in this study.

 SIGNATURE OF PARTICIPANT

 DATE



Appendix D
Correlation Tables

Table 31

Pearson Correlations Between Parenting Stress Index Scales and Demographic Variables

Demographic variables	<u>n</u>	Child	Parent	Total
Gender of infant	40	.29	.21	.28
Number of siblings of infant	40	-.19	-.04	-.12
Age of infant	38	-.04	-.02	-.03
Education of mother	40	.01	-.17	.00
Education of father	37	.25	-.18	.21
Work status of mother	32	.23	.21	.23
Hours mother works per week	32	.19	.17	.19
Age of mother	30	-.24	-.03	-.14
Age of father	28	-.22	-.09	-.15
Religion	39	-.26	-.07	-.29
Hours in religious activities	39	.07	-.32*	.01
Breastfeeding	37	-.11	.07	-.06
Length of breastfeeding	37	-.20	-.14	-.23
How often mother massages infant	37	.16	.10	.15

Note. * $p < .05$.

Table 32

Pearson Correlations Between Relationship Survey Scales and Demographic Variables

Demographic variables	<u>n</u>	Secure/Avoidant	Ambivalent
Gender of infant	39	.04	.03
Number of siblings of infant	39	.03	.39**
Age of infant	36	.26	.32*
Education of mother	39	.22	.42**
Education of father	36	.23	.49***
Work status of mother	32	-.16	-.15
Hours mother works per week	32	-.04	-.14
Age of mother	29	.37*	.42*
Age of father	27	.39*	-.21
Religion	38	-.19	-.03
Hours in religious activities	38	.32*	.34*
Breastfeeding	36	.29	.09
Length of breastfeeding	36	.37*	.23
How often mother massages infant	36	-.28	-.39*

Note. * $p < .05$ ** $p < .01$ *** $p < .005$.

Table 33

Pearson Correlations Between Infant Behavior Questionnaire Scales and Demographic Variables

Demographic variables	n	1	2	3	4	5	6
Gender of infant	41	.00	.19	-.02	.23	.14	-.16
Number of siblings of infant	41	-.14	-.28	-.07	-.02	.03	.14
Age of infant	38	.09	.06	.26	-.02	-.12	-.31
Education of mother	41	.19	.05	.20	.03	.23	-.02
Education of father	38	.22	-.04	-.05	.05	.03	-.29
Work status of mother	34	.28	.28	-.05	.33*	.08	.23
Hours mother works per week	34	.25	.09	-.11	.34*	.07	.18
Age of mother	31	-.06	-.23	.06	.18	.05	.12
Age of father	29	.01	.01	.12	-.12	-.27	-.05
Religion	40	-.19	-.03	.14	-.16	-.11	.26
Hours in religious activities	40	.04	-.02	.10	-.05	-.19	-.23
Breastfeeding	38	-.00	.29	.11	-.26	-.23	-.09
Length of breastfeeding	38	-.07	.05	-.04	-.26	-.17	-.14
How often mother massages infant	38	-.11	.04	-.12	.13	-.17	.08

Note. 1=Activity Level
 2=Distress to Limitations
 3=Fear
 4=Duration of Orienting
 5=Smiling
 6=Soothability

* $p < .05$.

Table 34

Pearson Correlations between Parental Attitudes Toward Childrearing Scales and
Demographic Variables

Demographic variables	n	Warmth	Encourages Independence	Strict- ness	Aggra- vation
Gender of infant	39	-.08	-.09	.17	.35
Number of siblings of infant	39	.15	-.08	-.32*	-.25
Age of infant	36	.00	.10	-.37*	-.24
Education of mother	39	.24	.14	-.23	-.13
Education of father	36	.02	-.05	-.30	-.19
Work status of mother	32	.06	.27	.32	.15
Hours mother works per week	32	.05	.31	.28	.14
Age of mother	29	.34	.27	-.48**	-.36*
Age of father	27	.12	.04	-.25	-.36
Religion	38	-.00	.03	-.01	.04
Hours in religious activities	38	-.02	-.23	-.29	-.18
Breastfeeding	36	.17	.04	-.25	-.08
Length of breastfeeding	36	.10	.07	-.33*	-.08
How often mother massages infant	36	.04	.26	.20	.02

Note. * $p < .05$ ** $p < .01$.

Table 35

Pearson Correlation Coefficients between Outcome Measures (Part 1)

Subscale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. PSI Child		.66	.96****	-.17	-.23	.18	.14	-.05	.05	-.17	-.22	-.25	-.15	.16	.33*
2. PSI Parent			.90****	-.34*	-.48**	.14	-.11	-.16	.05	.00	.07	-.15	-.20	.46**	.64****
3. PSI Total				-.23	-.27	.21	.05	-.08	.06	-.10	-.22	-.21	-.17	.17	.40**
4. Secure/Avoidant					.52	-.03	.18	.19	-.15	-.06	-.33*	.21	.27	-.13	-.39
5. Ambivalent						-.06	.13	.18	-.10	.07	-.18	.31	.20	-.44**	-.49***
6. Activity level							.11	-.10	.00	.22	.06	.16	-.09	-.09	.09
7. Distress								.52***	-.29	-.39**	-.24	.05	.15	.05	-.05
8. Fear									-.35**	-.35**	-.22	-.02	.05	-.03	-.15
9. Duration of orienting										.40**	.24	.07	.03	-.10	.05
10. Smiling											.37**	.51****	.30	.01	.19
11. Soothability												.46****	.32*	.05	.20
12. Warmth													.70****	-.26	-.15
13. Encouragement of independence														-.17	-.28
14. Strictness															.64****
15. Aggravation															

Note: * $p < .05$. ** $p < .005$. *** $p < .001$. **** $p < .0001$.

Table 36

Pearson Correlation Coefficients Between Independent Variables

Variable	1	2	3	4	5	6	7	8	9
1. Age of infant									
2. Number of siblings	.21								
3. Age of mother	.17	.37**							
4. Age of father	-.06	.09	.57*****						
5. Education of mother	.49*****	.06	.27	.04					
6. Education of father	.39**	.08	.13	-.04	.68*****				
7. Hours mother employed per week	.08	-.41***	-.02	.03	.28*	.16			
8. Hours per week spent in religious activity	.35**	.19	.36**	.34**	.42***	.32*	-.23		
9. Length of breastfeeding	.09	.15	.39**	.50***	.12	-.04	-.42**	.40**	
10. Length of massage (in months)	-.24	-.12	.09	-.02	-.24	-.08	.30	-.08	-.13
Note. * $p < .05$	** $p < .01$		*** $p < .005$		**** $p < .001$		***** $p < .0001$.		

VITA

Vonda Kay Jump

330 Canyon Road

Logan, Utah 84321

(435) 755-0356 (H)

(435) 797-3539 (W)

email: SLLBN@CC.USU.EDU

EDUCATION

PhD candidate, ABD, Family & Human Development, Utah State University

MS in Counseling Psychology, University of Kentucky, May 1991

BS in Psychology, BA in French, Centre College, June 1988

HONORS/RECOGNITIONS

Named one of eleven outstanding volunteers for the Citizens Against Physical and Sexual Abuse (the local domestic violence shelter and advocacy group) in April, 1998.

Elected to the Graduate Student Senate by fellow graduate students for 1996-1997 academic year at Utah State University.

Awarded one of nine \$30,000 Head Start Research Scholars Dissertation Grants during 1995-97 academic years. Conducting research with a Head Start population to improve positive parent and child outcomes through a nurturing touch intervention.

Awarded a \$10,000 Vice Presidential Research Fellowship for the 1994-95 academic year at Utah State University.

Honored as an outstanding educator in the state of Kentucky at the Governor's Scholars Program in Danville, Kentucky in July of 1993.

Named to the All-Conference Team in Cross-Country and Track during 1984-85, 1985-86, and 1987-88 seasons.

Awarded a 4 year Trustee Scholarship to attend Centre College.

GRANTS

Wrote a \$30,000 grant proposal to the Head Start Doctoral Research Scholars program to become a Research Scholar and to conduct research with Head Start families who also have infants in the home. Was one of 9 projects funded nationally in October, 1995.

Co-authored a \$55,000 grant proposal for a Family Resource Center in Covington, Kentucky in April 1993. Funded.

Wrote an \$800 innovative grant proposal for the Greater Cincinnati Foundation for a parent-child lending library in an isolated housing project in Covington, Kentucky. Funded November 1993.

EMPLOYMENT EXPERIENCE

- 07-97 to present **Early Intervention Research Institute, Center for Persons with Disabilities, Utah State University.**
Logan, Utah
Assessor/Research Assistant. Conduct assessments of parents and young children as part of an ongoing research project investigating the effects of introducing a new home visiting protocol on the parent-child interaction. Develop data analysis files and enter data. Provide training for home-visiting programs.
- 08-96 to present **Citizens Against Physical and Sexual Abuse**
Logan, Utah
Volunteer in Children's Programming. Helped to develop a format for interviewing children who have witnessed domestic violence in order to better understand and meet their needs. Assist in the evolution of the Children's Group so that emotionally damaged children can express their feelings and begin to resolve issues through art and play therapy.
- 01-95 to present **Utah State University**
Logan, Utah
Volunteer Cross-Country/Track Coach. One of 3 volunteer assistants, in addition to 5 paid coaches, as allowed by the NCAA. Provide assistance in timing, run with athletes, give advice and tips on running and other issues, and provide emotional support to the athletes.

- 09-94 to present **Utah State University**
 Logan, Utah
Research Assistant. Conduct research on parent-child relationships, develop and implement intervention programs for at-risk families with infants and young children, and evaluate effectiveness of intervention programs through stringent research designs.
- 09-94 to 09-95 **Child and Family Focus**
 Logan, Utah
Referral Counselor and Employer Liaison. Made referrals, provided parenting and quality childcare tips, advocated for the needs of families, promoted positive family practices in employing agencies, advised child care providers, and educated employers about family issues.
- 09-92 to 07-94 **Covington Independent Public Schools**
 Covington, Kentucky
Chapter 1 Parent Coordinator. Worked with parents of inner-city children aged 3 to 13. Introduced new skills for working with children, and reinforced and encouraged parents to become more involved with their child and school. Conducted workshops so parents could be empowered to be more involved in the educational process. Was recognized in a national newsletter for efforts at getting parents involved.
- 04-93 to 06-93 **Family Nurturing Center of Kentucky**
 01-94 to 04-94 Edgewood, Kentucky
Tic-Toc Therapist. Led groups for sexually abused preschoolers. Integrated music, art, and play therapy.
- 11-91 to 09-92 **Cabinet for Human Resources**
 Newport, Kentucky
Child Protective Services Worker. Worked intensely with families in crisis to prevent continued abuse of children and to promote positive interactions. Worked with the judicial system when necessary to advocate for the safety of children.
- 01-91 to 05-91 **Comprehensive Care Centers of Central Kentucky**
 Danville, Kentucky
Counselor. Counseled emotionally disturbed and behavior disordered children aged 7 to 14 individually and in groups as part of an afterschool treatment program.

- Summer 1990 **Covington Recreation Department**
Covington, Kentucky
Lifeguard and swim coach at inner city pool. Supervised pool area, organized activities for children, and counseled children informally.
- 01-90 to 05-91 **University of Kentucky**
Lexington, Kentucky
Researcher. Researched the graduation rate of collegiate athletes at the University of Kentucky for years 1981 to 1991. Reported findings to the NCAA.
- 10-89 to 06-90 **University of Kentucky and Veteran's Hospital**
Lexington, Kentucky
Laboratory worker. Worked in Biochemistry Lab doing research on epilepsy funded by the University of Kentucky and Veteran's Hospital.
- Summers 1984-87 **Private residences**
06-88 to 05-89 Long Island, New York and Lexington, Kentucky
Nanny. Organized and participated in developmentally appropriate play activities for children, prepared meals, and tutored school-age children and instructed younger children.

COURSES TAUGHT/PRESENTATIONS MADE

- Spring 1998 Teach a developmental course, Infancy, at Utah State University. Have 50 students for this upper division course. Integrate lecture and discussion with films and guest speakers to increase understanding of the development occurring during the first 2 years in a child's life. Course requirements include exams, a laboratory experience, and papers on topics related to infants.
- Winter 1998 Taught a developmental course, Children 2 to 5, at Utah State University. Had 50 students for this upper division course. Integrated lecture and discussion with films and guest speakers to increase understanding of the developmental processes occurring during these age ranges. Course requirements included advocacy letters, exams, community service, and case studies with this population.

- Fall 1997 Taught a developmental course, Children 2 to 5, at Utah State University. Had 80 students for this upper division course. Integrated lecture and discussion with films and guest speakers to increase understanding of the developmental processes occurring during these age ranges. Course requirements included advocacy letters, exams, community service, and case studies with this population.
- October 1997 Presented a workshop entitled "Promoting Optimal Infant Outcomes" for the 1997 Extension workshop at Utah State University. Discussed infant development and how to facilitate it in the areas of cognitive, physical, social, and language development.
- September 1997 Presented information about the attachment process to a home-
February 1998 visiting program in order to increase awareness of the importance
March 1998 of attachment and allow home visitors to brainstorm strategies for helping parents promote activities which might facilitate the parent-child relationship.
- Summer 1997 Teaching assistant for Child Abuse and Neglect course at Utah State University. Graded papers and exams, proctored exams, was available for any questions from students, and taught class upon request from professor.
- 05-96 to 10-97 Taught infant massage techniques to Head Start parents who also have infants in a 4 session procedure. Have taught in Brigham City and Logan, Utah as well as Preston and Fort Hall, Idaho. Fort Hall is a Native American Head Start facility.
- 11-96 Conducted a 4 hour training session for volunteers working with at-risk youths in the Preston, Idaho City Schools. Volunteers received graduate credit for the seminar. Topics addressed included self-esteem of children, developmental stages, conflict management training, praise and encouragement, and how to work effectively with children.
- Fall 1996 Team taught a 5 credit introductory life-span human development class with 130 students at Utah State University. Incorporated visual aids, guest lecturers, group activities, films, and writing activities to enhance the learning environment.

- Summer 1996 Taught a 3 credit Child Abuse and Neglect class with 120 students at Utah State University. Focused on causes, consequences, and prevention of child abuse. Incorporated community service activities, visual aids, guest lecturers, group activities, films, and writing activities to enhance the learning environment.
- Fall 1995 Taught a 3 credit Guidance of Children class with 56 students at Utah State University. Discussed effective guidance and discipline strategies for prospective teachers and parents. Enhanced the learning process through group and individual activities, visual aids, films, and writing activities.
- 1994-95 Guest lecturer for Guidance of Children and Children 2 to 5 classes at Utah State University. Lectured on praise and encouragement, what's wrong with punishment, logical consequences, problem-solving strategies, moral development, and aggression.
- 03-95 Presented an educational seminar on choosing quality childcare.
- 04-94 Presented "Parents as Partners" at State and Federal Programs Conference in Lexington, Kentucky.
- 02-93 to 06-94 Presented one evening workshops on how to make learning more fun for elementary aged children and co-facilitated a 4 session behavior management series for at-risk parents.
- 09-92 to 06-94 Taught weekly parenting education seminar for parents of at-risk 3 year-old children enrolled in Home Visiting Program.
- 12-90 Presented a one day parenting workshop at the Lexington (KY) Child Abuse Center on nurturing, effective discipline, praise and encouragement, and positive reinforcement.

RESEARCH POSTERS/PRESENTATIONS

- Roggman, L. A., Boyce, L., Cook, G., & Jump, V. K. (1998, July). Correlates of attachment security among 10-month-olds in an Early Head Start research project. Head Start National Research Conference, Washington, DC.

- Roggman, L. A., Jump, V. K., Boyce, L. K., & Cook, G. (1998, April). Attachment and maternal responsivity: The context of infant affect and temperament. International Conference on Infant Studies, Atlanta, GA.
- Jump, V. K., Innocenti, M., Akers, J., Akers, A., & Boyce, G. (1998, February). Naturalistic assessment strategies when working with existing home visiting programs: A participatory action approach. Early Intervention Research Institute Mini-Conference, Logan, UT.
- Jump, V. K., & Hunt, T. (1997, April). Effects of a massage intervention on parenting attitudes. Society for Research in Child Development, Washington, D. C.
- Roggman, L. A., Hart, A. D., & Jump, V. K. (1996, April). Attachment in relation to parenting stress and temperament: Longitudinal effects from 10 to 18 months. International Conference on Infant Studies, Providence, RI.
- Roggman, L. A., & Jump, V. K. (1996, March). Maternal attention and attachment security: A longitudinal analysis. Southwestern Society for Research in Human Development, Park City, UT.

PROFESSIONAL SERVICE

- | | |
|-------------------------|--|
| June 1998 | Have been asked to participate in review of Head Start Doctoral Researcher grants. |
| October 1997 to present | Member of Early Head Start Continuous Program Improvement team. Developed staff interview questions for report and helped to conduct the interview with staff. With one other doctoral student, developed videotape protocol for home visits. In the process of co-developing the videotape coding scheme for home visits. |
| August 1997 | Participated in Head Start review of Doctoral Researcher grants. |
| Spring 1996 | Grant proposal planning committee member for Early Head Start Research grant proposal. |
| Fall, Winter 1995-96 | Member of Local Arrangements Planning Committee for Southwestern Society for Research in Human Development Conference. |

REPORTS

Roggman, L. A., Elwell, C. A., & Jump, V. K. (1997, October 31). Bear River Early Head Start Continuous Program Improvement Evaluation Report: Year I.
Submitted to Bear River Early Head Start, Logan, UT.

PROFESSIONAL SOCIETIES

International Society for Infant Studies
Society for Research in Child Development
Southwestern Society for Research in Human Development
International Association of Infant Massage
National Association for the Education of Young Children

INTERNATIONAL ACTIVITIES

Studied Psychology and French at Universite de Montpellier in Montpellier, France during 1986-87 school year.

HOBBIES

Running, sports, cooking, reading, backcountry skiing, rockclimbing, playing with and learning about animals and their behavior, playing with and learning more about children.