

The Importance of Touch in the Development of Attachment

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ABSTRACT

Until recently the role of human touch in the social world of the developing infant has not been given special attention. Instead the focus, in part due to John Bowlby's Attachment Theory, has centered on the critical need for a child to develop a secure attachment to his caregiver. To be sure, this has provided a valuable contribution to understanding and promoting a child's well-being in his early years and beyond. Yet Bowlby's theory is limited in its discussion of the meaning of human touch and its role in development of attachment. As such, it now becomes more critical to delve into the factors that significantly foster development of attachment, specifically the concept of human touch. With recognition of the importance for a child to develop secure attachment to his caregiver, the essential function that human nurturing touch provides in facilitating that connection is explored.

KEY WORDS: attachment, infant development, touch

The health of future families and communities is rooted in the health and well-being of the infants and children we care for today. A child's well-being has implications that are far-reaching. The goal of optimal health for children, in its broadest sense of the definition, has long inspired the efforts of parents, health care practitioners, researchers, and policy makers. Now more than ever, there is greater understanding of the complex, multifaceted nature of early human development and heightened appreciation of the positive and negative influences that impact its unfolding.

The 1999 Report from the Early Years Study¹ is one example of recent efforts undertaken to profile what we know about early brain development, particularly during the first 3 years, and its link to competence and coping skills in later life. This study was commissioned by the Government of Ontario with a primary focus to explore current literature regarding

the early years of child development. Their recommendations for optimal child care are grounded in the notion that the early years of development are fundamental for future learning, behavior, and health. Profiled in the study is the premise that nurturing by parents in the early years has an integral and decisive influence on human development. Furthermore, they highlight that it is important for a child to have a secure attachment to his or her caregiver. This secure attachment allows the child to discover his or her world through independent exploration and to develop other relationships. This caregiver nurturing fosters optimal early brain development that manifests itself in later learning and behavior.

In keeping with this pursuit of inquiry, the National Research Council and the Institute of Medicine established the Committee on Integrating the Science of Early Childhood Development to further elucidate the nature of early development and the meaning of early childhood experiences.² Their report echoes that of the Early Years Study, detailing again the importance of the first 5 years of the child's life as a time when they are rapidly developing capabilities that will serve as the foundation from which future development will occur. It also highlights as a core concept the importance of human relationships as the building blocks of healthy development. Underpinning their recommendations for developmental promotion and early childhood interventions

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is the theme that secure attachments with significant caregivers are essential features of healthy human development. Cradled in this relationship, this child's cognitive, linguistic, emotional, social, and moral development can occur.² Recognizing that development proceeds at an unprecedented pace during this early period, and that it is not immune to risk and vulnerability, the report emphasizes the critical nature of healthy development in ensuring the well-being and "well-becoming" of children.² Given the importance of secure attachment as a fundamental formative element that is integral to this process, an understanding of the factors that contribute to and facilitate meaningful attachment is paramount.

CONCEPTS OF ATTACHMENT THEORY

Bowlby^{3,4} made significant contribution to the articulation of modern attachment theory. The influential and vital role of the child's first relationship, the origins of which begin at birth, is clearly evident in his writings. Within this perspective attachment is conceptualized as an innate behavioral system monitoring events indicative of potential danger or stress, as well as accessibility to the attachment figure, wherein this desire for proximity becomes a set goal of the system.⁴ As such, he suggests that a child's attachment to his or her caregiver, typically the child's mother, signifies the child's desire to obtain connection and contact with that individual during a stressful period.⁴ When the attachment behavioral system is intensely activated in times of stress attachment behaviors such as crying, clinging, or following the attachment figure signal the infant's need of attention and desire for caregiver proximity. When the intensity of the system is low, interaction with the attachment figure via behaviors such as smiling or touching is common.⁴ The theory acknowledges the strong emotional component in attachment behaviors, suggesting that no other form of behavior is accompanied by such strong feelings.⁴ Organized within the attachment behavioral system, a child is seen to develop an inner cognitive working model of his relation with the attachment figure; for instance, aiding the child's decision making for the type of attachment behavior that would be most effective in achieving contact with the caregiver.

Linked with the child's attachment to his or her attachment figure is the response and interaction on the part of the attachment figure or caregiving system.⁴ In describing maternal caregiving, Bowlby⁴ speaks of "retrieving" as any action of the parent that promotes and ensures proximity of the child to them. This retrieval behavior, from possible danger, is similar to attachment behavior in its biological function, a protective function, and means of survival for the infant. Bowlby⁴ proposes that the attachment figure is the one who can deactivate the child's attachment behavioral system with the sound of their voice, their

touch, or their mere presence. Through this process, the child's attachment behavior of crying, for example, subsides and a sense of security is achieved. As the child approaches his first birthday, he comes to understand in a more meaningful way the conditions that decrease his distress and make him feel secure, and behaviors such as clinging evolve to become goal-corrected as opposed to simple reflex responses.⁴ It is this infant-attachment figure interaction, characterized as a progression of signals and responses, which is central in shaping the infant's quality of attachment.

Although Bowlby's attachment theory provides important insights into the concept of attachment, and an understanding of how it relates to the organization of attachment behaviors in connection with the attachment figure in various situations, it does not thoroughly delve into the significance of particular actions taken by the caregiving system and their resulting implications. Specifically, caregiver touch as an influential response to infant attachment behaviors, and its role in shaping the infant's expectations regarding caregiver responsiveness, is not fully expounded. Bowlby⁴ offers that depending on the intensity of the activation of the behavioral system and the resulting attachment behavior, its termination might be achieved only by physical contact. Yet further explanation as to why physical contact or touch is most critical, and how contact communicates comfort and a sense of security to the infant like no other action, is not presented. This is an essential part of understanding the infant-caregiver relationship and how it relates to satisfactory development of attachment.

TOUCH AS AN ANTECEDENT TO SECURE ATTACHMENT

Heller⁵ describes touch as a baby's lifeline, like a silent language connecting infant with parent, with the experience of each touch fostering a stronger tie. In humans, touch is the first sensory system to develop.⁶ The tactile (touch) system that is the system responsible for the infant's ability to respond to any form of touch is a complex one, composed of 4 different sensory abilities, and their corresponding and unique neural pathways.⁷ The 4 sensory abilities are cutaneous: pressure (the feeling of the skin contacting an object), temperature, pain, and proprioception (the sense of position and movement).⁷ It is through these sensory pathways that the effects of nurturing parental touch are registered with the infant. The impact that touch has in the development of the infant and their relationship with the parent has been explored by a number of investigators. Highlights from some of the earliest studies regarding touch will be presented initially to help frame our current understanding of its role in development of attachment.

HISTORICAL PERSPECTIVES ON THE ROLE OF TOUCH

Some of the early explorations regarding the role of touch began with studies involving subhuman primates, specifically infant monkeys. One of the first key studies regarding its importance in the development of affectional responsiveness was conducted with 8 newborn monkeys.^{8,9} These monkeys were separated from their mothers and divided into 2 groups. Four monkeys were partnered with an inanimate cloth surrogate mother from which they could feed and an inanimate wire surrogate mother with no feeding capacity. The other group was assigned an inanimate cloth surrogate mother but their food could be obtained only from their inanimate wire surrogate mother. These infants remained with their surrogate mothers for a minimum of 165 days, and during this time it became evident that there was a distinct preference for the cloth mother, given the amount of time spent by both groups with this model. As they grew older, although some monkeys interacted with the wire mother who provided food, they became increasingly more responsive to the cloth mother who did not have this capacity. In addition, during encounters with fear-producing stimulus, the cloth model was again preferred wherein the monkeys sought immediate physical contact with the cloth model after which their fear subsided and some even ventured to investigate. This study provided one of the first glimpses of the significance of touch. In additional testing with infant monkeys, such as those regarding retention of affectional responses over time, similar results again confirmed the influential role of bodily contact in the development of the infant monkey's attachment.⁹ This suggests that without "contact comfort" only weak attachments are formed.⁹ Harlow¹⁰ indicated that although multiple factors may link the infant monkey to its mother, physical contact between them is the single most principal feature in that connection. While Bowlby⁴ acknowledged this evidence, further unraveling of the nature of this touch and of its development was limited.

Additional evidence continued to build with Rubin's¹¹ work on the nature and kind of maternal touch used as it relates to infants. She proposed that the infant's key mechanism for learning and understanding the world and his place in it lies in his tactile sense, at least in the early stages of infant development when the other senses are still emerging. In her approach to examining the issue of touch in the infant-caregiver relationship, she focused on observing how mothers interact with their infants through the use of touch. During the postpartum phase, she discovered a pattern wherein mothers initially appear to progress from touching their infants with their fingertips, then gradually with their hands, and finally with their whole arms as they draw their infants

close to their bodies. There appears to be a gradual advancement from a period of exploration and information seeking on the part of the mother, to one where she has a growing capability and involvement as evidenced in more extensive physical contact with her baby.¹¹ Integral to this dynamic, the infant's response provides a kind of reassurance and feedback to the mother, strengthening her sense of the connectedness with her infant. She suggests that the significance of positive human contact, in part, rests with its ability to communicate comfort and the opportunity for learning. The idea that a mother needs to and learns of her baby through touching, which is reciprocated by the infant and therefore acts as a powerful medium of interpersonal communication, is a notion that Bowlby did not detail.

During her time in Kampala, Uganda, in 1954 to 1955, Ainsworth's¹² longitudinal research on the development of Ganda infants enhanced our understanding of the importance of human touch in infant attachment. Twenty-eight babies (15 boys and 13 girls) were observed at different stages during their first 15 months of life, with a focus on the growth of attachment of the infant to his or her mother. She concedes that genetic factors characteristic of the human species contribute to the development of attachment, but in her study found that environmental variables have a powerful influence as well. In presenting her results, she divided the sample into 3 groups: (1) a secure-attached group; (2) an insecure-attached group; and (3) a nonattached group. The infants in the secure-attached group and insecure-attached group were designated as such if they exhibited patterns of attachment behavior found to be typical of their age (such as differential crying, differential smiling, following, exploration away from the mother as a secure base, burying the face in the mother's lap, embracing, and clinging), with the distinction that the insecure group remained unable to tolerate even a little distance from their mother, and even when they were within her reach frequently cried or were fussy.¹² The nonattached group consisted of those infants who were delayed in their development of attachment and could not yet be classified as secure or insecure. She found that Ganda infants, who were securely attached, experienced much physical contact especially during the early months of life. The securely attached infant is described as the one who has received physical contact when he cries and is soothed by holding. Ganda infants whose care involved being held a lot without spending long periods of time in their crib were those infants who developed secure attachments. Bowlby⁴ profiled Ainsworth's study of the Ganda infants, yet is modest in the scope of his discussion regarding the meaningful contribution positive physical contact by a mother toward her infant makes in shaping healthy attachment.

With an interest in tactile experience and its potential effect on the development of behavior,

Montagu¹³ further analyzed the subject of touch in his book, *Touching: The Human Significance of the Skin*. He postulated that affectionate tactile stimulation or touch is a universal basic human need, and that fulfilling this need is central to the healthy development of the infant. His words paint a picture of the fetus' earliest experiences of touch within the loving embrace of the walls of the uterus,¹³ and more recent evidence indicates that indeed the fetus can respond to touch as early as the second month of gestation.⁶ Montagu¹³ further suggested that even the course of labor, and specifically uterine contractions, function as a mechanism of stimulation (albeit cutaneous stimulation) for the baby to optimize their postnatal functioning. In emphasizing the importance of promoting infant contact during the immediate postpartum period and for some time beyond, Montagu¹³ asserts that it is the infant's early physical contact with the caregiver that begins the infant's socialization with another human being, and it is within this experience of touch that he comes to understand it as a source of comfort and security, enabling a growing capacity to manage new encounters. Reiterating Rubin's¹¹ earlier notion of tactile sense being integral to an infant's initial learning, Montagu¹³ adds to this acknowledgment, suggesting that especially in the preverbal stages of human development, tactile experience cannot be overemphasized. Touch, as felt through the sensitive medium of skin, becomes a basic means of communication, and as such, the first language an infant comes to know.¹³ Through the language of touch, affection and involvement are expressed, such as in the manner by which the infant is held. From this the infant develops an association regarding touch, its meaning, and what it represents, and the absence of these positive associations may have a negative impact on how the individual ultimately interacts and establishes contact relations with others.¹³ The suggestion is that communication of caregiver involvement and affection begin at birth and find expression through the actions of holding and carrying the infant.¹³ Montagu's¹³ assertion that adequate tactile satisfaction during infancy and childhood is of great necessity for healthy behavioral growth and development of the individual reaffirms previous evidence.

In 1978, Ainsworth et al¹⁴ chronicled observations of the attachment of infants to their mothers with specific focus on the patterning of infant behavior when the infant's attachment system is activated, as well as unique differences among infants in the way their behavior is patterned and how this affects development. The composite sample was created from 4 separate projects for a total of 106 infants. These infants were from white, middle-class families from Baltimore, Maryland, and they were observed in the "strange situation" procedure at approximately 1 year of age.¹⁴ Comparisons were also made to

attachment behaviors observed in the home setting. Of note, the *strange situation* procedure is defined as a standardized laboratory procedure that consists of 8 episodes of interaction between the infant, the infant's mother, and a stranger in an unfamiliar setting to the infant, and is designed to invoke mild but mounting stress in the infant.¹⁴ The procedure involves a series of phases wherein the infant's behavior is observed as the mother comes and goes at various points in time in conjunction with the appearance and disappearance of an individual unknown to the infant.¹⁴ Guided by the child's response to the mother upon her return in the "strange situation," these authors delineated a classificatory system according to the patterning of the infant's behavior: (1) secure attachment to the mother; (2) anxiously attached to the mother and avoidant; and (3) anxiously attached to the mother and resistant. As noted by Bowlby,⁴ this was a significant contribution in terms of being able to classify patterns of attachment. It also further profiled, however, the importance of touch as it relates to the securely attached infant. The securely attached infant, described as having a more positive behavior toward his mother than infants in the other 2 groups, both seeks and is comforted by physical contact with his mother. This type of infant behavior is credited with previous positive experiences of comforting physical contact with a caregiver.¹⁴ In addition, infants classified as anxiously attached and avoidant are depicted as having mothers who were not comfortable with close physical contact with their baby, often resulting in a dismissal of the infant's signaling for contact. Collectively, Ainsworth and colleagues¹⁴ offered further insight into the understanding of close infant-caregiver contact as an antecedent to secure attachment. And, in 1981, Tracy and Ainsworth¹⁵ presented similar findings lending additional support to this theory.

In considering a broader perspective regarding the concept of touch, Weiss¹⁶ challenged that the qualitative nature of the experience must be examined. She offered that given its earlier development as compared to other senses, touch is more fundamental, aiding therefore to further additional complexities. In her exploration of touch as a channel of communication, she suggested that 6 major tactile symbols capture the essence of this language: duration, location, action, intensity, frequency, and sensation.¹⁶ Of particular relevance is location and frequency. Location is further detailed in the 3 categories of threshold, extent, and centripetality or degree to which the trunk of the body is touched. It is the latter concept that parallels a similar idea by Rubin.¹¹ There is the suggestion that contact with the trunk of the body symbolizes a greater degree of closeness. Rubin¹¹ found that mothers did not offer this kind of touch to their infants immediately after

birth, but rather needed time to establish a greater level of comfort. Recognizing the communication this kind of touch translates provides important information for potentially assisting new mothers in fostering closeness with their infants when they may be hesitant to do so. The issue of frequency of touch is also noteworthy. Weiss¹⁶ alluded to the fact that high frequency of positive touch is likened to a sense of closeness with others and a stabilizing factor in relationships. Linked with the notion of facilitating interactions between individuals, frequency of touch plays into the quality of infant-caregiver relations. Thus, it is the way in which these symbols are used that the power of touch is most meaningful, and therefore its impact in facilitating child development must be carefully considered.

RECENT EVIDENCE LINKING TOUCH AND SECURE ATTACHMENT

During the 1990s and early 2000, Reite¹⁷ was one among several who profiled touch as a fundamental, necessary component of the development of the child's attachment. He conceptualized human touch as central to the infant-caregiver relationship and instrumental in developing a child's secure attachment. This is an essential foundation to allow for learning, emotion regulation, and additional social interactions to evolve. He noted that the converging data provided convincing argument in support of the profound nature of touch and its vital link to attachment.

Other authors¹⁸ used an experimental design to test the hypothesis that increased physical contact would promote more secure attachment in infants at 13 months of age. Twenty-three women of low socioeconomic status and their infants were randomly assigned to the experimental group who received soft baby carriers. The soft baby carriers were assumed to promote increased physical contact between mother and infant. Twenty-six mothers and their babies served as the control group and as such received infant seats with the expectation that this would not promote as much physical contact. The assessments were conducted at 2 points in time. The first occurred when the infants were approximately 3 months old, at which time analysis of a play session between the mother and her infant was conducted. The second phase involved testing with Ainsworth's "strange situation" procedure when the infants were 13 months of age. The results supported their hypothesis that early carrying would foster secure attachment as evidenced by the fact that significantly more experimental infants were securely attached to their mothers when tested at 13 months of age. In addition, they reported that the experimental mothers were more responsive to their infants, noting that the close physical contact between mother and infant enabled the mother to be more attuned to her infant's needs.

Their findings lend further support to the importance of physical contact between infants and their caregivers in facilitating healthy child development.

Browne¹⁹ echoed this notion that touch provides the foundation for complex, intimate interchange between the infant and his or her caregiver, aiding the infant through touch to begin to understand their world and more specifically the individuals in it. Touch is presented as a means of providing the infant stimulation, organization, communication, and emotional exchange. She suggests that health care providers help facilitate and encourage parents to touch, handle, and hold their infants early on so that their comfort level with this form of care and communication is firmly and effectively established.

Other authors²⁰ examined aspects of maternal touch and its relation to a low-birth-weight infant's security of attachment at 1 year of age. In this observational study, maternal sensitivity and the mother's history of touch, as well as the infant's gender and biological vulnerability, were analyzed to determine their potential modifying effects. The sample consisted of 131 socioculturally diverse low-birth-weight infants and their mothers, and subjects were assessed at 4 different stages. The first, during the neonatal period, the infant and mother were evaluated for medical complications. When the infant was 3 months of age, the infant-mother pair was videotaped during a feeding session and the mother's properties of touch, her sensitivity, and infant responsiveness were considered. During the third stage, when the infant was 6 months of age, the mother received a questionnaire to elicit an understanding of her history of touch as a child and her feelings regarding that experience. Finally, when the infant was approximately 1 year of age, the Attachment Q-Set was completed. The results indicate that nurturing touch was associated with more secure attachment of robust infants to their mother at 1 year of age. In addition, it was found that infants whose mothers felt more secure about their own childhood experiences of touch were more likely to develop secure attachments, a finding that the investigators link to the notion of intergenerational transmission of working models of attachment. Neither maternal sensitivity nor infant gender influenced attachment outcomes, although they suggest that the role of maternal sensitivity may indeed strengthen as the infant becomes an increasingly interactive partner in this relationship. Interestingly, however, the degree of infant vulnerability (birth weight, perinatal complications) moderated the effects of nurturing touch, suggesting that more vulnerable infants are at risk for less secure attachments, regardless of the nature of touch they receive. This result has important nursing practice implications for both robust and more vulnerable infants as it relates to the use of touch.

The historical and more recent conceptualizations and empirical testing provide convincing support for

the notion of human touch as a vital element in the child's development of attachment. These findings collectively provide important guidance for nursing practice as well direction for further exploration.

IMPLICATIONS FOR NURSING PRACTICE

There are several nursing practice issues to consider when examining the importance of touch as it relates to healthy child development and attachment. First, initiatives that encourage and foster nurturing touch between mother and infant in the immediate postpartum period deserve attention. Enabling parents to be with their infant whenever possible during the first hour after delivery and throughout their hospital stay provides important beginning opportunities of contact for the infant-parent dyad.²¹ Holding their infant after delivery and "rooming in" with their infant are examples that offer parents early connections in coming to know their infant and in turn, the infant learning the touch of their parent. Health care practitioners can support mothers in their interest to learn about their babies through touch by recognizing that this is an important maternal behavioral system that enhances their relation with their infant.²¹ Health care institutions also need to consider issues such as becoming Baby-Friendly institutions (World Health Organization). While these types of initiatives are typically viewed within the frame of promoting breastfeeding, they also send important messages to new families in terms of facilitating healthy physical closeness and contact with their newborn that sets the stage for the developing relationship.

Another important area of consideration is the sick or preterm infant. Aiding parents who have infants in the neonatal intensive care unit find the type of touch and handling, which is most comforting to the infant, is essential for both ensuring healthy development of the child and fostering effective parenting skills.¹⁹ Given the very preterm infant may not be able to cope with significant amounts of touch due to physiologic instability, which may deter parents from handling their infant, education of parents needs to include acknowledgment that as the infant grows stronger this type of connection will also change and that parents need to respond to the infant accordingly. Understanding the mother's own childhood experiences of touch may also be an important early consideration so that supportive interventions can be implemented as needed to ensure healthy beginnings for her own child.^{13,20} Engaging parents at this time can help establish their skill and comfort level with providing nursing touch. Skin-to-skin touch as provided in kangaroo care is an important way that parents can implement touch with even the smallest preterm infant.²²

Although comforting physical contact between infant and parent has a role in times of infant distress,

it is suggested as well that nurturing contact as part of daily interaction has a meaningful role in development of a child's secure attachment.¹⁴ Touch "accessibility" is an eloquent way of capturing an essential element related to this notion.²³ Communicating this information to parents should be part of the dialogue that health care practitioners partake in with parents. Directing them to Web site resources such as the Canadian Pediatric Society and the American Academy of Pediatrics offers additional aids in understanding the significance of nurturing touch in healthy child development. Other interesting sites include the "I Am Your Child" Foundation, which is a national organization dedicated to raising public awareness about the critical nature of the child's first years of life and factors that influence their healthy growth and development. Written materials on healthy child development provided by this organization emphasize to parents the importance of frequent loving touch and holding of their infant to enable the formation of secure attachment.

Health care practitioners are in a unique role to influence the dynamic between infants and parents. From the moment of birth to the months beyond that are colored with health check-ups and immunization visits and to unexpected hospitalizations for childhood sickness, nurses have opportune moments to educate, reinforce, and commend interactions that foster parent-child contact in a positive way, recognizing the unique preferences of each individual.

IMPLICATIONS FOR NURSING RESEARCH

Much has been revealed about the concept of touch, and more specifically its link to a child's development of attachment. With these discoveries however, directions for new investigations are also uncovered. Suggestions for future research initiatives include further exploration of interventions that support nurturing touch, with a specific focus on high-risk populations. For example, increasing the study sample size and diversifying the sample to include a broader representation of the population could advance our understanding of the impact of an intervention such as the use of soft baby carriers plays in contributing to infant-parent connection. Focusing on teenaged mothers and their use of touch in nurturing their infants, as well as incentives that facilitate this type of care, would also be meaningful, given the high-risk nature of this population.

Expansion of our knowledge related to initiatives conducted with the sick and very preterm infant and the long-term implications of early interventions that are performed in support of their care would also be beneficial. Evidence that more effectively guides practice to balance the importance of not inundating the very preterm infant with numerous forms of stimulus, yet connects them to their parents through the

use of touch, would contribute to our knowledge base regarding this vulnerable population. Given the indication that the very preterm infant is more at risk for not developing a secure attachment, greater understanding of the role touch can have, may facilitate healthier attachments.

Another area for further investigation is that of maternal childhood experiences of touch and the implication it has on their relationship with their own child. How can we more effectively identify those mothers who might be more reluctant to exhibit physical contact with their child and enable them to modify their actions so that the experience of touch is a meaningful, positive connection for both mother and infant? In addition, how do cultural considerations factor in, and are there effective educational interventions that can have a positive influence in reinforcing the considerable contribution of meaningful touch.

Finally, on a more philosophical note, it is offered that the true power of touch remains an elusive concept. As Weber²⁴ suggests, most of our current data focus on touch as conceived within a physical-sensory model. However, do we truly understand the meaning of touch and its significance within a more holistic capacity? Why does it hold so much power and are there other avenues by which its benefits can be channeled? Does its power lie within a deeper human meaning that is yet to be unraveled? Does the use of therapeutic touch have a role in fulfilling the parent-infant connection to support development of secure attachment that may be of advantage to very sick young infants and children where hands-on contact may not be possible? To be sure, these are the questions that are more challenging to actualize in research yet may prove invaluable in our understanding of touch and its relation to human connection.

CONCLUSION

The healthy growth and psychological well-being of a child is dependent on his or her relationship with the significant caregiver. Secure attachment to this individual heightens the child's chances for more adaptive, healthy development. Bowlby⁴ shone the spotlight on this important concept, and in continuing to build on this critical issue, attention also needs to be focused on successful interventions that facilitate this relationship, specifically the positive experience of caring human touch. The medium of touch acts as a communication of support and protection that is

integral to the infant in achieving secure attachment. It is in the arms of their caregiver that the infant begins developing the vital capacity for human connection and meaning. The attachment tie as facilitated through caring, human physical contact is a powerful contributor to health and well-being, and there is much to be said about maintaining this connection throughout one's life continuum.

References

1. McCain M, Mustard F. *Reversing the Real Brain Drain: Early Years Study-Final Report*. Toronto, Ontario, Canada: Children's Secretariat, Government of Ontario; 1999.
2. National Research Council, & Institute of Medicine. From neurons to neighborhoods: the science of early childhood development. Committee on integrating the science of early childhood development. In: Shonkoff JP, Phillips DA, eds. *Board on Children, Youth, and Families, Commission on Behavioral and Social Sciences and Education*. Washington, DC: National Academy Press; 2000.
3. Bowlby J. *Attachment and Loss: Vol 1 Attachment*. New York: Basic Books Incorporated; 1969.
4. Bowlby J. *Attachment and Loss: Vol 1 Attachment*. 2nd ed. New York: Basic Books Incorporated; 1982.
5. Heller S. *The Vital Touch: How Intimate Contact With Your Baby Leads to Happier, Healthier Development*. New York: Henry Holt and Company; 1997.
6. McGrath JM. Neurologic development. In: Kenner C, McGrath JM, eds. *Developmental Care of Newborns and Infants*. St Louis, MO: Mosby; 2004: 105-118.
7. Lutes LM, Graves CD, Jorgensen KM. The NICU experience and its relationship to sensory integration. In: Kenner C, McGrath JM, eds. *Developmental Care of Newborns and Infants*. St Louis, MO: Mosby; 2004:157-181.
8. Harlow H. The nature of love. *Am Psychol*. 1958;13:673-685.
9. Harlow H, Zimmerman R. Affectional responses in the infant monkey. *Science*. 1959;130:421-432.
10. Harlow H. Development of the second and third affectional systems in macaque monkeys. In: Tourlentes TT, Pollack SL, Himwich HE, eds. *Research Approaches to Psychiatric Problems*. New York: Grune & Stratton; 1962:209-229.
11. Rubin R. Maternal touch. *Nurs Outlook*. 1963;11:828-831.
12. Ainsworth MDS. *Infancy in Uganda: Infant Care and the Growth of Love*. Baltimore, MD: The Johns Hopkins University Press; 1967.
13. Montagu A. *Touching: The Human Significance of the Skin*. New York: Columbia University Press; 1971.
14. Ainsworth MDS, Blehar MC, Waters E, Wall S. *Patterns of Attachment: A Psychological Study of the Strange Situation*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1978.
15. Tracy RL, Ainsworth MDS. Maternal affectionate behavior and infant-mother attachment patterns. *Child Dev*. 1981;52:1341-1343.
16. Weiss SJ. The language of touch. *Nurs Res*. 1979;28(2):76-80.
17. Reite M. Touch, attachment, and health: Is there a relationship? In: Barnard KE, Brazelton TB, eds. *Touch: The Foundation of Experience*. Madison, CT: International Universities Press Inc; 1990:195-225.
18. Anisfeld E, Casper V, Nozyce M, Cunningham N. Does infant carrying promote attachment? An experimental study of the effects of increased physical contact on the development of attachment. *Child Dev*. 1990;61:1617-1627.
19. Browne J. Developmental care; considerations for touch and massage in the neonatal intensive care unit. *Neonatal Network*. 2000;19(1):61-64.
20. Weiss SJ, Wilson P, Herenstein MJ, Campos R. The tactile context of a mother's caregiving: implications for attachment of low birth weight infants. *Infant Behav Child Dev*. 2000;23:91-111.
21. Klaus M, Kennell J. Labor, birth, and bonding. In: Klaus M, Kennell J, eds. *Parent-Infant Bonding*. St Louis, MO: Mosby; 1982:22-98.
22. Luddington-Hoe S, Morgan K, Abouelfetoh A. A clinical guideline for implementation of kangaroo care with premature infants of 30 or more weeks post menstrual age. *Adv Neonatal Care*. 2008;8:S3-S23.
23. Brazelton TB. Touch as a touchstone: Summary of the round table. In: Barnard KE, Brazelton TB, eds. *Touch: The Foundation of Experience*. Madison, CT: International Universities Press Inc; 1990:561-566.
24. Weber R. A philosophical perspective on touch. In: Barnard KE, Brazelton TB, eds. *Touch: The Foundation of Experience*. Madison, CT: International Universities Press Inc; 1990:11-43.