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# The Role of Touch in the Care of Toddlers among Bofi Foragers in Central Africa

Min-Jung Jung

*University of Tennessee, Knoxville*

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To the Graduate Council:

I am submitting herewith a thesis written by Min-Jung Jung entitled "The Role of Touch in the Care of Toddlers among Bofi Foragers in Central Africa." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Child and Family Studies.

Hillary Fouts, Major Professor

We have read this thesis and recommend its acceptance:

Brian Barber, Rena Hallam

Accepted for the Council:

Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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And recommend its acceptance:

Brian Barber  
Dr. Brian Barber

Rena Hallam  
Dr. Rena Hallam

Accepted for the Council:

Carolyn R. Hodges  
Carolyn R. Hodges,  
Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

The Role of Touch in the Care of Toddlers among  
Bofi Foragers in Central Africa

A Thesis  
Presented for the  
Master of Science  
Degree  
The University of Tennessee, Knoxville

Min-Jung Jung  
August 2008

## Abstract

The current study examined three types of touch (caregiving, social-affectionate, and passive) and toddlers' daily experience of physical interaction with caregivers among Bofi foragers, a semi-nomadic group of hunter-gatherers in Central Africa. With the purpose of describing a more holistic view of touch interactions and childhood experience in toddlers, rather than the extant Western, single-caregiver, mother-centric view, this study described the stylistic touch patterns that Bofi forager children experience and the influence of child characteristic factors (age, gender, and birth order) and social ecological factors (four types of caregivers: mother, father, adult relatives, and juvenile relatives). Based on cultural characteristics of the Bofi foragers, it was hypothesized that each type of caregiver would show a different stylistic touch pattern toward toddlers and also that the age of the child and birth order would affect the frequency of each type of touch toddlers received. A total of 35 Bofi forager children (17 boys and 18 girls; 14 firstborn children), between 18 and 59 months-old, and their various caregivers participated in this study. Naturalistic observations were conducted with Bofi forager families over 12 daylight hours while they were engaged in normal activities, and a focal child sampling technique was used for the observation of one child at a time and the recording of that child's behavior on a checklist. Frequencies of each type of touch and the rank order of types of touch that a toddler received were compared between caregivers and in relation to child characteristic factors. Results of the Bofi forager data suggest that compared to other types of caregivers, mothers have an important role in touch interactions with young children. Juvenile relatives also have a unique role in touch, which is more likely as playmates rather than alloparents. In addition, different child characteristic factors displayed different patterns

in touch interactions. Children received different stylistic patterns of touch depending on age and birth order, but not gender as expected. The findings from the current study help to identify the stylistic touch pattern in Bofi forager society.

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## Introduction

Touch is the most basic, but powerful form of communication and the form that we often rely on to express complicated emotions and feelings, such as love, sympathy, joy, and sadness (Harlow, 1958; Jones, 1994; Montague, 1986; Stack, 2001). The experience of touch induces “those neural, glandular, muscular, and mental changes which in combination we call an emotion” (Montagu, 1986, p. 128). Even before learning to talk, through touch, which is the very first sense to emerge in the growing human fetus (Frank, 1957), infants can communicate and experience the world (Jones, 1994). Touch helps physical growth, socio-emotional development, and self-regulation behavior, and so a better understanding of it is important to the areas of child development and child care (Feldman, Weller, & Sirota, 2003; Field et al., 1986; Weiss, Wilson, Seed, & Paul, 2001). A classic study by Harlow (1958) examined choices between food and physical warmth in infant monkeys isolated from their mothers. The infant monkeys exhibited a clear preference for a cloth-covered over a wire-mesh surrogate mother, even though both surrogates provided food. In other words, the results implied a significant importance of contact comfort more than biological need (food) at an early age (Harlow, 1958). However, rather than tactile/skin stimulation, predominately verbal communication and stimulation by caregivers have been examined among children in Western industrial societies because language ability is noted as an important indicator of cognitive development. As a result, the main belief in industrialized societies is that early interactions between mothers and children are crucial factors mostly as they relate to verbal ability. Thus, among school age children, obtaining successful adult competency in the society occurs through successful school achievement, which happens due to better verbal ability (Estrada, Arsenio, Hess, & Holloway, 1987; Hess, Holloway, Dickson, & Price, 1984; Murray, & Hornbaker, 1997; Walker, Greenwood, Hart, & Carta, 1994). However, Ogbu (1981)

and Keller (2003) propose that different child rearing practices reflect the value of each society for successful child outcomes. They also argue that different cultures emphasize different abilities for social competence, which causes children to develop specific characteristics unique to that society. For instance, Cameroonian Nso children are encouraged to develop motor independence earlier than other cultures because earlier physical development for the children means that they can help their families with daily tasks sooner. On the other hand, early cognitive maturation is viewed as more important than physical maturation for urban German children (Keller, 2003) Therefore, it is necessary to conduct studies in underrepresented cultures, like small-scale societies, to examine traits unique for competency in those cultures and how they differ from more extensively researched cultures.

Culture conveys “a way of life that a group of people share and transmit from one generation to another” (Murry, Smith, & Hill, 2001, p.912) whether or not they are of the same ethnicity. Specifically, culture “influences behavior and decision-making processes” (Murry, et al., p. 913). Studies of small-scale societies and cultures have significant meaning in the area of child care and parenting studies. Most of our scholarly knowledge about child development and caregiving is based predominantly on studies that are mother-centric, and in middle class, Western industrialized cultures. Several, but relatively few, studies in non-Western small-scale societies have acknowledged the importance of evaluating the relevance of Western theories, considering culturally relevant child rearing practices, and examining multiple caregivers’ roles in order to avoid assumptions of applying the same ideas in different context (Belsky, 1997; Chisholm, 1993; Konner, 2005; LeVine, 2004). Through examining and identifying in underrepresented contexts culture-specific patterns of child rearing practices, touch in this study, over-generalizations of the middle-class, Western image of child rearing patterns can be avoided.

Touch is an extremely appealing topic not only due to its importance as a basic communication channel, but also because it leads to different rates of child development, like motor development. In other words, differences in development rates occur due to early frequent physical interactions, especially when comparing non-Western small scale societies to Western industrialized societies. For example, in the studies conducted by Geber and Dean (1957) and Ainsworth (1967), Ugandan babies, who received continuous tactile stimulation while they were carried on the back by their mothers, showed advanced motor development, like sitting alone earlier, compared to European babies, who were not carried on the back by their mother.

In addition, touch or body contact is more prevalent in interactions in other cultural contexts, such as the Aka from Central Africa (Hewlett, Lamb, Shannon, Leyendecker, & Scholmerich, 1998) and the !Kung from Botswana (Konner, 1976a), and Gusii from Kenya (Richman, Miller, & LeVine, 1992). Especially, in non-Western small scale societies, multiple caregivers, such as grandmothers, aunts, fathers, and siblings display high levels of involvement in childcare, utilizing frequent physical contact. For example, Gusii infants are frequently held by siblings during the daytime when the mother is not available to the infants (LeVine et al., 1994). Also, Aka fathers are more likely than female relatives to hold infants when they were in camp with their infant (Hewlett, 1991b).

Therefore, including an idea of multiple caregivers' active engagement with children, especially in physical interactions, would also help to avoid a mother-centric view of child rearing experiences. In consideration of the importance of touch to children and the paucity of research relating to the role of touch in caregiver-toddler interactions, examining touch interactions in non-Western small scale societies will provide an opportunity to promote a more

holistic study of child rearing experiences, rather than the extant mother-centric, middle-class Western image of child rearing.

The cultural group for this study is the Bofi foragers in Central Africa, a group of semi-nomadic hunters and gatherers who live with extended families and who also rely heavily on family resources (Fouts, 2005). Even though in studies of early childhood, physical proximity, holding, and physical soothing describe the cultural pattern of intimate parent-child relationships and the gradual weaning process of Bofi forager toddlers (Fouts, 2005; Fouts, & Lamb, 2004; Fouts, Hewlett, & Lamb, 2005), a caregiver-child stylistic touch pattern has not yet been identified among the Bofi foragers. Therefore, the first purpose of this study is to provide a methodological framework for categorizing types of touch interactions between caregivers and toddlers (age 1 ½ to 4 years-old). This will be accomplished by examining many types of touch that Bofi forager toddlers experience in daily life when the toddlers are in a positive or neutral state. Within the various forms of touch, four touch categories will be used to describe the full experience of physical touch as one of the types of care that children receive. More specifically, caregiving, social-affectionate, and passive types of touch will be examined along with the overall amount of touch that the children experience.

The second purpose of this study is to examine whether specific child characteristics and social ecological factors predict the overall amount of touch that toddlers experience, as well as caregiver-child stylistic touch patterns. In this study, age, gender, and birth order will be viewed as the child characteristic factors, with the types of caregivers as a social ecological factor, in order to examine the overall amount of touch and the different stylistic touch patterns between caregivers and toddlers.

## Literature review

### *Theoretical perspectives*

The present study utilizes Bronfenbrenner's (1979) ecological systems theory and Ogbu's (1981) cultural-ecological theory to justify studying diverse contexts of families with various caregivers of children, as found in Bofi forager families. Bowlby's (1969) attachment theory is also utilized to understand the importance of touch in caregiver-child interactions.

Bronfenbrenner (1979) posits, in the ecological systems theory, that the environment directly or indirectly affects individuals' behavior and development. Therefore, one's development cannot be considered without his or her own environmental setting. However, as the environment affects the human, the human also influences environmental changes. The dynamics that humans and the environment create mutually influence each other, so he regarded development as a change within one's environment. Bronfenbrenner proposed that the "ecological environment is conceived as a set of nested structures" (Bronfenbrenner, 1979, p.3) and divided the environment into four connected systems: a microsystem, a mesosystem, an exosystem, and a macrosystem.

The microsystem is the immediate setting in which the individual is located and which interacts on a "face-to-face basis" with the person; examples are the home and family (Bronfenbrenner, 1979, p. 7). In this study, children's micro level interactions with prominent caregivers, particularly touch, are examined. Furthermore, the caregivers are not limited to parents because nonparental caregivers are also investigated in touch interactions with children to provide broader social contexts of caregivers with whom the children interact at the micro level. In addition, macrosystem factors are considered with respect to cultural values and the ecological environment. According to Bronfenbrenner (1979), in a particular society or culture

where individuals are located, distinct belief systems or ideologies exist. These bigger frames of culture and environment constantly and mutually influence small-scale systems, and this interaction affects ones' thoughts along with development. In other words, culture is a factor that may influence parents' and family members' behaviors and parenting practices. Therefore, through looking at a non-Western small-scale society (i.e., the Bofi foragers), that has different cultural and ecological environments from Western industrialized society, a pattern of caregiver-child physical interactions different from that of the typical mother-centered, middle-class Western society will be displayed.

Overall, Bronfenbrenner posited that children's behavioral or developmental outcomes result from the mutual and intricate interactions between individuals, the physical settings where children spend their time, and the experiences that come from the surrounding ecological context. This idea is also supported by Ogbu's cultural-ecological model for child rearing practice (1981).

Ogbu's (1981) cultural-ecological theory is influenced by Bronfenbrenner's ecological systems theory, but instead of focusing on the different layers of ecological systems, Ogbu emphasized the importance of the cultural environment directly surrounding the person, not only the physical environment, but also nonphysical resources, such as technology, knowledge, and cultural tasks. According to Ogbu, child rearing practices and values reflect the predominant beliefs regarding successful adult competencies in the society where the individual is located. Moreover, whether children are competent in the society is determined by how successfully they achieve culturally defined adult tasks. In other words, people raise their children to be competent in their community. Therefore, where children are raised is very important because parents pursue the most effective child rearing techniques for their children to gain competencies to fit their community. This is a similar concept to what Bronfenbrenner suggested with the



macrosystem, but Ogbu's model emphasizes more active roles of the physical and nonphysical environments on the child rearing practices and how children interact with their society. However, child rearing beliefs are somewhat relative to the context because individuals face different economic resources, knowledge, and social support in various ecological contexts. Ogbu suggested that no single rearing technique is better or worse than another because people use the most effective techniques to pursue social competencies and raise their children as competent adults in their specific community (1981). Therefore, adopting a cultural-ecological perspective supports the important role of culture in different child rearing practices and also supports including various types of caregivers, which then facilitates a culturally relevant interpretation of the child care pattern among Bofi forager families.

The first two theories suggest that environmental and cultural aspects of touch interactions vary, and attachment theory supports the importance of examining touch interactions between caregivers and children. Attachment theory is a model that characterizes the growth of infant behaviors to seek proximity with their primary caregiver, usually the mother during the first year (Ainsworth, 1973; Bowlby, 1969). When looking at attachment, touch is an important behavior in infants and children because attachment is not possible without touch and because children exhibit a stress response during separation precisely because they have lost their main source of physical stimulation (Field, 1996). When he was describing attachment and separation, Bowlby (1969) acknowledged the importance of touch. He described "primary object clinging" as one of the key characteristics of infants; it is the need for the infant to "be in touch with and cling to another human being," (Bowlby, 1969, p. 178). Touch is integral in the relationship between the infant and attachment figure, with higher levels of touch correlated with secure positive attachment between infants and mothers (Ainsworth, Blehar, Waters, & Wall, 1978;

Bowlby, 1969). In addition to the traditional measure of the stressful situation, contemporary attachment theory recognizes the importance of non-stressful interactions as well as multiple attachment figures (Bornstein & Tamis-LeMonda, 1997; Field, 1996; Fish & McCollum, 1997; Frosch, Cox, & Goldman, 2001; Sroufe, 1989).

In attachment theory, the mother was classically viewed as the primary figure to whom infants exhibit attachment. However, attachment theory over time has been expanded to include multiple attachment figures, such as fathers and other family members (Chase-Lansdale, & Owen, 1987; Cox, Owen, Henderson, & Margand, 1992; Lamb, 1977). Lamb (1977) found that infants form strong attachments with fathers as well as mothers with equal preference for each parent under non-stressful situations. Lamb did find differences in types of interactions, however. Mothers held infants more often to perform caregiving behaviors, while fathers held infants more often to play. Therefore, one child can form attachments with several figures equally, but each figure may have a distinct and important role in the development of that child (Lamb, 1977). The finding is especially supported by research among cultures where there are multiple caregivers and where infants form multiple attachments, like among the Efe foragers of the Congo (Tronick, Winn, & Morelli, 1985).

This study examines the physical touch relationships of Bofi forager toddlers with multiple caregivers. Therefore, instead of observing interactions in only mother-child dyads, various caregivers are included. Understanding the relationship between caregivers and toddlers in terms of types and styles of touch aids in viewing one important aspect of attachment, because children have a need for physical contact, attachment and touch are closely tied together. Many classic attachment studies focused on children in stressful situations, like the strange situation, which refers to a standardized laboratory procedure that creates unfamiliar episodes to activate

infants' attachment behavior (Ainsworth, 1973; Ainsworth, & Wittig, 1969; Cox, Owen, Henderson, & Margand, 1992; Crockenberg, 1981; Chase-Lansdale & Owen, 1987). However, many attachment studies have also been conducted in non-stressful situations, such as free play time at both the lab and home setting, and have examined children's proximity seeking behavior during daily activities (Bakerman-Kranenburg, van IJzendoorn, & Kroonenberg, 2004; Lamb, 1978; Rose-Krasnor, Rubin, Booth, & Coplan, 1996; Tracy, Lamb, & Ainsworth, 1976). Therefore, the more current studies on attachment guide the present study to examine touch interactions among Bofi forager children as an aspect of attachment, a proximity-maintaining behavior, in a positive or neutral emotional state in the setting of normal daily activities with consideration to the significant roles of multiple caregivers.

#### *Multiple caregivers*

Many studies on the topic of touch have been conducted among infants and have regarded physical touch as an important aspect of an infant's life in terms of health, growth, and social emotional development (Field, 2001; Feldman, Weller, Sirota, & Eidelman, 2003; Field, Schanberg, Scafidi, Bauer, Vega-Lahr, Garcia, Nystrom, & Kuhn, 1986; Lamb, 1978; Lappin & Kretschmer, 2005; Palaez-Nogueras, Field, Hossain, & Pickens, 1996). Physical touch has been examined in various contexts, such as breastfeeding, infant massage, and infant responsiveness, but usually only in the dyadic interaction of mother-infant. Moreover, the few studies conducted on touch interactions after infancy were also mostly mother-child dyadic interactions (Gibson, Wurst, & Cannonito, 1984; Jones, Ferreira, Brown, & Macdonald, 1979; Schmidt & Hore, 1970). According to Greenfield (1996), examining only mother-infant interactions could bring some misinterpretations of the full experience of infants by neglecting the roles of different caregivers. For example, the amount of eye contact received from mothers was less in Gusii

infants than American infants (LeVine et al., 1994). Therefore, the conclusion of the eye contact experience of African infants, based upon a dyadic interaction, was that the African infants received less eye contact than American infants. However, the results of a study of Whaley, Sigman, Beckwith, Cohen, and Espinosa (2002) reveal different conclusions. By including multiple caregiver interactions, results suggested that African infants receive more eye contact from caregivers than Euro American babies. In other words, various caregivers besides mothers account for a significant role in infant care.

The contribution of various caregivers in physical contact has also been examined (Fouts, Hewlett, & Lamb, 2005; Ivey, 2000; Hewlett, 1991a; Tronick, Morelli, & Ivey, 1992). In pastoral and agrarian societies, siblings, the most frequently reported alloparents, share in childcare responsibilities (Hrdy, 1999; LeVine et al., 2004; Munroe & Munroe, 1980; Weisner, 1987). Munroe and Munroe (1980) studied 12 Logoli infants between 7- to 13-months-old in Western Kenya. The Logoli infants' frequency of holding and rapidity of the response to crying depended on the number of people living in the household. However, when the mother was absent, older siblings mostly held and soothed the infants. Also, in Gusii society, Gusii mothers heavily rely on sibling care for the daytime care of infants (LeVine, et al, 1994). For example, much holding of Gusii infants is done by the mother and sisters. Infants were found to be held by the mother and sisters about 42 percent of spot observations for a 12 to 15 month period and 30 percent for a 15 to 18 month period of observations. While pastoral and agrarian societies utilize siblings as the most common alloparents, forager cultures often utilize multiple caregivers, which can include many different people, a finding supported by Ivey (2000). Ivey studied the Efe, a forager society in Africa that is known to utilize alloparenting (caregiving by people other than parents) very often (2000). Ivey found that Efe infants were in direct physical contact or social

interaction with a caregiver 85% of the time, with allocare being given over 30% of the time, usually by relatives. Moreover, Ivey found a mean of eleven caregivers other than the mother interacting with infants. Konner (2005) also examined the role of non-mothers and children as a subset of non-mothers in !Kung forager society in northwestern Botswana. Konner (2005) specifically looked at responsive behavior of the caregivers to infants' crying and found that !Kung mothers provided significantly more frequent comforting than other caregivers. However, among 88 percent of the total responsiveness rate, only 46 percent of bouts were responded to solely by the mother. In other words, half of the time other caregivers responded to crying infants whether solely or jointly with mothers. In addition, significant contributions of multiple caregivers in child care is also found among Hadza hunter gatherers in northern Tanzania (Marlowe, 2005). Similar to !Kung mothers, Hadza mothers are the primary caregivers of children, yet mothers rely heavily on non-maternal caregivers. In fact, non-maternal caregivers provide about 30 percent of all holding of young children. Among various caregivers, both fathers and maternal grandmothers are important sources of significant help for direct care and provisioning of the child. However, interestingly, when the father is present, Hadza grandmothers provide less direct care (Marlowe, 2005).

The father's role as an important caregiver is also found among Aka foragers in the tropical forest of the southwestern Central African Republic (Hewlett, 1991b). Aka fathers show a high level of involvement in infant care. For example, when Aka fathers were present with their infants in camp, they held one- to four-month-old infants about 22 percent of the time and four- to twelve-month-old infants about 11.2 percent of the time. Considering the fact that other caregivers altogether contribute about 27 percent of the time holding for the younger infants above and 2.3 percent for the older infants above, the father's sole contribution to holding is

outstanding. Proximity was measured when Aka fathers were within one meter of their infants during daylight hours, and researchers found that Aka fathers kept proximity with the infant about 92 percent of observations when they are in camp. The fathers' involvement and intimacy with infants are not a result of high levels of leisure time that Aka fathers have. Actually, according to Hewlett (1991b), Aka fathers who actively held their infants also actively engaged in subsistence activities. Therefore, fathers are important caregivers who provide high levels of physical contact. Overall, the results from the above studies support the view that forager societies tend to rely extensively on extended kin for child care and that there is a high level of physical contact between caregivers and children, likely more than in other societies.

Similar to other forager societies, Bofi foragers also use a high amount of family resources in childrearing. They tend to rely heavily on extended kin and non-parental caregivers, rather than primarily on the nuclear family (Fouts, 2004a; Fouts, 2005). Through ethnographic and observational studies of Bofi foragers, four types of major caregivers are often observed. The mother is typically the primary caregiver of the child, the main person to nurse, feed, and provide physical care. However, since Bofi foragers are relatively egalitarian, both the mother and the father are actively involved in hunting, collecting forest products, and child care. Therefore, fathers also have significant roles in child care. In fact, fathers frequently hold or carry children and keep close relationships with them (Fouts, in press). Along with fathers' contributions to child care, adult relatives, mostly grandmothers and aunts, are also highly involved in childcare, especially for children during or after the weaning process (Fouts, 2004a; 2004b; Fouts, Hewlett, & Lamb, 2005). Bofi forager children receive a relatively lower frequency of sibling care compared to adult care (Fouts, 2005). In Western societies, dyadic mother-child interaction has usually been the standard for examining aspects of childcare. However, because of the extensive

resources of family members, Bofi forager toddlers interact with various types of caregivers, and so more than a dyadic mother-child relationship should be examined to truly represent the type of care that children receive.

Looking at different patterns and frequencies of touch occurring between parents and children or between other family members and children can help to understand cultural values and child rearing practices (Keller, 2003). Bofi forager infants and toddlers are carried in a sling on the side of their caregiver, so they can freely access their mother's breast to nurse (Fouts, 2005). The amount of holding has been used as a measure for caregiving because "it represents an energetically costly form of investment and is a physically intimate type of caregiving like nursing" (Fouts, Hewlett, & Lamb, 2005, p. 37). Bofi forager mothers hold nursing children more than weaned children. Fouts, Hewlett, and Lamb conducted a study on caregiving and weaning and found that the amount of overall holding and maternal holding through the weaning process decreased among the Bofi foragers. However, holding by non-maternal caregivers, like fathers, grandmothers, or aunts, increased through the weaning process. This increase compensated for the decrease in maternal holding so that weaned children were still held a significant amount of time, about 30% of the day (Fouts et al., 2005). In fact, fathers also held nursing children more than weaned children, but only for the children who nursed infrequently. These results indicate that the Bofi foragers utilize a great deal of touch and close contact between adult caregivers and children and that the reliance on extended kin can influence how children adjust to a significant transition like weaning (Fouts et al., 2005). Caregiving by juvenile caregivers, such as physical care, holding, and soothing, was infrequent, but social interactions, like playing, vocalizing, and smiling/laughing, more frequently occurred with other

children. However, juvenile caregiving interactions are more likely to occur when adults are not near the children, so the role of juvenile caregivers is also significant (Fouts & Lamb, 2004).

The above studies show that in childrearing, one must take into consideration multiple caregivers in children's lives. In forager cultures especially, many different non-parental caregivers may spend a significant amount of time with children and care for them. The Bofi foragers also show evidence of the contribution of multiple caregivers. Although weaned children are held much less by the mother than when they were still breastfeeding, those children are still held much of the day, but by other relatives. Studies among the Bofi foragers also show that juvenile caregivers play specific roles. Therefore, the environment in which children grow is shaped to a significant degree by more people than just the parents.

#### *Examining touch interactions*

*Methods for study.* Physical contact interactions between caregivers and children have often been directly observed in various settings, rather than through questionnaires by parents or non-parental caregivers. However, Cowen, Weissberg, and Lotyczewski (1982) used a Physical Contact Survey to examine the physical contact that children experience in school. Child aides completed the survey and rated the frequency of physical contact with six-point frequency scales. The researchers found significant results, but they indicated not using direct observation and relying on aides' reports as the limitations of the study. However, previous literature using direct observation methods also suggests several limitations related to the duration of observation and the physical setting of observation (Gibson, Wurst, & Cannonito, 1982; Field & Pawlby, 1980).

The cross-cultural study of Gibson, Wurst, and Cannonito, utilized unobtrusive observation skills in order to examine variation in the amount of physical contact stimulation of children by caretakers (1982). Even though this study observed the physical interaction between



caregivers and children in a natural setting minimizing all observer effects, not surprisingly, the observation was not standardized in terms of duration and participants' characteristics. In addition, the observation time (8 to 30 minutes) was too short to make a good generalization about physical contact stimulation between caregiver and child interactions. Also, using such a method of observation makes it difficult to find out the exact relationship of the caregiver to the child. If the caregiver is not a parent, then the interaction pattern might differ when compared to another caregiver-child pair in which the caregiver was a parent.

On the other hand, Field and Pawlby observed mother and child interactions specifically in a more systematic setting (1980). Namely, the observation duration was the same, and the location (a playroom at the university lab) where the observations were taken was standardized. However, even though this procedure may regulate some unknown factors questioned in an unobtrusive study, the unnatural situation may not capture the normal behavior of the participants. Moreover, the observation time was quite short; only six minutes of film was analyzed for each participant pair. Actually, in many studies, physical interactions of caregivers and children have been studied utilizing relatively brief durations of observation, mostly less than 45 minutes (Lindahl & Heimann, 2002; Jones, Ferreira, Brown, & Macdonald, 1979; Salt, 1991; Laflamme, Pomerleau, & Malcuit, 2002). In fact, Leyendecker, Lamb, Schölmerich, and Fricke (1997) recognized the vulnerability of a short duration of observation. Leyendecker and colleagues examined caregiver and infant interaction in various contexts, such as object playing, feeding, and caretaking, and the impact of the length of observation. Forty Costa Rican families were observed over 12 daylight hours (8 a.m. to 8 p.m.) for 3 hours on each of 4 different days. The interactions were recorded "on-the-mark," at 20-second observe/10-second record intervals. The researchers found that a short duration of observation (45 minutes) led to unstable results of

individual differences in the interactions with various caregivers. Thus, they suggested the need for longer observation times. The overall conclusion of previous research is that when studying touch interactions, standardized naturalistic observation for longer periods of time appears to be the most reliable method.

Many studies in non-Western societies used longer-hour naturalistic observations (Hewlett, Lamb, Shannon, Leyendecker, & Schölmerich, 1998; Richman, Miller, & LeVine, 1992; Konner, 1975; LeVine et al., 1994). Also, in previous studies of Bofi foragers, Fouts and colleagues (2005) employed naturalistic observation using a focal child ‘on-the-mark’ technique for a total of 12 hours (6 a.m. to 6 p.m.) for 4 hours on each of 3 different days. The current study utilizes the same protocol of twelve hours of focal child ‘on-the-mark’ observation. This observation protocol will provide a full daily physical touch experience of the Bofi forager child. Also, observations on three different days may avoid any unusual behaviors of children on one particular day due to various reasons, such as sickness, drowsiness, and weather. When examining touch interactions in a culture, not only is a standardized observation important, but further defining types of touch interactions is critical.

*Types of touch.* Children often communicate and interact with caregivers through touch (Field, 2001). However, touch is often used as one umbrella term indicating many types of physical interactions (Montagu, 1986; Field, 2001; Blackwell, 2000). Many studies looking at physical interaction have proposed that numerous types of touch exist and have described different patterns of each type of touch between cultures, educational levels, and socioeconomic statuses (Feldman, Masalha, & Alony, 2006; Richman, Miller, & LeVine, 1992; Roopnarine, Fouts, Lamb, & Lewis-Elligan, 2005). Among many forms of physical interaction, the most frequently studied types of touch among children are holding, caregiving, and physical affection

in a variety of contexts (Barber & Thomas, 1986; Feldman et al., 2006; Hewlett, Lamb, Shannon, Leyendecker, & Schölmerich, 1998; Richman et al., 1992).

Many studies examined various types of touch. Richman, Miller, and LeVine (1992) looked at several types of physical interactions as one type of many maternal responses to infant behavior. In the Gusii-Boston study, caregivers' holding or jiggling of infants, infants' rooting, and caregivers and infants' touching, hugging, or kissing were initially categorized and observed. Also, caregiving-related physical behavior was coded, and the examples were washing/cleaning, grooming, dressing, and offering food. However, they collapsed all the categories into three main ones: touch, hold, and feed/nurse. In the Mexican study, Richman, Miller, and LeVine observed holding, physical behaviors, and caretaking behaviors with different distal interactions, such as talking and looking, and compared these between educational levels (2 years vs. 9 years) of mothers in Mexico. The less-educated mothers were more likely to have physical interactions with infants. Similarly, various physical behavior categories were observed in a study by Hewlett, Lamb, Shannon, Leyendecker, and Schölmerich (1998). Hewlett and colleagues categorized several types of infant care practices, such as feeding, caretaking, and holding, among the Aka and Ngandu of Central Africa (1998). For the behavioral codes, holding, caregiving (grooms/dresses/cleans), feed or nurse, physical affection, physical soothing, and location (lap, arms, and sling) were observed directly among infants and their caregivers.

Feldman, Masalha, and Alony's study on children's self-regulation behavior among toddlers and the influence of early family interaction patterns also included a passive form of touch along with an affectionate and caregiving-related touch (2006). Parent-infant contacts in which infants were located on the mother or father's lap or arms were coded as passive forms of touch. Also, parental touch was observed in two different cultural contexts: Israel and Palestine.

The types of touch observed included affectionate touch, such as hugs, kisses, and tickles; caregiving-related touch, such as wiping the baby's mouth and putting on a bib; and object-mediated touch. Overall, Palestinian parents showed more passive contact with infants, but less affectionate forms of touch. Israeli parents had more distal interactions, putting infants in front of them, but they showed more affectionate touch than passive touch. However, the proportion of touch is not explained in each culture. Also, Roopnarine, Fouts, Lamb, and Lewis-Elligan (2005) examined parents' availability, caregiving, and social behaviors among lower, middle, and upper SES African Americans. Each of ten behavior categories was observed from infants and caregivers. Examples of physical interaction categories for caregivers included looking, stimulating, physically soothing, and displaying physical affection.

Based on a review of touch studies, three main themes of touch were apparent: social-affectionate, caregiving, passive.

*Social-affectionate touch.* Previous literature suggests that positive affection expressed by parents to children is related to positive socioemotional outcomes of children (Isley, O'Neil, & Parke, 1996; Parke et al., 1989; Putallaz, 1987). Barber and Thomas (1986) examined physical affection as one type of parental supportive behavior in parent-child relationships, with kissing and hugging viewed as physical affectionate behaviors. This study revealed that daughters receive more physical affection from fathers than sons receive and that the physical affection from fathers is a significant predictor of self-esteem in daughters. Physical play can also be included as a type of social-affectionate touch because parents express affection to their children during physical play (MacDonald, 1987; MacDonald & Parke, 1984; Isley, O'Neil, & Parke, 1996; Salt, 1991). When caregivers play with children, positive physical contact occurs, like poking and tickling, (Feldman, Masalha, & Alony, 2006).

*Caregiving touch.* Caregiving touch is a functional type of touch in which caregivers are actively involved in the physical care of their children, such as cleaning, grooming, and nursing/feeding. Caregiving-related touch is frequently observed regarding the important role of breastfeeding and physical warmth (Blackwell, 2000; Fergusson & Woodward, 1999; Marty, Readdick, & Walters, 2005). Moreover, many studies on the topic of childcare include physical care and nursing/feeding as a basic type of care among young children (Fouts, Hewlett, & Lamb, 2005; Hewlett, Lamb, Shannon, Leyendecker, & Schölmerich, 1998; Richman, Miller, & LeVine, 1992). Therefore, caregiving touch is believed to take a significant role in the physical interactions between caregivers and children.

*Passive touch.* Physical proximity is a cultural pattern that really describes the Bofi foragers because caregivers frequently hold children on their laps or in their arms and frequently sit beside each other (Fouts, 2005; Fouts & Lamb, 2004; Fouts, Hewlett, & Lamb, 2005). Since there is no active engagement between caregivers and children in such cases, holding and sitting beside each other are regarded as passive forms of touch. Konner (1976a) studied the amount of passive physical contact that !Kung infants experienced with caregivers in order to observe a more stable aspect of caregiver-infant contact that excluded active touch. Thus, only passive physical contact was examined, and the amount of mother-infant passive touch was compared with the amount of other caregiver-infant passive touch. A total of 31 infants (aged 0 to 2 years) were observed, and the results showed that the amount of passive touch differed by age and gender of the child and also by type of caregiver. Therefore, passive touch may also account for a significant role in the physical interactions between caregivers and children, especially among the Bofi foragers.

In conclusion, caregiving touch, social-affectionate touch, and passive touch are significant types of touch that caregivers frequently utilize for child care when the child is in a positive or neutral state. However, few studies have actually solely explored touch interactions. Many studies described above examined touch, but only with other types of interaction, such as vocalizing and looking (Feldman, Masalha, & Alony, 2006; Hewlett, Lamb, Shannon, Leyendecker, & Schölmerich, 1998; Richman, Miller, & LeVine, 1992; Roopnarine, Fouts, Lamb, & Lewis-Elligan, 2005). Moreover, the few studies examining only touch interactions have mostly focused on only one type of touch (Barber & Thomas, 1986; Isley, O'Neil, & Parke, 1996; Parke et al., 1989; Putallaz, 1987). Therefore, by examining all three types of touch together along with the stylistic touch patterns of caregivers, this study will be a significant contribution to the understanding of physical interactions in the care of young children.

#### *Child characteristic factors*

Among various child characteristics, gender and age are most frequently examined in Western societies (Cowen, Weissberg, & Lotyczewski, 1982; Harrison-Speake, & Willis, 1995; Hewlett, Lamb, Shannon, Leyendecker, & Scholmerich, 1998; Richman, Miller, & LeVine, 1992; Weisberg, 1975). Along with gender and age, the birth order of children is also often studied (Dunn & Kendrick, 1980; Konner; 1976a; Stewart, 1990). Gender, age, and birth order have been examined solely or together in various studies on the topics of parent-child interaction, socialization, and peer interaction (Huston, 1983; Lindahl & Heimann, 2002; Lytton & Romney, 1991; Russell & Saebel, 1997; Siegal, 1987). Just as the effects of these three characteristics of children have been studied in various topics, these child characteristic factors have been examined in relation to physical interaction between caregivers and children.

*Gender.* Many studies of gender differences in physical interaction between caregivers and children were conducted in Western societies (Cowen, Weissberg, & Lotyczewski, 1982; Harrison-Speake, & Willis, 1995; Lindahl & Heimann, 2002; Russell & Saebel, 1997; Weisberg, 1975). Overall, research has shown gender differences in physical touch because girls usually have more physical touch than boys. Lindahl and Heimann (2002) conducted a study on social proximity in Swedish mother-infant interactions. Among twenty mother-infant dyads, nine mother-daughters and eleven mother-sons were observed during free play. Gender-related differences were found in physical contact interactions because mother-daughter dyads displayed more physical contact than mother-son dyads. This result is also supported by Russell and Saebel's study; mother-daughter interactions showed higher physical proximity than mother-son interactions (Russell & Saebel, 1997). Similar results have been found regarding gender differences in frequency of physical touch that children experience in school (Cowen, Weissberg, & Lotyczewski, 1982). Child aides were asked to complete a Physical Contact Survey rating children (343 boys and 216 girls) on six-point frequency scales of four physical contact variables (touch, holding hands, sitting on lap, and hugging). The results of the Physical Contact Survey suggested that girls had more contact than boys overall and more specifically, that girls had more contact with aides in all four types of physical contact.

However, in small-scale hunter-gatherer societies, gender has not been studied as a major factor with respect to caregiver-child interactions. When many researchers described child characteristic differences in physical contact patterns, gender differences were rarely mentioned in hunter-gatherer societies (Konner, 2005; Marlowe, 2005). Moreover, according to Hewlett (1991a), most of the hunter-gatherers provide essentially the same quantity and quality of care for boys and girls. It is possible that there will be no gender difference in the amount and types of

touch that children experience among Bofi foragers. However, it is still important to look at gender factors to see whether the cultural value of gender egalitarianism is apparent in touch interactions, since gender differences have been shown in many studies of physical interactions in other societies (Cowen, Weissberg, & Lotyczewski, 1982; Harrison-Speake, & Willis, 1995; Laflamme, Pomerleau, & Malcuit, 2002; Weisberg, 1975).

*Age.* Unlike gender, the age of children has been frequently examined in both Western and non-Western societies. In Western societies, much research on physical contact has revealed that as age increases, the frequency of touch decreases (Lindahl & Heimann, 2002; Richman, Miller, & LeVine, 1996; Salt, 1991). Lindahl and Heimann observed the physical interactions of twenty Swedish mother-child dyads. Compared to the frequency of physical contact of infant-mother dyads in which the infant was nine-months-old, the frequency of physical contact was less in dyads with fourteen-month-old infants (2002). Boston mothers also hold 3-4 month-old infants more than 9-10 month-old infants (Richman, Miller, & LeVine, 1996). Similar to the results of mother-child interactions, father-child interactions displayed the same pattern (Salt, 1991). Salt (1991) examined the changes in attitude and acceptance of affectionate touch between American fathers and sons with increasing age of the sons. For the participants, 39 father-and-son dyads from the middle class were recruited, and the ages of sons were between seven- and twelve-years-old. Responses by fathers and sons in the Parental Contact Scale (PCS) showed positive attitudes and perceptions about father-son touch. However, both fathers and sons' attitudes decreased in the acceptance of touch between father and sons as the age of the sons increased, and this was also shown in observations taken in an indoor play setting. Also, the amount of touch decreased with increasing age of the sons.



Similarly, age has been found to be a significant characteristic among forager children that influences physical interactions, mostly holding, between children and caregivers under a variety of circumstances. Examples include the daily caregiving experience of infants (Hewlett, Lamb, Shannon, Leyendecker, & Schölmerich, 1998) and the direct and indirect care experiences of children (Marlowe, 2005). Hewlett and colleagues (1998) observed the daily caregiving experience of twenty Aka infants. The results illustrated that 3-4 month old infants were held more and kept in closer proximity than 9-10 month old infants. Similar results were found in the direct and indirect care experiences of Hadza children (Marlowe, 2005). Younger children were held more by various types of caregivers. For example, children younger than one year-old were held about 52 percent of the time when the child was observed 90 minutes with focal child observation. On the other hand, four-year-old children were held about 23 percent of the time. Konner (1976a) conducted a study to investigate maternal care and infant development. As one type of maternal care, Konner examined the incidence of physical contact of !Kung children, from age one to four-years-old, and examined how the overall amount of passive touch changes as age increases. Konner utilized 15-minute timed-sequence observation with a total of six 15-minute observations conducted at each age point (1976a). As age increased, especially around twenty months, the total amount of physical contact decreased rapidly. Also, passive touch interactions with all caregivers, including mothers, and overall physical contact incidence decreased with increasing age.

Likewise, even though Bofi foragers have minimized age rank stratification, age-specific caregiving patterns are employed (Fouts, 2004b), and holding, one type of physical interaction, was found to decrease with child age (Fouts, Hewlett, & Lamb, 2005). Furthermore, younger children are more likely to breastfeed and to receive more physical care compared to older

children. Overall, age is a significant factor that could influence the frequency of various types of physical contact other than holding, which is fairly often studied. Therefore, age should be examined as a child characteristic factor that might influence caregiver-child touch patterns.

*Birth order.* Western and non-Western societies have recognized that children have unique experiences based on their order of birth (Brown, Pipp, Martz, & Waring, 1993; Dunn & Kendrick, 1980; Kojima, Irisawa, & Wakita, 2005; Konner, 1976a). For example, first-born children often experience a transition period in terms of interaction with parents when new siblings are born. On the other hand, latter-born children must share parents' involvement with other siblings from birth. In Western societies, the birth order of children has often been studied in terms of socialization between siblings and also behavioral-emotional problems in the context of the changes in parent-child interactions (Kojima, Irisawa, & Wakita, 2005; Nadalman & Begun, 1982; Stewart, Mobley, Tuyl, & Salvador, 1987). In addition, parental shifting of interactions can occur from the first to the second child. Studies have shown that the quantity and quality of maternal interactions with the firstborn child decreases with the second child's birth (Dunn & Kendrick, 1980; Konner, 1976a; Stewart, 1990).

In the small-scale Gusii society, caregiver-child physical interaction pattern differences related to firstborn children are important because firstborn toddlers do not have older siblings, and it is implied that firstborn children are to be cared for by mothers most of the time, while latter-born children are cared for by various caregivers including siblings (LeVine et al., 1994). Also, the parents' ages are young, or mostly younger, than the parents of second or third-born children. For example, the average age of marriage for Bofi forager women is between 15 and 17 years, and for Bofi forager men, it is the early twenties (Fouts, 2005). Considering the three to five year inter-birth interval among the Bofi foragers, parents of first-born children are more

likely to be younger and less experienced in child rearing than parents of a non first-born child. Even though the birth order of children has rarely been studied, along with direct changes of mother and child interactions, the experiences from the firstborn child may affect the parenting style of the second child. In other words, it is important to look at touch interactions between parents and children in terms of experiences of the parents raising more than one child.

### *Touch across cultures*

There are cultural differences across countries in that some people from “contact cultures,” such as Arabs, Latin Americans, and southern Europeans, are more likely to keep interactions at a closer distance and touch more frequently than people from “noncontact cultures,” such as Asians, North Americans, and northern Europeans (Field, 2001; Hall, 1966; Remland, Jones, & Brinkman, 1995). In a pilot study, Jourard observed touch interactions between two adults at coffee houses in San Juan (Puerto Rico), London, Paris, and Gainesville (Florida) (1966). Jourard scored when any touch occurred between the two people and found that London and Gainesville scored very low (almost none), but San Juan and Paris scored relatively high (more than 100). The overall cultural patterns in touch interactions are significant to understand caregiver and child physical interactions. In ecological theory, Bronfenbrenner emphasized the role of culture as a macro level factor that can influence small-scale systems, like caregiver and child interactions (1979). Accordingly, child rearing practices based on touch likely differ by cultural norms and ideas about the appropriateness and effectiveness of touch in each society. Therefore, the role of culture should be regarded as an important factor for predicting different levels of touch.

*Western and industrialized societies.* Several studies have examined differences in touch and other parental beliefs among Western and industrialized cultures, as well as impacts on

children (Gibson, Wurst, & Cannonito, 1982, Feldman, Masalha, & Alony, 2006; Field & Pawlby, 1980). One study conducted by Gibson, Wurst, and Cannonito (1982) took place in a playground, and the interactions between caregivers and children were observed unobtrusively. The purpose of this study was to see the variation of amount of physical contact stimulation by caretakers and compare it among three different nationalities: Greece (19 pairs), the United States (18 pairs), and Russia (12 pairs). Gibson, Wurst, and Cannonito (1982) found that the amount of contact stimulation of American caretaker-child pairs was significantly less than both Greece and Russia. For the caretaking contact category, Russian caretakers showed the most contact with children followed by Greek and then American caretakers. Both Greek and Russian caretakers provided more contacts than American caretakers in the pacifying responses category. However, no differences were found in physical retrieval and punishment contacts. In addition, Field (1999) examined mother and preschooler interactions during play in the U.S. (20 mother-preschooler dyads) and France (20 mother-preschooler dyads). Dyads were observed for a total of twenty minutes, and their behaviors, such as touching, talking, and watching, were coded with 10-second intervals. Not surprisingly, American mothers watched and touched their children less than French mothers. The results of both studies suggest that different cultures have different childrearing tendencies and that American caretakers may be less likely to be physical contact stimulators. This coincides with the non-contact cultural pattern (Field, 2001; Hall, 1966).

Another cross-cultural study conducted in noncontact societies displays the influence of cultural pattern on the touch interactions between mothers and children. Field and Pawlby (1980) studied similarities and differences in face-to-face interactions of mother and infant dyads in two non-contact countries: England and the United States. Sixteen British and sixteen American mother and infant pairs participated in the study. When mothers played with their infants using

toys that were provided in a table setting, there were no differences in total time of both proximal interactions and distal interactions between American and British groups. Interestingly, proximal interactions and behaviors illustrated similar patterns across the cultures.

Interpersonal distance and a touch-oriented culture may also influence child rearing patterns and child outcomes. Feldman, Masalha, and Alony (2006) conducted a longitudinal study of children's self-regulation behavior among toddlers and examined the affects of early family non-verbal interaction patterns in two different cultural contexts: Israel and Palestine. Israel is a more individualistic society in which parents encourage independence and active compliance with requests, and Palestine is a more collectivistic society in which parents expect interdependence and deference to authority for the self-regulatory behavior. When infants were five-months-old, parents had an interview and completed questionnaires. Gaze, affect, proximity, and touch were coded through observation, and self-regulation behaviors (mobilizing action to requests and inhibiting action to prohibitions) were measured.

As predicted, two distinct patterns of interaction between parents and infants were observed. Palestinian parents continuously maintained contact with infants, putting them on their lap or holding them in their arms, but Israeli parents had more face-to-face interactions, putting infants in front of them (Feldman, Masalha, & Alony, 2006). Israeli parents also used more distal strategies like giving mutual gazes and active touch while Palestinian parents kept more proximity and physical contact. Israeli parents were more likely to suggest and give directions and encourage autonomy while engaging in solving tasks with toddlers, and toddlers tended to ignore the parents' help and not request parental assistance. Palestinian parents assisted their toddlers during performing tasks, and the toddlers showed acceptance of parental guidance. In accordance with Ogbu's (1981) theory, parents in both cultures utilized different child rearing

methods to fit in their societies. Overall, culture performed a significant role in touch interactions in Western societies (Feldman, Masalha, & Alony, 2006).

*Small-scale, non-Western societies.* Compared to the amount of research on the topic of child care and development in Western societies, there is less research in non-Western societies. Therefore, the necessity of conducting research among children in non-Western societies is often mentioned by researchers. In fact, studies in small-scale, non-Western societies have been attributed with having a significant role in modifying or creating child development theories to avoid generalization of Western societal patterns as universal (Belsky, 1997; Chisholm, 1993; Konner, 2005). In many studies in non-Western small scale societies, researchers often group hunter and gatherer societies and pre-industrialized farmer societies separately. Some neighboring foragers and farmers speak the same language, like Bofi foragers and Bofi farmers (Fouts, 2004a), or share a similar ecological context, like Aka foragers and Ngandu farmers in Central Africa (Hewlett, Lamb, Shannon, Leyendecker, & Schölmerich, 1998). However, forager societies and farmer societies show different parenting styles and physical interactions between caregivers and children. Several forager societies share similar patterns, like respecting the autonomy of children, a permissive parenting style, and a high level of physical contact (Fouts, 2004a; Fouts, 2005; Hewlett, 1991b, Konner, 2005). Hewlett, Lamb, Shannon, Leyendecker, and Schölmerich (1998) studied infant care practices in two small-scale non-Western societies: the Aka and Ngandu from the Central African Republic. Even though the two groups share a similar ecological context, they have distinct cultural norms in terms of child care and male-female relationships. This study revealed that Aka infants are more likely to be held or fed and to be proximal to their caretakers than Ngandu infants. Ngandu caregivers stimulated and vocalized more to their infants than Aka caregivers. Compared to Ngandu infants of 3-4 months, the 9- to

10-month-old Ngandu infants were less likely to be held and physically and nonphysically soothed. Overall, Aka infant-adult interactions were more proximal, and Ngandu infant-adult interactions were more distal.

The relationship pattern between Aka and Ngandu is similarly found among Bofi foragers and Bofi farmers. In previous studies of Bofi foragers and farmers, Bofi foragers kept higher levels of physical closeness and proximity than Bofi farmers (Fouts, 2004b; Fouts, 2005; Fouts & Lamb, 2004). Several studies of hunter and gatherer societies examined the childcare among infants and young children and found that holding is one of the most frequent types of care and that caregivers keep high levels of physical contact and proximity. According to Konner, infants of the !Kung (hunter gatherers of northwestern Botswana) have very high physical contact. They were found to spend ninety percent of their time in physical contact with various caregivers using spot observation quantitative data (1976b). Also, the Hadza, northern Tanzania hunter gatherers, show a similar pattern of high physical interaction among infants as !Kung infants (Blurton Jones, 1993). Aka infants are also known for being held and in physical contact throughout the day (Hewlett, 1991b).

A cross-cultural study conducted by Richman, Miller, and LeVine showed different levels of physical contact between caregivers and infants during childcare between a Western society and a non-Western society (1992). Richman and colleagues (1992) examined maternal responses to infant behavior. This study compared the Gusii community in Kenya with suburban Boston families in Massachusetts. A spot observation method was used with both Gusii participants and Boston participants at 3-4 months and 9-10 months, in which caregivers were encouraged to do usual activities. Each interactive behavior by mothers and infants in sequence was coded using categories of behavior developed based on social interactions. During both age

periods, Gusii caregivers showed mostly hold and touch interactions when responding to infant behaviors like looking, vocalizing, and crying. Boston mothers responded to all three infant behaviors mostly with holding at age 3-4 months, but talking and looking more frequently occurred at age 9-10 months. Moreover, Bril, Zack, and Nkounkou-Hombessa (1989) found very different ideas about children's physical development between French mothers and mothers from two African cultures. The French mothers believed in allowing child motor development to progress naturally and without influence, but the African mothers believed in faster physical development, with massaging and physically helping the children to practice activities as a means to help them learn skills like sitting and walking. Thus, the African mothers preferred a more physical approach to raising children. The cross-cultural studies between Western and farmer societies suggest that non-Western societies utilize a high frequency of physical interactions.

When studying touch interactions, Bronfenbrenner's (1979) ecological systems theory and Ogbu's (1981) cultural-ecological theory suggest that the person's environment and culture must be considered because they have such a profound impact on behavior. Indeed, the above studies examining physical contact and culture showed drastic differences in amount of touch and types of interactions between cultures, even those often considered very similar to each other, such as two Western, industrialized countries. Thus, it is important to note that child rearing practices based on touch differ by cultural norms and ideas about the appropriateness and effectiveness of touch in each society. Moreover, findings from non-Western small-scale societies would reveal various patterns of child rearing that may not be well known in the West, which suggests that we should not look at one set of practices as ideal or standard.



## Hypotheses

1. The first hypothesis of this study is that there will be differences in the frequency of overall amount of touch (the combination of all types of touch: social-affectionate, caregiving, and passive) between the types of caregivers among Bofi foragers. For this hypothesis, four types of caregivers (mother, father, adult relatives, and juvenile relatives) will be examined, and the frequency of overall touch for each type of caregiver will be compared. Since the mother is typically the primary caregiver of the child, the frequency of overall touch of the mother will be higher than the other caregivers. However, the frequency of overall touch by the father, adult relatives, and juvenile relatives will be similar because alloparenting is very common for toddlers in Bofi forager society (Fouts, 2004b).

2. The first hypothesis focuses on caregiver differences, whereas the second hypothesis examines child characteristic factors and the frequency of overall touch. In other words, the frequency of overall touch will differ by age and by birth order of the child characteristic factors. It is predicted that as children get older, the amount of overall touch will decrease. A previous study conducted by Konner (1976a) described longitudinal changes of the amount of passive physical contact that !Kung infants received from the first week after birth up to 94 weeks. The amount of passive touch was displayed in a unit of weeks and showed considerable changes every couple of weeks throughout the first 2 years of life. The pattern of change in the amount of passive touch in units of weeks depicted an overall idea about the infants' experience of passive touch. Therefore, examining overall amount of touch at four age points (1 ½, 2, 3, 4 years-old) would display yearly changes in the overall touch pattern among Bofi forager children. First-born children will receive a higher amount of overall touch than latter-born children because first-born children aged between 1 ½ to 4 years-old do not have to share the physical touch of

their caregivers with siblings. However, no gender differences will be observed given the gender egalitarian nature of the Bofi foragers.

3. The first two hypotheses focus on the frequency of overall touch. For the next two hypotheses the proportions of the three types of touch (social-affectionate, caregiving, and passive) that caregivers display will be considered. In order to examine the next two hypotheses, rather than looking at the frequency of each type of touch, the rank order of the three types of touch is emphasized. For example, even if mothers engage in more of every type of touch than other types of caregivers, a stylistic difference will be indicated by the different rank order of the types of touch for various types of caregiver.

In order to examine the different patterns of several types of caregivers, four types of caregivers (mother, father, adult relatives, and juvenile relatives) will be distinguished. Therefore, for the third hypothesis, it is predicted that each type of caregiver will show different stylistic touch patterns. Juvenile relatives are unlikely to use the same style of touch as adult caregivers. It is expected that juvenile relatives are less likely than adult relatives to use caregiving touch (Fouts, 2005) and more likely to use social-affectionate touch. Therefore, caregiving touch will be the least frequent type of touch displayed by juvenile caregivers. Passive touch, like sitting beside during play or eating, will be the most frequent type of touch, followed by social-affectionate touch, like poking and tickling in the middle.

Adult caregivers (mother, father, and adult relatives) will mostly utilize passive touch due to predominant physical interactions, such as holding and sitting on the lap. Therefore, mothers are expected to show passive touch the most. However, distinctively, the mother will show caregiving touch as second most frequent because the mother is the major caregiver, who breastfeeds the child. Social-affectionate touch will be the last. Adult relatives will show similar

patterns of touch with mother even though the frequency of each type might be different. It is predicted that passive touch will be most frequent followed by caregiving touch, with social touch as last. Like other adult relatives, the father will show passive touch the most. However, fathers will show a different pattern of the other two types of touch. Among Aka foragers, who share very similar parenting beliefs and childcare patterns with Bofi foragers (Fouts, 2005), fathers were more likely to hug or kiss than all other caregivers, including mothers, and more engaged in playing activities than mothers (Hewlett, 1991b). Similar to Aka fathers, Bofi forager fathers are expected to show more social-affectionate touch than other caregivers. However, caregiving is also an important role of fathers, so social-affectionate touch is predicted to show a similar level of frequency as caregiving touch.

4. The fourth hypothesis is that the stylistic patterns of touch interactions by caregivers will also differ by age and birth order of the child characteristic factors, but not by the gender factor. For the age factor on stylistic patterns of touch, younger children will be more likely to receive caregiving touch than older children. However, older children will be more likely to receive passive touch than younger children. Therefore, for 1 ½-year-old and two-year-old children, caregiving touch and passive touch will be displayed similarly in high frequency followed by social-affectionate touch as the last. For three-year-old and four-year-old children, passive touch will rank the highest followed by caregiving touch, with social-affectionate touch as the last.

For the birth order factor, it is expected that first-born children will specifically have more passive touch and caregiving touch than latter-born children because the parents of the first born child are more likely to be young and have no other children. Therefore, they are expected to give more attention and physical care to their first-born child rather than sharing their attention

between two or more children. Therefore, the rank order of the types of touch for first-born children will be passive touch the most, followed by caregiving touch, and then social-affectionate touch. In contrast, latter-born children will exhibit similar frequencies of the two types of touch (caregiving touch and passive touch) with social-affectionate touch as least frequent. However, there will be no gender differences in the stylistic patterns of touch. Both male and female children are predicted to show passive the most, followed by caregiving, and social-affectionate touch as the last.

## Method

The data presented in the current study were collected as a part of larger study designed to examine caregiver-child relationships among the Bofi foragers, Bofi farmers, and Aka foragers of Central Africa (Fouts & Lamb, 2004; Fouts, Hewlett, & Lamb, 2005).

### *Participants*

A total of 35 Bofi forager children, between 18 and 59 months-old, and their various caregivers (mother, father, adult relatives, and juvenile relatives) participated in this study (see Table 1). The principle investigator (PI) of the larger study did 13 months of fieldwork between 1998 and 2001, and observed 22 Bofi forager children in the Northern regions (the Western Lobaye) of the Congo Basin Rainforest in the Central African Republic. Moreover, during 2 months in 2006, the PI and a graduate student visited the same field region, the Western Lobaye, and observed 13 Bofi forager children. As a recruitment process, the researchers spent a few days getting to know the Bofi foragers by visiting the Bofi forager settlements. The researchers also talked about the study to all the people of each settlement and then gave more detailed information to potential participants. The parents who agreed were scheduled to have a demographic interview and then the sequenced observations.

Table 1

### *Child characteristics*

	Age (year)				Gender		Birth order	
	1.5 year	2 year	3 year	4 year	Boy	Girl	First	Latter
N	5	8	10	12	17	18	14	21

### *Procedure*

Naturalistic observations were conducted with Bofi forager families over 12 daylight hours, and they were asked to engage in normal activities. A focal child sampling technique was used for the observation of one child at a time and the recording of that child's behavior on a behavioral checklist. Each child was observed for 4 hours (6-10 a.m., 10 a.m.-2 p.m., 2-6 p.m.) on three different days. Child and caregiver behaviors were recorded on-the-mark at 30-second intervals (20-second observation and 10-second recording) onto a checklist of caregiving and social-emotional behaviors. Observers wore a small earphone, attached to a voice recorder, which announced "observe" at the beginning of the 20-second observe period, and announced "record" at the beginning of the 10-second record period. After every 45-minutes of observation, a 15-minute rest period was taken by the observer. Observers were trained to a 90% criterion for each code prior to observing. Even though demographic and caregiver ideology interviews were conducted with the primary caregivers of the focal children, the current study only utilized demographic and observational data.

### *Behavioral codes*

Several behavioral codes of nonverbal physical interactions were utilized for the current analysis (see Table 2).

### *New variables*

Four new variables were created from the codes listed in Table 2. More specifically, three types of touch variables (caregiving, social-affectionate, passive) describe how the caregivers deliver touch to the children in a positive or neutral state in order to examine the touch interactions in the setting of non-stressful normal daily activities.

Table 2

*Behavioral codes of 12 nonverbal physical interactions*

Behavioral codes	Description
I-Touch-A	Coded when the child touched another person, whether adult or infant.
I-Crawls in Lap	Coded when the child crawled into the lap of another person.
A- Soothe Physical (P)	Coded when an individual tried to physically quiet or calm an irritable or crying child, including behaviors like rocking, patting, and swaying.
A-Stimulate/Arouse- I	Coded when an individual showed any action with the intention of focusing the child's attention on a specific event, like poking, pulling on limbs, or shaking.
I- Play	Coded when the child distracts him/herself with objects he can touch with his/her body. If the child played with others, the individuals were indicated.
A-Caregive-I	Coded when an individual provided physical care or grooming to the focal child, including behaviors like wiping the child's nose, changing diapers, combing hair, or dressing or undressing.
M-Nurse-I	Coded when mother presents nipple to child or the child takes the nipple into his/her mouth. If the child falls asleep and is no longer sucking, then nurse is no longer coded.
A-Feed-I	Coded when an individual directly feeds a child with spoon, bottle, or by hand.

Table 2, continued

Behavioral codes	Description
A- Affect-Physical (P)	Coded when an individual shows any overtly positive affect to a non-crying, non-irritable child and includes behaviors like hugging, nuzzling, and kissing. Physical soothing is distinguished from affectionate touch.
A-Touch-I	Coded when the child and another person are contacting each other and includes behaviors like sitting close together, holding a limb, or leaning on a person. Other physical interactions, like holding or physical affection, are documented in their categories if occurring simultaneously with physical contact.
A-Hold-I	Coded when a caregiver was holding the child in the lap, the slang, or the arms.
A-Carry-I	Coded when a caregiver was carrying the child in the slang or the arms.

*Note.* A = any individual; I = focal toddler; M = mother; P = physical. From “Caregiver-child relationships during pregnancy among foragers in Central Africa: Definitions of Observational Categories,” by H. Fouts, 2006, Unpublished manuscript, University of Tennessee at Knoxville.



One compilation touch variable (overall touch) indicates the overall amount of touch that children receive from a caregiver regardless of type of touch.

Of the four created variables, the three types of touch (caregiving, social-affectionate, and passive) are not mutually exclusive. Caregiving touch and social-affectionate touch can occur together at one interval, and each score is counted for each type of touch. However, passive touch cannot occur together with either type of touch since all active forms of touch were excluded when calculating passive touch. Overall touch is an inclusive variable of all physical interactions. 'I' indicates the focal toddler, 'M' indicates the mother, and 'A' indicates any individual other than the focal toddler including mother.

*Caregiving touch.* Caregiving touch is a functional type of touch. This variable is meant to measure various forms of physical care that the child receives from caregivers, like dressing, feeding, and cleaning. The behavioral codes of A-caregive-I, M-nurse-I, and A-feed-I were used for caregiving touch.

*Social-affectionate touch.* This variable is meant to measure a direct form of physical affection, such as kissing and hugging, or when caregivers physically played with or stimulated the children, such as tickling and poking. Several behavioral codes, I-affect-P, I-play-A, A-stim/arouse-I, and A-touch-I, were used for social-affectionate touch. However, there were no direct behavioral codes for physical play or physical stimulation and arousal, so the behavioral codes for I-play-A and A-stimulate/arouse-I were closely examined when they occurred simultaneously with the behavioral code of A-touch. When there was coinciding touch between a caregiver and child that was coded in both I-Play-A and A-touch in the same interval, one instance of physical play was counted. Moreover, when I-play self or I-play object was coded with A-touch-I, the instance of physical touch was not counted toward to physical play. The

same counting method was applied to a code for physical stimulation or arousal. However, I-play and A-stimulate/arouse could be coded simultaneously, so when two codes were coded together at the same interval, only one instance of a social-affectionate touch was scored to prevent over-representing the actual frequency. For example, while the mother plays with the child, she could stimulate the child by poking or tickling. This was counted as only one instance of social-affectionate touch.

*Passive touch.* Passive touch variable is meant to be a measure of non-active physical contact, like sitting on the lap and leaning on the caregivers. Mainly, passive touch was calculated by taking the physical contact score (which was coded simultaneously with all forms of touch) and subtracting all active forms of touch (I-touch-A, I-crawls in lap, A-soothe physical, A-physical care-I, A-affection physical, I-play, A-stimulate/arouse, M-nurse, and A-feed-I). The behavioral code of A-hold-I was included since holding is not an active form of touch.

*Overall touch variable.* Overall touch indicates that an individual and the focal child are in physical contact. This is a compilation category including all positive (non-conflict) touch, such as caregiving, social-affectionate, and passive forms of touch. All twelve of the behavioral codes were included to explain overall touch, but since many of the behavioral codes could be coded simultaneously with other codes, the amount of touch could be over-represented. Therefore, an appropriate calculation of counting the frequency was applied. For example, if the child was being held and was receiving caregiving during the same interval, this was counted as one instance toward overall touch, not two.

#### *Data analysis*

Several statistical analyses were applied in order to test the four hypotheses. The current data was collected for a total of 12 daylight hours on three different days to represent each

toddler's typical daily experience. Therefore, for all analyses, data were summed across the 12 hours, which is a composition of the number of 30-second units in which each behavior occurred. The frequencies of overall touch and each type of touch (social-affectionate, caregiving, and passive) were examined as a proportion of intervals when the child was awake in order to look at active engagement between caregivers and children. Therefore, the intervals in which touch occurred when the child was asleep were excluded.

However, when the stylistic differences between four types of caregivers in terms of touch are examined, just looking at the frequency of each type of touch as proportions of intervals when the child was awake is inappropriate. To prevent the influence of the most frequently present caregiver's touch pattern on each type of touch, the frequency of each type of touch was prorated in proportion to the particular caregiver (mother, father, adult relative, and juvenile relatives) who was proximal to the children since there is no clear code of indication of the presence of a certain caregiver. Therefore, the percentage shows the stylistic differences in the three types of touch as a function of the presence of each type of caregiver.

*Type of caregiver and overall touch.* Repeated measure analysis of variance (ANOVA) was used to test whether there are differences in the frequency of overall amount of touch between the types of caregivers (mother, father, adult relatives, and juvenile relatives). Repeated measure ANOVA demonstrates the differences between overall amount of touch between caregivers, which showed which caregiver provided the most touch and had the most physical interaction with the child.

*Child characteristics and overall touch.* Three separate analyses were conducted for testing the differences in the frequency of overall touch that each child received from caregivers based on their characteristic factors (age, gender, and birth order). One-way analysis of variance

(ANOVA) was used to compare the frequencies of overall amount of touch between the ages (1.5 to 4 year-old). One-way ANOVA displayed the frequencies of overall touch that children received at each age. Two t-tests were conducted, for gender and birth order factors. The t-test compared the frequencies of overall touch between boys and girls and between firstborn and latter-born children.

*Stylistic differences on touch between caregivers.* One 4 (types of caregivers) X 3 (types of touch) repeated measure ANOVA was computed to identify the main effect caregiver differences considering each of the three types of touch. Four types of caregivers (mother, father, adult relatives, and juvenile relatives) and the three types of touch (social-affectionate, caregiving, and passive touch) were entered as within subject repeated variables. With the repeated variables, a repeated measure ANOVA allowed examination of the frequency between each type of touch and determined whether all types of caregivers have similar or different stylistic touch patterns or not.

*Stylistic differences on touch and child characteristic factors.* Three separate repeated measure analyses of variance (ANOVA) were computed to identify the differences in the frequencies of each type of touch. For the age factor, a 4 (age: 1.5, 2, 3, and 4 year-old) X 3 (type of touch: social-affectionate, caregiving, and passive touch) repeated measure ANOVA was conducted. With the type of touch as a repeated variable, a repeated measure ANOVA allowed for testing of stylistic pattern of touch at each age of the child (1.5 to 4 year-old) and determined whether children at each age experience similar stylistic touch patterns or not.

For the gender factor, a 2 (gender of child: male or female) X 3 (types of touch: social-affectionate, caregiving, and passive touch) repeated measure ANOVA was conducted with

types of touch as a repeated variable. Through a repeated measure ANOVA, stylistic touch patterns between male and female children were compared.

Similar to the gender factor, a 2 (birth order of child: first-born or latter-born) X 3 (types of touch) repeated measure ANOVA was used for the birth order factor. With the type of touch as a repeated variable, a repeated measure ANOVA showed differences or similarities in stylistic touch patterns between the experiences of firstborn and latter-born children.

## Results

### *Hypothesis 1: Type of caregiver and overall touch*

The descriptive statistics of overall touch by types of caregivers are presented in Table 3. The results showed a significant main effect for type of caregiver on overall amount of touch, Wilks's  $\lambda = .41$ ,  $F(3, 32) = 15.31$ ,  $p \leq .001$ , corrected  $\eta^2 = 0.43$ . More specifically, mothers provided more touch than any of the other three types of caregivers (Bonferroni post hoc test,  $p_s \leq .001$ ), but there were no differences in frequency of overall amount of touch between the fathers, juvenile relatives, and adult relatives (see Figure 1, all figures are located in the appendix).

### *Hypothesis 2: Child characteristics and overall touch*

The overall amount of touch that children received from all types of caregivers were analyzed in terms of child characteristic factors: age, gender, and birth order. The descriptive statistics of overall touch by three types of child characteristics are presented in Table 4, Table 5, and Table 6. There was only one significant main effect, which was for birth order ( $t(33) = -2.6$ ,  $p \leq .05$ ), as latter-born toddlers received a higher amount of overall touch than firstborn toddlers (see Figure 2). There were no significant main effects for gender or age of the child.

Table 3

*The mean percentages of overall touch when child is awake*

(%)	Mother		Father		Juvenile relative		Adult relative	
	M	SD	M	SD	M	SD	M	SD
Overall ***	37.8	22.90	7.35	9.64	12.77	12.86	7.26	13.69

*Note.* \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$ .

Table 4

*The mean percentages of overall touch by age when child is awake*

age	1.5 year (N=5)		2 year (N=8)		3 year (N=10)		4 year (N=12)	
	M	SD	M	SD	M	SD	M	SD
(%)	81.37	10.10	68.49	12.90	56.18	23.06	60.89	19.19

*Note.* \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$

Table 5

*The mean percentages of overall touch by gender when child is awake*

gender	Boys (N=17)		Girls (N=18)	
	M	SD	M	SD
(%)	60.12	23.17	68.07	14.67

\*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$

Table 6

*The mean percentages of overall touch by birth order when child is awake*

Birth order*	First born (N=14)		Latter born (N=21)	
	M	SD	M	SD
(%)	54.55	23.26	70.65	13.41

\*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$

### *Hypothesis 3: Stylistic differences of touch between caregivers*

Type of caregiver and also types of touch were entered as repeated measures factors, and it was found that there was a significant main effect for the interaction of type of caregiver and types of touch, Wilks's  $\lambda = .24$ ,  $F(6, 29) = 15.20$ ,  $p \leq .001$ , corrected  $\eta^2 = 0.77$ . For the stylistic touch of each type of caregiver, four separate repeated measure ANOVAs were conducted with types of touch entered as a repeated variable. There were significant main effects for type of touch among all types of caregiver: mother (Wilks's  $\lambda = .12$ ,  $F(2, 33) = 127.08$ ,  $p \leq .001$ , corrected  $\eta^2 = 0.77$ ), father (Wilks's  $\lambda = .50$ ,  $F(2, 33) = 16.85$ ,  $p \leq .001$ , corrected  $\eta^2 = .50$ ), juvenile relatives (Wilks's  $\lambda = .38$ ,  $F(2, 33) = 26.51$ ,  $p \leq .001$ , corrected  $\eta^2 = .48$ ), and adult relatives (Wilks's  $\lambda = .73$ ,  $F(2, 33) = 6.19$ ,  $p \leq .01$ , corrected  $\eta^2 = .27$ ).

The mean percentages of the three types of touch of each caregiver are shown in Table 7. The rank order of the types of touch that mothers provided was passive touch as the highest amount, caregiving touch as second, and social-affectionate touch as lowest (Bonferroni post hoc test,  $ps \leq .001$ ) (see Figure 3). The father's rank order of types of touch was passive touch as highest (Bonferroni post hoc test,  $ps \leq .001$ ) among the three types of touch, but there were no significant mean differences between caregiving touch and social-affectionate touch (see Figure 4). For the juvenile relatives, the rank order was passive touch as highest, social-affectionate touch second, and caregiving touch last (Bonferroni post hoc test,  $ps \leq .05$ ) (see Figure 5). Lastly, the rank order for adult relatives was highest in passive touch (Bonferroni post hoc test,  $ps \leq .001$ ), but there were no significant mean differences between caregiving touch and social-affectionate touch (see Figure 6).



Table 7

*The mean percentages of three types of touch when child is awake*

	Mother***		Father***		Juvenile relative***		Adult relative**	
	M	SD	M	SD	M	SD	M	SD
Affectionate	.37	.37	1.38	3.04	4.73	5.41	.89	2.04
Caregiving	16.20	13.82	1.67	3.52	.96	1.91	1.42	3.34
Passive	50.71	20.60	32.74	32.16	25.08	23.46	29.09	46.69

*Note.* Each mean is a proportion of observations in which the caregiver was proximal to child.

\*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$

#### *Hypothesis 4: Stylistic differences on touch and child characteristic factors*

Repeated measure analyses of variance (ANOVA) were computed to identify the stylistic differences in the frequencies of each type of touch for the child characteristic factors (age, gender, and birth order). The frequency of each type of touch was summed across the four types of caregivers. The descriptive statistics of three types of touch based on child characteristic factors are presented in Table 8, Table 9, and Table 10.

There was a significant interaction of types of touch and age, Wilks's  $\lambda = .49$ ,  $F(6, 60) = 4.360$ ,  $p \leq .001$ , corrected  $\eta^2 = 0.03$ . The stylistic touch pattern of a 1.5 year-old child showed passive touch first, caregiving touch second, and social-affectionate touch last (Bonferroni post hoc test,  $ps \leq .05$ ) (see Figure 7). The rank order of a 2 year-old child was similar as a 1.5 year-old child in that passive touch was the highest and social-affectionate touch was the lowest (Bonferroni post hoc test,  $ps \leq .05$ ) (see Figure 8). However, for the 3 and 4 year-old children, passive touch was the highest (Bonferroni post hoc test,  $ps \leq .05$ ), but there were no significant mean differences between caregiving touch and social-affectionate touch (see Figure 9 and Figure 10).

There was a significant interaction of types of touch and birth order, Wilks's  $\lambda = .81$ ,  $F(2, 32) = 3.80$ ,  $p \leq .05$ , corrected  $\eta^2 = .02$ . For first-born children, the rank order of touch showed passive touch as the highest (Bonferroni post hoc test,  $ps \leq .05$ ), but there was no significant differences between caregiving touch and social-affectionate touch (see Figure 11). However, for the latter-born children, passive touch was the highest, and social-affectionate touch was the lowest, with caregiving touch in the middle (Bonferroni post hoc test,  $ps \leq .05$ ) (see Figure 12). There was not a significant main effect for child gender.

Table 8

*The mean percentages of three types of touch by age when child is awake*

	1.5 year*		2 year*		3 year*		4 year*	
	(N=5)		(N=8)		(N=10)		(N=12)	
(%)	M	SD	M	SD	M	SD	M	SD
Affectionate	5.72	2.84	5.87	4.00	2.88	2.86	3.81	3.32
Caregiving	23.30	6.93	17.30	9.57	7.48	5.50	4.25	5.95
Passive	56.20	8.32	47.65	15.87	46.31	20.41	53.42	19.79

*Note.* \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$

Table 9

*The mean percentages of three types of touch by gender when child is awake*

	Boys (N=17)		Girls (N=18)	
	M	SD	M	SD
Affectionate	4.59	3.23	3.99	3.61
Caregiving	11.40	10.51	10.94	10.10
Passive	45.88	18.39	54.80	16.26

*Note.* \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$

Table 10

*The mean percentages of three types of touch by birth order when child is awake*

(%)	First born* (N=14)		Latter born* (N=21)	
	M	SD	M	SD
Affectionate	4.76	3.95	3.97	3.03
Caregiving	9.08	10.32	12.55	10.05
Passive	41.92	21.33	56.16	12.21

*Note.* \*  $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\* $p \leq .001$

## Discussion

The current study provided a unique opportunity to examine both the overall touch interactions and the stylistic touch interactions between various types of caregivers and toddlers among the Bofi foragers. Two broad categories of results based on the influence of child characteristic factors and social ecological factors are reported. The first category was from the involvement of the caregivers. In other words, the results pertained to touch that the caregivers provided to children and how touch interactions differed based on the caregiver. The second category involved touch that was received by the toddlers and how touch interactions differed based on child characteristic factors. Several of the results were expected, but there were also some surprising findings.

### *Multiple caregivers*

Just as hypothesized, the amount of the mothers' overall touch, the combination of all three types of touch (social-affectionate, caregiving, and passive), was distinctly higher than any of the other three types of caregivers. In fact, even though alloparenting from other caregivers is very common among the Bofi foragers, the mother's role in childcare in terms of the sheer amount of touch occurring in young children's daily experience is highly significant. Previous studies of Bofi foragers have highlighted the extensive involvement of mothers in childcare (Fouts, 2005; Fouts, Hewlett, & Lamb, 2005). For example, Bofi forager mothers breastfeed their children up to 4-5 years. Thus, frequent physical touch occurring between mother and child is unavoidable and is the norm in daily life for the Bofi foragers. This fits with attachment theory, which involves the relationship between children and their primary caregiver (Bowlby, 1969). Touch is important to attachment, so it makes sense that as the primary caregiver, mothers, provide more touch to children than other caregivers.

Examining overall touch was important in this study, but much more information was found by looking at details of the stylistic touch pattern of caregivers. According to the results, passive touch ranked first for all types of caregivers. Bronfenbrenner (1979), in the ecological systems theory, emphasized the importance of the environment to which individuals belong. Culture, as a macro level factor, influences inner systems like parenting practices, parent child interaction, and children's behavior. Thus, consistent with the cultural pattern of maintaining high amounts of physical contact and utilizing high amounts of holding (Fouts, 2005; Fouts, Hewlett, Lamb, 2005), the extensive use of passive touch was found among all types of caregivers.

As a result, the rank order of the two other types of touch describes the stylistic touch of specific caregivers. Mothers provided more caregiving touch than social-affectionate touch as predicted, but both fathers and adult relatives provided similar stylistic touch in that there were no differences between the frequencies of caregiving and social-affectionate touch. Just as adult relatives provided caregiving touch as much as social-affectionate touch, fathers also did not provide one type of touch over the other. In other words, fathers showed a similar pattern of touch as other adult relatives in a combined group, which included grandparents, uncles, and aunts. Fouts (in press) examined the father's involvement by looking at several factors and indicated that Bofi forager fathers, who live patrilocally (i.e., living with paternal kin group), show a higher level of proximity, holding, and availability than fathers living matrilocally. Also, Bofi forager fathers' involvement decreased when post-menopausal female relatives, generally grandmothers, were present. Therefore, both grandmothers and fathers are involved in the care of children. This coincides with the current results because fathers also provide a similar type of childcare as other adult relatives. Interestingly, but not surprisingly, Bofi forager fathers did not

provide social-affectionate touch significantly more than caregiving touch. Social-affectionate touch involves affectionate touch and physical touch while the child is engaging in any play activities or any playful stimulation. Many studies on fathers' involvement in childcare in Western society focus on the role of fathers more as playmates or economic resources (Cox, Owen, Henderson, & Margard, 1992; Laflamme, Pomerleau, & Malcuit, 2002; MacDonal & Parke, 1984). However, among the Bofi foragers, fathers provided similar frequencies of social-affectionate touch and caregiving touch, which implies that fathers are not only engaged in play activities, but also physical caregiving.

In a study conducted in the U.S., Lamb (1977) suggested that infants form attachments to multiple caregivers, but each caregiver might have different roles in childcare. For example, the mother forms attachment through caregiving, but the father forms attachment through play or stimulating activities. However, among the Bofi foragers, fathers provided similar frequencies of social-affectionate touch and caregiving touch, and the data implies that children may form their attachments with fathers not simply in one specific paternal role, such as being a playmate. Even if the data on social-affectionate touch does not make a distinction between affection and play, the results are somewhat supported by studies of other foragers, like the Aka (Hewlett, 1991b). Aka fathers rarely played with infants, but rather they held and showed affection or caregiving behavior. In other words, Bofi forager children may form an attachment with fathers in various areas of father involvement in childcare, such as holding and physical care.

One interesting finding from overall amount of touch and stylistic touch comes from the role of juvenile relatives. In many studies in small-scale societies, researchers have emphasized sibling-care as a major characteristic of early childcare, with older siblings providing significant care for younger siblings (Hrdy, 1999; LeVine, 2004; LeVine et al., 1994; Weinsner, 1987).

However, similar patterns of high utilization of sibling care might not be found in every small-scale society, and perhaps care by siblings has been over-generalized. As a matter of fact, according to the stylistic touch pattern by caregivers, juveniles utilized caregiving touch the least, which coincides with previous studies of Bofi foragers. Bofi forager juveniles were less likely to be involved in childcare, like physical caregiving and feeding, because Bofi forager adult caregivers are common alloparents for young children (Fouts, 2004a; 2005; Fouts, Hewlett, & Lamb, 2005). Examining the data, juvenile relatives used social-affectionate touch more than caregiving touch, which coincides with previous research that has shown Bofi forager children to be heavily involved in play with other children (Fouts, 2005). Thus, juvenile relatives are likely to have a unique pattern in touch interactions compared to other relatives for providing more social-affectionate touch and less caregiving touch.

Although the results simply indicated no significant difference between amount of overall touch from adult caregivers and juvenile relatives, the stylistic touch pattern provided more enriched information because the actual type of touch that each caregiver used was different. In other words, adult relatives provided more caregiving type of touch, and juvenile relatives provided more social-affectionate type of touch. The results gathered from overall touch only suggested who was in physical contact with the child the most. However, the stylistic touch, displayed as a rank order of each type of touch, provided more specific information about what kind of touch the caregivers provided the most or least and about the major role of the caregivers based on touch interaction. In addition, the results of amount of overall touch showed that juvenile relatives' overall amount of touch was slightly higher than that from fathers and adult relatives. The high frequency of overall amount of touch among juvenile relatives might explain some of the results regarding the child characteristic factors.



### *Child characteristic factors*

*Gender.* The results from overall touch supported the hypothesis that gender would not have an effect on amount of touch. As predicted, Bofi foragers are relatively egalitarian in terms of gender roles, so the overall amount of touch did not differ between boys and girls (Fouts, 2004; 2005). Ogbu (1981) suggested that each culture has unique parenting skills to raise the child to best fit in that society. The cultural idea about gender influencing touch interactions with children does not appear to be a part of Bofi forager society. Studies in Western societies, however, have shown gender differences in amount of touch, usually with girls receiving more than boys (Cowen, Weissberg, & Lotyczewski, 1982; Lindahl & Heimann, 2002). But as expected in the relatively egalitarian Bofi forager society, the results revealed a contrast to studies conducted in Western cultures. Thus, there was no difference in touch between boys and girls.

*Age.* As children age, they tend to become more independent and go through the weaning process, and so it was hypothesized that younger children would receive more touch than older children. However, surprisingly there were no significant differences in overall touch between children of different ages. Fouts and colleagues (2005) showed that for weaning children, the amount of holding by non-maternal caregivers increases when maternal holding decreases. The results may be explained by the extensive involvement of juvenile relatives with older toddlers in touch interactions. As mentioned above, juvenile relatives in this study actually provided a similar frequency of touch as fathers and adult relatives. This shows juvenile relatives have an important role in touch interactions with children in Bofi forager society. Even though older toddlers may receive less caregiving touch due to the weaning process, the social-affectionate

touch involving playing with other juveniles could compensate for the decrease in caregiving touch. Therefore, the overall amount of touch stays consistent.

Finally, the rank order of type of touch in terms of the age of the child was interesting. Even though there were no differences in overall amount of touch by age of child, there were changes in stylistic touch as they became older. In fact, 1.5- and two-year-old children's stylistic touch patterns were similar with passive touch first, caregiving touch second, and social-affectionate touch least. On the other hand, three- and four-year-old children's stylistic touch patterns were similar to each other but different from younger children. In these older children, passive touch was first, but social-affectionate and caregiving touch levels were similar. Since young toddlers rely heavily on breastfeeding, the younger toddlers receive a higher amount of caregiving touch than social-affectionate touch. However, at age 3 and 4, the child starts weaning, so they received reduced caregiving touch than younger toddlers as expected (Fouts, 2004a; 2005; Fouts, Hewlett, & Lamb, 2005). Therefore, the results from overall amount of touch were unexpected because as age increases, amount of touch usually decreases. However, in this study, as age of the children increased, the amount of touch stayed consistent. Also, regarding the consistent amount of overall touch, the changes of the stylistic touch patterns between younger children (1.5- and 2-years-old) and older children (3- and 4-years-old) is quite interesting and informative. Younger children indeed received different stylistic touch compared to older children since the focus of the physical interactions differed as age increased.

*Birth order.* Regarding birth order, the hypothesis of this study was that firstborn children would receive more overall touch than latter-born children. However, latter-born children actually received a higher amount of touch. This is unexpected from findings even in studies conducted in Western societies, which have shown that firstborn children tend to receive more

parental care (Dunn & Kendrick, 1980; Konner; 1976a; Stewart, 1990). Based on previous studies, it was believed that firstborn children would receive more touch because parents would have more time to devote to only one or two children, since the firstborn child has a lower possibility of having siblings. Then, parents of multiple children would have to divide their time between several children, and so the firstborn child would not have to share care with siblings.

However, in consideration of the results, there may be several reasons why latter-born children received more touch, and one possibility takes into consideration the role of juvenile relatives, a category that included older siblings. Since juvenile relatives do have an important role in touch, this may have had an impact on the amount of touch that latter-born children received. In other words, although latter born children may have received less touch from adult caregivers than firstborn children, this difference may have been compensated for by older siblings. The presence of older siblings means that there are more people in the immediate family, so there is a higher potential for touch interactions, which may be the reason that latter born children received more touch than firstborn children, who would not really have the potential for touch interactions with siblings.

The other main result related to birth order of the children was the rank order of the three types of touch received from caregivers. Originally, it was expected that firstborn children would display the rank order of passive touch first, caregiving second, and social-affectionate third. However, according to the results, latter-born children actually displayed the predicted rank order of firstborn children. Moreover, the firstborn had passive touch first but no difference in caregiving and social-affectionate touch. The fact that latter-born children received less social-affectionate touch than caregiving touch when there was no difference in these types for firstborn children is interesting. According to previous studies in Western societies, latter-born children

receive less parental care because they have to share parents' involvement with siblings (Dunn & Kendrick, 1980; Kojima, Irisawa, & Wakita, 2005; Konner, 1976a). However, the studies in Western societies did not examine the involvement of other caregivers aside from mothers. In fact, in the small-scale Gusii society, Levine and colleagues (1994) indicated that latter-born children are cared for by various caregivers when first born children are mainly cared for by the mother. Therefore, Bofi forager latter-born children also may receive more caregiving from various caregivers, which led to higher frequencies of caregiving touch and displayed the results of the unpredicted rank orders of both first born and latter-born children.

#### *Limitations and future directions*

The current study has some limitations, but these also lead to opportunities for future research. The first limitation was the sample size. Even though the sample size was adequate for examining overall touch interactions among the Bofi forager children, breaking up the sample into groups based on child characteristic factors divided the already small number of participants into smaller groups. For example, the results were significant for age and birth order factors, but the effect size for both age and birth order were small, ranging from 0.0099 to 0.0587, according to Cohen's categorization of effect size of  $\eta^2$  (Cohen, 1988). Therefore, a larger sample size may be beneficial to increase the effect size of both variables and display more accurate trends within specific characteristic groups regarding touch in Bofi forager society.

Another limitation of the study is that it only focuses on how children receive touch by their caregivers. The overall amount of touch and the stylistic touch patterns explain how much and what kind of touch interactions children have. However, this data only focused on the contributions of the caregiver and the role of the caregiver in touch interactions. How much the children contribute to touch interactions is not displayed. The fact that a given caregivers' touch

pattern is the result of both the initiation of the caregiver and a reciprocal interaction between caregiver and children was not addressed. In order to give a more complete view of the touch interactions that children experience, future research can also include reciprocal interactions by children to the caregivers' touch. It may also be useful to examine whether the children give physical cues before being touched that may lead caregivers to either initiate touch or that may influence the type of touch caregivers provide.

The current study is based on quantitative data from 12 hours of observation using an on-the-mark observation technique. Bofi foragers are a small-scale hunter-gatherer group and have not been studied frequently. As a beginning step to the study of this group related to a topic of touch, quantitative data describing the overall stylistic touch pattern of Bofi forager caregivers is important, but 12 hours of quantitative data is still not enough to generalize a pattern to the Bofi forager caregivers. Qualitative data can help to explain more details of caregiver touch patterns. Including more descriptive information about circumstances surrounding touch can provide deeper insight into not only the touch interactions that children have, but also the environmental conditions surrounding and influencing different types of touch.

The focal group of the current study is toddlers. At the beginning, the purpose of using this particular group was to find whether this age group of children receive a significant amount of touch, in addition to who is involved in touch interactions and how the stylistic touch pattern differs by age. One opportunity for future research is to include an infant group (0 to 18 months), which will more clearly describe the toddler's experience and whether it is similar to infants or distinctive from them. Comparing the toddlers' experience to that of infants will allow a better understanding of unique aspects of toddler touch interactions in Bofi forager society.

The current study strictly examined touch interactions between caregivers and children. However, influences or relationships between touch and verbal interactions were not examined. Further defining and categorizing verbal interactions and examining their relationship to touch interactions would prove interesting and may also give a more accurate depiction of the daily life of Bofi forager children. Such a study would also give more insight into caregiver interactions in general. There may be a relationship found between specific types of touch interactions and verbal cues. Regardless, though the current study gives a holistic view of the touch interactions in the daily experience of Bofi forager children, further study can provide a more complete view of such interactions.

### *Implications*

The current study is a novel one that focuses on stylistic differences in touch, quantitatively measuring different types of touch by various social ecological factors and child characteristic factors. The stylistic differences in touch were measured as the rank order of the three types of touch either provided by the caregiver or received by the child. In fact, the topic of touch has been examined in many studies, yet studies have mostly only examined one type of touch, like holding or affectionate touch, in order to explain caregiver and child physical interactions (Barber & Thomas, 1986; LeVine et al, 1994; MacDonald & Parke, 1984; Marlowe, 2005; Isley, O'Neil, & Parke, 1996). It is necessary to focus on one type of touch if the purpose of the study is to find the pattern of a particular type of touch while examining a specific purpose of caregiver-child interactions, such as with attachment formation. In this way, explaining an interaction with one type of touch is effective. For example, Lamb (1977) conducted a study to look at interactions between caregivers and infants in order to view attachment formation processes from looking at the role of each type of caregiver. He utilized holding and found that

mothers hold infants for more caregiving behaviors, while the fathers hold more for play. Lamb (1977) only examined the one type of touch in order to examine attachment formation of infants with multiple caregivers. However, he focused on the different purposes of holding in order to differentiate the major roles of mothers and fathers while sharing physical interactions with infants. Therefore, through various types of holding, it was possible to conclude that the main foci of holding of the mother and father are different. The mother has more of a caregiving role and the father more of a playmate role.

In contrast, in order to examine the overall touch pattern of the society as a whole, simply looking at one type of touch or a few very specific interactions is not enough, and for further direction, it is essential to examine various forms of touch together that children experience in daily life. Also, focusing on only one type of touch may lead to misinterpretations of the importance of certain caregivers when finding the overall touch pattern of a society. Several studies have examined the frequency of one type of touch between multiple caregivers (Konner, 1976a; LeVine et al., 1994), and if one caregiver provides one type of touch more than others, like holding, that caregiver may be regarded as the more important caregiver in general. Instead, the other caregivers may also provide a similar level of touch, but just of another type that was not examined. In this way, focusing on multiple types of touch decreases the possibility of minimizing certain caregivers' roles in physical touch interactions because the frequency of one type of touch may not accurately represent the contribution of each caregiver. Typically fathers and other non-maternal caregivers simply do not spend as much time with the children as mothers, so the frequency of touch of other caregivers is small in comparison. However, when considered in proportion to the actual amount of time involved in childcare that a caregiver contributes, the touch provided by a particular caregiver may be very meaningful. For example,

the results of the stylistic touch pattern of juvenile relatives indicate that those relatives contribute more social-affectionate touch than caregiving touch. If caregiving touch alone was examined in Bofi forager society, the role of juvenile relatives in childcare would not be considered important, but because of examining all three types of touch, a more complete view of the contribution of various caregivers was highlighted. In addition, the current study utilized a prorating procedure. More specifically, the frequency of each type of touch was prorated in proportion to the particular caregivers' proximity to the children in order to avoid the influence of the most frequently present caregiver's touch pattern. In doing so, prorating the touch interactions for child proximity with the caregiver allowed a compensation for amount of time spent with the children by the caregivers. Thus, the stylistic touch pattern displayed as a rank order of three types of touch helps to explain the major role of each type of caregiver through touch interactions. Also, the interactions, which were prorated for child proximity to caregiver, show how the caregivers use their effort while interacting with children. As in this study, juvenile relatives used more social-affectionate touch, while other caregivers utilized more caregiving touch. So a greater amount of effort was spent on playing or being affectionate for the juvenile relatives.

The current study is an important step in the study of other societies because this model can be used to examine caregiver involvement via touch in different cultures and societies. This study has shown that the ways in which different caregivers are involved in a child's life, their roles, can be examined by measuring touch. Just as it was shown that Bofi forager fathers have considerable roles in both caregiving and providing physical affection, the roles of other types of caregivers in other societies can also be further discovered and defined through quantitatively examining stylistic differences in touch.



In addition, the results highlighted an important role for juveniles in Bofi forager society as playmates to other juvenile relatives and young children as compared to children's role as alloparents in other small-scale non-western societies. For example, Bofi farmer juveniles who live in adjacent neighborhoods are common alloparents for young children (Fouts, 2004a; 2005). However, Bofi forager children receive care continuously by adult caregivers. In other words, the results suggest that sibling care or juvenile alloparenting is not a general pattern in all small-scale non-western societies. Therefore, this role should be examined further and should not be generalized to other small-scale societies like the Bofi foragers.

Lastly, the current study examined not only mothers but also various types of caregivers who are involved in childcare using touch interactions. Many studies conducted in Western societies have primarily examined mother-child dyadic interactions, overlooking other caregivers' roles in child care. Mothers provided the most amount of touch compared to other caregivers in this study. However, the results of the current study showed that other caregivers (fathers, adult relatives, and juvenile relatives) also contribute significantly to the amount of overall touch when adding the amount of touch together from the three non-maternal caregivers. In other words, studying only mother and child interactions might lead one to misinterpret the full experience of children in terms of touch. Therefore, this study supports the need for examining various caregivers' involvement in childcare. Overall, this study provided a more thorough characterization of the touch experience of toddlers than previous studies of touch, but further research is necessary to provide a more complete view of the touch experience.

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## Appendix

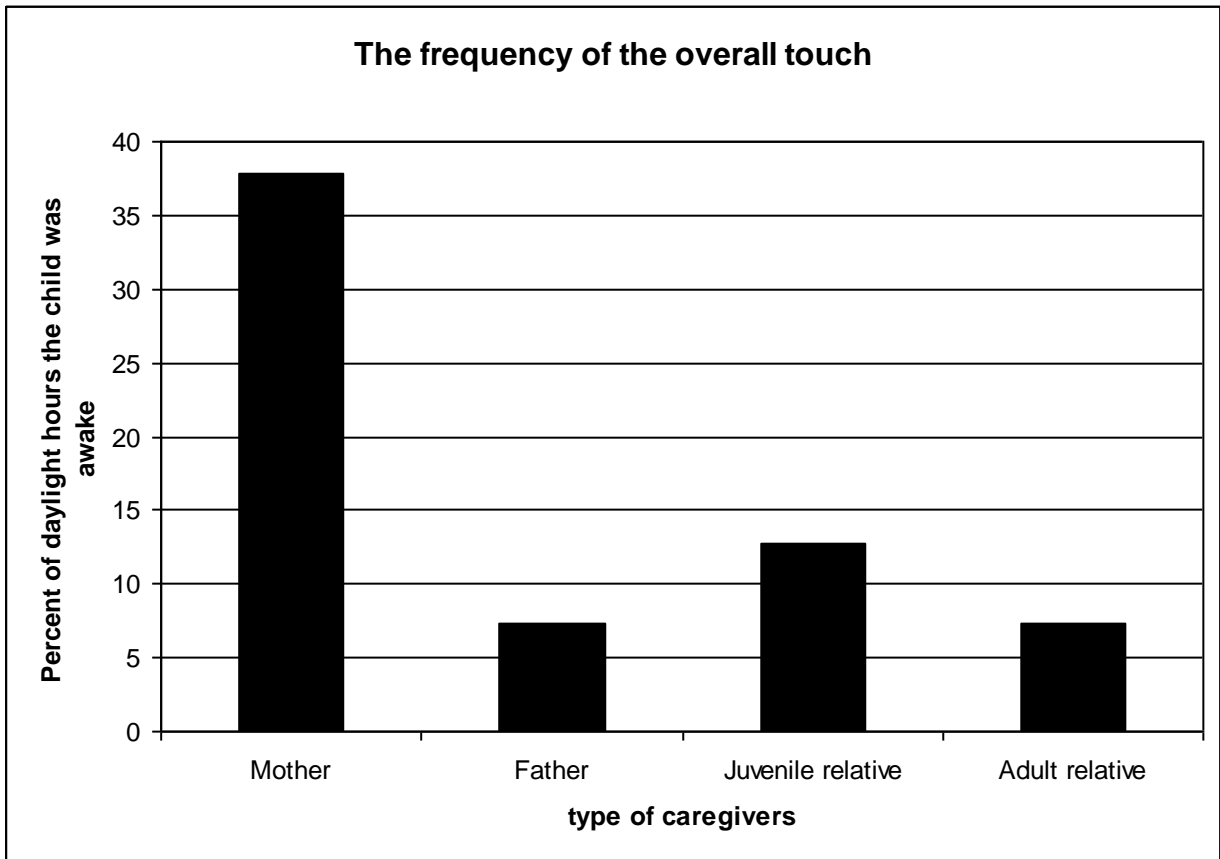


Figure 1. The frequencies of overall touch and types of caregiver.

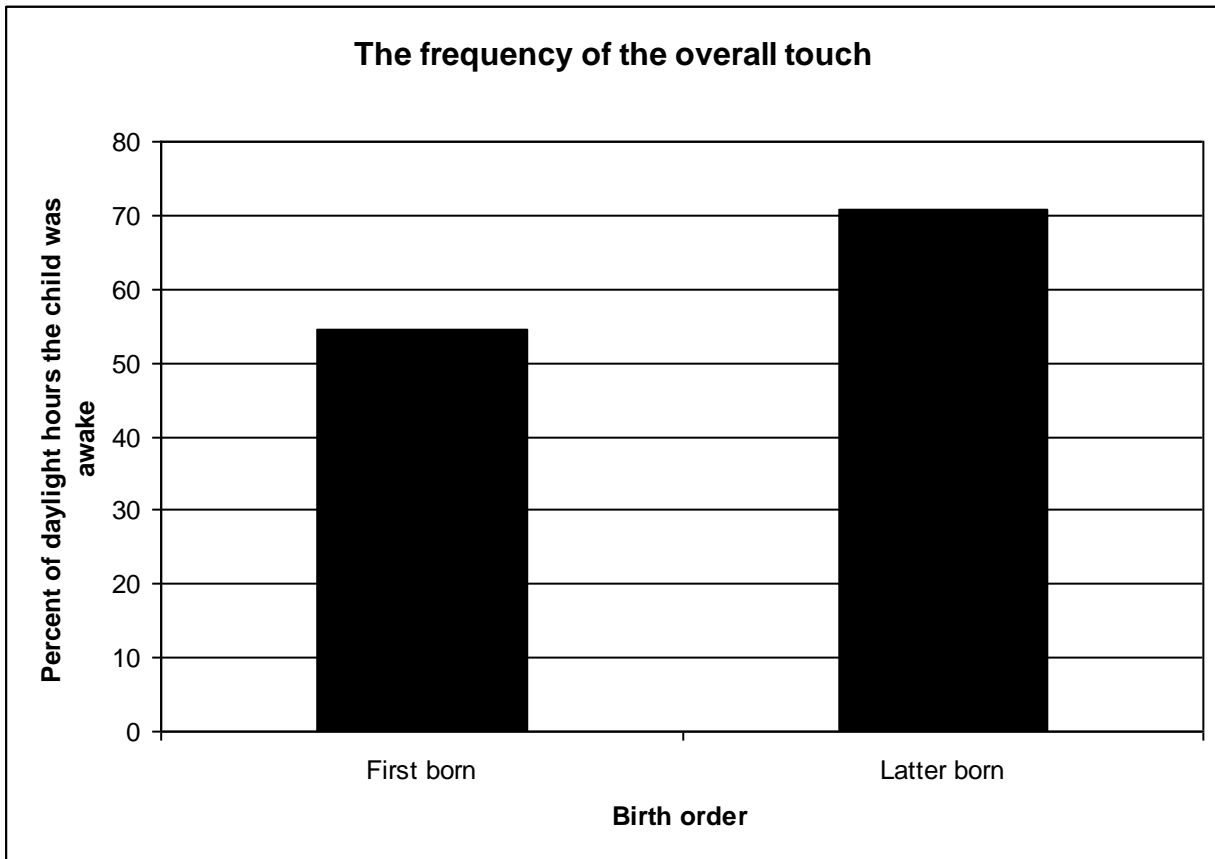


Figure 2. The frequencies of overall touch and birth order of child.



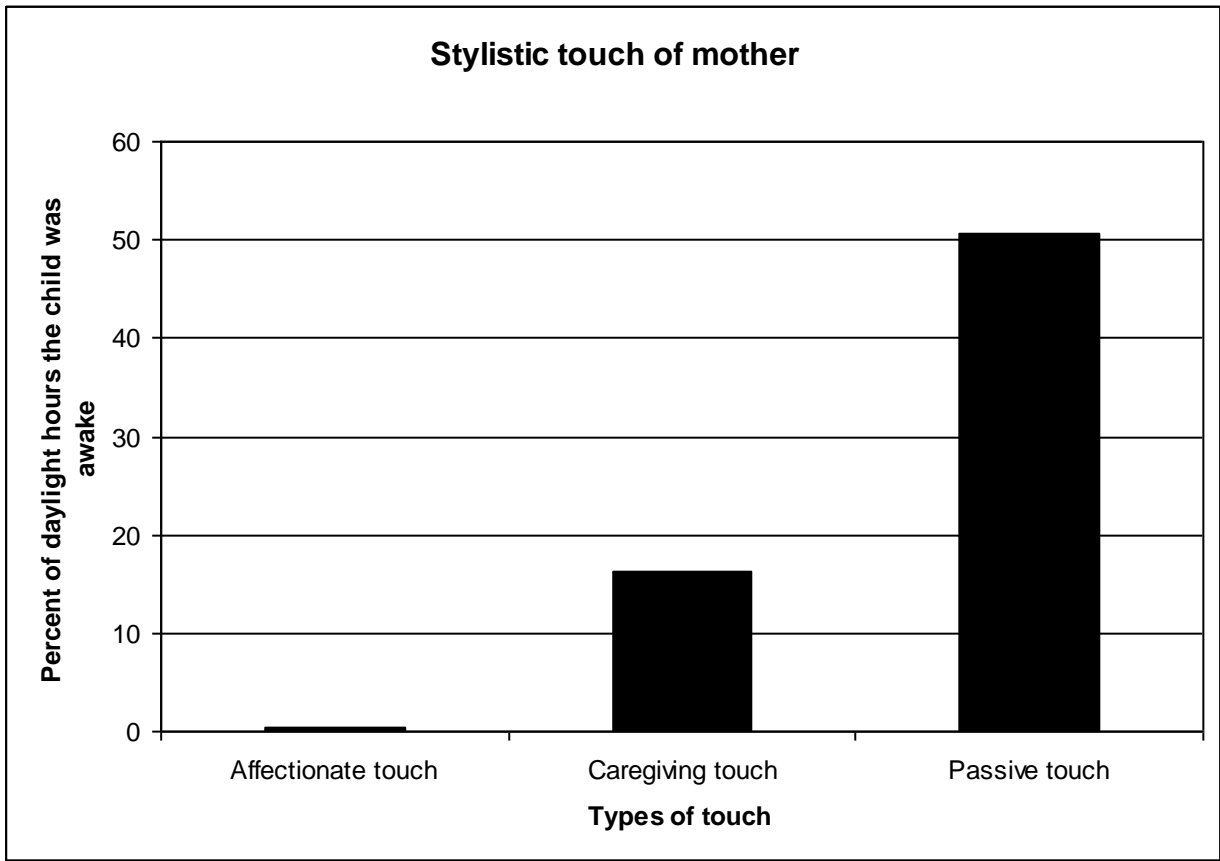


Figure 3. The frequencies of the three types of touch of mother. The mean is a proportion of observations in which mother was proximal to child.

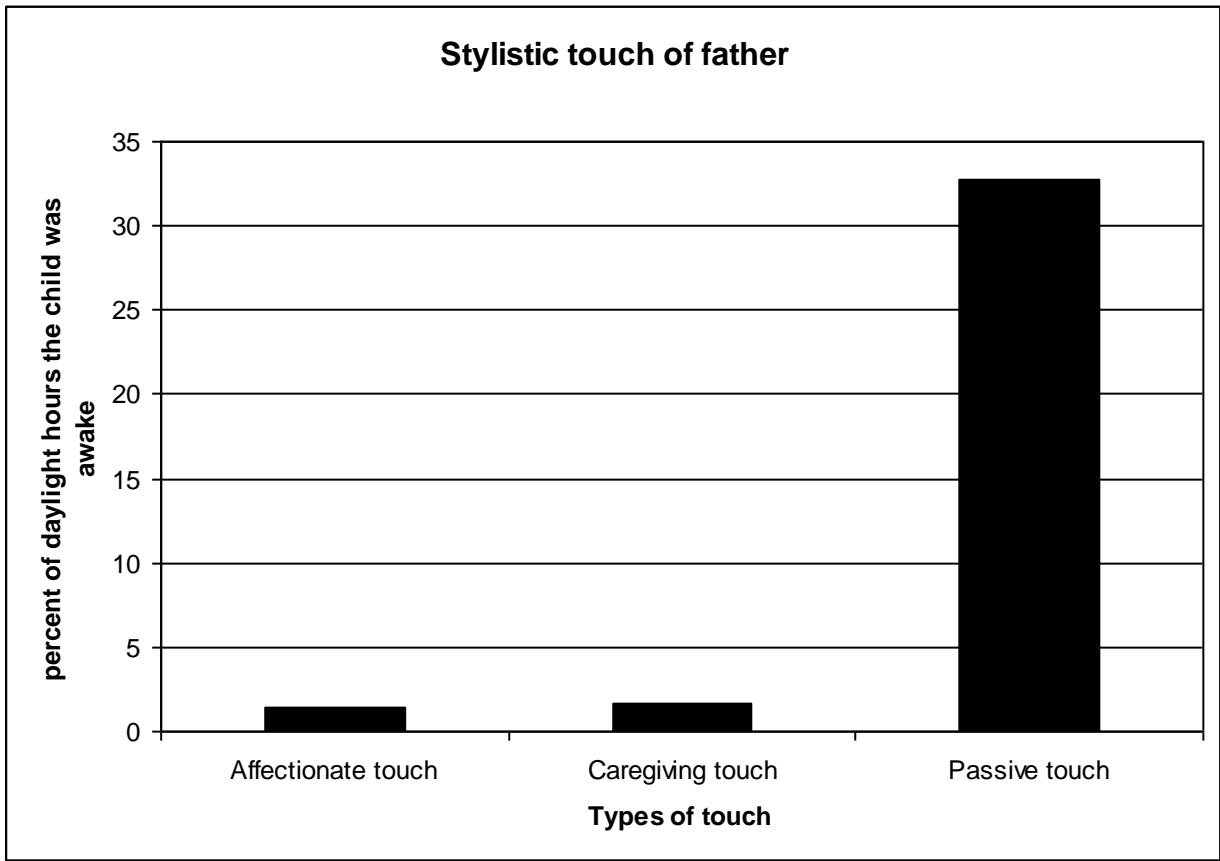


Figure 4. The frequencies of the three types of touch of father. The mean is a proportion of observations in which father was proximal to child.

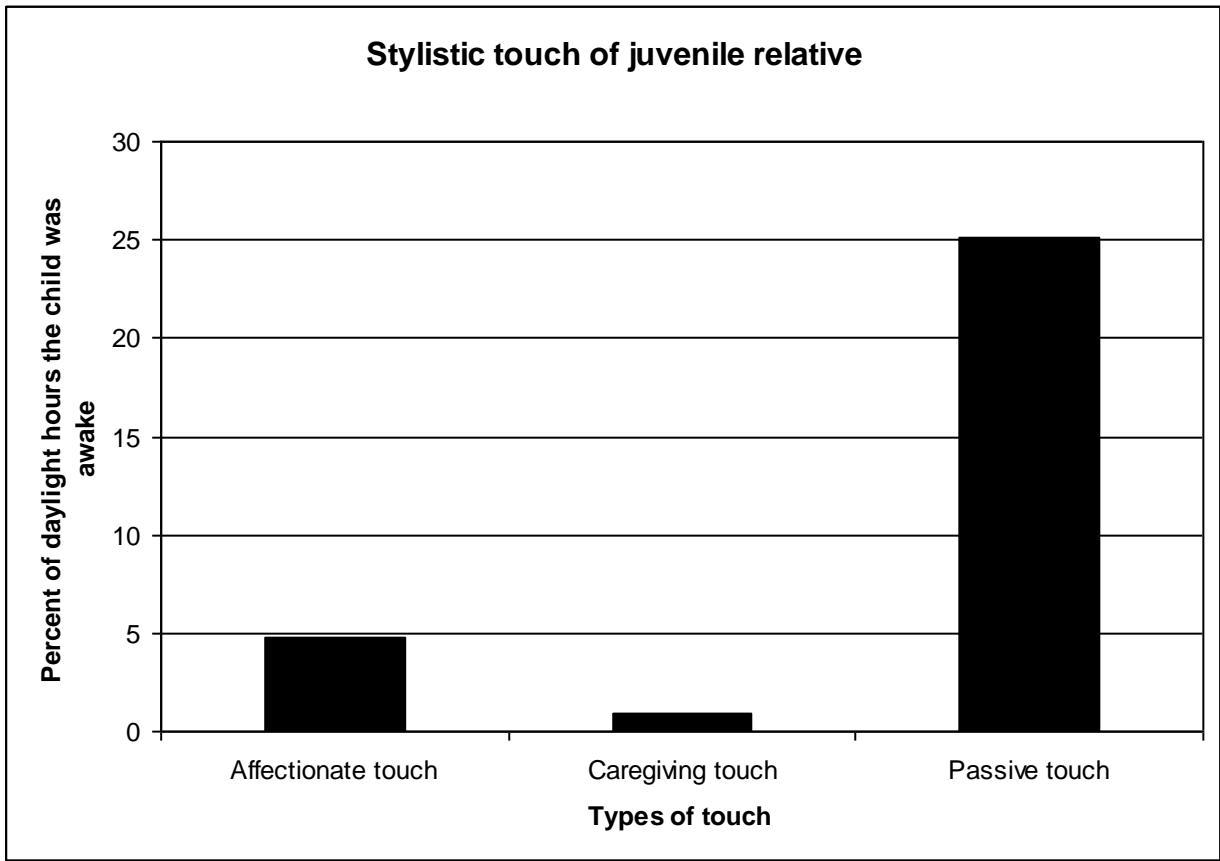


Figure 5. The frequencies of the three types of touch of juvenile relatives. The mean is a proportion of observations in which juvenile relative was proximal to child.

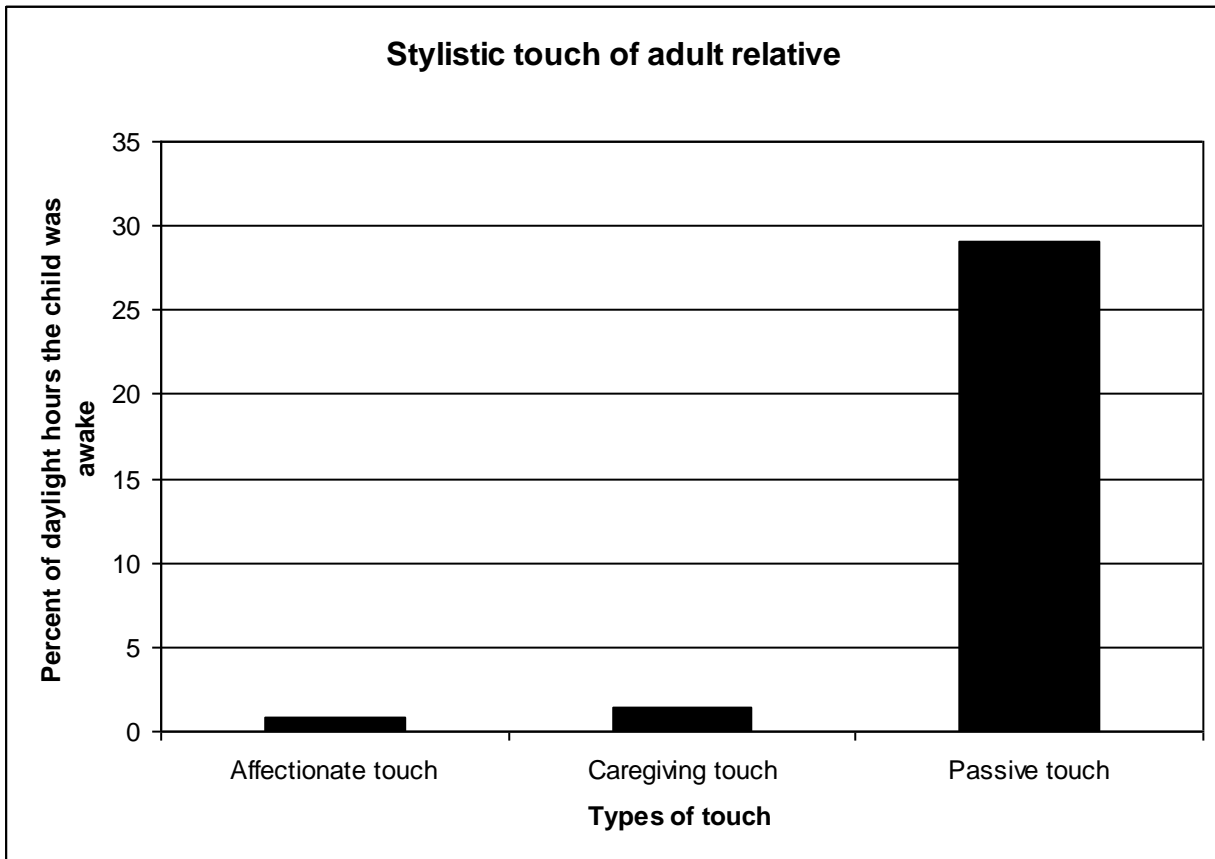


Figure 6. The frequencies of the three types of touch of adult relatives. The mean is a proportion of observations in which adult relative was proximal to child.

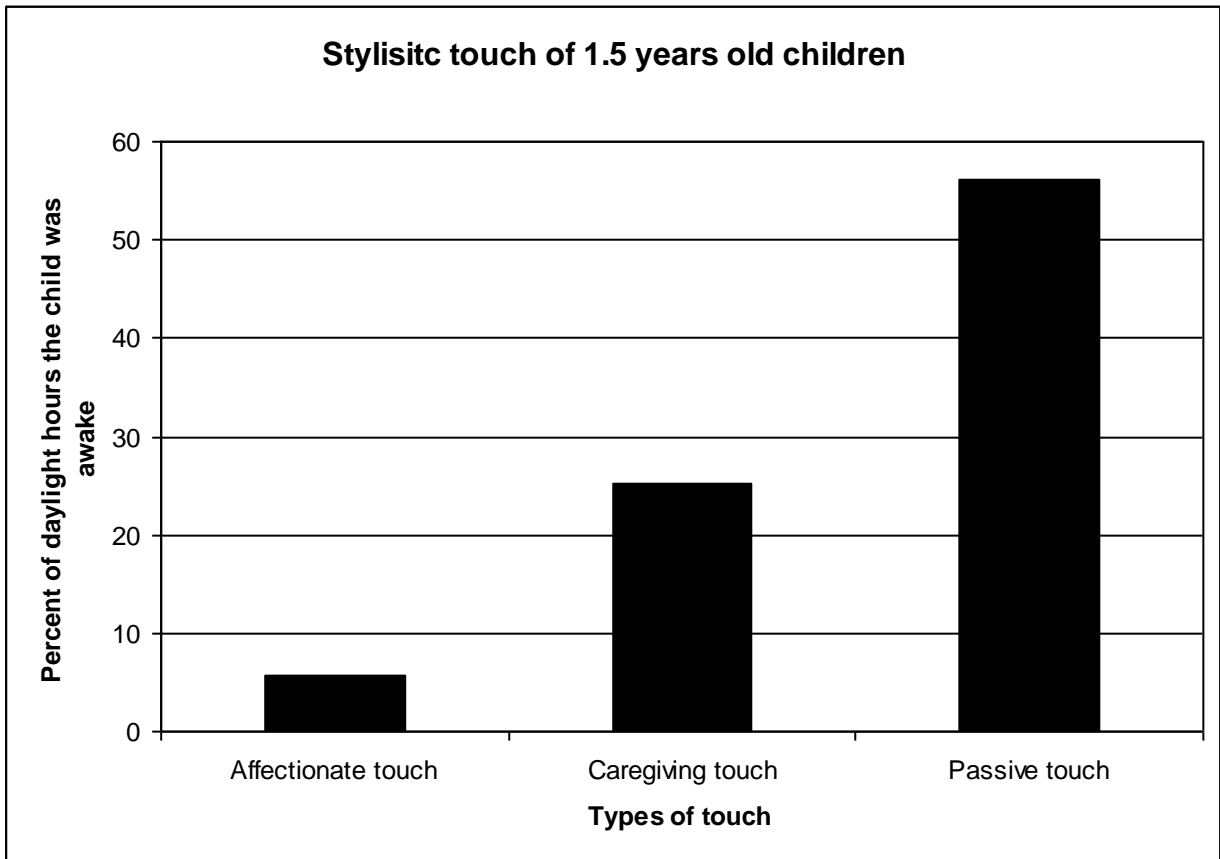


Figure 7. The frequencies of the three types of touch of 1.5 year-old children.

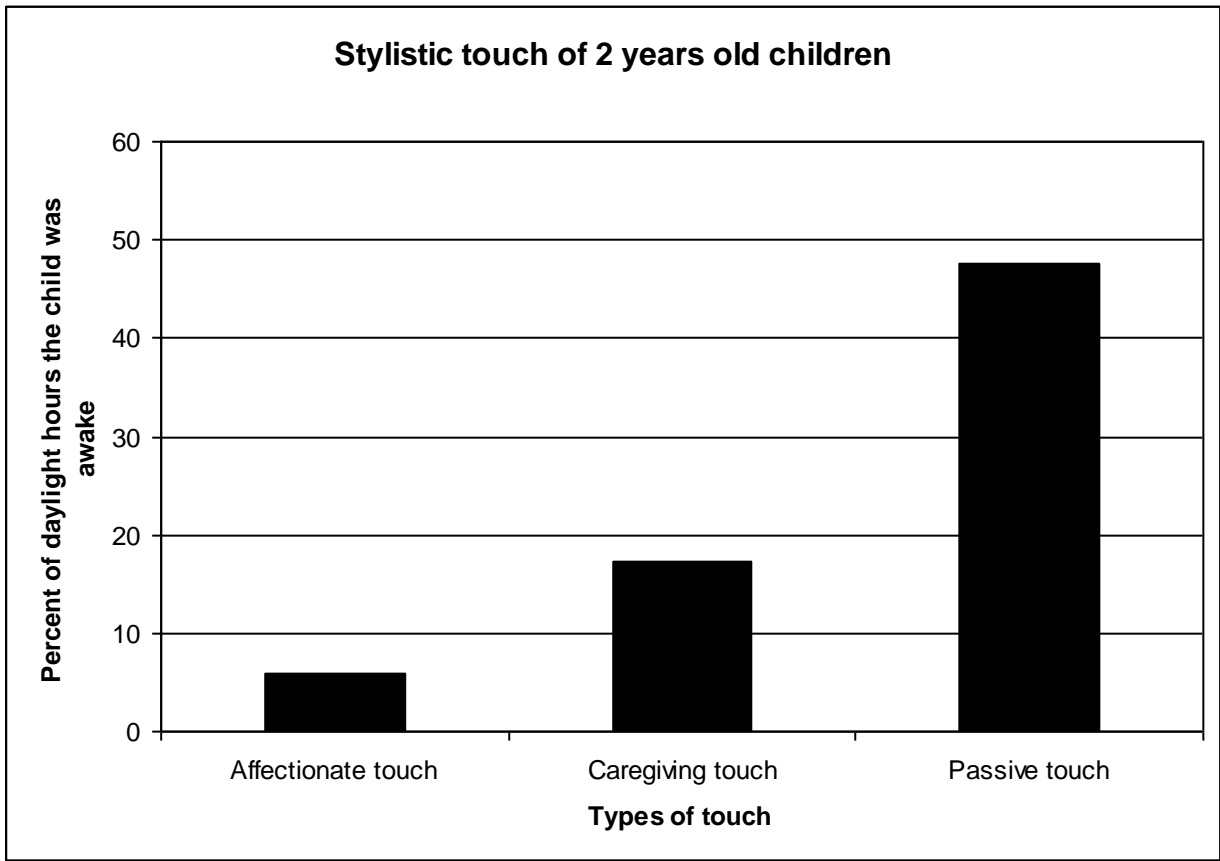


Figure 8. The frequencies of the three types of touch of 2 year-old children.

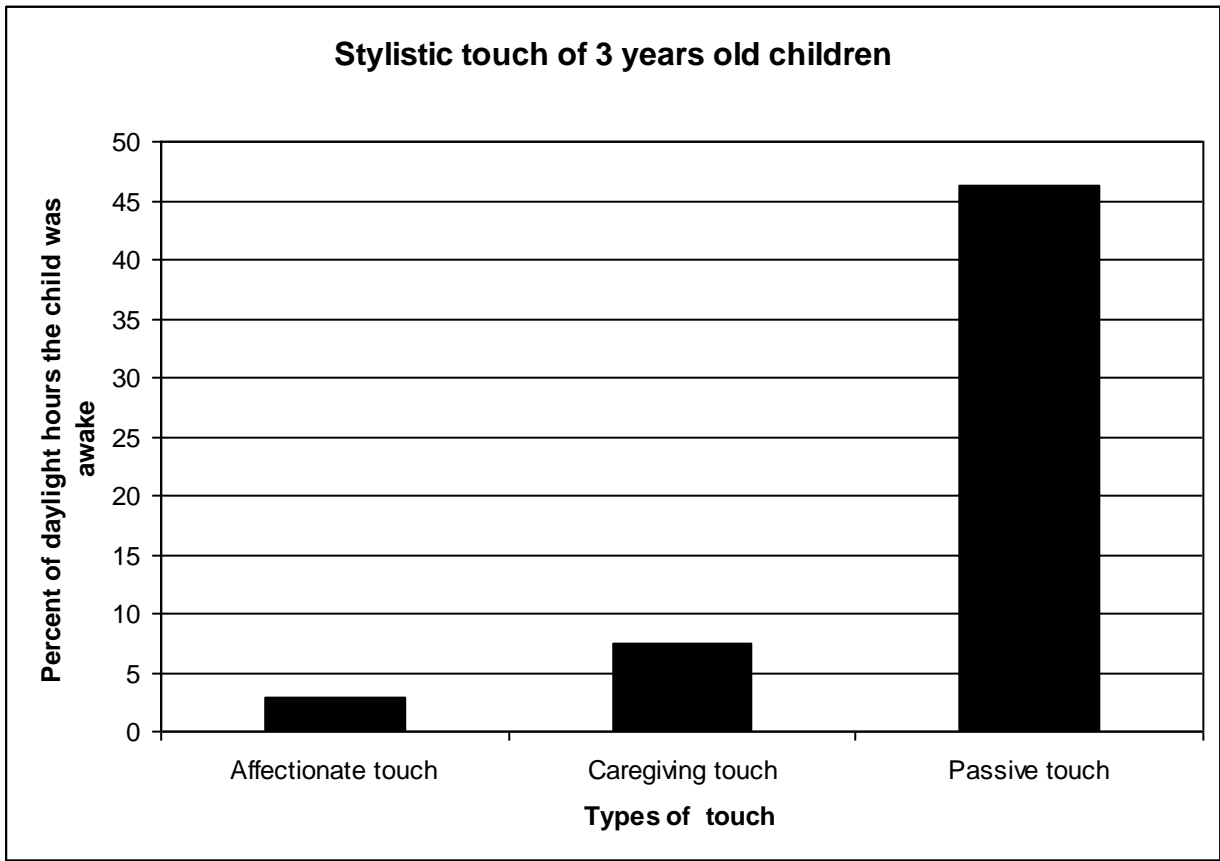


Figure 9. The frequencies of the three types of touch of 3 year-old children.

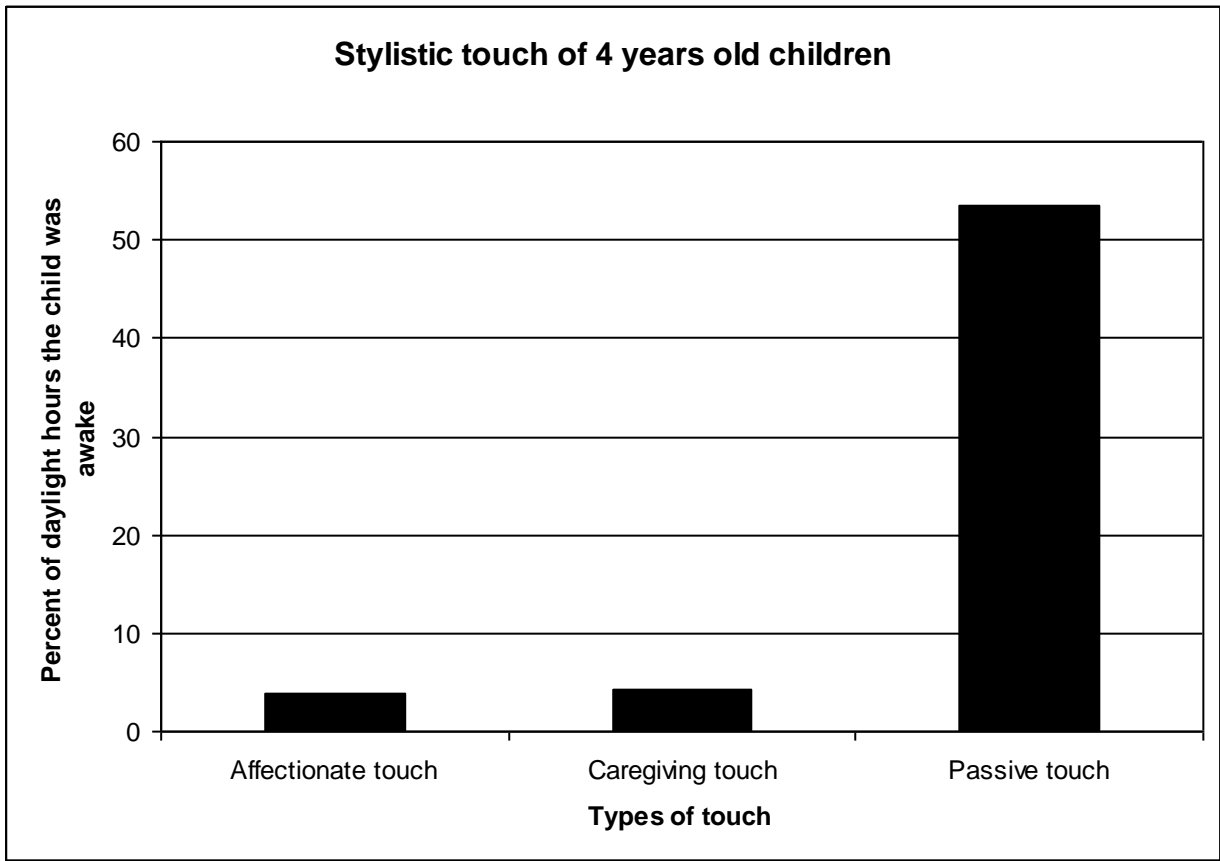


Figure 10. The frequencies of the three types of touch of 4 year-old children.



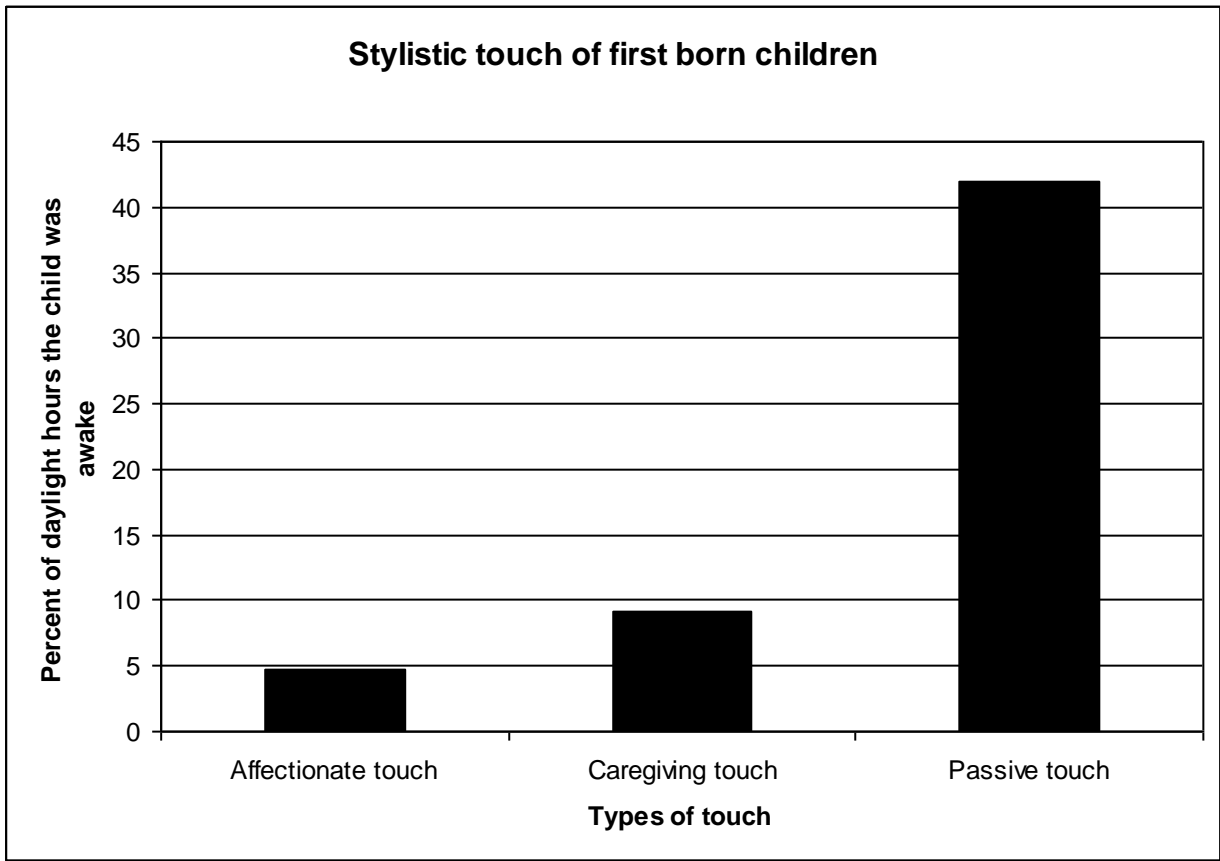


Figure 11. The frequencies of the three types of touch of first born children.

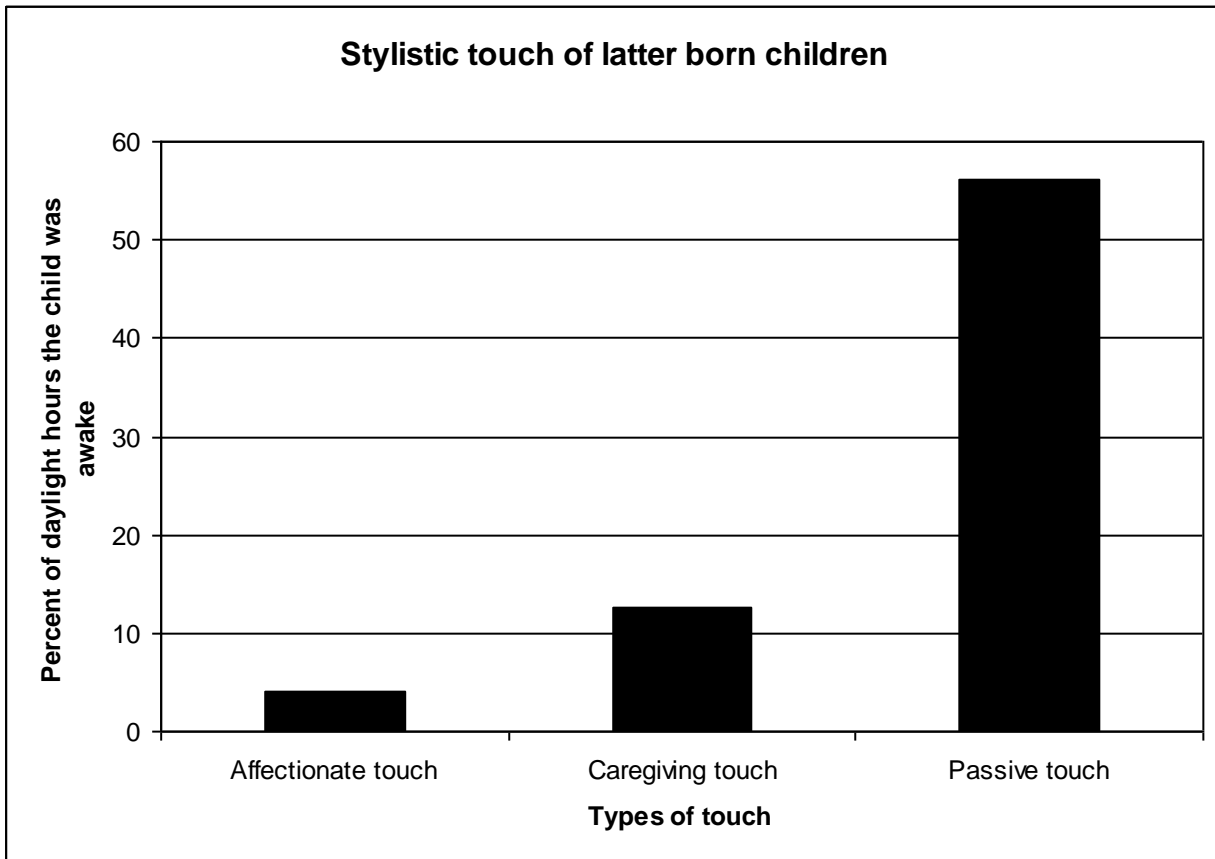


Figure 12. The frequencies of the three types of touch of latter born children.

## Vita

Min-Jung Jung was born on August 22, 1980 and was raised in Seoul, South Korea. She graduated from Changmoon Girls' High School in March, 1999, and entered Hanyang Women's College in Seoul, South Korea. After receiving an Associates' Degree in Early Childhood Education, she served as a kindergarten teacher for one year. She then transferred to Maryville College in Maryville, TN, in August 2002 and graduated Cum Laude with B.A. in Psychology in January 2005. She is currently finishing a Master's Degree in Child and Family Studies at The University of Tennessee, Knoxville.