The development of maternal touch across the first year of life

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Abstract

The developmental trajectories of specific forms of maternal touch during natural caregiving were examined across the first year in relation to the development of mother–infant reciprocal communication. One hundred and thirty-one mothers and infants in four groups aged 3, 6, 9, and 12 months were observed in a cross-sectional design at home during natural caregiving and mother–child play sessions. Microanalytic coding of the caregiving sessions considered nine forms of maternal touch, which were aggregated into three global touch categories: affectionate, stimulating, and instrumental. Play sessions were coded for maternal sensitivity and dyadic reciprocity. Maternal affectionate and stimulating touch decreased significantly during the second 6 months of life. In parallel, dyadic reciprocity increased in the second half year. Dyadic reciprocity was predicted by the frequency of affectionate touch but not by any other form of touch. Results contribute to specifying the role of touch as it evolves across the first year of life within the global mother–infant communication system.

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Maternal touch;
Crawling;
6 months;
Separation individuation

1. Introduction

Touch is a multi-dimensional phenomenon that includes various sub-types, each of which may affect infant development in a unique way, especially during the first months of life. For instance, higher levels of maternal affectionate touch in early infancy were found to predict cognitive and neurobehavioral development [1,2], better maternal adaptation to the mothering role [3], and an increase in infant smiles and vocalizations [4]. On the other hand, higher levels of stimulating touch elicited more negative facial expressions compared with stroking and holding [5,6]. Mothers tend to use different forms of touch as a result of infant cues and...
temperamental dispositions [7], cultural background [8], or in situations where the typical pattern of mother–infant relatedness is disrupted, such as during the still-face paradigm.

Individual differences in maternal well-being are also expressed through the frequency and type of maternal touch. For example, depressed mothers tend to use less affectionate touch and more stimulating touch [1,9–12]. Due to the fact that touch is sensitive to both maternal and infant contributions, it is possible that different forms of maternal touch may have unique effects at different stages of development and thus, the development of specific forms of maternal touch and their role within the mother–infant normal relational system should be investigated across infancy [13].

Previous studies of maternal touch typically differentiated various forms of touch using global constructs, such as harsh or negative touch versus affectionate touch (i.e., caressing, holding, and light stroking versus harsh, awkward and forcing; [14]). More detailed inventories of touch subcategories include proprioceptive touch, vestibular touch, passive touch, instrumental touch, and firm touch [15,16,9,11,17,18]. In combination, the various forms of positive maternal touch types may be grouped into three central subcategories: affectionate touch, stimulating touch, and instrumental touch. Each of these sub-types has been used in at least one of the aforementioned studies to differentiate healthy from at-risk dyads.

Studies of maternal touch in typically-developing infants have mainly focused on the first months of life (e.g. [19]). In contrast, studies of touch at older ages concentrated on pathological populations, such as children with feeding disorders or failure to thrive [16,29,15]. As both the frequency and quality of maternal touch in primates show substantial variations with development [20], it is important to examine the development of maternal spontaneous touch at different nodes across infancy in the normal human mother.

Maternal touch is part of the global mother–infant communicative system and is related to the level of maternal sensitivity and the degree of reciprocity and synchrony between mother and child. Reciprocity considers the degree of give and take between the mother and the child during the interaction and synchrony describes the temporal coordination between the behaviors of the mother and the child [21–23]. Reciprocity and synchrony develop across the first year of life [24–27] and reflect the degree of familiarity mother and child have of each other’s patterns and rhythms [29]. Reciprocity tends to develop across the first year of life whereas the degree of maternal sensitivity often remains constant, as sensitivity implies the mother’s careful adaptation to the child’s changing, age-appropriate signals and emerging capacities [29–32]. However, the associations between various forms of maternal spontaneous touch during basic caregiving and the level of dyadic reciprocity at play across the first year of life have not yet been addressed. Because the mother’s touch may evolve with time and its interactive meaning may change with development, it is important to chart how the three forms of maternal touch – affectionate, instrumental, and stimulating – interact with the give-and-take reciprocity between mother and child at different stages across the first year. Furthermore, charting the development of maternal touch across the first year in a normative sample may serve as a basis for understanding high-risk development. As such, the goal of this study was to provide normative data on the development of specific forms of maternal touch, focusing on concrete micro-level touch patterns during mother–infant interactions rather than on ecological factors such as maternal breastfeeding or infant temperament. Reciprocity and synchrony are among the most important components of the early caregiving environment and carry long-term effects on infant growth [25], and were thus chosen as the outcome variables.

In light of the above, the goals of the present study were twofold: (1) to examine developmental changes in maternal touch across the first year and (2) to address the role of touch categories in shaping the reciprocity between mother and infant, controlling for demographic maternal and infant variables that are known to affect the level of interactive synchrony. On the basis of previous research, we hypothesized that affectionate touch would be the most growth-promoting form of touch and would have the closest relations to mother–infant reciprocity as compared to all other forms of touch. Reciprocity was selected as an outcome variable due to the reported links between mother–infant reciprocity with the child’s cognitive, linguistic and social–emotional outcomes [33,34].

2. Methods

2.1. Participants

Participants in this cross-sectional study included 131 Israeli infants and their mothers in four groups; aged 3 (n=43), 6 (n=38), 9 (n=28) and 12 months (n=22). Infants at each age were recruited through Well-Baby clinics, a nation-wide childcare system that provides preventive medicine and developmental follow-up to nearly all Israeli infants. All infants received their developmental follow-up at the Israeli nation-wide Well-Baby clinics and were screened for developmental delays by nurses who specialized in developmental health care. Infants ranged between one week younger and one week older than the assigned age group. Infants were assigned to the study from a successive list of deliveries in several randomly-selected clinics and the refusal rate was 5%. Thus, the design was sectional and the sampling method was convenient. Groups were matched globally but not individually on demographic variables. We were careful to sum up with similarities in the total number of subjects within each group for every demographic variable but did not match subject to subject within each group. According to the Well-Baby clinic’s records, all infants had an Apgar score of 8 and above, were between the 10th and the 50th percentile in weight and height at birth, and were in good health since birth. There were no differences in gender distribution or birth order between groups (see Table 1 for demographic information). All mothers were from a middle class background and the sample was representative of the urban population in northern Israel. No differences between groups were found in this regard. All infants tested in this study were included in the final analyses. The mothers were informed that the study examined natural modes of mother–infant interaction. Both parents were informed of the
research goals and procedures and the mothers signed the informed consent at the beginning of the home visit.

Exclusion criteria included infants with (1) chronic illness; (2) sick at the time of the measurement; (3) had undergone surgery; (4) delay in one or more developmental parameters; (5) genetic anomalies; (6) maternal depression; or (7) maternal physical disability. We used the infants’ files at the health care clinics for information on exclusion criteria.

2.2. Procedure

Mothers and infants were observed at home in a caregiving session followed by a play session. Mothers were given general instructions after signing the informed consent. Visits were conducted during the day (10 am through 7 pm) after the mother had informed the research assistant that the infant was neither tired nor hungry, had eaten and slept well during the previous hours, and was ready for play. Before arriving the research assistant phoned the mother to check if the infant was ready to play, not tired, had slept well and had eaten well. In cases where the situation was not appropriate for the infant, a new date was scheduled.

2.2.1. Caregiving session

A ten-minute caregiving session was videotaped to allow a feeling of convenience and freedom between mother and infant. Mothers were encouraged to treat the infant freely in as many ways they felt appropriate, to provide caregiving as needed, and to attend to the infant’s needs as if the experimenter was not present. The main activities during this session were diaper change, holding the infant in the arms, cleaning the infant or changing clothes.

2.2.2. Play session

For the play session mothers were encouraged to actively play with the infant. The infant was placed in an infant seat on the floor facing the mother at the age of 3 and 6 months. Older infants sat on a rug close to the mother, who was also seated on the same rug facing her infant in a position that allowed eye contact and face-to-face interaction. The distance between infant and mother was approximately 45 cm and the angle between their seating positions was 45°, consistent with previous research (e.g., [30,31,35,21]). Mothers and infants were videotaped for 5 min in accordance with previous research [21,35]. The camera was on a solid stand for the entire filming period. The camera focused on the infant and the upper half of the mother’s body, including her hands. The filming angle allowed observation of at least 75% of their faces. The main activity during this type of session was playing with available toys, talking to the infant, touching the infant, or speaking/singing to him or her. The rationale behind the lack of standardization in the two sessions was in order to measure maternal touch during free, normal and independent situations.

2.3. Measures

Coding was conducted separately for the two sessions. In cases where the sessions extended the time we aimed to film, the extensions were not coded. The caregiving session was coded for maternal touch using the Touch Scoring Instrument [15] and the play session was coded for maternal sensitivity and dyadic reciprocity using the Coding Interactive Behavior system (CIB, [36]).

2.3.1. The Touch Scoring Instrument [15]

In this instrument, which has been shown to differentiate between children with failure to thrive [15] and mothers with maternity blues [9], the frequencies of 9 categories of touch are micro-coded within 30-second frames. Codes include the following: 1 — firm touch, defined as firm patting, stroking, or massaging with the whole hand; 2 — proprioceptive stimulation, defined as flexion–extension–flexion of the infant’s limbs by the mother. Specifically, this kind of maternal behavior, often observed during dressing, involves folding, extending, and folding again with the last positioning of limbs close to the infant’s body; 3 — vestibular stimulation, defined as movements that change the body’s orientation in space, including repositioning by lifting, sliding, or rotating the child’s body, or swaying or rocking; 4 — light active touch, defined as affectionate kissing, caressing, or stroking; 5 — holding, defined as affectionately comforting, holding, or hugging in ventral–ventral, ventral–dorsal, or other positions; 6 — awkward holding, defined as holding the child in an uncomfortable or precarious manner with an uninterested or neglectful attitude; 7 — rough handling, defined as exercising forceful or abrupt restraint or physical control of the child with an angry or punitive quality; 8 — matter-of-fact touch, defined as purposeful utilitarian contacts, such as wiping the child’s mouth, guiding the child’s hand to a toy, etc.; and 9 — passive touch, defined as passive contact, such as resting the hand in contact with the infant. Passive touch is a form of touch that secures the mother’s presence for the infant without interrupting his/her flow of attention and has been previously shown as a component of the affectionate composite [9]. As for the

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Table 1 Distributions of demographic variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>3 months</th>
<th>6 months</th>
<th>9 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age (M ± SD)</td>
<td>28.35 ± 5.49</td>
<td>28.75 ± 6.12</td>
<td>27.36 ± 3.94</td>
<td>28.13 ± 4.21</td>
</tr>
<tr>
<td>Maternal education (M ± SD)</td>
<td>13.53 ± 2.47</td>
<td>13.73 ± 2.36</td>
<td>13.68 ± 2.50</td>
<td>14.65 ± 2.45</td>
</tr>
<tr>
<td>Gender</td>
<td>Female N = 25</td>
<td>Female N = 16</td>
<td>Female N = 15</td>
<td>Female N = 11</td>
</tr>
<tr>
<td></td>
<td>Male N = 18</td>
<td>Male N = 22</td>
<td>Male N = 13</td>
<td>Male N = 11</td>
</tr>
<tr>
<td>Birth order</td>
<td>First born N = 16</td>
<td>First born N = 19</td>
<td>First born N = 18</td>
<td>First born N = 12</td>
</tr>
<tr>
<td></td>
<td>Second and above N = 29</td>
<td>Second and above N = 19</td>
<td>Second and above N = 11</td>
<td>Second and above N = 10</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Jewish N = 17</td>
<td>Jewish N = 14</td>
<td>Jewish N = 10</td>
<td>Jewish N = 7</td>
</tr>
<tr>
<td></td>
<td>Arab N = 28</td>
<td>Arab N = 24</td>
<td>Arab N = 19</td>
<td>Arab N = 15</td>
</tr>
</tbody>
</table>

N: aged 3 (18 boys and 25 girls), 6 (22 boys and 16 girls), 9 (13 boys and 15 girls) and 12 months (11 boys and 11 girls).
validity of the Touch Scoring Instrument, we found [9] that this form adds to face validity of the affectionate touch and contributes to the discrimination between multipara and primipara depressed mothers. The difference between stroking and caressing was defined as the length of movement of the mother’s hand. Affectionate comforting touch refers to touching with affection when the child is fussing. Angry–punitive touch is assessed together when mothers express anxiety or anger. The coders were able to see and use facial affect, vocalizations, and verbalizations. This may compound with the scoring of the successive session, the play interaction but the punitive types of touch were not included in the final analyses. The different types of touch were coded following extensive training and regular discussions between the trainer and the trainees before the final test of reliability and video coding. Reliability in the Polan and Ward [15] study for each type varies between 0.57 and 0.91.

Rough and awkward forms of touch were excluded due to low frequency. The other items were combined into three composites: Affectionate touch — was the mean frequencies of holding and passive touch, behaviors that were included in the affectionate touch composite in previous research [16,29,1] and “nurturing touch” in other studies [7]. Alpha = 0.8. Stimulating touch — was the mean frequency of firm and vestibular touch. This variable corresponds to “active touch” [4,37,38] and “tactile stimulation” [39] in previous research. Alpha = 0.7. Instrumental touch — was the mean frequency of matter-of-fact touch. Alpha = 0.7. Two graduate students coded the frequencies of each type of touch across the caregiving session after being trained in 13 randomly-selected interactions (3– to 4-interaction sessions from each age group) from the study database with a 98% level of agreement between the coders and trainer. The entire length of each interaction used for training was coded. These interactions were recoded after reaching reliability and thereafter were included in the final analysis. Inter-rater reliability was conducted for 12 sessions. Reliability kappa was .86. The coders were first introduced to the Polan and Ward [15] coding system and then they reviewed several maternal touch types on the 13 randomly-selected mother–infant interactions and after all inconsistencies were resolved between the coders they coded separately and independently 5 other randomly-selected interactions from the study database and were tested for reliability with a 98% of agreement.

2.3.2. Coding Infant Behavior

The mother–infant play session was coded with the Coding Interactive Behavior (CIB, [36]) system. The CIB is a global rating system of parent–child interactions with infants aged zero to 3 years and includes 42 codes: 21 for parents, 16 for infants, and 5 for dyads, rated on a 5-point scale ranging from 1 = low to 5 = high, and 8 of these are not applicable for children in the first year. Codes are averaged into eight composites, two of which were used in the present study: maternal sensitivity and dyadic reciprocity. The CIB has been validated in studies of healthy and at-risk dyads and has shown sensitivity to infant age and cultural setting, to parent gender and different interacting adults, to biological and emotional risk conditions, to levels of maternal catalyzation of delivery pain, and to improvement following intervention [35,25,30,31,40,23,16,29,41,42,21]. The CIB has shown test–retest, construct validity and discriminative validity in multiple studies of normative and high-risk populations across infancy and early childhood. From the total number of codes included in the CIB system, the codes included in the composites tested in this study and internal consistency for this sample were as follows:

Dyadic reciprocity/synchrony — (alpha = .88) included the following codes: give-and-takes interactions, fluency of style, adaptation /regulation of interaction.

Maternal sensitivity — (alpha = .91) included the following codes: parent acknowledgement of infant’s signals, maintenance of visual contact, warm and positive affect, appropriate vocal quality, resourcefulness in handling infant distress or expanding the interaction, consistency of style, adaptation to the infant’s changing states within the period. Coding of sensitivity and reciprocity was conducted for the play session only as this is the standard use of the CIB system. We aimed to examine links between natural maternal touch and dyadic behavior in a more structured play session.

Two coders, first trained for reliability in using the CIB system on training tapes chosen randomly from the study database, coded the interactions. Inter-rater reliability was conducted for 13 sessions and inter-rater reliability was .98 for sensitivity and r = .96 for reciprocity. In the coding phase following the training and reliability phases each of the two coders coded on her own a randomly-selected package of videos. All coders were blind to demographic, health and developmental data.

2.4. Statistical approach

Mean-level analyses were computed to assess the development of each form of maternal touch across the first year. Next three hierarchical multiple regressions were computed to examine the contribution of demographic variables and maternal behavior to the prediction of mother–infant reciprocity. Predictors were entered in the following theoretically-determined order: infant age, infant gender, birth order and ethnicity in order to partial out variance related to demographic factors. Subsequently, the three forms of touch type were entered in each of the three separate models (i.e. affectionate, stimulating, and instrumental touch).

3. Results

All variables were checked for normalcy conditions and all variables were normally distributed. The developmental trajectory of each form of touch — affectionate, stimulating, and instrumental — was examined using ANOVA. Following mean-level differences between two consecutive ages were examined with post-hoc comparisons with Duncan’s tests.

Means, SDs, F values, and Effect Sizes (ES) for the three forms of touch across the different ages appear in Table 2.

As seen in Table 2, all forms of touch — affectionate, stimulating, and instrumental — decreased across the first year of life. Post-hoc comparisons showed that for affectionate and stimulating touch, a significant decrease was observed between 6 and 9 months and no other consecutive
time-point showed mean-level differences. These data suggest that during the second 6 months, mothers reduced the level of affectionate and stimulating touch. For instrumental touch, no two consecutive points showed a significant mean-level difference (see Fig. 1).

As shown in Table 2, sensitivity and reciprocity showed mean-level change across the four age groups. Post-hoc comparisons showed that, for reciprocity, differences were found around 6 months and onwards, with no differences observed within the first or second half year in reciprocity (see Fig. 2). For sensitivity, gradual mean-level changes were found but no two points were significantly different from each other.

Associations between the three forms of touch for each age are presented in Table 3. As seen in Table 3, the three types of touch were significantly correlated at each age, and no differences between the magnitudes of the correlations were found between age groups with the exception of the group of 12 month olds.

Maternal sensitivity and dyadic reciprocity were inter-related from the age of 6 months onwards (at 3 months \( r = 0.29 \), NS, at 6 months \( r = 0.58 \) \( p < 0.001 \), at 9 months 0.42, \( p < 0.001 \), at 12 months \( r = 0.76 \), \( p < 0.0001 \)).

Results of the three hierarchical regression models showed that maternal affectionate touch was a significant predictor of dyadic reciprocity while controlling for maternal and infant demographic variables (see Table 4). The two regressions predicting dyadic reciprocity from demographic variables and stimulating touch or from demographic variables and instrumental touch were not significant.

Results presented in Table 4 show that the mother’s affectionate touch during natural caregiving explained unique variance in dyadic reciprocity, above and beyond the effects of infant age, infant gender, birth order, and ethnicity.

4. Discussion

Results of this study indicated that the amount of maternal touch of all forms, including stimulating, affectionate, and instrumental touch, decrease during the first year of life. The data also suggest that mothers who tend to touch more are likely to use all forms of touch more frequently than those who provide less touch, findings that underscore the multi-dimensionality of touch. While we found small, but significant differences between age groups in the decrease of various forms of touch, any clinical implication of these findings may need to take into consideration the gradual manner in which maternal touch decreases. This gradual decrease is likely related to the tendency of both mother and child to rely more on complex multi-modal communications after the age of 6 months.

Several studies (e.g., [15,16,29]) indicate that different forms of touch are differentially expressed in various forms of developmental psychopathology and the present study is the first to investigate the development of each form of touch in a cross-sectional design in healthy mother–infant dyads. The frequencies of all forms of maternal touch decreased substantially with age, suggesting that with the development of crawling and mobility mothers allow children more freedom and rely on less proximal and

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Distributions (mean, SD, range) of touch types frequencies during 10 min of caregiving sessions and maternal sensitivity and reciprocity ratings during a play situation across the first year of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Affectionate touch</td>
<td>2.31 (1.36)</td>
</tr>
<tr>
<td>Range</td>
<td>.50–7.50</td>
</tr>
<tr>
<td>Stimulating touch</td>
<td>2.05 (2.09)</td>
</tr>
<tr>
<td>Range</td>
<td>0–8</td>
</tr>
<tr>
<td>Instrumental touch</td>
<td>1.9 (1.8)</td>
</tr>
<tr>
<td>Range</td>
<td>0–9</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>3.59 (0.60)</td>
</tr>
<tr>
<td>Range</td>
<td>2.2–4.7</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>3.72 (0.83)</td>
</tr>
<tr>
<td>Range</td>
<td>1–5</td>
</tr>
</tbody>
</table>

Figure 1  The distribution of maternal touch (mean frequencies and SE) across the first year of life.

Figure 2  The distribution of sensitivity and reciprocity (mean ratings and SE) across the first year of life.
immediately physical cues. One of the central findings relates to the role of affectionate touch in promoting a synchronous dialogue between mother and child during the first year. While decreasing in frequency, it appears that affectionate touch still plays an important role for the mother–infant communication system, as demonstrated in the regression model.

The fact that mothers decreased all forms of touch may point to the adaptation of the typical mother to the growing autonomy of her infant [43]. Along with the infant’s growing independence around the age of 6 months and the evolving individuation [44] as well as the child’s emerging mobility [45], touch may become a background to more complex multi-modal messages that draw on the infant’s attentive, inter-subjective, and intentional skills. Changes in the tactile experiences of the infant and in the processing of human touch may be modulated by the tactile experience that the child undergoes while crawling and being mobile. The relatively greater frequency of affectionate touch at the early stages may represent the maternal support of the development of the infant’s self-regulation and state organization through holding touch [46] that provides external boundaries for negative arousal along with signaling warmth and proximity. The stimulating type may be more important at very early ages when infants are more passive and require stimulation and active communication from the mother. This perspective is consistent with Brazelton and Cramer [28] who suggested that in the first postpartum months the mother must become infant-centered and actively demand a response from her child, thus supporting the emergence and social attention and active alertness.

The development of inter-subjectivity and joint attention as well as the emerging capacity to regulate affect, along with the decrease in the reliance on non-verbal communication around the age of 6 months, may be the basis for the significant contribution of touch to the experience of synchrony with the primary caregiver during the second half of the first year [27,47], compared with the relevance of touch for state and emotional regulation at earlier ages [46]. This may explain the parallel decrease in affectionate touch with the increase in dyadic reciprocity during the first year of life.

From an ecological point of view [48], the study may show the impact of the infant’s growing skills on the mother’s tactile communication. It is apparent that the beginning of locomotion and the perceptual and social progress that accompany crawling recruit the mother’s resources to

| Table 3 | Correlations between maternal touch types, sensitivity and reciprocity across the first year |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | Sensitivity     | Reciprocity     | Affectionate    | Stimulating     |
| 3 months       |                 |                 |                 |                 |
| Reciprocity    | 0.293           |                 |                 |                 |
| Affectionate   | 0.272           | −0.023          | 0.505**         |                 |
| Stimulating    | 0.174           | 0.146           |                 | 0.475**         |
| Instrumental   | −0.048          | 0.001           |                 | 0.747**         |
| 6 months       |                 |                 |                 |                 |
| Reciprocity    | 0.588**         |                 |                 |                 |
| Affectionate   | 0.085           | 0.214           |                 |                 |
| Stimulating    | 0.026           | 0.106           | 0.611**         |                 |
| Instrumental   | −0.024          | 0.158           | 0.585**         | 0.521**         |
| 9 months       |                 |                 |                 |                 |
| Reciprocity    | 0.448**         |                 |                 |                 |
| Affectionate   | 0.326           | 0.338           |                 |                 |
| Stimulating    | 0.303           | 0.100           | 0.654**         |                 |
| Instrumental   | 0.382           | 0.059           | 0.451**         | 0.702**         |
| 12 months      |                 |                 |                 |                 |
| Reciprocity    | 0.811**         |                 |                 |                 |
| Affectionate   | 0.277           | 0.441           |                 |                 |
| Stimulating    | 0.151           | 0.270           | 0.596*          |                 |
| Instrumental   | −0.172          | −0.116          | 0.461           | 0.249           |

*p < .05, **p < .01.
flexibly adapt and decrease her active leading dominance in the dyad in order to allow her child to engage in more reciprocal relations. With the development of locomotion and mobility infants may engage in other forms of tactile experiences and the need for maternal touch may decrease. The multi-dimensional processes that the infant undergoes from the time he/she embarks on locomotion [45] are likely to have implications for cognitive, social, and relational growth and further research is required to understand the links between emerging locomotion and mother–infant touch.

Limitations of this study primarily relate to the fact that this was not a longitudinal study and the stability of touch behavior in individual dyads was not investigated in a repeated measured model. Although we controlled for a range of demographic conditions, it is possible that some unknown or untested variable differentiated the four groups. Similarly, the sample size at 12 months was small compared with that of the other age groups, and this may have had an impact on the pattern of correlation. However, it is possible that the lack of correlations between stimulating and affectionate touch is not a result of sample size but of the low frequencies of stimulating touch at this age. The possible implications for power are minimal as exemplified in the level of partial Eta squared indicating large effect sizes. In addition, measuring reciprocity from one interaction only may be a limitation, yet such is often the practice in mother–infant interaction research. Also, the procedural differences in carrying out the study for the different age groups may pose some limitations on general conclusions. Future research is required to further assess the different forms of maternal touch as they evolve across infancy and the multiple ways various touch patterns affect the infant’s ultimate growth.

References


