The father–infant co-regulation and infant social proficiency with a stranger

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Abstract
A growing body of knowledge is available on the father’s instrumental role in the development of the child, but there is less data on the role he fulfills in preparing the child for challenging social encounters. The present study was designed to investigate the predictive value of the toddler’s co-regulation with the father and the capacities the infant shows during a later encounter with a stranger, beyond the effect of the co-regulation of the toddler with the mother. Thirty-one toddlers were engaged in three interactions: with the mother, father, and a stranger. The order of the first two interactions was randomized, while the session with the stranger, which involved a game of peek-a-boo with an object, was always last. The sessions were videotaped and coded according the Early Interaction Scale (EIS) off-line by trained coders. The results indicate that the extent of the infant’s proficiency in interacting with the stranger was predicted by his or her social proficiency and his or her co-regulation with the father, beyond the contribution of his or her proficiency and co-regulation with the mother.

1. Introduction

Interactions with strangers are among the most stressful situations that human toddlers face and demand higher capacities of regulation. To date, these emotions are commonly considered to stem from the establishment of attachment relations and not the acquisition of traumatic fear (Hofer, 2003; Menzies & Harris, 2001). A stranger may arouse the interest of some toddlers, while others may consider him or her a threat (Bridges, Connell, & Belsky, 1998; Grych & Clark, 1999). The drive to explore may cause the toddler to respond with robust enthusiasm (Abram, 1997).

One source of considerable variability in toddlers’ social interactions outside the family may be that fathers interact with their infants in a more stimulating and unpredictable way than mothers do. This difference may benefit the toddler so that encounters with the stimulating, unpredictable outside world are more easily tolerated and enjoyed (Custodero & Johnson, 2003; Forbes, Cohn, Allen, Lewinsohn, & Forbes, 2004; Laflamme, Pomerleau, & Malcuit, 2002; Paine, 1999; Tamis-LeMonda & Cabrera, 2002; Volling, McElwain, Notaro, Herrera, 2002). As stimulation and unpredictability are challenges for the toddler, the paternal challenging style may be conducive for the toddler’s coping outside the family.

Modern theories of development view the father, no less than the mother, as a primary co-regulator of the infant (Als, 1986; Als et al., 2004; Duffy, Als, McAnulty, 2003; Hofer, 1994; Mareschal, Johnson, et al., 2007; Mareschal, Sirois,

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Westermann, & Johnson, 2007). Regulation is defined as the ability of the organism to return to baseline after mounting specific responses to an environmental stimulus (Ferber, 2008, 2009). Regulation can be observed by use of microanalytic methods which focus on the impact of each and every behavior on each other (Ferber & Makhoul, 2004, 2008) and global methods (Field, 1998; Field et al., 1984) which focus on the interaction between the organism and the social environment.

This study aimed to investigate the contribution of the paternal co-regulation with the toddler to the toddler’s proficiency during the interaction with a stranger beyond the maternal co-regulation impact.

2. Materials and Methods

2.1. Participants

Thirty-one first-born infants (12 girls, 19 boys) between the ages of 12 and 18 months participated in the study. Participants were randomly assigned to the study from two Well-Baby Clinics in North Israel. Participants were approached according to inclusion and exclusion criteria using the successive list of deliveries available at the clinics. Mothers were approached one by one according to the lists and the refusal rate was 2%.

2.2. Inclusion criteria

Inclusion criteria: (1) at least eight Apgar points at 5 min postnatal; (2) weight and height at 12 months around the 50% percentile; (3) generally healthy during postnatal life (based on the records in the postnatal community childcare center), (4) first born to their parents, and (5) families with two parents. The participating families and were not compensated.

2.3. Exclusion criteria

Exclusion criteria: (1) chronic illness; (2) sick when measurements were taken; (3) had undergone surgery; (4) experienced a delay in one or more developmental parameters such as growth and language acquisition and (5) genetic anomalies. Both parents received explanations on the research before agreeing to participate. The parents provided their informed consent at the start of the one-time visit to the family’s home.

2.4. Procedure

For purposes of observation, mother–infant, father–infant, and stranger–infant dyads were videotaped playing during day hours. The session only began if the mother felt that the infant had sufficiently eaten and slept during the previous hours and that both she and the infant were ready for play. Each segment lasted 5 min. The camera was placed in a distant corner not to disturb the toddler and 5 min of familiarization with the situation were spent while the camera was on and the mother played with the toddler but those 5 min were not coded. The order of the interactions with the parents was randomized, while the stranger always went last. The infant was placed on the floor on a rug. The adults sat on the rug facing the child, approximately 45 cm, in a position that allowed for eye contact and face-to-face interaction. The parents were encouraged to relate to, play with, and maintain eye contact with their infant. The first interaction was preceded by a 5-min interlude for warm-ups and preparations. Both the first and the second interactions were followed by 10-min breaks. The last 5 min of the break were used by the experimenter (hereby referred to as the stranger) to provide the toddler with a comfortable experience and enhance the toddler’s confidence for the up-coming play session with her. The stranger did so by taking softly to the infant, touching toddler’s arm or leg softly in a holding manner, by telling the toddler her name and the name of the game, and by showing the ball which was the game toy. This was executed without other specific toys and without the materials used during the sessions with the parents. Filming of each interaction lasted 5 min. The camera was on a solid stand for the entire period and focused on the infant and the upper half of the adult’s body, including his or her hands. The film angle captured at least 75% of the baby’s and adults’ faces.

2.4.1. Interaction with the stranger

There were two experimenters, two female research assistants who acted as the stranger for the infants. The experimenters were trained up to 98% agreement to carry out the demo “peek-a-boo with an object” game sessions. They were guided to conduct the sessions in a soft and encouraging manner, and that the toddlers should be assisted to relax in order to perform well on the challenging game. During training we divided the “stranger” recommended behaviors and the toddler’s expected behavior into segments and then tested the level of agreement. The experimenters were trained to use soft voice, touch of the toddler’s arm or leg while introducing themselves and the game to the toddlers. The experimenters were also trained to observe mutual gaze, the toddler’s laughter and signs of comfort and satisfaction and signs of avert gaze in order to carry out the pick-a-boo game in a reliable manner. Reliability was established by the leading investigator, a clinical psychologist. Level of agreement reached 98% on all categories of the game. This process took place, after the training to assure standardization of the “peek-a-boo with an object” procedure using a piece of cloth and a ball while empathically encouraging the toddler’s to participate.
Table 1
Mean and SD of the Early Interaction Scale items.

<table>
<thead>
<tr>
<th>Social proficiency</th>
<th>Mean with father</th>
<th>SD with father</th>
<th>Mean with mother</th>
<th>SD with mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>General positive joint attention</td>
<td>4.16</td>
<td>1.12</td>
<td>4.35</td>
<td>1.08</td>
</tr>
<tr>
<td>Toddler positive affect</td>
<td>3.51</td>
<td>1.35</td>
<td>4.16</td>
<td>1.13</td>
</tr>
<tr>
<td>Optimal range of affect</td>
<td>3.38</td>
<td>1.30</td>
<td>3.51</td>
<td>1.36</td>
</tr>
<tr>
<td>Level of gradual rapidity of affective build up</td>
<td>4.16</td>
<td>1.12</td>
<td>4.35</td>
<td>1.08</td>
</tr>
<tr>
<td>Length of interest in play incidents</td>
<td>3.51</td>
<td>1.36</td>
<td>3.84</td>
<td>1.13</td>
</tr>
<tr>
<td>Toddler alertness</td>
<td>4.61</td>
<td>0.80</td>
<td>4.48</td>
<td>0.88</td>
</tr>
<tr>
<td>Vocal behavior</td>
<td>2.48</td>
<td>1.54</td>
<td>3.06</td>
<td>1.05</td>
</tr>
<tr>
<td>Toddler initiation of interaction cycles</td>
<td>2.03</td>
<td>1.13</td>
<td>2.74</td>
<td>1.34</td>
</tr>
<tr>
<td>Irritability</td>
<td>1.77</td>
<td>1.23</td>
<td>1.58</td>
<td>1.77</td>
</tr>
<tr>
<td><strong>Dyadic co-regulation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutuality between onsets of an joint attention</td>
<td>3.51</td>
<td>1.36</td>
<td>4.22</td>
<td>1.11</td>
</tr>
<tr>
<td>Level mutuality of breaks avert gazes, level of infant fussy states</td>
<td>3.38</td>
<td>1.08</td>
<td>3.83</td>
<td>1.12</td>
</tr>
<tr>
<td>Level of parent support to child arousal buildup and returns to balance</td>
<td>3.45</td>
<td>0.99</td>
<td>3.83</td>
<td>1.00</td>
</tr>
</tbody>
</table>

The game consisted of repeated trials in which the ball was first hidden behind the spread cloth 3 times in front of the toddler, then one time when the stranger leaned to her right and one time when she leaned to the left. Thereafter, in case the toddler successfully discovered the hidden ball, it was hidden behind the back of the toddlers 5 times and then again one time to the right and one time to the left in front of the baby. During the remaining time, for a filming session of 5 min, the above trials were repeated. Each trial ended when the toddler discovered the ball and the next trial was started after the stranger supported, praised and encouraged the toddler.

2.5. Measures

The Early Interaction (EIS) scale was used for scoring observed infant interaction with the mother, father, and stranger. Interactions are rated on a five-point scale ranging from a low of 1 to a high of Codes (adopted from the concepts of Als, 1986; Als, Lester, Tronick, & Brazelton, 1982; Brazelton & Cramer, 1990; Field, 1998; Field et al., 1984; Hofer, 2003) were averaged into two composites.

2.5.1. Composites

The items of the composite appear with means and SD for interaction with the fathers and the mothers respectively:

(I) Social proficiency ($\alpha = .85-.88$) (see Table 1).

(II) Dyadic co-regulation ($\alpha = .70-$) (see Table 1).

2.5.2. Coding

Interactions were coded off-line following a training period that included ten videotaped sessions of healthy mother-infant dyads. Inter-rater reliability among the coders reached a 98% agreement level for each category. The two coders were students, different from those performing the stranger role, and were blind to the infants’ developmental information. The above-mentioned composites were used to score the toddler’s social proficiency and co-regulation with the mother and the father. The social proficiency composite was then used to score the child’s social functioning with the stranger.

2.5.3. Statistical analysis

A multivariate analysis of variance was used to compare the level of the toddler’s social proficiency with the mother, father, and stranger, as well as the co-regulation with each of the parents. An hierarchical regression model (see Table 3 for order of predicators entrance) was utilized for testing the unique effect of the toddler’s social proficiency and co-regulation with the father—beyond the contribution of the toddler’s proficiency and reciprocity with the mother—on the toddler’s social proficiency while interacting with the stranger. Gender differences were analyzed using $t$-test.

2.6. Theory

This article is based on the modern attachment theory which when tested showed to predict many attachment bonds of the infants beyond his immediate caregiver (Fonagy, 1996). This research is a foundation for further research on the role of many challenging experiences of the toddler in the development of robust emotional modulation with figures outside and immediate familial circle.
Table 2  
Correlations between predicting and predicted variables.

<table>
<thead>
<tr>
<th></th>
<th>Toddler D co-regulation with the stranger</th>
<th>Toddler proficiency with the father</th>
<th>Toddler proficiency with the mother</th>
<th>Co-regulation between toddler and the father</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-regulation between toddler and mother</td>
<td>.129</td>
<td>.279</td>
<td>.692**</td>
<td>313</td>
</tr>
<tr>
<td>Co-regulation between the toddler and father</td>
<td>.442’</td>
<td>.742**</td>
<td>.565**</td>
<td></td>
</tr>
<tr>
<td>Toddler proficiency with the mother</td>
<td>.232</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toddler proficiency with the father</td>
<td>.450’</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at p < 0.05 level (2-tailed).
** Correlation is significant at the .01 level (2-tailed).

Table 3  
Prediction of social proficiency with a stranger.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>R</th>
<th>R²</th>
<th>B</th>
<th>β</th>
<th>R² change</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddler's social proficiency with mother</td>
<td>.232</td>
<td>.054</td>
<td>.59</td>
<td>.23</td>
<td>.054</td>
<td>1.64</td>
<td>.21</td>
</tr>
<tr>
<td>Toddler's social proficiency with father</td>
<td>.452</td>
<td>.205</td>
<td>.488</td>
<td>.43</td>
<td>.15</td>
<td>5.31</td>
<td>.029</td>
</tr>
<tr>
<td>Toddler's co-regulation with mother</td>
<td>.129</td>
<td>.17</td>
<td>−.13</td>
<td>.12</td>
<td>.02</td>
<td>.49</td>
<td>.44</td>
</tr>
<tr>
<td>Toddler's co-regulation with father</td>
<td>.452</td>
<td>.196</td>
<td>.539</td>
<td>.44</td>
<td>.17</td>
<td>6.22</td>
<td>.05</td>
</tr>
</tbody>
</table>

R² = .44, p(1,29) = .04.

2.7. Calculation

Among the clinical implications of this study may be the importance of inclusion of paternal style characteristics by mothers in their interaction with their toddlers from their second year of life onwards especially in the case where the father is absent, as well as the inclusion of maternal style in the paternal repertoire.

3. Results

The sample consisted of 4 (12.9%) families from high SES while the rest were from medium SES. One (3.2%) mother completed elementary education, three (9.7%)—academic education and the rest—high school. All the toddlers managed to find the ball, but varied with respect to the social-affective parameters that were measured. The multivariate analysis of variance revealed that infants were more competent with their mothers than either the fathers or the strangers (Wilk's Lambda(1,29) = 13.29, p < .001).

Significant differences were found in between the proficiency with the mother versus the father and the stranger (Wilk's Lambda(1,29) = 10.96, p < .01) and between the proficiency with the stranger versus the proficiency with both parents (Wilk's Lambda(1,29) = 5.45, p = .05). Thus infants' proficiency with their mothers was highest and with the stranger the lowest. In addition, the multivariate analysis of the co-regulation with each of the parents revealed significant differences between the toddler's co-regulation with the mother and with the father (Wilk's Lambda(1,29) = 5.35, p < .05).

The child social proficiency with the stranger was predicted by the child's proficiency and reciprocity with the father, beyond the contribution of the child’s proficiency and co-regulation with the mother. Correlations are presented in Table 2. The variables were entered to the model one by one in the ordered presented in Table 3. No gender differences were found (see Table 4).

Table 4  
Gender differences in social proficiency and co-regulation.

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddler’s social proficiency with mother</td>
<td>19</td>
<td>3.57</td>
<td>.78</td>
<td>t(1,29) = .99</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>3.88</td>
<td>.95</td>
<td></td>
</tr>
<tr>
<td>Toddler’s social proficiency with father</td>
<td>19</td>
<td>3.06</td>
<td>.94</td>
<td>t(1,29) = 1.34</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>3.50</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td>Co-regulation with mother</td>
<td>19</td>
<td>3.70</td>
<td>.75</td>
<td>t(1,29) = 1.55</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>4.17</td>
<td>.91</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>3.83</td>
<td>.8</td>
<td></td>
</tr>
<tr>
<td>Co-regulation with father</td>
<td>19</td>
<td>3.25</td>
<td>.78</td>
<td>t(1,29) = 1.97</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>3.29</td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>2.90</td>
<td>1.13</td>
<td>t(1,29) = 1.03</td>
</tr>
</tbody>
</table>
4. Discussion

The current study shows that the social proficiency and co-regulation of 12–18 months old toddlers with strangers is predicted by their interaction with their fathers, above and beyond the contribution of the mothers; Specifically, that two children with equivalent interaction competences with their mothers will nonetheless differ in their interactions with the stranger and that the difference is predicted by how they interact with their fathers (i.e. a toddler with high quality interactions with the father will do better than a toddler with lower quality interaction with the father). The results imply that it is this paternal behavior that may support toddlers in their development of bonds outside the familial ring of interactions. This may be a working through of their capabilities beyond the established relations with the mother. It is noted that the contribution of the father to the social proficiency of the toddler was found in addition to the maternal contribution and not as a replacement of the contribution of the mother.

This is in accordance with earlier studies that noted that ecological validity of fathers’ sensitive and challenging interactive play supports the toddler’s internal capacities for social confrontations, cognitive performance and the sense of internal security when challenged (e.g. Cohen et al., 2000; Frosch, Cox, & Goldman, 2001; Lester, Hoffman, & Brazelton, 1985; Stern, 2001; Warner, 2002; Yogman, Kindlon, & Earls, 1996).

Therefore, although it seems that the children are attached primarily to one parental figure, optimal functioning, especially in social encounters with unfamiliar people, is dependent on the existence of other social bonds, beyond the dominant relationship with the mother (Fonagy, 1996). As shown by the results of this study, the combinatorial effect of bonds with the mother and the father may be responsible for the toddler’s better social proficiency when interacting with a stranger.

Given a suggested combinatorial effect of the social proficiency and the known maternal contribution during early infancy (Field, 1998) of to the toddler’s proficiency, it could be that the timing and sequence of the parental cues is more conducive for the toddler and that paternal cues becomes more significant only later in infancy (e.g. the second year of life) as suggested earlier (Wulff, Dedek, & Siegmund, 2001). This suggestion is a basis for further study.

Limitations of this study include its modest sample. As sociability appears to be a personality trait with notably high genetic contribution, the other limitation of the study is that infant temperament was not measured.

5. Conclusion

The toddler’s ability to maintain social proficiency in the absence of the parents who makes him/her feel safe as shown in this study, may point to the fact that separation and distance are not causing an inhibition of the toddler’s social capacities in cases of an earlier co-regulating experience with the father.

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References


