Prediction of Infant–Father and Infant–Mother Attachment

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The 1st-year correlates of infant–father and infant–mother attachment were investigated in a longitudinal study of early family development. Mothers and fathers were observed interacting with their firstborn, 3-month-old infants. Parents also were interviewed individually at 3 months child age concerning their time with the infant and their attitudes and reports about the infant and their parental role. Mothers and fathers were seen in the strange situation with their infant at 12 months. For infants and fathers, security of attachment was predicted from the qualities of interaction at 3 months, the father's attitudes and reports about the infant and the paternal role, and the father's time with the infant. For infants and mothers, security of attachment was predicted from the qualities of interaction at 3 months and the mother's time with the infant.

Over the last 2 decades, Bowlby's attachment theory (Bowlby, 1969) and the work of Ainsworth and others (Ainsworth, Blehar, Waters, & Wall, 1978) have influenced the thinking of many developmental psychologists about the infant–mother relationship and the importance of the emotional bond that develops between the infant and mother during the 1st year. Though much research has established the 1st-year correlates of infant–mother attachment at 12 months (see Belsky & Isabella, 1988), much less is known about the early correlates of the infant–father attachment relationship.

Fathers as Attachment Figures

Because, in Western cultures, mothers typically become the preferred attachment figure and fathers typically become the preferred playmate (Bretherton, 1985), it is unclear whether the attachment construct is as important in describing infant–father relationships as it seems to be in describing infant–mother relationships. Though one parent can serve in both roles, Bretherton notes that Bowlby (1969) considered the roles to be conceptually distinct, with the child seeking an attachment figure when under stress and a playmate when in a positive mood.

In a number of studies (Ainsworth et al., 1978; Belsky, Rovine, & Taylor, 1984; Crockenberg, 1981; Maslin & Bates, 1983; Miyake, Chen, & Campos, 1985), researchers have found that mothers' behavior during the 1st year covaries significantly with assessment of attachment at 1 year using the strange situation procedure developed by Ainsworth and her colleagues (Ainsworth et al., 1978). That is, when mothers have been more sensitive, warm, responsive, and accepting in observations made of mothers with their infant during the 1st year, infants are more likely at 1 year to be judged as having secure attachments with their mother from observations in the strange situation procedure.

Although Bowlby (1969) recognized that fathers were usually attachment figures and could be primary attachment figures, comparable findings concerning the relationship between fathers' behaviors with infants during the 1st year and the security of infant–father attachment have not been reported. In one study of 1st-year origins of infant–father security of attachment, Belsky (1983) concluded that there was no relation between quality of infant–father attachment and father–infant interactional experience. Belsky suggested that the failure to find such a relation may be due, in part, to measurement of inappropriate dimensions; variables other than those that are typically measured (sensitivity, responsibility, warmth) may indeed predict the development of a secure infant–father attachment.

Origins of Infant–Father Versus Infant–Mother Attachment

The origins of infant–father attachment may reside in different types of interactions than the origins of the infant–mother attachment. There are several differences between mothers and fathers in Western cultures. Fathers spend considerably less time on average with infants than do mothers, and this decreased time includes less one–on–one interaction, less accessibility, and less responsibility for the infant's care (Lamb & Oppenheim, 1989). When with their infants, what mothers and fathers do with them differs: Mothers' interactions typically involve caretaking, but fathers' interactions typically involve play (Lamb, 1981; Yogman, 1982).
Several researchers provide evidence that fathers are as capable of providing care for the infant as are mothers (Belsky, Gilstrap, & Rovine, 1984; Lamb, 1981; Parke & Tinsley, 1981). Lamb and his colleagues (Lamb, Frodi, Frodi, & Hwang, 1982; Lamb, Frodi, Hwang, Frodi, & Steinberg, 1982) have reported, however, that even when fathers are highly involved in caretaking, differences persist between mothers and fathers. Fathers are less likely to hold, tend to, show affection toward, smile at, and vocalize to their infant whether the father is highly involved in caretaking or not. Perhaps as a result of these differences, on attachment measures infants show clear preferences for their mother whether fathers are highly involved in caretaking or not (Lamb & Oppenheim, 1989).

In the past, infant–father attachment has been studied mainly to address the question of whether an infant's attachment classification with one parent is related to or independent of the attachment classification with the other parent. Because most researchers report independence in the attachment classifications for infant–mother and infant–father dyads (K. E. Grossman & Grossman, 1981; Lamb, 1977; Main & Weston, 1981; Sagi et al., 1985), it has been suggested that the infant's security of attachment with each parent is a result of the interactional history with that parent. But the nature of that history with father relevant to attachment to father has not been established.

The Current Investigation of Early Correlates of Infant–Father Security of Attachment

In the present study, the 1st year correlates of infant attachment security with father were investigated. In line with the concern that researchers have not investigated the appropriate variables, a broader set of variables was investigated in this study (sensitivity and warmth as well as reciprocal play, activity level, physical affection, and appropriate encouragement of achievement). We used a play context for observations because fathers' interactions are more likely to involve play than mothers'. Thus, fathers may be more likely to show behaviors related to attachment in a play context than in a caretaking context.

In addition, we interviewed fathers and mothers individually to assess the amount of time they spent with their infant and their attitudes and reports about their infant and their role as a parent. Assessing the amount of time that parents actually spent with their infant was considered important because though a parent may have the capacity to be sensitive to the infant, if the infant has limited experience with the parent the capacity for sensitivity may make little difference. The interview assessment of the parent's attitudes and reports about their infant and their role as a parent was an attempt to tap the kind of models that parents have about themselves in relation to their child. Assessing parents' cognitions about the child and the parenting role in addition to observing the parents with the child was considered important because of research suggesting the influential role of parents' cognitions in mediating responses to individual children (Bacon & Ashmore, 1986; Parke, 1978). Additionally, Bowlby's (1969) theory suggests that parents come into the relationship with their infant with their own cognitive models of relationships and that these influence their treatment of the child (Bretherton, 1985).

Thus, we address several questions in this report: (a) Do sensitivity, responsiveness, physical affection, and positive affect of the mother in interaction early in the 1st year predict security of infant–mother attachment, as has been found in other studies? (b) Do these or other attributes of interaction early in the 1st year predict security of infant–father attachment? (c) For both mothers and fathers, do parental attitudes and reports about themselves as parents and about the infant and actual time that parents spend with their infant predict security of attachment over and above what is predicted by interaction?

Method

The subjects in the study were 38 White, married couples and the 15 female infants and 23 male infants subsequently born to them. The couples were recruited from the patients of several obstetrical practices at a large medical center in an urban area. Couples in which neither husband nor wife had ever had a living child were included in the study. We attempted to contact all couples who fit the study criteria in the practices of these obstetricians. Of those contacted, 74% agreed to participate, giving an initial sample of 40 couples, 2 of whom dropped from the study following the initial interviews. Also eliminated from the analyses reported here were two mother–child dyads for whom data were incomplete and five father–child dyads for whom data were incomplete. Thus, the analyses for husbands involve 33 subjects, and the analyses for wives involve 36 subjects. There were 32 families with complete data for both husband and wife.

The mean length of marriage for the couples at the prenatal enlistment period was 3.5 years. The age range for husbands was 21–42 years with a mean of 29.4 years. The age range of wives was 18–35 years, with a mean of 27.3 years. The mean family income fell in the category of $35,000–$39,000 per year in 1982. The mean education for husbands was 15.8 years, the mean education for wives was 15.5 years. On the Hollingshead (1975) four-factor index of social class, couples' scores on social class ranged from 32 to 66 with a mean of 52.4.
Procedure
The data reported here were collected as part of a longitudinal study of early family development. In this study, couples were seen twice during the 2nd trimester of the wife's pregnancy. At the first visit, the husbands and wives were interviewed individually concerning their marriage, family of origin, work, friendships, and feelings about self. At the second prenatal visit, each couple was interviewed as a couple, and each couple engaged in a videotaped marital discussion task. In addition, each individual completed measures of personality, social support, stress, and marital satisfaction. When the child's age was 3 months, 1 year, 2 years, 4 years, and 6–7 years (first grade), we repeated interviews with individual parents, marital interactions, and questionnaires. Additionally, at each time period, parent-child interactions, whole family interactions, measures of the child's cognitive and social/emotional development, and interviews with parents about their child and their parenting role were added. At the 1-year postnatal time period, we collected the strange situation measure of attachment for each infant-parent dyad. At the 4-year and 6–7-year time periods, preschool/school data concerning child social and emotional development were collected.

This report involves data collected at child ages 3 months and 1 year. Data collection for the measures discussed in this report took place in the family home and in the laboratory. We gathered data using semistructured interviews and videotaped semistructured parent-child interactions when infants were 3 months old and videotaped strange situation procedures when infants were 1 year old.

The 3-month period.
At 3 months after the birth of the child, 3 visits occurred with the couples over a 2-week period. In this report, only the second and third visits are described. During a laboratory visit, the parents were interviewed individually in a comfortable setting. Parents were asked questions concerning their feelings about the infant and the parenting role and perceptions of the child's development. Many of these questions were drawn from an interview by Hock, Christmas, and Hock (1980). Parents also were asked about time spent with the infant. About a week later, each parent was videotaped in a 15-min, semistructured interaction with their 3-month-old infant in the home. For this interaction, the camera was fixed, and the parent and child were left alone in their own living room. Parents were instructed to stay in camera range and to "do whatever you would normally do with your infant if you had some free time at this time of day." After these interactions, the couple was interviewed together. The interview, which lasted less than 1 hr, focused mainly on their adjustment as a couple, their perception of the baby, and the way in which their roles had been worked out.

The 1-year period.
When the infant was 12–13 months old, we made three visits with the family. The two visits to the laboratory are described. In each visit, Ainsworth's strange situation procedure (Ainsworth et al., 1978) was used to assess qualities of infant-parent attachment; one visit was for the assessment of infant-mother attachment, and one visit was for the assessment of infant-father attachment. The visits were separated by 7–10 weeks; order of which parent first was counterbalanced. There has been no evidence of order effects with this length of separation between the two sessions (e.g. Chase-Lansdale & Owen, 1988; Easterbrooks & Goldberg, 1984).

Measures
Interview assessment of parenting at 3 months postnatal.
A developmental psychologist and trained research assistants independently made global ratings from transcripts of the 3-month individual interviews with each parent and 3-month couple interviews. Excerpts of the interviews for the section in which parents were asked about the child and their parenting were given to raters blind with respect to other data. The parenting variables were chosen to reflect attitudes and reports about the infant and the parenting role. The following variables were rated: (a) the parent's delight in the baby, involving the extent to which the parent expresses pleasure in the baby, as distinguished from a pride in parenthood that has little to do with qualities of the baby (on a scale ranging from delight is absent [1] to markedly frequent delight [9]); (b) the parent's acceptance of the baby, involving the degree of acceptance versus rejection of the baby as a result of the baby's interference with the parent's own autonomy (on a scale ranging from highly rejecting [1] to complete acceptance [9]); (c) an attitude of sensitivity to the baby's communications, as reflected in the degree of awareness, freedom from distortion, and empathy in the parent's reports of his or her interactions with the child (on a scale ranging from highly insensitive [1] to highly sensitive [9]); and (d) investment in parenting, reflecting the extent to which the parent values parenting over other adult roles, sees himself or herself to be important in the infant's development, and holds spending time with the baby as a
priority (on a scale ranging from highly invested [1] to very uninvested [5]). The ratings of delight, acceptance, and sensitivity were adapted from Ainsworth (n.d.). The rating of investment was constructed for this study. Two independent ratings were made for both husbands and wives with each spouse rated by individuals who had no knowledge of the rating made on the other spouse. Interrater reliabilities computed by Pearson product–moment correlation were .81, .89, .80, and .83 for delight, investment, sensitivity, and acceptance, respectively. Ratings of the more experienced rater were used for the analyses. These four ratings (delight, investment, sensitivity, and acceptance) were highly intercorrelated and thus were combined using standard scores. This composite variable represents the parent's attitudes and reports about the infant and the parenting role.

Also rated from the interview was amount of time spent with the infant. Parents were asked in interview to give an account of time they had available to spend with the infant during the last week. They also were asked how typical the last week had been. From this information, two independent raters rated time with infant on a 5-point scale, ranging from provides most of the care for baby and is with baby most of the time (1) to spends little time with infant, frequently leaves before infant wakes and comes home after infant is asleep, and engages in weekend activities that rarely make parent available to infant (5). The focus of the time with infant variable was on time that a parent was available to the infant without a concern for the types of interactions or activities parents engaged in with the infant. Categories were used because they could be scored highly reliably. Interrater reliability was .90 using a Pearson correlation. These raters were different than the raters of the parent attitude variable described above.

Observation ratings of parenting at 3 months postnatal.

Global observation ratings were adapted from Ainsworth (n.d.) and Egeland and Farber (1984) and, for two of the scales (positiveness of affect and animation), were constructed for this study. Two developmental psychologists blind to other information about the family independently rated mother–infant and father–infant interactions. Ratings were made on a variety of variables chosen to broadly represent the interaction. Thus, global ratings were made of (a) the parent's sensitivity, which involves the extent to which the parent–infant interaction is characterized by prompt and appropriate responses to the baby's signals, ranging from highly insensitive (1) to highly sensitive (9); (b) positiveness of parental affect, ranging from very negative (1) to very positive (5); (c) the parent's affective animation, ranging from flat, blank, expressionless face and voice to very animated with appropriately expressive face and voice and sparkling eyes (5); (d) the amount of reciprocal play, which reflected the quantity of time in which infant and parent shared mutual attention to a toy or gamelike interaction where both were taking an active part and there was some contingent alternation of response, ranging from none (1) to nearly constant reciprocal play (9); (e) the parent's attitude toward play, which reflects the parent's enjoyment of playing with the baby, ranging from strong, active dislike (1) to much active enjoyment (9); (f) the parent's activity level, which reflects the amount of parental physical or verbal activity in the play situation, ranging from distant (1) to extremely high (9); and (g) the parent's encouragement of achievement, which reflects the extent to which the parent stimulates the infant toward development whether through play or through obvious training, ranging from highly inappropriate encouragement (1) to moderately appropriate encouragement (9). Microanalytic ratings also were made from the same interactions, but by different raters. These included a count of the number of 15-s intervals in which (a) the parent showed physical affection by kissing the child and (b) the parent vocalized to the child.

For all of the above ratings, one-fourth of the interactions were coded by two raters for reliability. Interrater agreement computed by Pearson product–moment correlations ranged from .88 to 1.00 for the global ratings. For the microanalytic variables, agreement on the occurrence of the behavior within a 15-s interval occurred 93% of the time for kissing the baby and 94% of the time for vocalizing to the baby. Table 1 contains means and standard deviations for all the parent variables (interaction and interview); mother and father variables are reported separately.
We subjected the nine interaction variables to a principal components factor analysis with varimax rotation to determine how many independent descriptors of interaction the variables constituted. Two factors emerged, both with eigenvalues greater than 1.

The first factor included parental sensitivity, positive affect, animation, attitude toward play, activity, encouragement of achievement, amount of vocalizing to the child, and amount of reciprocal play. This factor seemed to represent what we have labeled positive interaction between parent and infant, which broadly includes not only sensitivity and warmth but also level of activity and stimulation of the infant.

The second factor, which we have labeled physical affection, included only the number of intervals in which the parent kissed the child.

Using the information from the factor analysis, the eight variables that loaded together on the factor we labeled positive interaction were combined using standard scores. The physical affection variable was used by itself.

Infant–parent attachment. According to the protocol outlined in Ainsworth et al. (1978), infant behavior in the strange situation was classified by two trained raters into one of the subcategories of the major categories of insecure–avoidant (A), secure (B), or insecure–resistant (C) in relation to the infant's relationship with mother and with father. In addition, disorganized/disoriented (D) behavior was scored using descriptions by Main and Solomon (1986).

Twenty-three percent of the tapes (a portion of which were randomly chosen and a portion of which were deemed difficult by one of the raters) were coded independently by both raters. Agreement on the major classifications of these tapes occurred for 88% of the tapes. Disagreements were resolved by reviewing the videotapes with a third trained coder and reaching consensus.

The measure of security of attachment used in the analyses reported here was a continuum of security similar to the continuum used by Main, Kaplan, and Cassidy (1985). From the traditional classification ratings (Ainsworth et al., 1978), this continuum was formed because of the concern that the dichotomous secure/insecure designation would result in loss of important variation. This concern also has been expressed by Cummings (1990). He argues that using the secure/insecure designation leads to a major loss of power that can be avoided with an attachment continuum that retains distinctions within secure and insecure groups.

In the continuum used here, the B3 classification was assigned a 4 for most secure. B1, B2, and B4 scores were given a 3. However, when the scoring of the attachment tape had originally resulted in a determination that the attachment was B1/A2—some signs of security but high avoidance scores—or B4/C1—some signs of security but high resistance scores—regardless of what final determination was made (secure or insecure), the cases were kept separate and assigned a 2 on the continuum. A score of 1 was used for A and C classifications, as well as for any D classifications. Thus the scale ranged from 1 to 4 and represented a continuum from least secure to most secure.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mother (M, SD)</th>
<th>Father (M, SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delight</td>
<td>5.9 (1.9)</td>
<td>5.7 (2.5)</td>
</tr>
<tr>
<td>Acceptance</td>
<td>6.3 (1.8)</td>
<td>6.4 (2.2)</td>
</tr>
<tr>
<td>Attitude of sensitivity</td>
<td>3.6 (1.0)</td>
<td>3.5 (1.4)</td>
</tr>
<tr>
<td>Investment in parenting</td>
<td>2.4 (1.4)</td>
<td>2.9 (1.8)</td>
</tr>
<tr>
<td>Amount of time with infant</td>
<td>1.4 (0.8)</td>
<td>3.2 (0.7)</td>
</tr>
</tbody>
</table>

Table 1: Means and Standard Deviations for Maternal and Paternal Interview and Observation Predictor Variables
Results

Infant–Mother and Infant–Father Attachment Scores

On the continuum outlined above, infant–mother and infant–father attachment scores were somewhat similarly distributed. For infant–mother attachment, the distribution was as follows: (a) 32% were Cs, As, or Ds (least secure), (b) 14% were originally B1/A2 or B4/C1 regardless of final classification, (c) 30% were B1s, B2s, or B4s, and (d) 24% were B3s (most secure). For infant–father attachment, the distribution was as follows: (a) 21% were Cs, As, or Ds (least secure), (b) 32% were originally B1/A2 or B4/C1 regardless of final classification, (c) 26% were B1s, B2s, B4s, and (d) 21% were B3s (most secure).

A slightly higher percentage of infant–mother dyads (54%) as opposed to infant–father dyads (47%) were rated as clearly secure (B1, B2, B3, or B4). Surprisingly, fewer infant–father dyads (21%) as opposed to infant–mother dyads (32%) were rated as clearly insecure (A, C, or D). This was because a larger percentage of infant–father dyads (32%) as opposed to infant–mother dyads (14%) were initially seen as having elements of both insecurity and security (originally B1/A2 or B4/C1, regardless of final classification).

This sample was very similar to other samples in overall proportions of secure/insecure classifications for both infant–mother and infant–father dyads. Of those who were originally rated as B1/A2 or B4/C1 (some signs of security and insecurity), about half were given final secure ratings and half given final insecure ratings for both infant–mother and infant–father dyads. Thus, in the final determination, about 62% of infant–mother and infant–father dyads were judged to be secure. This is consistent with other studies of 12-month infant–parent attachment.

With regard to the issue of independence of infant–mother and infant–father attachment scores, with this sample we found as others have that the correlation between the attachment scores of infant with mother and infant with father was small and not significant at the .05 probability level (r = .32).

Intercorrelations of 3-Month Predictor Variables

Table 2 shows the intercorrelations of the predictor variables, which included the two observation variables (positive interactions and physical affection), the parent’s attitude toward and reports about the infant and the parental role from interview, and time spent with the infant, which was derived from interview.

<table>
<thead>
<tr>
<th>Variable</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mothers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Positive interactions</td>
<td>.31*</td>
<td>.46**</td>
<td>-.06</td>
</tr>
<tr>
<td>2. Physical affection</td>
<td>—</td>
<td>.11</td>
<td>.19</td>
</tr>
<tr>
<td>3. Attitudes toward the infant and the parental role</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4. Time with the infant</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Fathers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Positive interactions</td>
<td>.06</td>
<td>.48**</td>
<td>.31*</td>
</tr>
<tr>
<td>2. Physical affection</td>
<td>—</td>
<td>.15</td>
<td>.21</td>
</tr>
<tr>
<td>3. Attitude toward the infant and the parental role</td>
<td>—</td>
<td>—</td>
<td>.18</td>
</tr>
<tr>
<td>4. Time with the infant</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*p < .10.  **p < .01.

For both fathers and mothers, the composite positive interaction observation variable (which included sensitivity, positive affect, animation, reciprocal play, parent activity level, attitude toward play, amount of vocalization, and appropriate encouragement of achievement) was correlated significantly with the parent’s attitudes and reports about the infant and the parental role assessed in interview. Otherwise, the predictors were relatively independent.

Univariate Analyses

In Table 3 are the correlations between the continuum representing the security of infant–father attachment and the 3-month father–child interaction and father interview variables as well as the
correlations between the continuum representing the security of infant–mother attachment continuum and the 3-month mother–child interaction and mother interview variables.

As can be seen in the table, for fathers both the composite variable from interaction that represents a positive interaction and the composite variable from interview that represents the parent's attitudes toward and reports about the infant and the parenting role were significantly related to the infant–father security continuum. Thus, when the interaction at 3 months was highly positive (sensitive, warm, reciprocally playful, active, appropriately encouraging of achievement, etc.) or when the rating from interview of the parent's attitudes and reports about the infant and the parental role was more positive, the infant–father attachment rating at 1 year was significantly more likely to be secure.

For mothers, when there was more physical affection in the 3-month interaction or when mothers spent more time with the infants at 3 months, the infant–mother attachment rating at 1 year was significantly more likely to be secure. The correlation between positive mother–child interactions at 3 months and security of infant–mother attachment at 1 year just missed being significant at the .05 level.

**Multivariate Analyses**

In the next step, the predictor variables were included in hierarchical multiple regression analyses (one for father, one for mother) with the following logic: The interaction variables (positive interactions and physical affection) were included first as a set because the literature suggests that a history of sensitive, responsive, and warm interactions results in secure attachments between infant and mother. The parental attitudes toward and reports about the infant and parental role variable was added next to ask whether parental attitudes or cognitive models add to the prediction of attachment beyond what is predicted by observation. Time with the infant was added next to determine whether amount of time spent with the infant predicts security of attachment over and above what is predicted by observed interaction and parental attitudes. Results of those analyses in which this order of entry was used appear in Table 4.

### Table 3
**Correlations Between 3-Month Predictor Variables and the 12-Month Attachment Continuum**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Infant–mother</th>
<th>Infant–father</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive interaction</td>
<td>.31*</td>
<td>.43***</td>
</tr>
<tr>
<td>Physical affection</td>
<td>.38**</td>
<td>.24</td>
</tr>
<tr>
<td>Attitude toward the infant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and the parental role</td>
<td>.17</td>
<td>.54****</td>
</tr>
<tr>
<td>Time with the infant</td>
<td>.45***</td>
<td>-.28</td>
</tr>
</tbody>
</table>

*p < .1. ** p < .05. *** p < .01. **** p < .001.

### Table 4
**Hierarchical R² Analyses by Sets: Prediction of Security of Attachment Continuum—Order of Entry 1**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>R²</th>
<th>1</th>
<th>F₁</th>
<th>df'</th>
<th>β</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant–mother security continuum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive interaction</td>
<td>.19</td>
<td>.19</td>
<td>3.8*</td>
<td>2, 33</td>
<td>.22</td>
<td>.22</td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>Physical affection</td>
<td>.35</td>
<td>.16</td>
<td>7.03*</td>
<td>1, 31</td>
<td>.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude toward infant and the parental role</td>
<td>.19</td>
<td>.00</td>
<td>0.00</td>
<td>1, 32</td>
<td>.00</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time with infant</td>
<td>.35</td>
<td>.16</td>
<td>7.03*</td>
<td>1, 31</td>
<td>.41</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Infant–father security continuum              |    |   |    |     |           |        |        |        |
| Positive interaction                          | .25| .25| 5.00* | 2, 30 | .44 | .24 | .34 |
| Physical affection                            | .37| .12| 5.52* | 1, 29 | .40 | .40 |      |
| Attitude toward infant and the parental role  | .56| .19| 12.09** | 1, 28 | .45 |      |      |
| Time with infant                              | .56| .19| 12.09** | 1, 28 | .45 |      |      |

Note: 1 = increase in R²; F₁ = significance of increase in R².
* p < .05. ** p < .01.
For both infant–father and infant–mother security of attachment, the inclusion of the set of observation variables accounted for a significant amount of variance (R² = .25 and .19, respectively). When the variable representing fathers’ attitudes and reports about the infant and the parental role was added, additional significant variation was explained. When mothers’ attitudes and reports about the infant and the parental role was added to the prediction of infant–mother security of attachment, no new variance was explained.

Finally, inclusion of time spent with the infant added significantly to the prediction of infant–mother security of attachment with sensitive, warm, active, and physically affectionate maternal behaviors in interaction and attitudes and reports about the infant and the parental role controlled. The inclusion of time spent with the infant also added significant prediction of infant–father attachment security with sensitive, warm, active, and physically affectionate paternal behaviors and attitudes and reports about the infant and the parental role controlled. However, the prediction of infant–father attachment was in the opposite direction from that for mothers. With the other variables controlled, fathers who spent more time with their infants were less likely to have infants who were securely attached to them than fathers who spent less time, but mothers who spent more time with their infants were more likely to have infants who were securely attached to them.

In a second set of hierarchical multiple regression analyses (one for mother, one for father), the predictor variables were included in the analyses in a different order to address the question of whether the observation variables and the attitude and report about the infant and parental role variable predicted security of attachment when time with the infant was included first (controlled). Fathers and mothers vary with respect to the amount of time available for interaction with and caretaking of their infant. It is important to consider whether the quality of a parent’s interactions with the infant predicts security of the infant–parent attachment beyond what is predicted by the amount of time the parent spends with the infant.

Additionally, this second set of regression analyses, which used a different order of inclusion of variables, allowed us to further explore the meaning of some of the findings from the first set of regression analyses reported above. Particularly of interest was whether suppression was present in the prediction of infant–father attachment. Suppression is present when the relationship between two predictor variables is hiding or suppressing their real relationship with the outcome variable (Cohen & Cohen, 1983). In this case, it was considered that the relationship between quality of the father’s interaction with the infant and time with the infant may lead to suppression of their real relationship with security of infant–father attachment. The inclusion of the suppressor in the regression equation removes (suppresses) the unwanted variance in the predictor variable and has the effect of enhancing the relationship between the predictor variable and the outcome variable (Cohen & Cohen, 1983). Thus, regression analyses in which quality of interaction and time with infant were included with and without the presence of the other were of interest.

Table 5 contains the results of the second set of hierarchical multiple regression analyses (one for fathers, one for mothers). The order of inclusion for this analyses was time with infant first, followed by quality of interaction, then parent’s attitudes and reports about the infant and the parental role. For infant–father security of attachment, inclusion of the time with infant accounted for a nonsignificant 8% of the variance. Inclusion of the set of observation variables (positive interaction and physical affection) resulted in a significant increase of variance explained (an increase of 36%); inclusion of the interview variable of the parent’s attitudes and reports about the infant and the parental role resulted in a significant addition of variance explained (an additional 12%).

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Hierarchical R² Analyses by Sets: Prediction of Security of Attachment Continuum—Order of Entry 2</th>
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</thead>
<tbody>
<tr>
<td>Independent variable</td>
<td>R²</td>
</tr>
<tr>
<td>Infant–mother security continuum</td>
<td></td>
</tr>
<tr>
<td>Time with infant</td>
<td>.20</td>
</tr>
<tr>
<td>Positive interaction</td>
<td>.35</td>
</tr>
<tr>
<td>Physical affection</td>
<td>.35</td>
</tr>
<tr>
<td>Attitude toward infant and parental role</td>
<td>.35</td>
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<tr>
<td>Infant–father security continuum</td>
<td></td>
</tr>
<tr>
<td>Time with infant</td>
<td>.08</td>
</tr>
<tr>
<td>Positive interaction</td>
<td>.43</td>
</tr>
<tr>
<td>Physical affection</td>
<td>.55</td>
</tr>
</tbody>
</table>

Note: 1 = increase in R²; F₁ = significance of increase in R².  
* p < .05. ** p < .01.
For prediction of the infant–mother security of attachment, inclusion of the time spent with infant accounted for a significant 20% of the variance. Inclusion of the set of observation variables added significantly to the variance predicted (an additional 15%). Inclusion of the interview variable, parent's attitudes and reports about the infant and parental role, did not add significantly to the variation predicted.

Discussion

Clearly, security of the infant–father attachment relationship at 1 year can be predicted from the nature of infant–father interaction earlier in the 1st year. A broad set of observational variables was used reflecting not only sensitivity and positive affect but also animation, reciprocal play, parental activity, attitude toward play, amount of vocalization, encouragement of achievement, and physical affection. For both mothers and fathers, this broader set of composite observational variables predicted significant variation in attachment, so that the more positive and physically affectionate the interaction at 3 months, the more secure the infant–parent attachment at 1 year. The use of a play situation in which to judge the interaction of infant and parent and the rating of a broader set of variables may have been important to understanding the development of the infant–father relationship.

Documentation that as with mother, father's interactions with the infant predict later security of attachment is important and suggests the utility of the infant–father attachment rating from the strange situation procedure in capturing variations in infants' experiences of their father during the 1st year. Another important finding reported here is that the father's attitudes about the infant and his parenting role predicted significant variation in infant–father security of attachment, even when the observation variables were already in the equation. In the infant–mother analyses, however, mother's attitudes did not add significant additional variation over that predicted from observed interaction. The composite, interview variable investigated here included how positively the father described the infant and his delight in the infant, the extent to which he saw himself as important in the infant's development, the extent to which he felt having time with the infant was a priority in his life, and the extent to which he expressed sensitivity to and acceptance of the infant. It seems particularly important to us to investigate such variables. As Bremerton (1985) suggests:

The exclusive study of attachment from the perspective of the attached person has, I believe, led us to focus on the caregiver's physical and psychological availability, responsiveness, and sensitivity to signals. Yet it is probably wrong to conceive of the attachment figure in a purely responsive role. We can assume that the parent or caregiver adult already has constructed a generalized or normative model of infants, perhaps even a vague model of the specific infant before that infant is born… We can also assume that such working models guide, from the outset, not only an attachment figure's behavior in individual circumstances but also long-term goals and planning for their attainment. (p. 34)

We suggest that looking at the parent's cognitions and reports about the infant and about the parental role may be particularly important in understanding the development of the infant–father relationship. Because fathers are typically not primary caregivers, the range of roles that are culturally approved for fathers to adopt with regard to their children is broader than for mothers. Some fathers are quite distant with their children, to the point of rarely seeing them or having face-to-face conversations with them, even in intact families. Other fathers are quite involved and active with their children.

These attitudes, or cognitive models, which fathers develop about their children and their roles as parents seem important in determining present and future behavior with their infants in that the attitudes and reports of both fathers and mothers at child's age 3 months were associated significantly with qualities of their interactive behaviors at 3 months. Interestingly, in other reports from this project, we have noted that these attitudes, or cognitive models, that fathers have about their young infants and their roles as fathers can be predicted by prenatal assessments of the quality of the father's marital relationship (Cox, Owen, Henderson, & Lewis, 1989) and by qualities of the father's relationships in his own family of origin (Cox & Owen, 1991). These origins of father's attitudes would be expected from Bowlby's (1969) thesis that one forms working models of the world and significant people in it, including self, from the repeated interactions with important people in one's life.

Finally, time spent with the infant was a significant predictor of infant–parent security of attachment. For mothers, time spent with the infant was not significantly related to the mother's interaction behaviors or attitudes toward the infant. Spending more time did not seem to make mothers more positive, nor did being more positive make them spend more time. Many of the mothers were employed by 3 months, and their employment was the main reason mothers spent less time with the infants.
Time spent with infant predicted security of attachment of infants with mothers over and above the mother's observed behaviors and attitudes. When time with infant was entered first in the hierarchical multiple regression analysis, the contribution of time with infant and quality of the interaction from observation was about the same as when the observation variables were entered first. The time mothers spend with their infants and the quality of their interactions with their infants both apparently make an independent contribution to the prediction of attachment. This is an important finding, and one that needs replication. The suggestion from these data is that although the quality of the mother's interaction with the infant when she is with the infant is important, how much time is spent with the infant is important to security of attachment independent of the quality of interaction. There was a trend for fathers who spent more time with their infants to also have more positive interactions with them. Either fathers who spend more time with infants become more positive, or those who are more positive are motivated to spend more time with infants. Time spent with infant had no significant univariate relationship to infant–father security of attachment, but when included in the hierarchical multiple regression equation with interaction and attitude variables controlled, it did add predictability. However, the direction of prediction with the above variables controlled was that when fathers spent more time with infants, the infant–father attachment was less likely to be secure. Additionally, when father's time with infant was included as the first predictor of security of attachment, it did not make a significant contribution to prediction of security of infant–father attachment. However, with the father's time with the infant already included in the equation, the observational interaction predictors made a larger contribution to the prediction of infant–father attachment than they did without time with infant controlled. Suppression apparently occurs in this case.

The finding that both the father interaction variable and the father's time with infant variable were stronger predictors of infant–father security of attachment when the other variable was first controlled in the equation was a surprise, and only a post hoc explanation can be offered. We suggest that fathers spend time with their infants for a variety of reasons. Although fathers who had more positive interactions with their infants were marginally more likely to spend more time with the infant, we also found that fathers' time spent with the infant was significantly and inversely related to mothers' time spent with the infant. This suggests that fathers' time with the infant could, in some cases, be a compensation for mothers' lower involvement (primarily because of employment in this study) and also may be a marker of stressed families. In other words, fathers may be spending more time under conditions of family necessity that have little to do with qualities of the father's behavior with the infant. By first controlling for father's positive interactions and attitudes and removing the common variation between time spent with infant and security of attachment, on the one hand, and positive interactions and security of attachment, on the other, variability attributable to father time with infant, which may be a marker of family stress, is what remains.

Note that in an earlier study, Chase-Lansdale and Owen (1988) found that when mothers are employed (and presumably have less time with the infant), secure attachments to father are less likely. And, relatedly, Crouter, Perry-Jenkins, Huston, and McHale (1987) found that greater child-care involvement of fathers with employed wives was associated with lower levels of marital satisfaction and that in dual-wage families the predictors of fathers' involvement were the demands of the family situation. Again, in both of these other studies we may be seeing the impact of stressed families. These findings are intriguing but not entirely explicable. Further investigations are needed.

Conversely, we see that when father's time with infant is controlled, the quality of the father's interaction with the infant during the 1st year is an extremely strong predictor of security of infant–father attachment. The fact that the true strength of this predictor is only revealed when time with the infant is controlled may account for the difficulty other researchers have had in demonstrating a relationship between security of infant–father attachment and the history of the father's interaction with the infant.

We have documented here that by using a play situation and a broader set of variables, 1-year infant–father security of attachment is predictable from the nature of the infant–father interaction earlier in the 1st year. Still, there is much work to be done in understanding fathers, and we would urge that more of that work be focused on fathers as attachment figures.

Most of the attachment research has focused on the infant–mother relationship. Work by Main and her colleagues (Main et al., 1985; Main & Weston, 1981) is often cited as demonstrating stronger associations between infant–mother security of attachment and later characteristics of the child than between infant–father security of attachment and later child characteristics. Main and her colleagues (Main et al., 1985) did find significant associations between infant–mother attachment and children's representations of attachment at age 6 and overall functioning with a female examiner at age 6. These significant associations were not found for infant–father security of attachment. However, they did find...
a strong association between infant–father attachment and later discourse fluency at reunion of 6-year-olds with fathers ($r = .64$, $p < .001$).

These findings raise the question of whether looking at a broader spectrum of outcomes, one might see the impact of fathers as attachment figures more clearly. If one looked at the child relating to a male examiner, for example, rather than a female examiner, infant–father attachment might be more predictive than infant–mother attachment. Sroufe and Fleeson (1986) cite a case history by Cottrell in which a patient's negative treatment of his young son seemed associated with harsh treatment he had received from his own father, whereas the same patient's positive treatment of his wife seemed associated with the nurturing relationship he had had with his mother.

Other questions have to do with the understanding of the child's development within the context of the family. We know little about the family situations in which the father is an important figure in the child's emotional development. We are at a time in our culture when the role of fathers in the lives of very young children has the potential for great change. More than half of mothers with children age 1 and under are now employed (U.S. Bureau of Labor Statistics, 1987). In this study, we found that when mothers were employed, fathers spent more time with their infants.

This social change suggests several important questions. Does security of attachment to father have stronger predictability in some families than others? Specifically, is the quality of the infant–father attachment more important in predicting later emotional development in the child in families in which the father spends considerable time with the child? Are there family situations in which a secure relationship with father buffers an insecure relationship with mother and family situations in which it does not? Can we see variation in the patterns of the child's later intimate relationships with peers depending on the patterns of attachment security or insecurity with mother and father? In doing this work, researchers must be aware that different contexts and different variables may be revealing of critical aspects of the father–child as opposed to the mother–child relationship. Indeed, understanding the father–infant relationship apparently is a complicated business, but one that should lead to a more complete understanding of the emotional development of children.

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