Adult attachment styles, early relationships, antenatal attachment, and perceptions of infant temperament: A study of first-time mothers

BEATRIZ PRIEL AND AVI BESSER
Ben-Gurion University, Beer-Sheva, Israel

Abstract
We explored the relative contributions of first-time mothers' romantic attachment styles and early relations with their own mothers to the prediction of infant temperamental difficulty. A mediating role for mother’s attachment to the unborn baby was assumed. In a prospective longitudinal study of 115 mothers of healthy babies, a structural model was delineated according to a conception of maternally reported infant temperament as a reflection of basic aspects of the mother's personality and mother-infant relationships. Mothers' experiences with their own mothers as supportive and nonintrusive differentiated between securely and insecurely attached participants. Security of attachment was found to facilitate antenatal attachment and perceptions of the 4-month-old infant as easier. Findings indicate that the effects of the mothers' romantic attachment styles on their perceptions of temperamental difficulty are mediated by their antenatal attachment. Moreover, the pattern of findings obtained suggests a link among mothers’ history of relationships, romantic attachment styles, and caregiving characteristics that is congruent with evolutionary theoretical assumptions.

The basic tenets of attachment theory (Bowlby, 1969, 1973, 1979) are that humans have a propensity toward making strong and affectionate bonds to particular others, and that the mental representations of early experiences with caregivers guide subsequent significant interpersonal relations. These assumptions have spawned a great deal of research on the attachment of infants and children to their parents, and on adult attachment styles in relation to intimate partners. Less is known, however, about the effects of early caretaking experiences on romantic attachment styles, and on mother–child caregiving relationships. In the present study we outline a mediation model of the effects of the history of early relationships and maternal attachment security, as assessed during pregnancy, on perceptions of infant temperament 4 months after birth. Antenatal attachment to the unborn baby was assumed to mediate these effects.

Attachment theory assumes that early infant–mother experiences affect relationships and interpersonal competence during childhood and later on in life; this continuity is assumed to be mediated by internal working models of self and others that intervene in the interpretation of and reac-
tion to new situations (Main, Kaplan, & Cassidy, 1985; van IJzendoorn, 1995). Moreover, parents' early experiences with attachment figures and their internal working models of attachment have been assumed to affect parental sensitivity and interactions with their own children (Bowlby, 1988; Bretherton, 1985). Studies on attachment theory using the Adult Attachment Interview technique provide ample evidence that a parent's insecure state of mind regarding attachment may jeopardize parent–child relations and children's adaptation (Cowan, Cohn, Cowan, & Pearson, 1996; Crowell & Feldman, 1988; Fonagy, Steele, & Steele, 1991; van IJzendoorn, 1995). This research assumes that parents' internal working models of attachment to their own parents shape their own parental behavior and parent–infant relationships.

For instance, Ward and Carlson (1995) reported that security of attachment assessed during pregnancy was associated with maternal sensitivity at 3 and 9 months postnatally. In addition, recent studies report important associations between representations of early relationships with parental figures and the maternal caregiving system (George & Solomon, 1996). It is suggested that the ability to provide protection, which characterizes the caregiving behavioral system, is a mature transformation of earlier relational experiences and their representations (George & Solomon, 1996).

A recently growing body of empirical research based on self-report methods and following Hazan and Shaver's (1987) pioneering work outlined, on theoretical grounds, a classification of adult romantic attachment styles defined by two dimensions: views of self and views of others, with individuals having either positive or negative views in each dimension (Bartholomew & Horowitz, 1991). The positive self appears as lovable and worthy, whereas the negative self is unlovable and unworthy. The positive other is available and responsive, while the negative other is unavailable and rejecting. These dimensions define four attachment styles: secure (positive model of self and others); preoccupied (negative model of self and positive model of others); dismissing (positive model of self and negative model of others), and fearful (negative model of self and others). Attachment styles are characterized by specific strategies to maintain felt security, particularly emotional responses and interpersonal behavior (Griffin & Bartholomew, 1994a). In addition, each attachment style has a unique profile of interpersonal problems (Bartholomew & Horowitz, 1991).

Although adult attachment styles assessed by self-report questionnaires have been found to predict basic aspects of adult romantic interpersonal relationships, little is known about the association between adult attachment styles and mother–infant relationships. A recent study by Rholes, Simpson, and Blakely (1995) provides evidence of the association between maternal adult attachment styles and mothers' feelings of closeness and behavior toward their children. In addition, Rholes, Simpson, Blakely, Lanigan, and Allen (1997) have shown systematic associations between the attachment styles of childless adults and their expectations about themselves as parents, and about their prospective children's characteristics. These studies suggest that self-reported assessments of adult attachment styles to romantic partners may connect to basic issues of parenting.

Belsky and colleagues (Belsky, 1997; Belsky, Steinberg, and Draper, 1991) redefined attachment theory in a manner consistent with modern evolutionary principles, and they developed a theoretical model linking the security of attachment with parents to both romantic attachment styles and child-rearing behavior. From this perspective secure and insecure patterns of attachment evolved as adaptive responses to environmental risk and uncertainty; different attachment styles warrant reproductive fitness under diverse ecological conditions. Accordingly, a secure attachment history predicts harmonious and stable romantic relationships and the ability and willingness to invest in caregiving. In contrast, insecure early patterns of attachment are assumed to promote unstable pair-bonds and hinder
the ability or willingness to invest in offspring (Belsky, 1997; Chisholm, 1996).

Thus, existing research documents important associations between early models of caretaking and parenting capacities on the one hand, and between adult attachment to romantic partners, and parental attitudes and feelings on the other hand. In addition, the evolutionary theoretical perspective suggests that early interpersonal experiences affect later patterns of romantic attachment and caregiving. In the present study, we examined whether adult romantic attachment styles and memories of early relationships with parents were related. The direction of the associations between memories of early relationships and actual attachment styles is unclear as effects may be prospective (early relations may affect later attachment styles) or retrospective (current internal working models may affect recollections of early interpersonal experiences). Taking into consideration the expected associations between them, we explored the effects of these constructs on maternal antenatal attachment and, after birth, on mothers' perceptions of their infants' temperament. We assumed that, despite the conceptual similarities underlying the adult attachment and early relationships constructs, their implications for caregiving might be different: although the early relationships construct includes a full-fledged model of parenthood with the other as caregiver and the self as caretaker, adult romantic attachment implies a more symmetric relation with self and other as both caretaker and caregiver (Simpson, Rholes, & Nelligan, 1992).

The mother's attachment to the unborn baby is a central developmental task in the processes of pregnancy and childbirth. Moreover, maternal prenatal representations of the unborn baby have been found to remain stable and affect the child's security of attachment postpartum (Benoit, Parker, & Zeanah, 1997; Condon, 1993; Fonagy et al., 1991; Slade & Cohen, 1996), and they play a role in maternal emotional regulation (Priel & Besser, 1999). Developmental studies postulate that the emotional attachment to the fetus during pregnancy may be predictive of mother–infant relationships after birth (Fonagy et al., 1991; Benoit & Parker, 1994), and that aspects of parental representations of the infant are present before the infant is born, and may relate to parental interpretations of the child's characteristics and behavior (Mebert, 1989, 1991; Zeanah, Keener, Anders, & Vieira-Baker, 1987). According to this empirical evidence, we assumed antenatal attachment would be associated both with maternal internal models of relationships and mothers’ perceptions of infant temperament.

The evaluation of maternal perceptions of infants' temperamental difficulty has been chosen because of the repeatedly demonstrable predictive value of these perceptions in the study of mother–child interactions and child development (Belsky, 1984; Vaughn et al., 1987; Zeanah, Keener & Anders, 1986; Scher & Mayseless, 1997). Infant temperament has been defined as the “relatively consistent, basic dispositions inherent in the person that underlie and modulate the expression of activity, reactivity, emotionality, and sociability” (Goldsmith et al., 1987, p. 524). Despite the implicit endogenous underpinnings of this definition, maternal reports of an infant's temperamental difficulty have been correlated with maternal demographic characteristics (SES, ethnic origin), personality characteristics (anxiety, aggressiveness, impulsiveness), and maternal child-rearing attitudes assessed prenatally (Sameroff, Seifer, & Elias, 1982; Vaughn et al., 1987). Likewise, Zeanah et al. (1986) have found impressive continuity between prenatal and postnatal maternal descriptions of infant temperament. Moreover, research has emphasized the influence of maternal perceptions of the infant on the mother–infant system: perceptions of the infant as more difficult correlate with diminished maternal stimulation and responsiveness (Bates, Maslin, & Frankel, 1985; Klein, 1984; Nover, Shore, Timberlake, & Greenspan, 1984; Priel, Henik, Dekel, & Tal, 1990).

Even though studies of the association between maternal perceptions of infant
temperament and objectives evaluations of the infant’s behavior offer mixed evidence, recent research (Susman-Stillman, Kal-koiske, Egeland, & Waldman, 1996) documents complex and substantial effects of maternal personality on the relations between an infant’s perceived and objectively assessed temperament and attachment security. Thus, studies of maternal perceptions of infant temperament have corroborated the importance of the mother’s personality and her expectations about the baby for subsequent mother–infant relations. Moreover, beyond the well-documented predictive value of temperament evaluations, recent evidence in the infant attachment literature suggests that maternal personality and behavior may affect the child’s attachment classification via its effect on infant temperament characteristics (Cassidy, 1994; Mangelsdorf, Gunnar, Kastenbaum, Lang, & Andreas, 1990; Steele, Steele, & Fonagy, 1995). On the basis of the extensive research on maternal perceptions of infant temperament, we predicted that the effects of both early interpersonal experiences and adult romantic attachment styles on maternal perceptions of infant temperament would be mediated by antenatal attachment.

To tap the sequence of events and explore directional patterns of effects, we conducted a prospective study, interviewing first-time mothers during their pregnancy and after birth. During pregnancy, we assessed participants’ early relationships with their own mothers, their romantic attachment style, and antenatal attachment to their future child. Maternal assessments of their infants’ temperament were collected 4 months after delivery. The following hypotheses were tested:

H1: We expected participants’ representations of their own mother as caring and supportive, and romantic attachment styles to be related but different constructs.

H2: Mothers’ romantic attachment styles and memories of early experiences with their own mothers were assumed to predict the quality of the mother’s antenatal attachment to her child, and perceptions of her infant’s temperament. Specifically, higher levels of attachment to the unborn baby and perceptions of easier infant temperament were expected among securely attached mothers who had more positive memories of early caretaking.

H3: Early relationships with mother and adult romantic attachment style were predicted to affect maternal perceptions of the infant’s temperament through the mediation of the mother’s antenatal attachment.

Method

Participants

Participants were a sample of pregnant women attending routine checkups at their community Well Baby Clinic in a middle-class, urban area in Israel. Participants were volunteers. We included in our sample only first-time natural pregnancies among married women without previous psychiatric history and without previous miscarriages. High-risk pregnancies were also excluded. Eighty-seven percent of the women we approached agreed to take part in this research. The final sample included only those subjects who subsequently had normal childbirth and healthy babies. Infants’ health status was defined according to their Apgar scores as determined by two consecutive pediatric evaluations. We used Apgar scores of 8 and higher as criteria for normality in newborns (Nelson, 1987). Our original sample included 121 women. Of these, three participants had miscarriages or premature deliveries, two did not agree to take part at Time 2, and one participant left the area. The final sample included 115 participants, with a mean age of 25.22, SD = 3.56, and 10 to 19 years of formal education (M = 13.30, SD = 1.70).

Measures

Attachment style. The Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991) was used to assess adult romantic attachment style. The RQ is an adaptation of the Hazan and Shaver (1987) three-paragraph Attachment measure. The RQ con-
Mothers' attachment and infant temperament

sists of four short paragraphs, each describing a prototypical attachment pattern (i.e., secure, preoccupied, fearful-avoidant, and dismissing-avoidant). Participants were asked to select the paragraph that described them most accurately (Bartholomew & Horowitz, 1991). The construct validity of this measure has been demonstrated (Griffin & Bartholomew, 1994b).

Relationships with mother. The Parental Attachment Instrument (PBI; Parker, Tulping, & Brown, 1979) is a 25-item self-reported measure of participants' memories of parental behaviors and attitudes. In the present study, we used the Mother Scale. The PBI yields two scores, one for care and one for overprotection. These variables stem from two bipolar factors, with 12 items assessing care versus indifference and rejection, and 13 items assessing overprotection versus allowance of autonomy and independence. These variables are defined according to Bowlby's basic conceptualization of good parenthood as responsiveness to the child's desire for love and protection on the one hand, and respect for the child's desire to explore and extend his or her relationship with the environment on the other (Parker, 1983a, 1983b). In a recent overview of the psychometric properties of this inventory, Parker (1994) reported relatively high test-retest reliability over a period of 10 years, with levels of agreement of .68 and .62 for Care and Overprotection, respectively (Wilhelm & Parker, 1990).

Maternal Antenatal Attachment Scale (MAAS). Maternal antenatal attachment was assessed using the Maternal Antenatal Attachment Scales (MAAS) (see Condon & Corkindale, 1997). The scale focuses specifically on attitudes, feelings, and behaviors toward the fetus rather than the pregnancy state or maternal role. This scale consists of 19 items with two underlying dimensions: the quality of, and the preoccupation with, attachment. The first dimension assesses affective experiences, such as closeness, tenderness, and positive feelings about the fetus, a desire to know about it, as well as vivid internal representations of the future baby. The second dimension assesses the intensity of preoccupation with the fetus and the intensity of feeling, including the amount of time spent thinking about, talking to, and dreaming about the unborn baby. Participants' responses are made on 5-point scales, with higher values indicating greater antenatal attachment.

Infant temperamental difficulty. The Revised Infant Temperament Questionnaire (ITQ-R; Carey, 1970; Carey & McDevitt, 1977) was used to assess maternal perceptions of infant temperament. The ITQ-R is a screening device for temperament in infants. It consists of 95 statements that describe specific behaviors of the infant in everyday situations. The ITQ-R measures nine temperament dimensions corresponding to the domains identified by Thomas and Chess (1977): activity, rhythmicity, approach, adaptability, intentionality, persistence, distractibility, threshold, and mood. Temperament difficulty is characterized by arrhythmicity, withdrawal, high intensity, slow adaptability, and negative mood (Carey, 1977; Vaughn et al., 1987).

Procedure

A longitudinal design was utilized. Participants who fulfilled the demographic and clinical criteria completed self-report measures during the last trimester of their pregnancy (Time 1, M = 26.10 weeks, SD = 7.22) and 16 weeks after childbirth (Time 2). At Time 1, participants completed the maternal scale of the Parental Attachment Instrument (PBI), the Relationships Questionnaire (RQ), and the Maternal Antenatal Attachment Scales (MAAS). At Time 2, participants completed the Revised Infant Temperament Questionnaire (ITQ-R).

Results

Descriptive statistics and preliminary analyses

In the present sample, the distributions of attachment styles were as follows: 52
(45.22%) participants defined themselves as secure, 24 (20.87%) as fearful, 12 (10.43%) as preoccupied, and 27 (23.48%) as dismissing. In their original sample, Bartholomew and Horowitz (1991) reported 47%, 21%, 18%, and 14% of secure, fearful, preoccupied, and dismissing participants, respectively. None of the differences between the proportions of individuals in each attachment style group for the two independent samples were statistically significant.

To explore differences involving demographic variables, a multivariate analysis of variance (MANOVA) was performed, with Attachment Styles as independent variables and the age and formal education of the participants as dependent variables. Differences were not significant ($F[3,111] = 1.15, \text{ns}$ for age, and $F[3,111] = 2.32, \text{ns}$ for education).

**Differences between attachment style groups**

Table 1 presents the means, standard deviations, and univariate $F$ statistics of the scores on the Antenatal Attachment scales for each romantic Attachment Style group. A MANOVA, treating the four attachment groups (secure, preoccupied, fearful, and dismissing) as independent variables and Quality of attachment and Preoccupation about the unborn baby as the dependent variables showed significant effects for Attachment Style on Antenatal Attachment (Wilks $\lambda [6,220] = .54, p < .0001$), with secure participants reporting a strong sense of attachment to their unborn infants. As can be seen in Table 1, group differences for the Quality variable were more robust than were differences for the Preoccupation variable. Table 1 shows that planned comparisons between secure and insecure attachment groups were significant for both the Quality and the Preoccupation scales of the Antenatal Attachment Questionnaire.

Additionally, post hoc comparisons showed that the four groups were significantly different from each other on the Quality of attachment variable with the exception of the comparison between fearful and dismissing participants. Post hoc comparisons involving the Preoccupation variable, however, showed three significant differences (between secure and preoccupied, secure and dismissing, and fearful and preoccupied participants) and three nonsignificant mean differences (between secure and fearful, fearful and dismissing, and preoccupied and dismissing participants).

A MANOVA with Attachment Styles as independent variable and the five temperament scales that define Temperamental Difficulty (high intensity, arrhythmicity, slow adaptability, low approach, and negative mood) as dependent variables showed significant differences (Wilks $\lambda [15,295] = .42, p < .0001$; see Table 2), with secure participants reporting perceptions of the infant as being easier. While the planned comparison between secure and insecure participants showed significant differences, post hoc comparisons between attachment groups showed mixed results, especially when pairs of insecure groups were compared (see Table 2).

To evaluate attachment group differences in relation to reported memories of maternal Care and Overprotection, a MANOVA was performed with the four attachment groups as independent variables and the PBI scales as dependent variables (see Table 3). This analysis showed significant differences (Wilks $\lambda [6,220] = .77, p < .0001$). Planned comparisons show that securely attached women reported receiving significantly more maternal Care and less maternal Overprotection. Post hoc comparisons showed that securely attached participants differed significantly from all the insecure attachment groups on the maternal Care variable. As for the maternal Overprotection variable, securely attached participants were significantly lower than fearful and dismissing individuals, but they did not differ significantly from preoccupied participants. The significance of the differences between the insecure attachment styles was mixed, as can be seen in Table 3.
Table 1. Means, standard deviations, univariate F values, and post hoc comparisons of antenatal attachment

<table>
<thead>
<tr>
<th>Antenatal Attachment Scales</th>
<th>I Secure</th>
<th>II Fearful</th>
<th>III Preoccupied</th>
<th>IV Dismissing</th>
<th>Planned Comparison</th>
<th>Post hoc Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>I ≠ II + III + IV</td>
<td>F(3,111)</td>
</tr>
<tr>
<td>Quality</td>
<td>47.81 (2.58)</td>
<td>44.75 (3.04)</td>
<td>39.17 (4.76)</td>
<td>43.26 (3.82)</td>
<td>28.09***</td>
<td>74.0***</td>
</tr>
<tr>
<td>Preoccupation</td>
<td>28.81 (4.21)</td>
<td>28.38 (6.40)</td>
<td>24.58 (4.56)</td>
<td>26.22 (4.39)</td>
<td>3.59*</td>
<td>6.74**</td>
</tr>
</tbody>
</table>

Note: N = 115. Standard deviations are in parentheses.
* p < .05, ** p < .01, *** p < .001.

Table 2. Means, standard deviations, univariate F values, and post hoc comparisons of temperamental difficulty

<table>
<thead>
<tr>
<th>Temperamental Difficulty</th>
<th>I Secure</th>
<th>II Fearful</th>
<th>III Preoccupied</th>
<th>IV Dismissing</th>
<th>Planned Comparison</th>
<th>Post hoc Comparisons</th>
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<td>I ≠ II + III + IV</td>
<td>F(3,111)</td>
</tr>
<tr>
<td>Rhythmicity</td>
<td>4.41 (.47)</td>
<td>4.04 (.42)</td>
<td>4.01 (.56)</td>
<td>3.37 (.66)</td>
<td>23.82***</td>
<td>36.26***</td>
</tr>
<tr>
<td>Approach</td>
<td>4.00 (.43)</td>
<td>3.64 (.37)</td>
<td>3.50 (.48)</td>
<td>3.70 (.35)</td>
<td>8.13***</td>
<td>24.24***</td>
</tr>
<tr>
<td>Adaptability</td>
<td>4.41 (.48)</td>
<td>4.33 (.52)</td>
<td>3.73 (.83)</td>
<td>4.04 (.43)</td>
<td>7.39***</td>
<td>14.55***</td>
</tr>
<tr>
<td>Intensity</td>
<td>2.91 (.64)</td>
<td>3.30 (.68)</td>
<td>3.36 (.58)</td>
<td>3.62 (.75)</td>
<td>7.01***</td>
<td>15.54***</td>
</tr>
<tr>
<td>Mood</td>
<td>3.23 (.98)</td>
<td>2.80 (.65)</td>
<td>3.22 (.83)</td>
<td>2.49 (.78)</td>
<td>4.91**</td>
<td>5.4*</td>
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</table>

Note: N = 115. Standard deviations are in parentheses.
* p < .05, ** p < .01, *** p < .001.
*Higher scores indicate that the infant is perceived as more Rhythmic, more Approachable, more Adaptable, more Intense, and has a more Positive Mood.
Table 3. Means, standard deviations, univariate F values, and post hoc comparisons of early relationship scales

<table>
<thead>
<tr>
<th>Early Relationship</th>
<th>I Secure</th>
<th>II Fearful</th>
<th>III Preoccupied</th>
<th>IV Dismissing</th>
<th>F(3,111)</th>
<th>F(1,111)</th>
<th>I ≠ II + III + IV</th>
<th>Post hoc Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Care</td>
<td>31.9 (4.93)</td>
<td>27.04 (7.03)</td>
<td>22.67 (8.45)</td>
<td>24.89 (8.79)</td>
<td>10.08***</td>
<td>25.85***</td>
<td>.005</td>
<td>.000</td>
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<tr>
<td>Maternal Overprotection</td>
<td>9.69 (4.82)</td>
<td>13.29 (6.77)</td>
<td>12.83 (5.42)</td>
<td>12.85 (8.12)</td>
<td>2.75*</td>
<td>7.58**</td>
<td>.02</td>
<td>ns</td>
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Note: N = 115. Standard deviations are in parentheses.
* p < .05. ** p < .01. *** p < .001.
Correlations among study variables

Table 4 presents the correlations, means, and standard deviations of all the continuous variables in the study. Table 4 shows that the Care dimension of Early Relationship representations and the Quality dimension of Antenatal Attachment correlated moderately and in the expected directions with maternal perceptions of infant temperamental difficulty. The Overprotection scale of the PBI correlated negatively with perceptions of the infant as rhythmic and approaching, and positively with perceptions of the infant as intense. In addition, we found, as expected, negative correlations between the maternal Care and maternal Overprotection dimensions of the PBI, and a significant, though weak, positive correlation between the Quality and Preoccupation scales of the MAAS. The Rhythmicity, Approach, Adaptability and Intensity scales of the Difficult Temperament construct were significantly intercorrelated in the expected directions; the Mood scale was not associated with them.

The mediation model

Does Antenatal Attachment mediate the effects of Early Relationships with mother and romantic Attachment Styles on maternal perceptions of infant temperament? We explored this question using a structural equations modeling (SEM) strategy that allowed us to evaluate simultaneously both the direct and mediated effects of Early Relationships and Attachment Style on Antenatal Attachment and perceptions of infant Temperament, while assessing measurement errors in the dependent and independent variables. All SEM analyses were performed with the AMOS software (version 3.61, Arbuckle, 1994) using the maximum-likelihood method. The means, standard deviations and correlation matrix of the variables in this analysis are presented in Table 4. In the following analyses we first tested the measurement model, we next analyzed the direct effects and the total effects, and we then specified the final model.

Analysis of the measurement model. We analyzed a single measurement model, applied to all cases in both groups (secure and insecure participants), delineating all the associations between observed and latent variables. The measurement model included three latent variables: Early Relationships, assessed by two indicators: Maternal Care and Maternal Overprotection; Antenatal Attachment, measured by the indicators Quality and Preoccupation; and infant Temperament Difficulty, assessed by five indicators: Intensity, Rhythmicity, Approach, Adaptability, and Mood (once again, difficult temperament is defined by high intensity, low rhythmicity, slow adaptability, withdrawal, and negative mood). This measurement model also included the romantic Attachment Style categorical predictor, a dummy code with the secure group coded “1” and the insecure group coded “0.”

We allowed for the indicators’ error terms to correlate in the latent variables, except for Temperament Difficulty. This model provided a good fit to the data ($\chi^2[30, N = 115] = 34.16, p = .27, GFI = .95, AGFI = .90, CFI = .97$). Following the modification indices described by Jöreskog and Sörbom (1985), we then controlled for the correlations between the error terms of Approach with Rhythmicity with Mood. The model specified fitted the observed data ($\chi^2[28, N = 115] = 18.27, p = .92, GFI = .97, AGFI = .94, CFI = 1$). Results from the $\chi^2$ test of the differences between the two measurement models indicated that the last model significantly improved the fit to the data ($\chi^2\text{diff}[2, N = 115] = 15.89, p < .001$). After verifying the acceptability of the measurement constructs, as recommended

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1. Allowing for all the possible intercorrelations of the error terms among the five indicators of Temperament Difficulty results in 0 degrees of freedom. As ours is a confirmatory model, it did not seem reasonable to select, in an exploratory way, some intercorrelations between errors, and not the others. Moreover, the arbitrary selection of intercorrelations between error terms might produce a misleading improvement of the overall fit (see Hoyle & Smith, 1994).
Table 4. Correlations, means, and standard deviations for the study variables

<table>
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<tr>
<th>Variables</th>
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<td>Early Relationship</td>
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<td>1. Maternal Care</td>
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<td>.23**</td>
<td>-.23**</td>
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<td>28.28</td>
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<td>2. Maternal Overprotection</td>
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<td>-.24**</td>
<td>-.19*</td>
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<td>3. Quality</td>
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<td>4. Preoccupation</td>
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<td>5. Rhythmicity</td>
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<td>6. Approach</td>
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<td>7. Adaptability</td>
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<td>8. Intensity</td>
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Note: N = 115 (two-tailed test).

aHigher scores indicate that the infant is perceived as more Rhythmic, more Approachable, more Adaptable, more Intense, and has a more Positive Mood.

* p < .05. ** p < .01. *** p < .001.
Mothers' attachment and infant temperament

by Anderson and Gerbing (1988), we proceeded to test structural models. In all subsequent analyses, we allowed the error terms between Approach and Rhythmicity and Approach and Mood to correlate.

Analysis of the direct effects. Following Baron and Kenny's (1986) recommendations, in order to test for mediation, we estimated first the direct effects between the Attachment Style group code and the Early Relationships and Temperament Difficulty latent variables; we thereupon explored the combined direct effects of Early Relationships and Attachment Style on Temperament Difficulty. This model controlled for the associations between the Early Relationships and the Attachment Style groups. This model (see Fig. 1) provided a plausible fit to the observed data ($\chi^2[16, N = 115] = 14.44, p = .57, GFI = .97, AGFI = .93, CFI = 1$), showing that securely attached participants perceived their infants as easier, even after controlling for the effects of their own Early Relationships ($t = -2.31, p < .01$). As can be seen in Figure 1, higher maternal Care and lower maternal Overprotection scores were associated with perceptions of the infant as easier ($t = -2.28, p < .01$). This direct effects model accounted for 39% of the variance in perceptions of the infant's Temperament Difficulty.

Analysis of mediation. We assumed that Early Relationships with one's own mother and romantic Attachment Style should affect perceptions of Temperament Difficulty through the mediation of Antenatal Attachment. We first specified a complete mediation model that included one mediating latent variable: Antenatal Attachment. The two exogenous predictors were the latent variable Early Relationships, and the observed categorical variable Attachment Style. Temperament Difficulty was the dependent latent variable. This model included direct paths between Early Relationships and Infant Temperament and between Attachment Styles and Infant Temperament, as well as their indirect effects through Antenatal Attachment (see Fig. 2).

The specified mediation assumed that positive Early Relationships (high Care and low Overprotection) should be associated with higher scores on Antenatal Attachment, which, in turn, should be associated with perceptions of infant's temperament as being easier. In addition, we assumed that the differences between secure and insecure mothers' perceptions of Temperament Difficulty would be mediated by the strength of their Antenatal Attachment. This model (see Fig. 2) provided a good fit to the data ($\chi^2[28, N = 115] = 18.27, p = .92, GFI = .97, AGFI = .94, CFI = 1$), accounting for 30% of the variance of Antenatal Attachment and 57% of the variance of perceptions of Temperament Difficulty.

Baron and Kenny (1986) proposed that mediation has occurred when the indirect effect of a predictor through a mediator significantly reduces the predictor's direct effect. As can be seen in Figure 1, the direct path from Attachment Style to Temperament Difficulty, while controlling for Early Relationship, was significant (path coefficient = -.29, $t = -2.31, p < .01$). In Figure 2, however, this path approached 0 (path coefficient = -.06, $t = -2.24, ns$). The drop in the coefficient, once the mediating variable was controlled, was significant according to Sobel's test (Baron & Kenny, 1986): $z = -2.06, p < .05$. Thus, Antenatal Attachment is an almost full (though not necessarily exclusive) mediator of the difference between secure and insecurely attached mothers' perceptions of infant Temperament Difficulty. However, when we compared the paths from Early Relationships to Temperament Difficulty (see Figs. 1 and 2), we found that Antenatal Attachment did not mediate the effects of Early Relationships on Temperament Difficulty. As can be seen in Figure 2, the direct path from Early Relationships to Temperament Difficulty had remained significant (path coefficient = -.41, $t = -2.13, p < .01$) and the mediating path through Antenatal Attachment was nonsignificant (path coefficient = .11, $t = .59, ns$).
To obtain the most parsimonious model, we modified the model presented in Figure 2, following Bentler and Mooijaart (1989), by removing statistically nonsignificant structural paths. We removed the direct path from Early Relationships to Antenatal Attachment as well as the direct path from Attachment Style to Temperament Difficulty;
the more parsimonious model fit the data very well ($\chi^2[30, N = 115] = 18.65, p = .95$, $GFI = .97, AGFI = .94, CFI = 1$), accounting for 31% and 59% of the variances of Antenatal Attachment and Temperament Difficulty, respectively. Thus, this last model fit

Figure 2. Direct and indirect effects of attachment style and early relationships through antenatal attachment. Standardized maximum likelihood parameter estimates for structural model. Bold estimates are statistically significant. Large circles represent latent constructs, small circles represent residual variances, bi-directional arrows reflect correlations, and unidirectional arrows depict hypothesized directional, or “causal,” links.
was similar to the fit of the model presented in Figure 2.

Figure 2 shows that, contrary to our expectations, the Early Relationships construct was not associated with Antenatal Attachment. A plausible explanation for this null (unexpected) result is that the assumed effects of Early Relationships on Antenatal Attachment are themselves mediated by romantic Attachment Styles. If this is the case, then recollections of parental caring should predict attachment security, which, in turn, will affect antenatal attachment; hence, the direct path from Early Relationships to Antenatal Attachment should be nonsignificant when entering romantic Adult Attachment into the model, which is the finding represented in Figure 2. To test this possibility, we defined a simplified model that included only the direct ef-

![Figure 3. Direct effect of early relationships on antenatal attachment. Standardized maximum likelihood parameter estimates for structural model. Bold estimates are statistically significant. Large circles represent latent constructs, small circles represent residual variances, bi-directional arrows reflect correlations, and unidirectional arrows depict hypothesized directional, or “causal,” links.](image-url)
The direct path from Early Relationships to Antenatal Attachment was .46 \( (t = 2.01, p < .01) \), explaining 21% of the variance in Antenatal Attachment. The model demonstrated an adequate fit to the data \( (\chi^2 = 115, GFI = .55, AGFI = .98, CFI = 1) \). We then specified a mediation model with the Early Relationships latent variable as predictor, the dummy-coded Attachment Style variable as mediator, and the Antenatal Attachment latent variable as the dependent variable (see Fig. 4). This model demonstrated an adequate fit \( (\chi^2 = 115, GFI = .88, AGFI = 1, CFI = 1) \) and explained 28% of the variance in Antenatal Attachment.

In this model the direct path from romantic Attachment Style to Antenatal Attachment was found to be significant \( (path\ coefficient = .48, t = 3.40, p < .001) \), whereas the path from Early Relationships to Antenatal Attachment decreased to .10 \( (t = .57, ns) \). The intercorrelation between Early Relationship and romantic Attachment Style remained significant, as in models 1 and 2 \( (path\ coefficient = .45, t = 3.27, p < .001) \). However, the drop in the path coefficient from .46 (see Fig. 3) to .10 (see Fig. 4) was found to be nonsignificant \( (z = .55, ns) \). Thus, romantic Attachment Style does not seem to significantly mediate the Early Relationships/Antenatal Attachment link.

**Discussion**

We explored mothers’ antenatal attachment to their unborn children and their perceptions of infants’ temperamental difficulty (postpartum), from the perspective of the mothers’ own internal models of early and romantic relationships. This study is one of the first to support empirically the assumption that adult romantic attachment styles are relevant to mother–infant relationships. This evidence is provided by the significant mean differences that were obtained in comparisons between securely and insecurely attached participants, as well as by the mediation model that was tested.

**Comparing secure versus insecure mothers**

Our findings documented significant differences between secure and insecure subgroups of participants. For example, mean differences between secure and dismissing mothers were significant for all the variables in the study, indicating that the latter group had significantly more negative recollections of early relationships with their mothers, were less attached to their unborn babies, and perceived their infants as more difficult postpartum, than secure mothers did. Dismissing mothers seem to elude the closeness and intimacy often associated with child-rearing, in accordance with Bowlby’s (1988) characterization of the difficulties that anxious-avoidant individuals have in maintaining close, long-term relationships. Moreover, recent studies by Rholes et al. (1995, 1997) reported that insecure attachment styles in general, and anxious-avoidant or dismissing individuals in particular, have a less close and less supportive orientation toward children.

Important differences were also obtained when comparing secure with preoccupied mothers. Compared to secure, preoccupied mothers reported less positive experiences with their own mothers (i.e., felt them to be significantly less caring and supportive; see Table 3), but did not report significantly more negative experiences with them (i.e., did not report more maternal rejection or indifference). As to perceptions of infant temperamental difficulty, compared with secure mothers, preoccupied mothers perceived their babies as more difficult according to four of the five temperament criteria used; however, they did not perceive their baby’s mood as more negative. The partial similarities found between preoccupied and secure mothers may reflect the positivity of the model of others that both groups share in common. These findings are congruent with reports of relatively “mixed” positive and negative
Early romantic attachment style.

Figure 4. Direct and indirect effects of early relationships on antenatal attachment through attachment styles. Standardized maximum likelihood parameter estimates for structural model. Bold estimates are statistically significant. Large circles represent latent constructs, small circles represent residual variances, bi-directional arrows reflect correlations, and unidirectional arrows depict hypothesized directional, or "causal," links.

findings for anxious-ambivalent or preoccupied individuals; a plausible corollary of these findings is the unpredictability that characterizes mother–child relations of anxious-ambivalent infants, with oscillations between periods of maternal responsiveness and lack of responsiveness (Ainsworth, Blehar, Waters, & Walls, 1978). Although comparisons of the attachment security/insecurity dimension showed
a rather consistent pattern of findings, differences between insecure groups themselves did not reveal clear trends. This pattern of findings underscores the relevance of the attachment security/insecurity dimension during the transition to motherhood. Probably during a developmental period when basic issues of self-identity and self-other differentiation are at stake (Ruble et al., 1990), individuals with positive internal models of both self and other may adapt considerably better, at least during the short and stressful period that we investigated.

The mediating role of antenatal attachment

The main aim of the present research was the exploration of Antenatal Attachment as a mediator of the effects of first-time mothers' romantic Attachment Style and Early Relationships with their own mothers on their perceptions of infant Temperament Difficulty. Our findings fully supported the predicted mediating model for romantic Attachment Styles. However, Antenatal Attachment did not mediate the effects of Early Relationships on Temperament Difficulty. Moreover, the association between Early Relationships and Antenatal Attachment was considerably weakened when controlling for the mothers' romantic Attachment Styles.

The mediating role played by the mothers' sense of attachment to their unborn baby is of special interest, as this is a construct not affected by infants' actual characteristics or behavior, but can only be construed according to the mothers' a priori beliefs and expectations. Antenatal attachment seems to play an important transitional role related both to maternal well-being and to the establishment of emotional ties with infants. Higher antenatal attachment scores predict considerably fewer postpartum depressive symptoms (Condon, 1993; Condon & Corkindale, 1997; Priel & Besser, 1999) and discriminate between secure and insecure infants (Benoit et al., 1997). Our findings suggest that mothers structure their imaginary relationship with the unborn baby following the security/insecurity pattern of their current relationships with their partner. These results corroborate previous findings showing that representations of the unborn baby present strong similarities to maternal descriptions of the baby's father (Ammaniti et al., 1992).

The specific significance of antenatal attachment is further elucidated by the complex associations found between this construct and the mothers' representations of their own mothers as caregivers. The latter representations affected mothers' perceptions of their real infant, but did not add significantly to the explanation of variations in antenatal attachment, beyond the effects of romantic attachment style. The differential effects on antenatal attachment found for romantic Attachment Styles and Early Relationships suggest a selective activation of models of attachment to different others during the transition to motherhood. The enhanced importance of romantic attachment styles and the relative disregard of early relationships representations in the mothers' constructions of antenatal attachment might be understood as related to the preoccupation with issues of self-identity and self-definition that characterize the transition to motherhood (Ruble et al., 1990; Priel & Besser, 1999).

The developmental effort to install a self-identity as mother may guide first-time pregnant women's concentration more in their current patterns of romantic attachment and less in mother–daughter relationships. After the child is born, and motherhood is a reality, mothers' early relationship representations seem to regain relevance.

At this point it is important to remind readers that this picture is a much more complex one because Early Relationships and Romantic Attachment Styles are presumably causally associated constructs, at least to some extent. The key role played by romantic Attachment Style in the transition to motherhood and the creation of the mother–infant bond corroborates the theo-
retical evolutionary perspective that romantic Attachment Styles “translate” early experiences of caretaking into caregiving expectations and capacities in adulthood (Belsky, 1997).

We would like to emphasize that the confirmation of the importance of internal working models of relationships with significant others on maternal perceptions of infants’ temperament does not necessarily deny the importance of actual, inborn differences in infants’ behaviors. Assuming inborn individual differences, our findings have focused on the effects of the quality of maternal responsiveness on the organization of the infant–mother system. Susan-Stillman and colleagues (1996) and van den Boom (1989) have provided evidence that maternal sensitivity mediates the relations between temperament and the child’s attachment classification. Accordingly, the associations found across different types of relationships—mothers’ current security of attachment, their antenatal attachment to the unborn baby, and their positive perceptions of their infants’ temperament—may explain the differences in maternal capacities for sensitive responsiveness.

Implications for attachment theory

Conclusions derived from this study could have two main implications for attachment theory. First, they strengthen current thinking about the coexistence of multiple working models of attachment (Hazan & Shaver, 1994) that might be activated differentially according to contextual changes and/or developmental processes. Already Bowlby defined two different influences (or attachment representations) that led to a mother’s style of mothering: “the amount of emotional support, or lack of it, she herself is receiving at the time . . . and the form of mothering she herself received as a child” (Bowlby, 1988, p. 126). Some of the associations and differences between the early and current models of attachment during the transition to motherhood have been discussed.

Our findings may also contribute to the understanding of the mechanisms involved in the intergenerational transmission of attachment styles. Parental sensitive responsiveness is assumed to be the main mechanism through which attachment security is transmitted. However, an extensive meta-analytic study of the intergenerational transmission of attachment security shows that the parents’ history of attachment explains only 12% of their sensitive responsiveness (van IJzendoorn, 1995, p. 398). Based on the evolutionary models of attachment presented (Belsky, 1997; Chisholm, 1996) and on the present study findings, one might speculate that the parents’ romantic attachment style and antenatal attachment might contribute significantly to the understanding of parents’ responsiveness and investment in caregiving.

Finally, two caveats should guide the interpretation of these findings. First, the present study provides a limited picture of the long and dynamic process of mother–infant relationships, and assessments made during a very specific period in first-time mothers’ lives may not be stable. In this context, a more specific limitation relates to the relative stability of perceptions of temperament among secure versus insecure mothers; already in the late 1970s, Ainsworth et al. (1978) reported that anxious-ambivalent (preoccupied) mothers tend to be rather unstable in their relations to the child; this instability may affect perceptions of infant temperament as well. Moreover, stability may constitute a main explanatory dimension in mother–infant relations research.

Second, this research does not directly answer questions related to the objective behavioral characteristics of babies of secure and insecure mothers, nor to the actual caring behavior of these mothers. However, the present findings about the relevance of adult attachment styles for the study of mother–child relationships may warrant further longitudinal and observational research in this area.
References


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