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Parental Beliefs, Infant Temperament, and Marital Quality: Associations with Infant-Mother and Infant-Father Attachment

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Abstract

The present research examined parental beliefs about the importance of the paternal caregiving role, mothers' and fathers' reports of infant temperament, and observed marital quality as predictors of infant-mother and infant-father attachment security, over and above the effects of parental sensitivity. Infants' attachment security to mothers and fathers were observed in the Strange Situation at 12- and 13-months, respectively ($N = 62$ two-parent families). Hierarchical regression models revealed that mothers who viewed the paternal caregiving role as important were less likely to have securely attached infants, but only when infant fussiness was high. Additionally, fathers who viewed the paternal caregiving role as important were more likely to have securely attached infants, but only when infants' fussiness or marital quality was high.

Keywords

attachment; beliefs about the paternal role; child temperament; fathers; sensitivity; marital quality

Attachment theory developed by Bowlby (1969/1982) highlights the influence of early, close relationships between the infant and caregiver. Secure infant-caregiver attachment relationships provide good foundations for children's later socio-emotional development, including greater social competence (NICHD ECCRN, 2006), conscience development (Kochanska, 1997), and fewer internalizing and externalizing problems (Lyons-Ruth, Easterbrooks, & Cibelli, 1997). The positive associations between secure attachment and

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later functioning highlight the need to understand the origins of attachment relationships: what contributes to individual differences in attachment security? According to Bowlby (1969/1982), the quality of early care that infants receive has important implications for the development of attachment security (see also Ainsworth, Blehar, Waters, & Wall, 1978). Based on meta-analyses, however, the effect size was only modest for the association between maternal sensitivity and infant-mother attachment security (De Wolff & van IJzendoorn, 1997), and even smaller for paternal sensitivity and infant-father attachment security (van IJzendoorn & De Wolff, 1997). As noted by a number of researchers, it is important to examine other factors that explain the remaining variance in infant-parent attachment relationships (Belsky & Fearon, 2008; Cowan, 1997).

Although it has been well-documented that infants form attachment relationships with fathers as well as with mothers (Lamb, 2002; Parke, 2002), most of the past research examining the antecedents of infant-parent attachment relationships has focused on infant-mother dyads. The role of fathers as attachment figures, however, should not be underestimated, as recent research has found that father involvement is associated with a range of favorable child outcomes (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000; Pleck & Masciadrelli, 2004). To date, attachment theory has not yet provided a thorough conceptual framework for examining the antecedents of infant-father attachment (Cabrera, Fitzgerald, Bradley, & Roggman, 2007). Moreover, previous research has viewed the development of infant-father relationships largely through the conceptual lens of infant-mother attachment (e.g., Belsky, 1996; Braungart-Rieker, Courtney, & Garwood, 1999; Cox, Owen, Henderson, & Margand, 1992; Lundy, 2003; Notaro & Volling, 2000; Owen & Cox, 1997; Schneider-Rosen & Rothbaum, 1993; Schoppe-Sullivan et al., 2006; Volling & Belsky, 1992). Consequently, our conceptual framework drew upon the fathering research as well as the determinants of infant-parent attachment relationships model (Belsky & Isabella, 1988), which emphasizes the multiple and interacting effects of characteristics within the family. The present study examined parent (i.e., beliefs about the importance of the paternal caregiving role), infant (i.e., temperament), and family (i.e., marital quality) characteristics associated with both infant-mother and infant-father attachment relationships, over and above the effects of parental sensitivity.

Parent Beliefs about the Importance of the Paternal Caregiving Role

Fathers' quality of involvement has important implications for infant-father attachment. Caldera (2004), for example, found that fathers who reported greater engagement in child caretaking tasks also described their infants as more secure using the Attachment Q-Set. Similarly, Cox et al. (1992) found that fathers' observed positive interactions with infants were associated with greater infant-father attachment security in the Strange Situation. Among preschool-aged children, Brown, McBride, Shin, and Bost (2007) found that fathers' involvement combined with other factors to predict children's attachment security using the Attachment Q-Set. It is possible that fathers' beliefs regarding the importance of the paternal caregiving role may be especially important in shaping their future caregiving involvement. Indeed, past research has documented associations between paternal attitudes and observed paternal activity (Beitel & Parke, 1998; Palkovitz, 1984) as well as reported father involvement (Rane & McBride, 2000). Though understudied, fathers' attitudes about the

parenting role may be important in fostering secure infant-father attachment relationships (Cox et al., 1992). Perhaps fathers who view the paternal caregiving role as important are more prepared for the fathering role and provide better quality of care, and therefore are more likely to have securely attached infants. Following previous research, we expected that fathers who viewed the paternal caregiving role as important would be more likely to have infants who were securely attached to them.

Although women's participation in the workforce has increased, some mothers may still feel ambivalent about fathers' involvement in caregiving and therefore may be reluctant to involve fathers in caregiving activities (Dienhart & Daly, 1997). Other mothers, in contrast, may view the paternal caregiving role as important, and thereby encourage paternal involvement and share caregiving responsibility with fathers. Although some researchers have suggested that low scores on measures of beliefs about the paternal role represent a proxy for maternal gatekeeping (e.g., Allen & Hawkins, 1999; De Luccie, 1995), recent studies examining mothers' beliefs and actual gatekeeping behaviors have found little convergence between the two methodologies (e.g., Schoppe-Sullivan, Brown, Cannon, Mangelsdorf, & Sokolowski, 2008). Whether or not these beliefs truly reflect maternal gatekeeping, it is still possible that mothers who think the paternal caregiving role is less important are more prepared to be responsible for the majority of caregiving tasks without relying on fathers' help. To our knowledge, the present study is the first to investigate the association between mothers' beliefs about the importance of the paternal caregiving role and infant-mother attachment security.

Infant Temperament

In the past, researchers have debated about the association between infant temperament and attachment relationships. On the one hand, some researchers have argued that individual differences seen in Strange Situation behavior reflect infants' susceptibility to distress, and therefore attachment security is a manifestation of infant temperament (Buss & Plomin, 1986). Other researchers have argued that attachment and temperament are orthogonal constructs (Sroufe, 1985). Research evidence examining the temperament-attachment association seems to be mixed. Some studies have documented direct associations between more extreme levels of difficult temperament and insecure attachment in high risk samples (van den Boom, 1994). Other studies found no direct association between temperament and attachment security/insecurity (Sroufe, 1985). Further, although Belsky and Rovine (1987) have argued some attachment groups (i.e., insecure-resistant group [C] and two of the secure subgroups [B₃ and B₄]) are more prone to distress than other groups (i.e., insecure-avoidant group [A] and two of the secure subgroups [B₁ and B₂]), the results of other investigations have also been mixed. Some researchers have reported significant differences between the subgroups in some temperamental dimensions (e.g., Braungart-Rieker, Garwood, Powers, & Wang, 2001), but others have found no differences (e.g., Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990).

Taken together, perhaps the best way to understand the temperament-attachment association is to consider temperament x family environment interaction as suggested by Thomas and Chess's (1977) *goodness-of-fit* model (see also Mangelsdorf & Frosch, 2000; Vaughn, Bost,

& van IJzendoorn, 2008). According to this model, a good fit between child temperament and parental or contextual characteristics is important to foster a secure attachment relationship. Crockenberg (1981), for example, found that mothers who received low social support were less likely to have securely attached infants, but only when infants were high in irritability. In another study, Mangelsdorf and colleagues (1990) found that lower maternal constraint (i.e., rigidity) was associated with secure infant-mother attachment relationships, but only when the infants were prone to distress. These examples together provide a rationale for testing whether the interaction between parental beliefs and infant temperament explained variation in attachment security. We speculated that when faced with fussy infants, fathers who viewed the paternal caregiving role as important would provide a good fit for these infants' development of greater attachment security.

Marital Quality

A number of studies have documented associations between the quality of marital relations and infant-parent attachment security. In general, greater marital harmony and satisfaction and lower marital conflict are associated with greater attachment security to mothers (e.g., Howes & Markman, 1989) and fathers (e.g., Owen & Cox, 1997). The quality of marital relations is expected to have direct and indirect effects on attachment security. On the one hand, Davies and Cummings's (1994) emotional security hypothesis suggests that infants exposed to greater marital conflict are more likely to develop insecure attachment relationships with their parents, independent of their parents' sensitivity. Other researchers have proposed a mediational path, such that parents who are in more conflicted marriages are less likely to provide sensitive care for their infants, which in turn undermines attachment security (Belsky & Jaffee, 2006). Based on these findings, we hypothesized that greater marital quality would be associated with greater infant-parent attachment security.

In addition, researchers have argued that fathers may be more influenced by the marital relationship than mothers (Cummings, Goeke-Morey, & Raymond, 2004; Doherty, Kouneski, & Erickson, 1998). Hence, it is possible that fathers may especially benefit from a positive marital relationship, and the combination of having positive marital quality and beliefs about the paternal caregiving role are likely to foster secure infant-father attachment relationships. As such, we examined marital quality interactions, and hypothesized that greater marital quality combined with fathers' stronger beliefs in the importance of the paternal caregiving role would be associated with greater infant-father attachment security. Because the present study is the first to examine the association between mothers' beliefs about the importance of the paternal caregiving role and infant-mother attachment security, we did not offer any specific hypotheses regarding interactions of mothers' beliefs' with child temperament and marital quality.

The Present Study

In summary, the present study hypothesized that: (1) fathers who viewed the paternal caregiving role as important would be more likely to have infants who were securely attached to them, and (2) greater marital quality would be associated with greater infant-parent attachment security. In addition, using the goodness-of-fit model we examined the

parental beliefs x infant temperament interaction and hypothesized that (3) when faced with fussy infants, fathers who viewed the paternal role as important would provide a good fit for their infants' development of attachment security. Additionally, we also examined parental beliefs x marital quality interaction and hypothesized that (4) when marital quality was high, fathers who viewed the paternal caregiving role as important would be more likely to have securely attached infants. Our examination of mothers' beliefs was exploratory and we offered no specific hypotheses. Finally, we also examined whether the associations between predictor variables and attachment security were stronger for fathers versus mothers.

Method

Participants

One hundred and three families in a small Midwestern city participated in a study of family development. Families were recruited from childbirth preparation classes, community newsletters, and flyers. Couples were required to be biological parents of the target child, and married or cohabitating at the time of participation. Families received a \$20 gift certificate for a local retail store at each time point. Results are based on 62 families with data on both infant-mother and infant-father attachment. During the Time 1 assessment, mothers on average were 28.93 years old ($SD = 4.56$) and fathers were 31.63 years old ($SD = 7.08$), and the majority had completed college. The average family income was within the \$51,000 – 60,000 range. Eighty-four percent of the mothers and 81% of the fathers were Caucasians and 65% were first time parents. All but one of the couples was married. Eighty-one percent of mothers and 90% of fathers were employed. Mothers and fathers worked on average for 21–30 hours and 31–40 hours per week, respectively. All the infants whose data were used in this report were healthy and full term (30 girls and 32 boys). When compared on the above demographic characteristics, the 62 families examined here did not differ from the families excluded from the analyses because of missing infant-parent attachment data.

Time 1: Third-trimester Assessment

Procedure and measures—Couples completed a series of questionnaires and participated in a 2-hour visit at their home that included a videotaped assessment of marital interaction.

Beliefs about the importance of the paternal role—Expectant mothers and fathers individually completed the What Is a Father? Questionnaire (WIAF; Schoppe, 2001) that was modified from the Role of the Father Questionnaire (ROFQ; Palkovitz, 1984). This questionnaire consisted of 15 items rated on a 5-point Likert scale (*strongly agree* to *strongly disagree*). A sample item is “A father should be as heavily involved in the direct care of his child (e.g., feeding, dressing) as the mother.” Some of the items were reverse coded so a higher number reflected endorsing beliefs that fathers can and should play an important caregiving role. A composite was created by summing across all items. Cronbach's alphas were .72 for mothers and fathers.

Marital quality—During the visit, couples were asked to complete the *Who Does What? Questionnaire* (Cowan & Cowan, 1990) together (after each had completed it

independently) and reach agreement about how they were currently dividing household tasks, and how they would like these tasks to be divided. They also discussed how they thought the division of child care tasks would be, and how they would actually like these tasks to be for the future infant. The couples' interactions were videotaped and coded by two trained coders using 7-point Likert scales (see Frosch & Mangelsdorf, 2001; Frosch, Mangelsdorf, & McHale, 1998, 2000). These scales were originally adapted from previous work on dyadic interaction (e.g., Easterbrooks & Emde, 1988; Markman & Notarius, 1987). Dimensions that were coded included *engagement* (involvement and persistent partner-directed behaviors), *enjoyment* (mutual exchanges of enjoyment and positive affect), *individual positive affect* (individual expression of smiling and laughter toward spouse's behavior), *sensitivity* (the extent to which couples responded to each others' signals accurately and appropriately), *irritation* (how couples expressed anger, hostility, and antagonism), *individual negative affect* (individual expressions of displeasure, anger, and hostility), *cooperation* (mutual participation, organization and discussion of task), *conflict resolution* (how couples worked out their disagreements), *balance* (relative contribution of each spouse), and *global interaction quality* (overall quality of relationship including positive emotional commitment). Interrater agreement was satisfactory with Gammas ranging from .63 to 1.00 ($M = .88$) for all scales, except cooperation (.58). We also computed ICCs, which ranged from .65 to .97 ($M = .81$) for all scales.

Previous work on these coding scales (Frosch & Mangelsdorf, 2001; Frosch et al., 1998, 2000) has identified two components based on principal components analysis, with scales with factor loadings of .55 and higher combined into composite variables. The first composite, *positive engagement*, was created by summing engagement, enjoyment, mothers' and fathers' positive affect, cooperation, balance, and global interaction quality. The second composite, *marital conflict*, was created by summing irritation and mothers' and fathers' negative affect, and subtracting conflict resolution and sensitivity. In the present study, we followed similar data reduction strategies and created these composites (except for the cooperation scale, which was excluded due to low reliability). Because positive engagement and marital conflict were significantly correlated ($r(61) = -.50, p < .001$), a composite, namely *marital quality*, was created by subtracting marital conflict from positive engagement (both standardized) (see also Schoppe-Sullivan, Mangelsdorf, Brown, & Sokolowski, 2007).

Demographics—Each expectant parent provided information about their age, education level, ethnicity, marital status, family income, and work hours.

Time 2: 3.5-month Postpartum Assessment

Procedure and measures—When the infants were 3.5 months old ($M = 109.50$ days, $SD = 10.20$), families participated in a second home visit. During the home visit, parents independently completed questionnaires about their infant's temperament and their interactions with infants were videotaped.

Parental sensitivity—Mothers and fathers were observed individually when they played with their 3.5 month-old infants. Two raters independently coded various dimensions of

mothers' and fathers' behavior (see Isabella, 1993; Goldstein, Diener, & Mangelsdorf, 1996 for a complete list of dimensions). Given the focus of the present study, *parental sensitivity*, which referred to how well-timed and empathic each parent's responses were with respect to the infant's needs and feelings, and how well the parent perceived and appropriately responded to the infant's signals, was used. The sensitivity coding scale was adapted from work by Ainsworth and colleagues (Ainsworth, Bell, & Stayton, 1974; Ainsworth et al., 1978). Ratings were made on a 5-point Likert scale. At the low end of the scale, the parent routinely ignored or distorted the meaning of the infant's behavior. When the parent did respond to the infant's signals, his/her response was characteristically inappropriate or fragmented. At the high end of the scale, the parent was very attuned to infant's signals and responded promptly and appropriately. Interrater reliability for sensitivity was satisfactory (Gammas = .93 for mothers and .77 for fathers; ICCs = .77 for mothers and .66 for fathers).

Infant temperament—Parents individually completed the 28-item Infant Characteristics Questionnaire (ICQ; Bates, Freeland, & Lounsbury, 1979) using a 7-point Likert scale. Given the purpose of the present study, only the *fussiness* subscale was used (6 items; e.g., "How easy or difficult is it for you to calm or soothe your baby when he/she is upset?"). Ratings were summed for each parent. Cronbach's alphas were .78 for mothers and .75 for fathers. Mothers' and fathers' perceptions of infant fussiness were correlated ($r(62) = .59, p < .001$) and so they were averaged to create a mother-father composite of *infant fussiness*.

Time 3: 12- and 13-month Postpartum Assessment

Procedure and measures—At 12- and 13-months, families were contacted to schedule a laboratory visit for the Strange Situation (Ainsworth et al., 1978) to assess infant-mother and infant-father attachment, respectively (see Main & Cassidy, 1988). Two trained raters classified infants into secure (Group B: distressed by their parent's departure but can be soothed by parent during reunion), insecure-avoidant (Group A: appear unaffected by their parent's departure and avoid the parent during reunion), insecure-resistant (Group C: distressed by their parent's departure, not easily soothed by parent during reunion, and often exhibit angry-resisting behavior towards the parent), or disorganized (Group D: fail to show a coherent attachment strategy with the parent and display bizarre behavioral patterns). Within the secure group, infants were further sub-classified into B₁, B₂, B₃, or B₄ to reflect their responses to distress (B₁: least distressed; B₄: most distressed). Traditionally, B₃ is regarded as the most secure subgroup. Interrater agreement for the A, B, C, D groups was satisfactory ($K = .87$ and $.90$ for infant-mother and infant-father attachment, respectively). Analyses involving traditional Strange Situation classifications often lose important variations among the groups and reduce power for detecting significant effects (Cummings, 1990). As a result, researchers such as Main, Kaplan, and Cassidy (1985) used a 3-point continuous attachment security variable based on the 4 attachment categories, with B₃ sub-classification assigned a 3 (most secure), remaining B sub-classifications assigned a 2, and A, C, or D classifications assigned a 1 (least secure). Cox et al. (1992) and Owen and Cox (1997) used a slightly modified strategy by creating a 4-point scale, with B₃ sub-classification assigned a 4 (most secure), remaining B sub-classifications assigned a 3, B classifications with insecure alternative classifications assigned a 2, and A, C, or D classifications assigned a 1 (least secure). In the present study, we created a 6-point scale to

maximize variability. Infants with B₃ sub-classification were assigned a 6 (most secure; 13% for infant-mother and infant-father dyads), and remaining B sub-classifications were assigned a 5 (45% for infant-mother dyads, 48% for infant-father dyads). Infants who were ultimately classified as secure (B), but showed some substantial signs of avoidance (A), resistance (C), or disorganization (D) were given a 4 (0% infant-mother dyads, 3% infant-father dyads). Major A and C classifications were given a 3 (14% infant-mother dyads, 18% infant-father dyads). Because more recent research has documented associations between attachment disorganization and behavioral problems and psychopathology (van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), infants with major A and C classifications, but also showed substantial disorganization (even though it did not meet the criterion for primary D classification) were assigned a 2 (10% infant-mother dyads, 3% infant-father dyads). All major D classifications were assigned a 1 (18% infant-mother dyads, 15% infant-father dyads). The secure-insecure distribution in this sample was comparable to those found for middle class non-clinical samples in North America (van IJzendoorn et al., 1999).

Results

Several sets of analyses were conducted. First, the associations among demographic variables and infant-parent attachment security were examined. Second, correlations were computed among all variables. Third, hierarchical regression analyses were conducted to examine how the parent, infant, and family characteristics predicted infant-parent attachment security, over and above the effects of parental sensitivity. Finally, follow-up analyses are presented to examine whether the strength of relations between predictors and infant attachment security differed across mothers and fathers.

Associations with Demographic Variables

Preliminary analyses examined whether demographic variables such as parent age, education, work hours, and family income were related to infant-parent attachment security. We found that the more hours fathers worked, the less likely infants were to be securely attached to them ($r(61) = -.38, p < .01$). Thus, fathers' work hours were included as covariates in the regression models predicting infant-father attachment security.

Associations among Predictor and Outcome Variables

Descriptive statistics and inter-correlations among the predictor and outcome variables are presented in Tables 1 and 2, respectively. We found that greater marital quality was significantly associated with greater infant-mother attachment security. Moreover, the infant fussiness and infant-father attachment association approached significance, such that greater infant fussiness was associated with lower infant-father attachment security. None of the nonlinear associations between attachment security and the predictor variables were significant. Additionally, the association between mothers' and fathers' beliefs was positive and significant, but the correlations between infant-mother and infant-father attachment security, and mothers' and fathers' sensitivity were positive but non-significant. Fathers' beliefs were significantly and positively associated with their sensitivity, but this association was non-significant for mothers.

Regression Models Predicting Infant-Parent Attachment Security

Two hierarchical regression models were conducted to predict infant-mother and infant-father attachment security, respectively. The predictor variables were centered by subtracting their means to minimize multicollinearity. Fathers' work hours were entered as covariates for the model predicting infant-father attachment security. Parental sensitivity was entered in Step 1. Parental beliefs about the paternal caregiving role, infant fussiness, and marital quality were entered in Step 2. Parental beliefs x infant fussiness and parental beliefs x marital quality interactions were entered in Step 3.

Infant-mother attachment security—The model predicting infant-mother attachment security was significant, $F(6, 53) = 4.14, p < .01, R^2 = .32$ (see Table 3). In Step 1, $F(1, 58) = .04, p = .84, R^2 = .00$, mothers' sensitivity was a non-significant predictor. In Step 2, $F(3, 55) = 2.20, p < .10, R^2 = .11$, greater marital quality was associated with greater infant-mother attachment security. In Step 3, $F(2, 53) = 8.24, p = .001, R^2 = .21$, the marital quality and infant-mother attachment association approached significance. Moreover, the maternal beliefs x infant fussiness interaction term was significant. Following Aiken and West (1991), we plotted the association between maternal beliefs and infant-mother attachment at low (1 *SD* below the mean), moderate (at the mean), and high (1 *SD* above the mean) levels of infant fussiness (see Figure 1) and found that mothers who viewed the paternal caregiving role as important were less likely to have securely attached infants, but this association was significant only when infant fussiness was high ($\beta = -.57, p < .01$). The association between maternal beliefs and infant-mother attachment security was non-significant when infant fussiness was moderate ($\beta = -.18, p = .17$) or low ($\beta = .22, p = .12$).

Infant-father attachment security—The model predicting infant-father attachment security was significant, $F(7, 50) = 3.16, p < .01, R^2 = .31$ (See Table 3). In Step 1, $F(2, 55) = 5.62, p < .01, R^2 = .17$, fathers' work hours made unique contributions, such that fathers who worked longer hours were less likely to have securely attached infants. Fathers' sensitivity was a non-significant predictor. In Step 2, $F(3, 52) = 1.20, p = .32, R^2 = .05$, fathers' work hours remained significant, and greater infant fussiness was marginally associated with lower infant-father attachment security. In Step 3, $F(2, 50) = 3.01, p = .06, R^2 = .09$, fathers' work hours still remained significant, but the infant fussiness and infant-father attachment association was no longer significant. Additionally, the fathers' beliefs x infant fussiness interaction approached significance. Because power to detect interaction effects is limited in non-experimental studies (McClelland & Judd, 1993), this marginally significant interaction warranted examination. The association between fathers' beliefs and infant-father attachment was plotted at low, moderate, and high levels of infant fussiness (see Figure 2) and we found that fathers who viewed the paternal caregiving role as important were more likely to have securely attached infants, but this association approached significance only when infant fussiness was high ($\beta = .39, p = .10$). The association between paternal beliefs and infant-father attachment security was non-significant when infant fussiness was moderate ($\beta = .14, p = .34$) or low ($\beta = -.12, p = .45$).

In addition, the fathers' beliefs x marital quality interaction was significant. We plotted the association between paternal beliefs and infant-father attachment at low, moderate, and high

levels of marital quality (see Figure 3) and found that fathers who viewed the paternal caregiving role as important were more likely to have securely attached infants, but only when marital quality was high ($\beta = .40, p < .05$). No significant association was found between paternal beliefs and infant-father attachment security when marital quality was moderate ($\beta = .14, p = .34$) or low ($\beta = -.13, p = .47$).

Follow-up analyses

We examined whether the strength of relations between predictor variables and infant attachment security differed across mothers and fathers using path analyses, with AMOS 7.0 (Arbuckle, 1995–2006). In this model, the error terms of infant-mother and infant-father attachment security were allowed to correlate to account for non-independence of the data. Both the predictor and outcome variables were allowed to covary. To balance the model, mothers' work hours were also included in the analyses. Predictors included mothers' and fathers' work hours, parental sensitivity, parental beliefs, infant fussiness, marital quality, and interaction terms (beliefs \times infant fussiness, beliefs \times marital quality). For each predictor, paths to the infant-mother and infant-father attachment security were estimated. The unconstrained model showed acceptable fit, $\chi^2(10) = 13.56, p = .19, RMSEA = .08, CFI = .98$. Next, for a given predictor, we constrained paths from each predictor to the outcome variables to be equivalent (e.g., paths from infant fussiness to infant-mother and infant-father attachment were constrained to be equal) and examined whether model fit significantly deteriorated when paths were free to vary. We found that model fit deteriorated for paths from parental beliefs \times infant fussiness to infant-mother and infant-father attachment security, $\chi^2_{diff}(1) = 19.10, p < .001$, and the inspection of path coefficients indicated that this association held for infant-mother but not infant-father attachment security. Additionally, model fit also deteriorated for paths from parental beliefs \times marital quality to infant-mother and infant-father attachment security, $\chi^2_{diff}(1) = 5.79, p < .05$, such that the association held for infant-father but not infant-mother attachment security. Model fit did not deteriorate for the rest of the comparisons. Thus we concluded that the factors predicting infant-mother and infant-father attachment were largely similar, except the beliefs \times infant fussiness interaction was a stronger predictor for infant-mother attachment security, and the beliefs \times marital quality interaction was a stronger predictor of infant-father attachment security.

Discussion

Guided by the existing fathering research and the determinants of infant-parent attachment relationships model (Belsky & Isabella, 1988), the present study examined how parents' beliefs about the paternal caregiving role, infant temperament, and marital quality made unique and joint contributions to infant-mother and infant-father attachment security, over and above the effects of parental sensitivity. In particular, we examined interactions of parental beliefs with child temperament and marital quality to predict infant-parent attachment.

Mothers who viewed the paternal caregiving role as important were less likely to have securely attached infants, but this association was significant only when infant fussiness was

high. No direct association was found between mothers' beliefs and infant-mother attachment. Indeed, past research has documented that father involvement can be influenced by child temperament, such that fathers are less likely to be involved with their temperamentally difficult children (e.g., Manlove & Vernon-Feagans, 2002; McBride, Schoppe, & Rane, 2002; Volling & Belsky, 1991). Thus, it is possible that in these families, infant fussiness has prompted fathers to decrease their involvement in caregiving, leaving the mothers feeling disappointed (because they had high expectations for paternal involvement) and overly-stressed. These emotional reactions may in turn undermine infant-mother attachment security.

Turning to fathers, we found that fathers who viewed the paternal caregiving role as important were more likely to have securely attached infants, but only when infant fussiness was high. According to the goodness-of-fit model (Thomas & Chess, 1977), children with difficult temperament are more likely to develop optimal outcomes when their parents have sufficient psychological and emotional resources to respond to their children's demands. Indeed, previous research has suggested that parents with more of these resources (e.g., being lower on constraint or having higher social support) would provide a better fit for their temperamentally difficult infants, so that these infants would be more likely to develop secure attachment relationships (Crockenberg, 1981; Mangelsdorf et al., 1990). Additionally, Belsky's differential susceptibility hypothesis proposes that temperamentally difficult children may be more susceptible to both the effects of positive and negative rearing environments than less difficult children (Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007). In the present study, temperamentally difficult infants might especially benefit from their fathers' valuing the paternal caregiving role, as fathers who valued the importance of such role might be more likely to help out with day-today caregiving activities and be more attuned to their infants' signals, and thereby provided greater psychological and emotional capacity to respond to these infants' demands. As a result, temperamentally difficult infants would develop secure attachment relationships to fathers in this context.

In addition, we found that fathers who viewed the paternal role as important were more likely to have securely attached infants, but this association was significant only when marital quality was high. Perhaps fathers are more likely to receive support from their spouse in a harmonious marriage, and when they view the paternal caregiving role as important, they are more likely to work with their spouse and get involved in caregiving activities. As such, infants are likely to develop secure attachment relationships to fathers. In contrast, for fathers who do not receive support and encouragement from their spouse, even though some of them may view the paternal caregiving role as important, they may be less likely to act on their beliefs, and so their beliefs are less likely to have an effect on infant-father attachment. In the past, researchers have argued that fathers may be more influenced by their marital relationship than mothers (Cummings et al., 2004; Doherty et al., 1998) and the present study provided partial support, as we found significant association between beliefs x marital quality interaction on infant-father attachment, and a marginal main effect on infant-mother attachment. Further, the effect of marital quality on attachment was independent of parental sensitivity, thus our findings supported Davies and Cummings's (1994) emotional security hypothesis.

Surprisingly, we found no significant associations between parental sensitivity and security of attachment. In the past, researchers have documented a modest association between maternal sensitivity and infant-mother attachment (De Wolff & van IJzendoorn, 1997), and even smaller association between paternal sensitivity and infant-father attachment (van IJzendoorn & De Wolff, 1997). Moreover, in the present study, sensitivity was observed during parent-infant play, which was a low-distress situation. The effects of parental sensitivity, however, are more likely to be detected in situations when parents have to respond to their infants' distress. Indeed, McElwain and Booth-LaForce (2006) found that maternal sensitivity to infants' distress at 6 months was associated with increased odds of classifying infants as secure to mothers, and no association was found between maternal sensitivity to infants' non-distress at 6 months and infant-mother attachment security.

Finally, because we found in our preliminary analyses that fathers who worked longer hours were less likely to have securely attached infants, we controlled for paternal work hours in the regression predicting infant-father attachment. It is possible that fathers who work longer hours may experience greater work-to-family spillover and therefore spend less quality time with their infants. Indeed, Cox and colleagues (1992) have documented a trend that fathers who reported spending more time with their infants tended to have more positive interactions with their infants. As such, fathers who work longer hours may have fewer opportunities to foster their infants' attachment security. Understanding the mechanisms involved in how fathers' work-family relationships affect infant-father attachment is important for future investigations.

Limitations and Future Directions

One limitation of the present study is that the majority of the participants were middle-class European-American families. Thus, our findings may not be generalizable to other SES or ethnic groups. Additionally, our relatively small sample size may have limited our power to detect interaction effects, as well as significant differences in factors predicting infant-mother and infant-father attachment security. Future studies should include larger and more diverse samples to better understand antecedents of infant-parent attachment relationships.

The present study is one of the first to examine both mothers' and fathers' beliefs about the paternal caregiving role and their associations with infant-parent attachment security. Because we did not have a measure of the amount of time fathers spent caring for their infants on a day-to-day basis, future studies should include both parental beliefs about the paternal role as well as involvement in predicting infant-parent attachment. By drawing on research on fathering, attachment theory can be further developed to achieve a better understanding of infant-father relationships.

Despite these limitations, the present study is notable for its simultaneous examination of both infant-mother and infant-father attachment relationships, and the use of both self-report and observational methods. Our findings help to illuminate the factors that pave the way to attachment security in infancy. In particular, we found that mothers' and fathers' beliefs, combined with infant and family characteristics, are important in predicting infant attachment security to mothers and fathers. Together, these findings may inform the design of interventions. To enhance the quality of infant-father attachment relationships, for

example, effective strategies may target fathers' beliefs about the importance of paternal caregiving and encourage them to be effective caregivers. Working with the marital dyad may also be important as fathers appear to be especially influenced by the quality of their marriage. In sum, the results of this investigation highlight the unique and cumulative contributions of infant, parent, and family characteristics in the prediction of infant attachment security to mothers and fathers. Our findings provide deeper understanding of some critical aspects of infant-father attachment relationships. As secure infant-parent attachment is related to positive child outcomes, investigating the origins of individual differences in attachment security will contribute to a more complete understanding of the ecology of children's socio-emotional development.

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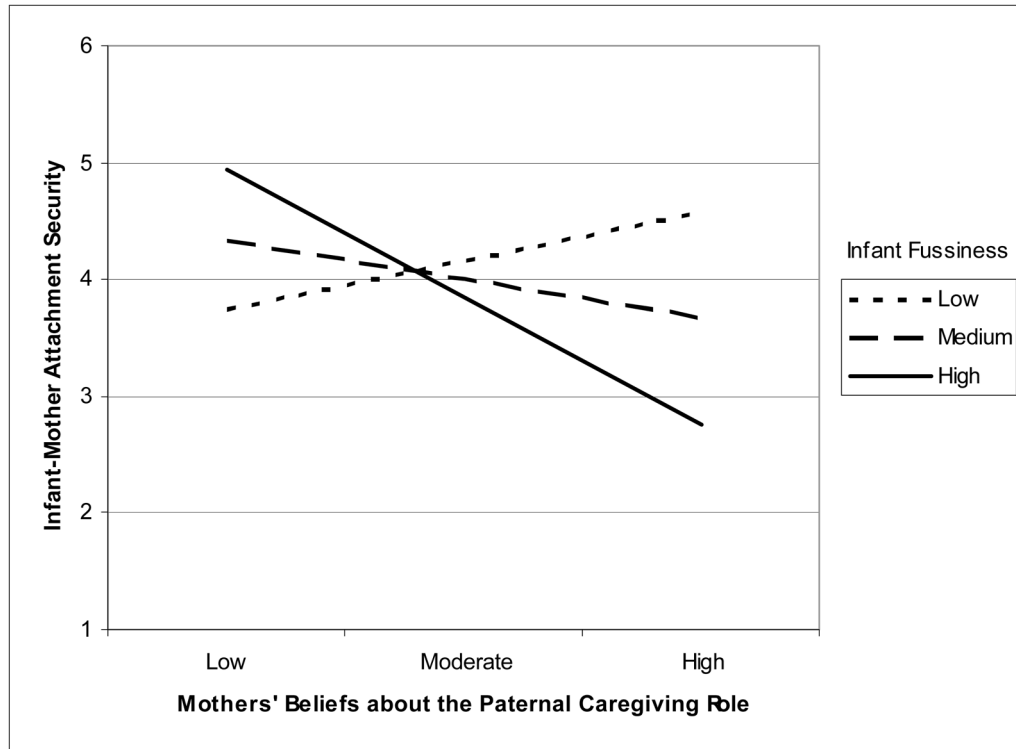


Figure 1. Association between mothers' beliefs about the paternal caregiving role and infant-mother attachment security as a function of infant fussiness

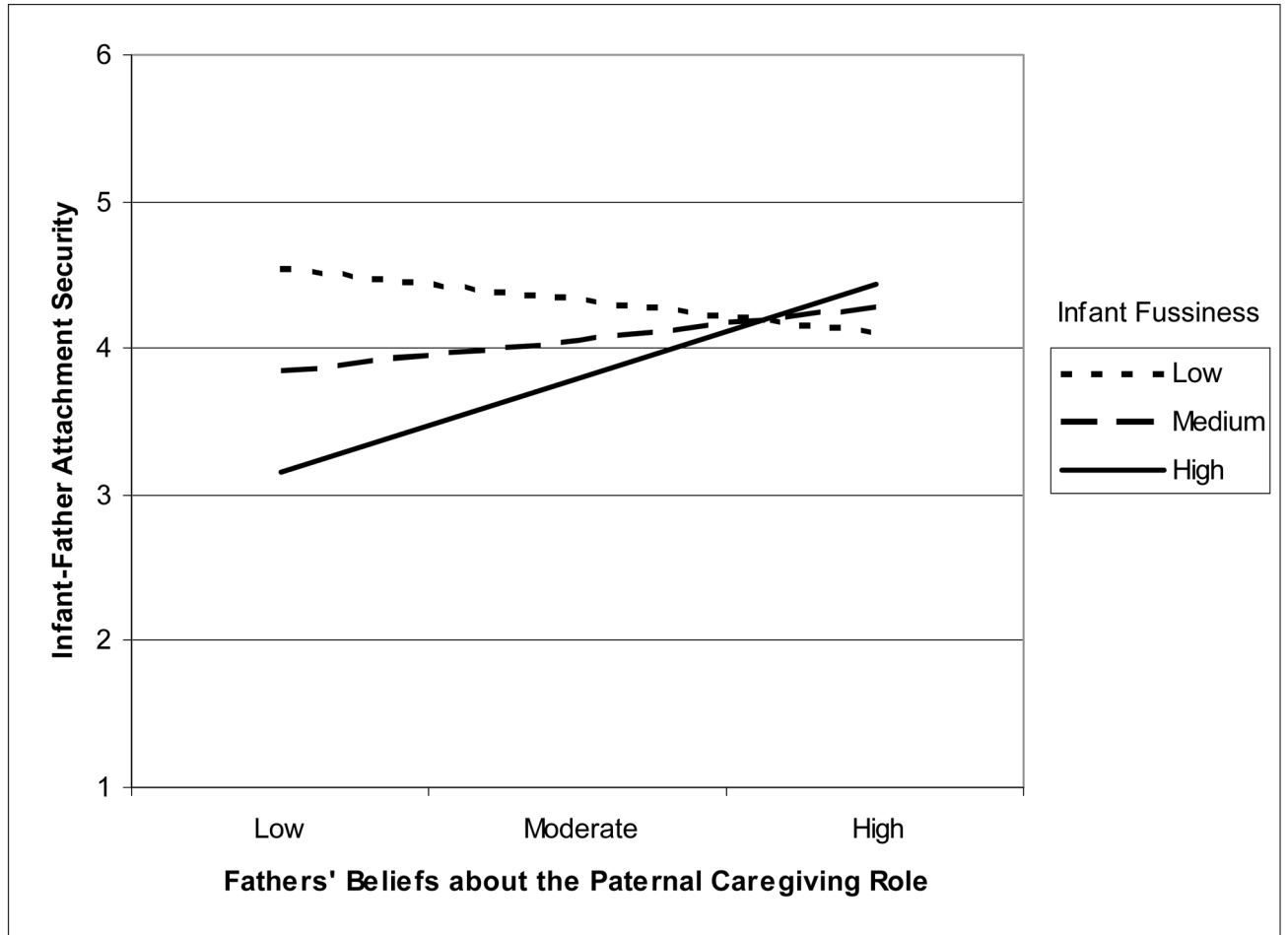


Figure 2. Association between fathers' beliefs about the paternal caregiving role and infant-father attachment security as a function of infant fussiness

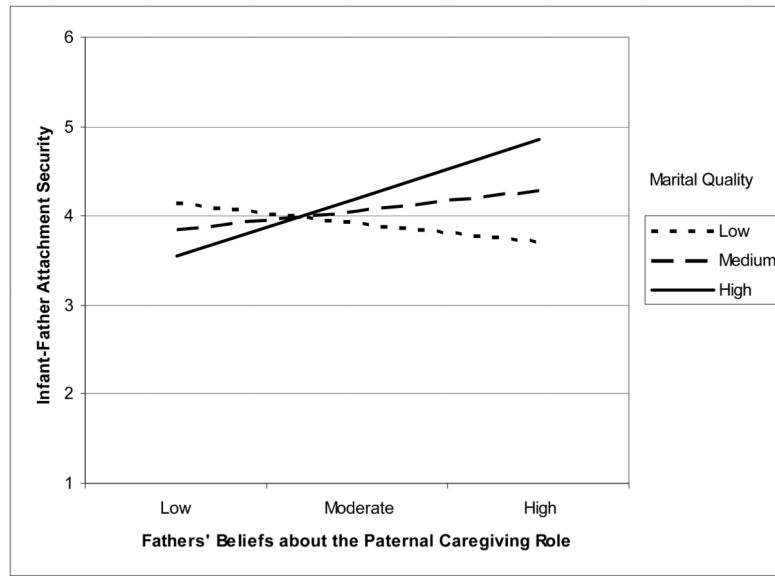


Figure 3. Association between fathers' beliefs about the paternal caregiving role and infant-father attachment security as a function of marital quality

Table 1

Descriptive Statistics for Study Measures

	Total			
	Mean	SD	Min	Max
Infant-mother attachment	3.84	1.77	1.00	6.00
Infant-father attachment	4.06	1.63	1.00	6.00
Mother sensitivity	4.16	.58	3.00	5.00
Father sensitivity	3.90	.66	2.50	5.00
Mothers' beliefs	57.72	5.18	42.00	66.00
Fathers' beliefs	57.90	5.91	43.00	74.00
Infant fussiness	17.94	4.26	10.50	27.50
Marital quality	0.00	1.73	-4.80	3.07

Note. Total *N* ranged from 60 to 62 because of missing data. The marital quality variable was created by combining two standardized composites and therefore had a mean of zero.

Correlations among Predictor and Outcome Variables

Table 2

	Infant-parent attachment	Parental sensitivity	Parental beliefs	Infant fussiness	Marital quality
Infant-parent attachment	.12	-.03	-.00	-.17	.28*
Parental sensitivity	.15	.09	.18	-.20	.12
Parental beliefs	.19	.42**	.47***	.17	.04
Infant fussiness	-.22†	-.01	-.08	**	-.22†
Marital quality	.02	.07	.03	-.22†	**

Note. Above diagonal are correlations for mothers. Below diagonal are correlations for fathers. Along diagonal are correlations between mothers and fathers. Infant fussiness was averaged from mothers' and fathers' reports. Marital quality was based on observers' reports. N varied from 59 to 62 because of missing data.

† $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$

Hierarchical Regressions Predicting Infant-mother and Infant-father Attachment Security

Table 3

Predictors	Infant-mother attachment security				Infant-father attachment security			
	β	B	SE	Total R ²	β	B	SE	Total R ²
<u>Step 1.</u>								
Fathers' work hours	---	---	---	---	-.33**	-.32	.12	.17**
Parental sensitivity	-.08	-.24	.38	.00	.17	.43	.34	.17**
<u>Step 2.</u>								
Parental beliefs	-.18	-.07	.05		.14	.04	.04	
Infant fussiness	-.09	-.04	.05		-.16	-.06	.05	
Marital Quality	.23 [†]	.23	.12	.11	.08	.08	.12	.22*
<u>Step 3.</u>								
Parental beliefs x Infant fussiness	-.45***	-.03	.01		.24 [†]	.02	.01	
Parental beliefs x Marital quality	-.15	-.04	.03	.21***	.27*	.04	.02	.09 [†]
				.32***				.31***

Notes: Standardized and nonstandardized betas, and estimated standard errors for the final steps are reported above.

[†] $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.