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Father Involvement, Paternal Sensitivity, and Father-Child Attachment Security in the First Three Years

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Abstract

To reach a greater understanding of the early father-child attachment relationship, this study examined concurrent and longitudinal associations among father involvement, paternal sensitivity, and father-child attachment security at 13 months and 3 years of age. Analyses revealed few associations among these variables at 13 months of age, but involvement and sensitivity independently predicted father-child attachment security at age 3. Moreover, sensitivity moderated the association between involvement and attachment security at 3 years. Specifically, involvement was unrelated to attachment security when fathers were highly sensitive, but positively related to attachment security when fathers were relatively less sensitive. Father involvement was also moderately stable across the two timepoints, but paternal sensitivity was not. Furthermore, there was significant stability in father-child attachment security from 13 months to 3 years. Secure attachment at 13 months also predicted greater levels of paternal sensitivity at 3 years, with sensitivity at age 3 mediating the association between 13 month and 3 year attachment security. In sum, a secure father-child attachment relationship a) was related to both quantity and quality of fathering behavior, b) remained relatively stable across early childhood, and c) predicted increased paternal sensitivity over time. These findings further our understanding of the correlates of early father-child attachment, and underscore the need to consider multiple domains of fathers' parenting and reciprocal relations between fathering behavior and father-child attachment security.

Keywords

father-child interaction; attachment; sensitivity; father involvement; parenting

Attachment theory (Bowlby, 1969/1982) has long been a predominant framework for understanding early parent-child relationship functioning. Bowlby suggested that adaptive patterns of parent-child interaction in the early years promote the development of secure relationships between children and their caregivers. As such, this early relationship can

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serve as a source of emotional security that promotes healthy functioning across many domains of development (see Thompson, 2008). Although a vast body of work has elucidated the origins and significance of individual differences in mother-child attachment, far less research exists on the antecedents and outcomes associated with father-child attachment security (see Weinfield, Sroufe, Egeland, & Carlson, 2008). Despite increased interest in fathers' contributions to child and family development (see Lamb & Tamis-LeMonda, 2004), the parenting behaviors responsible for a secure father-child attachment relationship are not yet well-elaborated.

Attachment theory and research have long privileged the role of sensitivity for mother-child attachment security, with research suggesting that mothers who respond to their children's cues in a warm, prompt, and appropriate manner are more likely to have children who are securely attached to them (e.g., DeWolff & van Ijzendoorn, 1997). Nonetheless, the evidence linking paternal sensitivity to father-child attachment security is somewhat mixed (e.g., van Ijzendoorn & DeWolff, 1997). Instead of exclusively focusing on qualitative aspects of parenting such as sensitivity, much research on fathering behavior has been concerned with father involvement, traditionally defined as the amount of time fathers spend with their children (see Pleck, 2010). Although father involvement appears to have profound consequences for development (e.g., Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008), it has rarely been implicated as a predictor of attachment security. Thus, the degree to which qualitative (i.e., sensitivity) and quantitative (i.e., involvement) aspects of fathering behavior simultaneously contribute to father-child attachment security remains unknown. The present study attempts to integrate these domains by examining associations among father-child attachment security, paternal sensitivity, and father involvement from 1 to 3 years of age.

Father-Child Attachment

Bowlby's (1969/1982) ethological theory of attachment postulates that children in secure relationships use their caregiver as a "safe haven" and "secure base" from which to explore their environments. Attachment theorists believe that over time children develop representations, or "internal working models", of their early experiences with their caregivers that will guide both intra- and inter- personal well-being (Bowlby, 1969/1982). Although Bowlby emphasized the importance of a secure attachment to one's *primary* caregiver, a role almost exclusively reserved for mothers in most species, some early attachment research revealed that many infants are likely to be distressed upon separation from *either* parent (e.g., Kotelchuck, 1976) and direct attachment-related behavior toward both mothers and fathers upon reunion (e.g., Lamb, 1976). Thus, although father-child attachment remains understudied, it appears that attachment relationships can and do form in most father-child dyads (Lamb, 2002). Furthermore, fatherchild attachment security has been implicated in numerous child outcomes, such that securely attached children show fewer behavior problems (Verschueren & Marcoen, 1999), greater sociability (Sagi, Lamb, & Gardner, 1986), and more reciprocated friendships (Verissimo et al., 2011) than those in insecure relationships. Indeed, father-child attachment security appears to be important for children's non-clinical outcomes, and may well lower their risk for internalizing and externalizing forms of psychopathology (Phares, Rojas, Thurston, & Hankinson, 2010).

Given these outcomes, increased understanding of the mechanisms that drive attachment formation seems an essential next step for conceptualizing the father-child relationship (Bretherton, 2010). Although the quality of this relationship is undoubtedly shaped by a wide variety of family and socio-contextual factors (e.g., Cowan, 1997), determining which aspects of parenting might be responsible for facilitating father-child attachment security is a logical point of departure. To better understand how secure relationships develop, research must examine the degree to which both quality and quantity of fathers' parenting contribute to attachment security.

Paternal Sensitivity and Father-Child Attachment Security

Fatherhood researchers have studied a diverse array of parenting behaviors, but most have focused on sensitivity as the primary determinant of attachment security (Lamb, 2002). Sensitivity refers to a parent's ability to recognize and accurately interpret their child's signals, and respond in ways that are affectionate, well-timed, and appropriately stimulating (Ainsworth, Bell, & Stayton, 1974). Sensitive parents are attuned to their child's needs, and attend to those needs in a responsive and non-intrusive manner. In theoretical and empirical work on attachment, early sensitive parenting is thought to promote children's emotional security and sense of trust in their caregiver. Indeed, numerous studies document associations between greater maternal sensitivity and mother-child attachment security (DeWolff & van Ijzendoorn, 1997).

It seems reasonable to assume that similar associations exist in father-child dyads (e.g., Lamb, 2002). However, the scant body of research on the relationship between sensitivity and attachment to fathers is somewhat less conclusive, with individual studies yielding mixed results (e.g., Braungart-Rieker, Garwood, Powers, & Wang, 2001; Cox, Owen, Henderson, & Margand, 1992). One meta-analysis indicated that paternal sensitivity was significantly associated with father-child attachment security (van Ijzendoorn & DeWolff, 1997), but this association was weak to moderate, and its magnitude (r = .13) was substantially lower than the parallel effect for mothers (r = .24) (van Ijzendoorn & De Wolff, 1997; De Wolff & van Ijzendoorn, 1997).

Given that sensitivity appears to be only a modest predictor of father-child attachment security, other dimensions of fathering behavior may also contribute to individual differences in attachment security. One key issue is the distinction between the quantity (i.e, father involvement) and quality (i.e., sensitivity) of parenting behaviors in which fathers engage. Despite calls for researchers to incorporate qualitative components of fathering, such as sensitivity, into operational definitions of father involvement (e.g., Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000; Pleck, 2010), many studies examine these constructs individually and less attention has been given to modeling interrelations between multiple aspects of fathering (Lamb & Tamis-LeMonda, 2004). Thus, it remains to be seen how involvement and sensitivity independently or interactively contribute to attachment security.

Father Involvement and Father-Child Attachment Security

Perhaps the most influential framework of father involvement comes from Lamb and colleagues (Lamb, Pleck, Charnov, & Levine, 1985), who proposed a conceptual model of paternal involvement consisting of: 1) interaction– the father engaging directly with his child; 2) accessibility – the father being physically and/or psychologically available to his child; and 3) responsibility – the father assuming responsibility for his child's welfare and care. This widelyused model has been influential in fatherhood research (Pleck, 2010), and was used to guide the conceptualization and definition of father involvement in the present study.

From an attachment theory perspective, there is little indication that father involvement per se will be directly related to father-child attachment security (e.g., Cabrera et al., 2000). Some have examined how much time is necessary to form attachments to non-maternal figures (Lamb, 2002), but individual differences in involvement have rarely been considered as a predictor of attachment security. Although some of Lamb's work with Swedish families (Lamb, Frodi, Hwang, & Frodi, 1983) found no association between involvement and attachment security, some studies with American samples suggested that fathers who were more involved in caretaking had children who showed stronger attachment-related behaviors, such as enthusiastic greetings (Pedersen & Robson, 1969) and proximity seeking (Kotelchuck, 1976) upon reunion. Furthermore, fathers who reported greater involvement were more likely to have children who were securely attached to them in the Strange Situation (Cox et al., 1992) and described their children as more secure using the Attachment Q-Set (AQS; Waters, 1987) (Caldera, 2004).

Clearly, researchers must distinguish between the *quantity* and *quality* of involvement that fathers provide for their children (e.g., Cabrera et al., 2000), and current conceptualizations of fathering incorporate both components of paternal care (Pleck, 2010). Despite the dearth of research studies including both dimensions, there are clearly reasons to believe that each might contribute to the quality of the attachment relationship. Based on attachment theory and research with mothers, as well as the limited body of work including fathers, we hypothesized that both involvement and sensitivity would be directly related to father-child attachment security.

Mediational and Moderational Models of Attachment Security

Including both dimensions of fathering also allows for mediational and/or moderational explanations of father-child attachment security to be tested. For instance, it may be that any association between involvement and attachment is mediated by sensitivity. This hypothesis is loosely supported by evidence indicating that qualitative aspects of fathering are more important for attachment security than are quantitative dimensions (see Lamb, 2002). Indeed, some have concluded that "the amount of time that fathers and children spend together is probably much less important than what they do with that time" (Lamb & Tamis-LeMonda, 2004, p. 10).

Alternatively, sensitivity might moderate the relation between father involvement and attachment security, such that secure attachment is most likely to occur when fathers are

highly involved *and* highly sensitive. The exact nature of this interaction effect is difficult to predict. Brown, McBride, Shin, and Bost (2007) found that involvement was unrelated to father-child attachment security when fathers were highly sensitive, but negatively related to attachment security when fathers were less sensitive. It also seems plausible that highly involved fathers who are low on sensitivity may be more likely to serve as secure attachment figures than their less involved counterparts. The inclusion of both involvement and sensitivity in the current study allowed for a test of the competing hypotheses that sensitivity might mediate or moderate the relation between involvement and attachment security.

The Dynamics of Fathering

Although longitudinal research is essential for understanding the developmental course of the father-child attachment relationship, such investigations are severely lacking in the literature. A longitudinal design provides the opportunity to examine whether patterns of association among father involvement, paternal sensitivity, and father-child attachment security differ across developmental stages. Moreover, we know little about the stability of father involvement, sensitivity, or father-child attachment security early childhood. Some evidence suggests moderate stability in father involvement across the first several years (NICHD Early Child Care Research Network, 2000). Similarly, limited evidence has found a relatively weak association between paternal sensitivity at 6 and 36 months (NICHD Early Child Care Research Network, 2000), but longitudinal studies of father involvement or paternal sensitivity are otherwise scarce. And despite numerous investigations documenting the stability of the mother-child attachment relationship from infancy to early childhood (see van Ijzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walravenet, 2004), no study to date has examined attachment stability in father-child dyads. Given attachment theory's focus on the persistence of the early caregiverchild relationship, we hypothesized that involvement, sensitivity, and attachment security would remain relatively stable across the first several years.

A longitudinal design also allows us to track the predictive power of early fathering for subsequent attachment security, as well as the consequences of early attachment for later fathering. Existing work on the consequences of father-child attachment security has focused exclusively on child outcomes. The notion of attachment as a dyadic *relationship* suggests that the quality of this relationship could also impact fathers' future parenting. In particular, having a child that is securely attached to them may increase fathers' motivation and self-confidence as parents, both of which are key determinants of sensitive and engaged fathering (e.g., Lamb et al., 1985). Thus, we hypothesized that fathers with securely attached infants may go on to show greater involvement and sensitivity with their children in later childhood.

This study examined multiple dimensions of fathering from a developmental perspective (Parke, 2000) to better understand relations between fathers' parenting behavior and father-child attachment security. Guided by attachment theory and an emerging body of research on fathers, this investigation tested several hypotheses: 1) Higher levels of father involvement and paternal sensitivity will be directly related to father-child attachment security; 2) Sensitivity will moderate or mediate associations between involvement and

attachment security; 3) Involvement, sensitivity, and attachment security will show significant stability from 1 to 3 years; and 4) Attachment security at 1 year will predict greater involvement and sensitivity at 3 years.

Method

Participants

Father-child dyads in the United States took part in two phases of a longitudinal study when the child was 13 months (Time 1) and 3 years (Time 2) of age. Most dyads (61.2%) participated at Time 1 as part of an ongoing longitudinal study of family relationships. Additional participants (38.8%) were recruited through flyers at local community centers, retail outlets, and electronic mailing lists. Data collection at Time 2 was designed explicitly to examine the variables of interest in the current investigation. All fathers were married to the child's biological mother at both timepoints. Most participants (N = 71) were seen at both timepoints, but father-child pairs that participated at either phase were included in the analyses to maximize power and take advantage of statistical procedures using maximum likelihood estimation to handle missing data (see below). As such, the total sample size was 115 children and their fathers (56 girls, 59 boys). Exact sample sizes differed somewhat at each phase. There were 103 father-child dyads that participated at Time 1 (51 girls, 52 boys), with 71 of those dyads (37 girls, 34 boys) also participating at Time 2. Twelve additional father-child dyads were recruited to participate at Time 2 for a final sample of 83 (42 girls, 41 boys) at that timepoint.[1] There were no demographic differences (i.e., race/ethnicity, income, education, work hours) among families that participated at only Time 1, only Time 2, or both phases.

Fathers in the overall sample were 80.0% European-American, 9.0% African American, 7.0% Latino, 2.0% Asian, and 2.0% identified as "other". Annual family income ranged from less than $10,000 to over $100,000; mean income was between $61,000 – $70,000 at both timepoints. In general, fathers were highly educated, with 81.5% of fathers at Time 1 and 83.1% of fathers at Time 2 possessing at least a college degree. Fathers' work hours ranged from zero hours to over 50 hours per week at both timepoints, with an average of 31–40 hours per week at Time 1 and 41–50 hours per week at Time 2.

Time 1 Procedures: 13 Month Laboratory Visit

To measure involvement at this timepoint, fathers completed a questionnaire assessing parenting responsibility. Fathers and their children were then scheduled for a laboratory visit in which paternal sensitivity was assessed using a semi-structured observational procedure, and father-child attachment was assessed using the Strange Situation Procedure (Ainsworth, Blehar, Waters, & Wall, 1978). All observational coding was completed by entirely independent teams of trained coders who were blind to all other data at both timepoints.

[1]All analyses were also conducted using only the longitudinal sample that participated at both timepoints. Using only this longitudinal sample (containing the same participants at both timepoints), the pattern of results was identical to the results presented in this paper. Therefore, we have chosen to report results utilizing the full sample (and maximum likelihood estimates for missing values).

Father involvement: parenting responsibility—An adapted version of the Parental Responsibility Scale (PRS; McBride & Mills, 1993) was used to measure responsibility forms of paternal involvement. This scale lists 14 common child care tasks in which parents of 1-year-olds typically participate (e.g., making baby-sitting arrangements, selecting appropriate clothes for the child). Fathers designated who had primary responsibility for each task by reporting what percentage of the time each task was completed by mothers, fathers, and both parents together. Fathers' percentages (% done alone by father + % done together) were averaged across all items (Cronbach's $\alpha = .77$) to create a composite responsibility score with a theoretical range of 0–100.

Paternal sensitivity—To assess sensitivity, fathers participated in a 10 minute competing demands task (Smith & Pederson, 1988) in which they completed a questionnaire while their infant was left in the same room. This procedure assessed how fathers handled the competing demands of completing the questionnaire and attending to their child's needs, and is analogous to everyday situations that parents may encounter. Sensitivity was coded using a global 5-point (1 = *highly insensitive*, 5 = *highly sensitive*) rating scale, whose structure was adapted from Ainsworth et al. (1974). Three trained coders watched the videos, and each coder overlapped on 15% of the videotapes with the others. Agreement within one scale point was 100%. Gamma coefficients were used to calculate inter-rater reliability because, like Cohen's kappa, chance agreement is taken into account, yet gamma is more appropriate for use with ordinal rating scale data (Liebetrau, 1983). Gammas between coders ranged from .83 to 1.00 ($M = .93$).

Father-child attachment—Attachment security was assessed in the laboratory by the standard Strange Situation Procedure (Ainsworth et al., 1978), and coded from videos following Ainsworth et al.'s (1978) procedures. In brief, infants who use the father as a secure base from which to explore and who are distressed by their father's departure but comforted by his return are classified as securely attached (Group B). Infants classified as insecure-avoidant (Group A) appear unaffected by their father's departure and tend to avoid their father upon his return. Infants classified as insecure-resistant (Group C) are thoroughly distressed by separations and not easily soothed upon their father's return, often exhibiting angry and/or ambivalent behavior. The disorganized classification (Group D) (e.g., Main & Solomon, 1986) generally describes children who lack a coherent attachment strategy. Two trained coders overlapped on 88% of tapes. Agreement on major classification categories (A, B, C, and D) was 96%, with a Cohen's kappa of .93. All discrepancies were resolved by conferencing. Classifications were as follows: 65.7 % were securely attached, 6.7 % were classified as insecure-avoidant, 13.3 % were insecure-resistant, and 14.3% received a primary disorganized classification. Given that hypotheses were not concerned with differences among "insecure" (A, C, D) categories, data were analyzed in terms of "secure" (B) vs. "insecure" (A, C, D) classifications.

Time 2 Procedures: 3 Year Home Visit

Father involvement was assessed with a parenting responsibility questionnaire, as well as an in-home interview that measured accessibility and interaction forms of involvement. During this home visit, fathers also participated in a semi-structured father-child play task to assess

paternal sensitivity, and an observation period that was used to assess father-child attachment security using the Attachment Q-Set (Waters, 1987). Each observational coding task was again completed by an independent team of coders who were blind to all other data at both timepoints.

Father involvement—The Interaction/Accessibility Time Diary interview protocol (McBride & Mills, 1993) was used to measure interaction and accessibility forms of father involvement. Data was collected for the most recent workday and non-workday using a forced-recall technique. For the target days, each father recounted their activities in great detail (15 minute intervals) from the time they woke up until the time they went to sleep. Prompts and cues from the interviewer allowed fathers to elaborate upon the exact length and nature of activities. This interview has been widely-used in the father involvement literature, and is a well-validated assessment of temporal forms of father involvement (Wical & Doherty, 2005).

All interviews were audiotaped and later analyzed. Each 15 minute interval was categorized as (a) interaction, (b) accessibility, or (c) no involvement at all. Interaction consists of activities in which both the parent and child are directly engaged. Accessibility encompasses activities in which parents are available to the target child, even though not necessarily engaged with them. The final scores were the total number of minutes spent in interaction and accessibility with the target child on workdays and non-workdays combined.

An adapted version of the PRS (McBride & Mills, 1993) was again used to measure responsibility forms of parental involvement. Fathers responded to a 5-point Likert scale (1 = *mother always responsible*, 5 = *father always responsible*) designating who had primary responsibility for each task. Fathers' responses were averaged across all items (Cronbach's $\alpha = .76$) to create a responsibility score ranging from 1–5. This form of the PRS was used to be consistent with past studies that have created a composite involvement score based on the measures utilized in this study. Total accessibility, interaction, and responsibility scores were standardized, and then averaged to create a composite father involvement score based on this previous work (e.g., Brown et al., 2007) and the influential, tripartite conceptualization of involvement created by Lamb, Pleck, Charnov, & Levine (1985).

Paternal sensitivity—Fathers and children participated in a 15-minute period of dyadic interaction in which they completed a series of puzzle tasks. The puzzles were slightly difficult for 3-year-old children, such that the child was likely to need the father's assistance. Episodes were coded using scales adapted from Egeland & Sroufe (1983) (see Frosch & Mangelsdorf, 2001). All scales used 7-point ratings (1 = *low*, 7 = *high*) and were coded by trained observers. These scales were combined into a single sensitivity score by adding the positively-valenced dimensions (supportive presence, structure and limit setting, quality of instruction, confidence, and engagement), and subtracting the negatively valenced dimensions (hostility, generational boundary dissolution, intrusiveness) (see, e.g., NICHD Early Child Care Research Network, 2000 for a similar approach). This yielded a single sensitivity variable in which a score of 32 (maximum of 7 on all positive scales and a minimum of 1 on all negative scales; Cronbach's $\alpha = .88$) represented the ideal. Coders

overlapped on 30% of tapes. Agreement within one scale point ranged from 83% to 100%, and gammas ranged from .52 to 1.00 (M = .66).

Father-child attachment security—The Attachment Behavior Q-Set (AQS; Waters, 1987) was used to measure attachment security. The AQS contains 90 statements about a child's behavior in the context of interaction with a caregiver. The items were developed to characterize the child's use of the caregiver as a secure base for exploration and as a haven of safety when distressed, which constitute the criteria for determining attachment security.

The AQS was completed by trained coders after watching a video of the child's behavior during the home visit. Observation periods lasted about 90 minutes. This included a 15-minute structured play session followed by approximately 45 minutes of naturalistic observation during which father and child were allowed to interact however they like (mothers were isolated in a separate room and engaged in another task). Children were also observed in a 15-minute semi-structured triadic interaction (a building task with "Lincoln Logs") with both mother and father, and a 15-minute competing demands task in which they were left alone while their parents completed a questionnaire together. Episodes were designed based on work by van Ijzendoorn et al. (2004) suggesting that the AQS is valid with relatively short observation periods, especially if different types of structured and/or semi-structured tasks are built into the observations.

Observers sorted AQS items on a continuum from "least descriptive" (1) to "most descriptive" (9) of the child's behavior with respect to his or her father. Sorts were based on a nine-category square distribution (i.e., 10 items in each of 9 categories), with the "score" for each item being the category in which it was placed. To generate attachment security scores, the Q-sort description of each child was correlated with a description of the hypothetical "very securely attached" child. This process yielded an attachment score for each father-child dyad. Coders were trained to a criterion of .70 before coding independently. Coders overlapped on 35% of tapes, and all major discrepancies were resolved through conferencing. After correlating each observer's sort with the criterion sort, the correlation between coders' security scores was .78. Means and Standard Deviations for all variables are presented in Table 1.

Data Analysis Plan

The first set of analyses examined bivariate associations concurrently at 13 months and 3 years of age and longitudinally across the two timepoints. Next, path analysis was used to examine each of these associations simultaneously while also testing for the presence of significant interactions and indirect effects. To test the proposed model, path analysis was conducted using the structural equation modeling program Mplus (Version 6.0; Muthén & Muthén, 2010). A single model testing concurrent and time-lagged associations was posited, and all pathways were free to vary. Path analysis was chosen because the model contained only observed (measured) variables, and no latent variables. This model examined all paths among the observed variables of involvement, sensitivity, and attachment at 13 months and 3 years. This approach allowed us to parsimoniously examine each pathway of interest and to test each of the study hypotheses within a single model by including: 1) concurrent

pathways from involvement to sensitivity, and from both involvement and sensitivity to attachment security at both timepoints; 2) Involvement x sensitivity interaction terms as predictors of father-child attachment security at both timepoints to test for moderation, and a test of indirect effects to examine mediation; 3) Stability estimates of all three constructs from 13 months to 3 years; and 4) Cross-lagged relations from each 13 month variable to all 3 year variables.

Past investigations have historically followed some broad guidelines for conducting path analysis in research on child development and family studies that recommend a minimum of 100 participants and 10 observations per variable in the model (e.g., Schumm, Southerly, & Figley, 1980; Tanaka, 1987). The sample size in the present study exceeds both thresholds. Furthermore, the Mplus program handles missing data via the full information maximum likelihood (FIML) approach, which uses information from each case to estimate missing values. Whereas traditional solutions to missing values are likely to yield biased parameter estimates, the maximum likelihood approach allowed us to maximize statistical power and estimation accuracy by taking advantage of all available data (e.g., Schafer & Graham, 2002).

Results

Preliminary Analyses

Involvement, sensitivity, and attachment were not significantly related to fathers' education or total family income at either time. Fathers' work hours at Time 2 were negatively related to father involvement at Time 2 ($r = -.32$, $p < .05$), but unrelated to either sensitivity or father-child attachment security. There was one gender difference, in that fathers of girls were more sensitive at Time 1 ($t = 2.42$, $p < .05$) and Time 2 ($t = 2.02$, $p < .05$) than were fathers of boys. However, no results differed significantly for boys vs. girls. Given this weak pattern of associations, demographic variables were not included as covariates in subsequent analyses.

Bivariate Associations Among Study Variables

Bivariate correlations among all continuous variables are presented in Table 1. At 13 months, the correlation between responsibility and sensitivity was non-significant. There was also no significant difference in parenting responsibility among secure ($M = 54.77$) vs. insecure ($M = 51.48$) father-child dyads, $t = .84$, $p = .41$ (Cohen's $d = .19$, effect size $r = .09$). Likewise, fathers with infants who were securely attached did not exhibit significantly higher levels of sensitivity ($M = 3.54$) than fathers with infants who were insecurely attached ($M = 3.10$), $t = 1.42$, $p = .16$ (Cohen's $d = .28$, effect size $r = .14$). Correlations at 3 years indicated that, somewhat surprisingly, fathers who were more involved were less sensitive than fathers who were lower on involvement. Although involvement was not associated with attachment security, sensitivity was significantly related to greater attachment security.

There was substantial stability in father involvement, such that parenting responsibility at 13 months was related to composite father involvement at 3 years. On the contrary, sensitivity showed relatively little stability over this period. Strikingly, there was a high level of

stability in father-child attachment security from 13 months to 3 years. Secure father-child dyads at Time 1 were higher on 3-year attachment security (M = .38) than insecure dyads (M = .14), t = 3.62, p < .001 (Cohen's d = .89; effect size r = .41). Other than the stability of involvement and attachment security, there were no significant bivariate correlations from 13 months to 3 years. There was also no difference in subsequent father involvement for fathers who were classified as having secure vs. insecure relationships with their 13-month-olds, t = 1.22, p = .29. However, fathers of secure infants at 13 months went on to show higher levels of sensitivity (M = 27.71) at 3 years than fathers of insecure infants (M = 22.66), t = 2.92, p < .01.

Path Analysis

The estimated path model fit the observed data well, χ^2 (6) = 7.50, p = .28, CFI = 0.99, TLI = 0.97, RMSEA = .05. Both the non-significant chi-square test and an RMSEA less than .08 represent a good fit between the specified model and the observed data (Browne & Cudeck, 1993). Furthermore, CFI and TLI values easily exceeded the widely accepted criteria of .90, thus suggesting good model fit (see Hu & Bentler, 1999). Individual pathways in the model are explicated below. The full model with all standardized path coefficients is presented in Figure 1, with statistically significant paths highlighted in bold type.

Concurrent associations—Consistent with bivariate analyses, none of the concurrent paths at 13 months were significant. Specifically, involvement and sensitivity were not related to one another, and neither involvement, sensitivity, nor the interaction between them significantly predicted 13 month attachment security. In contrast, there were numerous significant relations among the 3 year variables. Again, there was a significant, negative association between involvement and sensitivity at this time. However, paths from both involvement and sensitivity to attachment at 3 years were positive and statistically significant. Moreover, the involvement x sensitivity interaction term also significantly predicted 3 year attachment security. To probe this significant interaction, post-hoc plotting was conducted based on procedures outlined in Aiken and West (1991). This plot is presented in Figure 2. When fathers were highly sensitive, there was no significant association between father involvement and father-child attachment security. On the contrary, when fathers were low on sensitivity, there was a positive association between involvement and attachment security (t = 3.59, p < .001).

Cross-time relations among variables—Significant cross-time paths indicated that both involvement and attachment security were relatively stable across this two year period. In contrast, there was no significant relationship between sensitivity at 13 months and 3 years. Three year involvement was not predicted by sensitivity or attachment at 13 months, and paths to 3 year attachment security from prior involvement or sensitivity were non-significant. Interestingly, however, 13 month attachment security did predict 3 year paternal sensitivity, suggesting that fathers of securely attached children at 13 months of age were more likely to engage in sensitive parenting two years later. Notably, this effect exists over and above the influence of Time 1 sensitivity, as well as father involvement at both timepoints.

To further elucidate this pattern of findings, the indirect effect from Time 1 attachment security to Time 2 attachment security via Time 2 sensitivity was estimated as a test of mediation. The standardized indirect effect was .13, which was significant (p = .02). Mediation was also tested by calculating confidence intervals for the indirect effects using bootstrap methods (e.g., Mackinnon, Lockwood, Hoffmann, West, & Sheets, 2002) with 1000 drawn samples. Since this confidence interval did not contain zero (95% CI = .02 – . 27), the indirect effect is considered significant. This indicates that the association between 13 month attachment security and 3 year attachment security was mediated by 3 year paternal sensitivity.

Discussion

This study addressed fundamental questions about the development of the early father-child attachment relationship. Specifically, father-child attachment security appeared to be relatively stable from 13 months to 3 years of age, and was related to both the quantity and quality of early fathering behavior. Additionally, the early father-child attachment relationship predicted subsequently greater levels of paternal sensitivity in later childhood.

Patterns of Association at 13 Months

Fathers' responsibility and sensitivity failed to predict whether children were classified as securely or insecurely attached to their fathers at 13 months. Despite a non-significant association between sensitivity and attachment, it should be noted that this effect size is greater than some past investigations, and comparable to meta-analytic results (van Ijzendoorn & DeWolff, 1997). Null findings could be due to the limited measurement of father involvement at this timepoint or reflect fathers' relative lack of involvement with children in early infancy. Although absolute involvement generally decreases over time, the proportion of fathers' time spent caregiving relative to mothers increases beyond the first two years (Yeung, Sandberg, Davis-Kean, & Hofferth, 2001). Fathers' increased participation in child care over the first several years might partially explain the stronger associations among study variables at age 3. Overall, these findings emphasize the substantial unexplained variance in infant-father attachment, and the need for research to examine a wide range of parenting and contextual antecedents of this relationship.

Patterns of Association at 3 Years

At 3 years of age, children formed more secure relationships when their fathers were higher on both sensitivity and involvement. Sensitivity was a particularly strong predictor of attachment security, thus supporting theory and research privileging this aspect of parenting as a primary determinant of attachment quality (see DeWolff & van Ijzendoorn, 1997). Interestingly, father involvement was also a unique predictor of attachment security at this age in multivariate analyses. This result should be viewed cautiously, given the absence of a bivariate association between involvement and attachment. Nonetheless, parental involvement has received limited attention in the attachment literature (but see Lamb, 2002), and this result indicates that it is worthy of consideration as a correlate of early attachment quality. Independent effects of sensitivity and involvement suggest that these constructs encapsulate very different realms of paternal behavior (Lamb & Tamis-LeMonda, 2004).

This interpretation is bolstered by the somewhat surprising finding that more involved fathers actually showed somewhat lower levels of sensitivity than did fathers who were less involved. One explanation is that fathers who feel obligated to spend large quantities of time with their children may experience frustration, anger, or other emotional reactions that interfere with sensitive parenting (e.g., Crouter, Perry-Jenkins, Huston, & McHale, 1987). More involved fathers could be more over-burdened – and hence, less sensitive – than those who are less involved. This burden may be exacerbated among fathers working long or strenuous work hours. Regardless of the underlying mechanisms, it appears that high levels of temporal involvement may not in fact be a pre-requisite for fathers' sensitive parenting.

In addition to exerting independent effects, involvement and sensitivity interactively predicted father-child attachment security at 3 years. In general, children were the most securely attached when fathers were highly involved and highly sensitive, and the least securely attached when fathers were less sensitive and less involved. Perhaps more interestingly, the relation between father involvement and father-child attachment security differed markedly as a function of sensitivity. Specifically, involvement was unrelated to attachment security when fathers engaged in sensitive interactions with their children. That is, children were generally securely attached to these fathers regardless of their level of parental involvement (see Brown et al., 2007 for a similar pattern). In contrast, involvement was positively related to attachment security when fathers were relatively less sensitive. This suggests that the quantity of time fathers spent with their children *did* matter for these father-child dyads, such that less sensitive fathers who were highly involved had children who were more securely attached to them than did fathers who were both uninvolved and insensitive. For less sensitive fathers, involvement may play a role in attachment formation by mitigating the deleterious consequences of insensitive parenting.

This notion runs contrary to some past research indicating that attachment security was lowest when fathers were insensitive and highly involved (Brown et al., 2007). Clearly, the benefits of having an involved father will depend on the specific characteristic of his parenting behavior. However, fathers in normative samples may provide some level of felt security to their children simply by being engaged and readily accessible to them. Even if fathers are relatively insensitive caregivers, children may develop some sense of trust – manifest in secure base behavior toward the father – if those fathers spend a great deal of time with them. Fathers may also engage in other sorts of security-promoting practices that were not captured in the context or coding scheme by which sensitivity was assessed. Nonetheless, these interpretations should not be over-stated. Children whose fathers were relatively insensitive but highly involved developed less secure relationships than even those children who had sensitive but uninvolved fathers. Thus, although involvement may have some benefits for attachment security, the most efficient point of intervention for promoting high-quality father-child relationships is likely at the level of paternal sensitivity. This point might be especially relevant for clinicians working with fathers, given that sensitivity interventions appear to be particularly effective in enhancing father-child attachment (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003).

Stability of Fathering and Father-Child Attachment

Patterns of stability in fathering behavior from 13 months to 3 years of age were somewhat mixed. There was some stability in father involvement despite the lack of parallel measurement. Paternal sensitivity, on the contrary, was not particularly stable across these two timepoints. This may be attributable to different coding schemes, observational contexts, and conceptualizations of sensitivity used at these two ages. However, fathers undoubtedly gain knowledge about their children, themselves, and the most effective parenting practices across the first several years of their child's life. The degree to which this knowledge is gained and/or implemented may well differ as a function of numerous factors, and the lack of stability in sensitivity could reflect the dynamic nature of early fathering.

Importantly, father-child attachment security was quite stable from 13 months to 3 years. This stability is striking given the use of different methodologies and observational contexts, and a relatively long gap between assessments. The relation between Strange Situation attachment classification and attachment security via the Attachment Q-Set is similar to a meta-analysis examining this association in the mother-child attachment literature (van Ijzendoorn et al., 2004). The current study is the first to document convergence between these two important methods in attachment research with father-child dyads. As such, it provides important information about the construct and measurement validity of the Attachment Q-Set (as well as the Strange Situation) as a measure of children's attachment relationships with their fathers. Moreover, this temporal continuity suggests that infant-father attachment security may have consequences for father-child relationship functioning at least across the next several years. As such, efforts to include fathers in both research and clinical settings (e.g., Phares et al., 2010) may wish to focus their attention on the quality of the father-child relationship in the child's first year.

Longitudinal Associations

The overall pattern of longitudinal results suggests that that the processes underlying attachment stability may be relatively complex. Notably, neither 13 month paternal responsibility nor paternal sensitivity predicted father-child attachment security at 3 years. Instead, the association between attachment security and sensitivity operated in the opposite temporal direction, such that attachment security at 13 months was not only a unique predictor of sensitivity at 3 years, but also mediated the stability of attachment.

This pattern has important consequences for the conceptualization of attachment stability. The father-child attachment relationship may not simply remain static over time. Rather, a secure father-child attachment relationship may provide reinforcement for fathers that results in increased sensitive parenting, and that subsequent sensitivity is responsible for maintaining a healthy father-child relationship. In addition to benefiting children's social and emotional development (e.g., Lamb, 2002), a secure attachment relationship may also enhance fathers' own parenting. This idea fits with theoretical work suggesting that active engagement in the lives of their children may provide direct benefits to fathers themselves (Hawkins & Belsky, 1989). In this case, it may be that the father-child attachment relationship is a mutually rewarding one. Bowlby (1969/1982) suggested that children who

are securely attached to their fathers display behavior that reflects a sense of trust, comfort, and emotional availability. In addition to being adaptive for children, these attachment behaviors – and the emotional currency that accompanies them – may reinforce fathers' own behavior. Children who display a sense of trust in their father may encourage those fathers to behave sensitively, gain confidence in themselves as parents, and develop heightened interactional synchrony with their children. Future research should further examine the degree to which the early father-child relationship contributes to subsequent paternal behavior, and the mental health of both children and fathers themselves.

Limitations and Future Directions

Although this investigation provides insight into the father-child attachment relationship, it was limited in several ways. Despite the longitudinal design, findings are correlational in nature, and interpretations regarding causality are speculative. Moreover, the current sample was relatively small, predominantly European-American, middle-class, and well-educated. Substantial evidence suggests that fathers in low socioeconomic households, non-western cultures, and ethnic minorities within the United States differ markedly in the ways that they choose to enact their parenting roles, and there remains an increasingly critical need for research on fathers in each of these contexts (e.g., Cabrera et al., 2000). Moreover, the processes underlying the development of a secure father-child relationship may differ among families in which fathers are the primary caregiver. Future work should continue to examine the early father-child relationship among families from a wide range of racial/ethnic backgrounds, socioeconomic statuses, and family structures.

Furthermore, the measures employed in this study were somewhat restricted in scope. In particular, father involvement at 13 months was limited to the dimension of parenting responsibility. Parallel measures of involvement at both timepoints may further elucidate its stability and contribution to attachment security. Moreover, sensitivity at each time was observed in a single context that may not accurately reflect fathers' parenting over the course of daily interaction. A more comprehensive assessment of sensitivity could help to clarify its developmental course and its contribution to father-child relationship quality. Relatedly, fathers interact with their children in qualitatively different ways than do mothers (e.g., Lamb & Tamis-LeMonda, 2004), and an exclusive reliance on sensitivity may overlook some aspects of fathering behavior that could contribute to security. Future research would be well-served by developing coding systems and observational contexts that capture other qualitative nuances of fathers' parenting. This study also focused only on the contributions of fathers' own behavior to the father-child attachment relationship. Subsequent work may benefit from a family systems approach to both research and clinical practice with fathers (Cowan, 1997) that incorporates children, mothers, marital quality, and other family contextual variables.

Despite these limitations, this study is the first to examine associations among father involvement, paternal sensitivity, and father-child attachment security at multiple timepoints. Given the centrality of the early father-child relationship for healthy functioning and psychological well-being within the entire family system, this work could ultimately benefit family studies, family therapy, and programs aimed at supporting families with

young children. Moreover, this endeavor can perhaps serve as a catalyst for fatherhood researchers to begin merging what have to this point been rather disparate theoretical and methodological tools for examining fathers, and to do so in a way that captures the dynamic nature of fathering. In order to fully comprehend the paternal role, it seems necessary to examine the critical issues of fatherhood from multiple perspectives. It is our hope that this work is one step toward a greater understanding of the father-child relationship.

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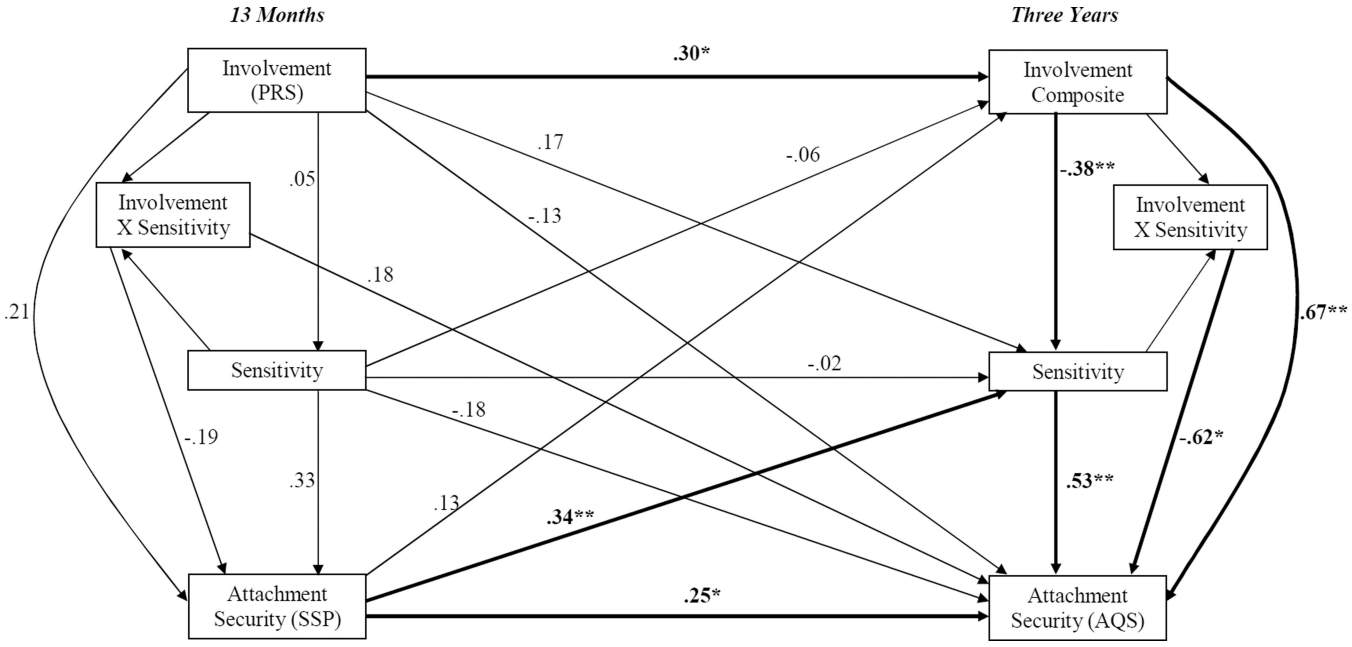

Figure 1.

Path Diagram with All Standardized Path Coefficients Included

Note: Statistically significant paths are highlighted in bold type

*$p < .05$ **$p < .01$

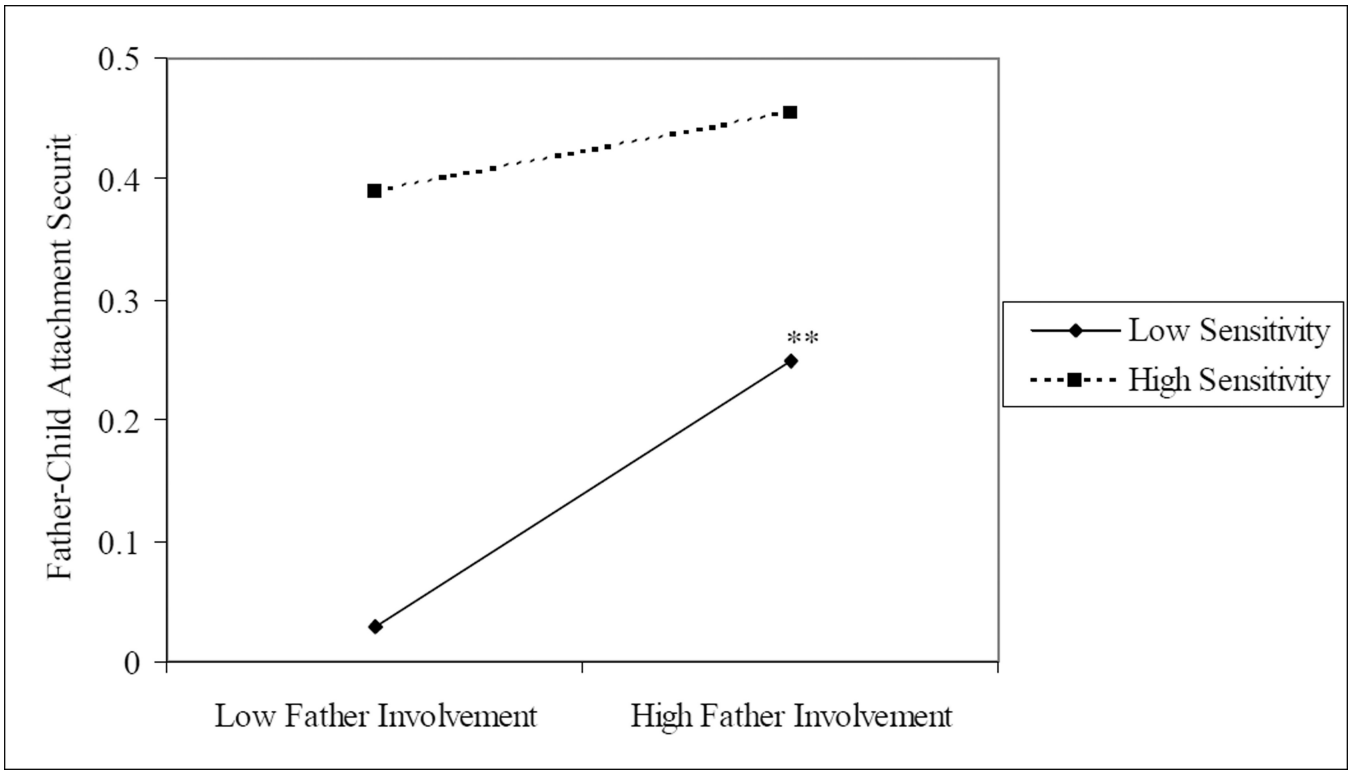

Figure 2.

Associations between Father Involvement and Father-Child Attachment Security as a Function of Paternal Sensitivity

**$p < .01$

Table 1

Means, Standard Deviations, and Correlations Among Continuous Variables

Variables	1	2	3	4	5
13 Months					
1. Fathers' Responsibility (PRS)	–				
2. Paternal Sensitivity (Observed)	.05	–			
3 Years					
3. Composite Father Involvement (Time Diary + PRS)	.31*	.09	–		
4. Paternal Sensitivity (Observed)	.12	.05	−.24*	–	
5. Father-Child Attachment Security (AQS)	.14	.00	.14	.42**	–
Mean	53.08	3.43	.00†	25.79	.29
Standard Deviation	16.88	1.17	.79	7.08	.28

* $p < .05$

** $p < .01$

† Composite score formed by averaging the standardized values of responsibility (PRS; $M = 2.53$, $SD = .34$), interaction (Time Diary; $M = 603.99$ minutes, $SD = 179.47$ minutes), and accessibility (Time Diary; $M = 999.87$ minutes; $SD = 197.72$ minutes) for each participant.