

Fathering in Infancy: Mutuality and Stability Between 8 and 16 Months

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SYNOPSIS

Objective. This longitudinal investigation explores how fathers engage with their infants, how their behaviors matter within and across developmental time, and how demographic and social factors affect the quality of the father – infant relationship. *Design.* Participants were 74 racially and ethnically diverse, low-income fathers from the Father and Newborn Study (FANS) and their 8- and 16-month-old infants (36 boys, 38 girls). Father – infant interactions were videotaped during semistructured free play in participants' homes. The quality of father – infant interactions was assessed using Likert-type ratings of fathers' and infants' behaviors. Fathers also rated their relationship with their infant's mother. *Results.* Two factors of father engagement emerged at each age (Responsive – Didactic and Negative – Overbearing), 2 factors of infant behavior at 8 months (Mastery, Social - Communicative), and 3 factors of infant behavior at 16 months (Mastery, Social, and Communicative). Responsive – Didactic fathering was concurrently associated with infant behaviors at both ages, although fathering at 8 months only marginally predicted infant 16-month Social behaviors. Fathers who were older, more educated, married to their partners, and who had higher incomes were more Responsive – Didactic at 8 months. Fathers' age and the quality of the mother – father relationship predicted fathers' Responsive – Didactic behaviors at the 16-month assessment. *Conclusions.* Fathers' responsiveness is important to infants' social and communicative behaviors, and the mother – father relationship influences fathering during the formative period of infancy.

INTRODUCTION

Infancy is a period of enormous parental investment (Bornstein & Tamis-LeMonda, 2001). Parents nurture, comfort, care for, and teach their infants virtually every day, and the quality of these parent – infant interactions exerts enduring influence on children's social and cognitive development. Daily activities between caregivers and their babies form the basis for in-

infants' developing attachment, communication, and social cognition, as babies increasingly appreciate that experiences and intentions can be shared with trusted others. Although these developmental processes characterize mother – infant and father – infant relationships alike, the parenting literature continues to be dominated by research on mother – infant interactions in predominantly middle-income, two-parent families. This longitudinal study of low-income fathers and their infants addresses this gap by offering a descriptive account of the nature, consequences, and determinants of fathers' behaviors with their 8- and 16-month-old infants.

Fathering in Infancy

The focus on father – infant engagement is of theoretical and practical significance. From a theoretical standpoint, infancy is a period of rapid change; fathers and mothers alike must adjust their behaviors daily in response to infants' growing needs and competencies. Fathers who are able to sensitively accommodate infants' emerging abilities are thought to promote secure infant attachments and to further their own enjoyment of and commitment to their roles as fathers (Lamb & Lewis, 2004). Fathers' sensitivity and responsiveness toward their infants and young toddlers are associated with young children's social competencies and language and cognitive abilities, both concurrently and predictively (Black, Dubowitz, & Starr, 1999; Lamb & Lewis, 2004; Shannon, Tamis-LeMonda, London, & Cabrera, 2002; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004).

From a practical standpoint, infancy is a time of unparalleled opportunity for practitioners and policymakers to support men who are invested in their "new" roles as fathers. Findings from the Fragile Families and Child Wellbeing study demonstrate that 80% of low-income unmarried fathers are present and express firm intentions to remain involved in their newborns' lives (Carlson & McLanahan, 2002). However, a measurable proportion of fathers who are initially committed and involved become disengaged later in infancy and the toddler years (Lerman, 1993; Perloff & Buckner, 1996). Therefore, researchers should aim to better understand fathering among those low-income men who are still present in their infants' lives before declines in father involvement begin. Preliminary research in our laboratory reveals that fathers' behaviors during pregnancy and birth (e.g., accompanying mother to prenatal visits, being present at the newborn's birth) predict their presence and involvement in their children's lives 3 years later (Shannon, Tamis-LeMonda, Cabrera, & Lamb, 2003). A first step toward promoting healthy father – infant relationships is to document how fathers engage with their infants, how their engagement matters within and across developmental time, and how demographic and social

factors contribute to the quality of the father – infant relationship. The Father and Newborn Study (FANS) offers unprecedented data on the behaviors of present, positively involved, low-income fathers and their babies that enable us to begin tackling these complex questions.

Assessing Father – Infant Interactions

Our first goal was to describe father – infant interactions at 8 and 16 months and to explore associations between these father and infant behaviors. In these assessments, we contrasted didactic, responsive, and positive modes of fathering with behaviors that were overbearing and negative in affect. Didactic behaviors were those in which fathers encouraged infants to engage and understand the environment outside the dyad by focusing the infant's attention on properties, objects, or events in the immediate surroundings as well as introducing, mediating, and interpreting the external world, describing, and demonstrating, or providing opportunities to observe, imitate, learn, and the like (Bornstein, 2002). Responsive behaviors encompassed the contingent, prompt, and appropriate reactions that fathers displayed to infants' verbal and nonverbal initiatives. Positive behaviors were affective displays that were positive or comforting. Overbearing behaviors were those in which fathers interfered with or inhibited their infants' behaviors, and negative behaviors were those in which fathers displayed negative affect either facially or vocally. These contrasting forms of behavior have been the focus of mother – infant engagement for decades, and have formed the basis for widely used taxonomies of parenting (Bornstein, 1995; Bornstein & Tamis-LeMonda, 2001). Although these behaviors capture distinct aspects of parenting, they often relate to one another. For example, parents' responsiveness has been strongly associated with didactic and positive behaviors; therefore, these behaviors have frequently been combined. Similarly, parents' overbearing behaviors have related to negativity, thus, these behaviors have also been combined (e.g., Love et al., 2002; Tamis-LeMonda et al., 2004).

Research in our laboratory has demonstrated the beneficial effects of Responsive – Didactic fathering for 2- and 3-year-old children (Shannon et al., 2002; Tamis-LeMonda et al., 2004). However, no studies have explored the predictive validity of these modes of engagement in fathers during the infancy period. Infants might show differential reactions to specific parental behaviors in mothers versus fathers (e.g., infants may show more tolerance of intrusiveness in fathers than in mothers). There is also some evidence suggesting that infants might develop somewhat different patterns of engagement with their fathers, due to spending less time with them (Pleck,

1997) in different developmental contexts (e.g., play; Lamb, Frodi, Hwang, & Frodi, 1983; Roggman, Boyce, & Cook, 2002).

The coding of infant behaviors paralleled behaviors observed in fathers. Social behaviors were those that were directed toward interpersonal interactions — smiles, coos, and face-to-face interactions. Infants' responsiveness captured behaviors that were participatory and sensitive to their fathers' overtures. Infants' play and communicative behaviors paralleled didactic behaviors in fathers — vocalizations, verbalizations, gestures, and interest in and engagement with toys.

Determinants of Father Involvement

Our second goal was to examine particular determinants of father involvement within and across the 8- to 16-month period. Fathering is affected by multiple interacting systems, operating at different levels over the life course, including personal characteristics (e.g., motivation, skills, and self-confidence), children's characteristics (e.g., temperament, gender), social contextual factors (e.g., relationships with partners and extended family members, socioeconomic opportunity, cultural ideologies), and institutional practices and public policies (e.g., welfare support, child support enforcement; Belsky, 1984; Lamb & Tamis-LeMonda, 2004; Tamis-LeMonda & Cabrera, 2002). For purposes of this study, we focus on demographic characteristics of fathers (income, education, and age) as well as the mother – father relationship (father residency, marital status, and the quality of the mother – father relationship).

Characteristics of fathers. Fathers who are employed and educated are more likely to be involved with their children while they live with them as well as after divorce or nonmarital births, perhaps because they are better able to support their children economically (Rangarajan & Gleason, 1998; Stier & Tienda, 1993; Sullivan, 1993). Additionally, older fathers are more able to provide for their children than are younger fathers, given that older fathers are more likely to be educated and employed (Lerman, 1993). Older fathers are also more involved with their infants and children and are found to display greater sensitivity in their interactions than younger fathers (Fagan, 1996; Gavin et al., 2002).

Mother – father relationship. The roles that fathers play in family life often depend on mothers' attitudes, expectations, and the quality of the mother – father relationship (Allen & Hawkins, 1999). Mothers have been found to gatekeep nonresidential fathers' access to children, and mothers often constrain and define the roles and responsibilities of both residential and non-

residential fathers (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000; Lamb & Tamis-LeMonda, 2004). In our own work, we found that fathers who reside with their partners and children are more involved with their children than their nonresidential counterparts because they have more access to their children on a daily basis (Cabrera et al., 2004). Residential fathers are also more likely to engage in sensitive behaviors than nonresidential fathers (Brophy-Herb, Gibbons, Omar, & Schiffman, 1999).

Positive paternal influences are also more likely to occur when fathers establish positive relationships with the mothers of their children. Warm and close mother – father relationships are linked to greater paternal involvement (McKenry, Price, Fine, & Serovich, 1992). In contrast, unmarried fathers in unstable or hostile relationships with their child's mother are more likely to be uninvolved (Edin & Lein, 1997; Gavin et al., 2002) and to display negative involvement with their children (Coley & Chase-Lansdale, 2000). A substantial literature shows that marital discord and conflict mediates the association between father engagement and child well-being (Cummings, Goeke-Morey, & Raymond, 2004).

This Study

This study uses data from FANS of the Early Head Start Research and Evaluation Project. FANS was designed to address the following questions: (1) How do different degrees, timing, and intensity of father involvement influence infant and toddler development? (2) How do fathers interact and become involved with their newborns? (3) How do fathers' relationships with their children's mothers relate to their children's development? and (4) How does early father involvement predict later parental involvement? This study examines the quality of father – infant engagement when infants were 8 and 16 months and fathers' behaviors were related to infants' behaviors within and across age. In addition, fathers' demographic characteristics and the quality of the mother – father relationship were examined in relation to fathers' engagement at both assessments and to patterns of fathering over time. We contrasted two models in our analysis (Bornstein, 1989a, 1989b, 1995; Bradley, Caldwell, & Rock, 1988). To test a "contemporary" model, we asked whether fathers' behaviors and infant behaviors at 8 and 16 months related concurrently. To test an "early effects" model, we asked whether the quality of father – infant engagement at 8 months uniquely predicted infant behaviors at 16 months after controlling for fathers' concurrent behaviors. Fathers and infants were observed during free play, in light of the prominence of play in father – infant interactions. Fathers spend greater proportions of time in play with their young infants than do mothers, and paternal playfulness and

relative novelty is thought to enhance fathers' salience to their infants and young children (e.g., Lamb et al., 1983; Roggman et al., 2002).

METHODS

Participants

Unlike the other Early Head Start father substudies, not all the families in FANS were part of the Early Head Start evaluation; some were recruited to participate from other infant and toddler programs that also provided comprehensive services to families. As in the Father Involvement with Toddlers Substudy (FITS; described by Boller et al., this issue), mothers were recruited into the study first and were asked to help identify and contact fathers. Mothers were asked if they expected their child's biological father would rear their child with them. If the biological father was not involved in their child's life and not expected to rear their child, then mothers were asked if they were in a romantic relationship with a father figure for the child with whom they expected to rear their child. If a biological or a romantic father figure (usually the mother's boyfriend) was named, then researchers contacted the identified fathers by telephone and informed them of the research. A father visit was scheduled and written consent to participate in the study was obtained from fathers. Of the 265 families who completed a first interview, only 4% included men who were not the child's biological father.

Mother and father interviews were conducted when the children were 1, 3, 8, 16, and 24 months old. Fathers and children also participated in three brief videotaped interaction tasks when the children were 8, 16, and 24 months old. For the 8- and 16-month father visits, we intended to complete them when infants were 6 and 14 months old by initially contacting fathers when their infants were 4 and 12 months of age, however, actually scheduling visits took several months and infants, on average, were 8 and 16 months old when father interviews and videotaped interactions were completed. Many of the same questions asked of mothers were drawn from the parent interviews used in the Main Study of the Early Head Start Evaluation, and many of the questions asked of fathers were drawn from the FITS study. Additional questions included asking both mothers and fathers about the father's involvement during the pregnancy, the child's birth and the newborn period, and the quality of the mother - father relationship.

Of the initial 123 men participating in the videotaped portion of the FANS at 8 months, 74 fathers (60%) agreed to participate in the 16-month

videotaped assessment. The final sample, therefore, comprised 74 fathers and their infants (36 boys and 38 girls).

Most father – infant dyads (78%) were from urban neighborhoods and came from diverse racial and ethnic backgrounds with the majority being Latin American (46%) or African American (36%). A smaller percentage of fathers were European American (15%) or Chinese American (3%). Sixty fathers spoke English, and 14 spoke another language (12 Spanish and 2 Cantonese). The majority of fathers (71%) had been living with their infants since birth, and they were unmarried (69%). About half ($n = 39$) were first-time fathers. At the time of the interview, fathers ranged from 16 to 39 years of age ($M = 25$, $SD = 6.8$). Their infants averaged 8.19 months ($SD = 1.49$) at the time of the 8-month assessment and 16.15 months ($SD = 2.11$) at the time of the 16-month assessment. Over a third, 36% ($n = 27$), of fathers completed 11 or fewer years of high school; 38% ($n = 28$) graduated from high school or received their government equivalency diploma; and 26% ($n = 19$) completed some college or graduated from college. All infants' mothers were low income and eligible to receive some form of governmental assistance (e.g., Medicaid, food stamps, WIC). Most of the fathers (8 months: 93%; 16 months: 85%) reported working full time or part time, and their mean monthly income was \$1,251 ($SD = \970) at 8 months and \$1,377 ($SD = \1040) at 16 months.

Overall, demographic characteristics of father – infant dyads who participated at both time points did not differ from those who only participated in the 8-month videotaped assessment. The exception was that Latin American fathers were more likely to participate at both time points than fathers from the other racial and ethnic groups, $\chi^2(2, N = 121) = 9.50, p < .01$.

Procedures

Father – infant videotaped interaction task. Dyads were videotaped during semistructured free play for 8 min at 8 months and 10 min at 16 and 24 months. They were provided with a standard set of age appropriate toys (8 months: a set of plastic rings, soft plastic book, musical ball, plastic colorful bolster with bells, and a brightly colored double-star fine motor toy; 16 and 24 months: three separate bags which included a book, a pizza set and telephone, and a farm with farm animals). Fathers were asked to sit on a mat with their children, to ignore the camera, and to do whatever was most natural to them. They were instructed to play only with the toys presented to them and to divide up the time as they chose.

Coding. The quality of father – infant interactions was assessed using the Caregiver – Child Affect, Responsiveness, and Engagement Scale (C-CARES;

Tamis-LeMonda, Rodriguez, Shannon, Ahuja, & Hannibal, 2002; Shannon et al., 2002), which rates various father, infant, and dyad behaviors on a 5-point Likert-type scale (1 = *behavior not observed* to 5 = *behavior constantly observed*). At 8 months, 18 father and 9 infant items were used, and at 16 months, 19 father and 13 infant items were used (see Table 1 for father items). Infant items were as follows: positive affect, negative affect, emotional regulation, participation with caregiver, responsiveness to caregiver, emotional attunement, persistence, toy play, and amount of communication. Additional infant items at 16 months were positive touch, negative touch, play sophistication, and quality of communication. These items were coded at 16 months and not at 8 months because of development in children's communication and play skills that occur around their first birthday.

Two trained coders reached 85% agreement (within 1 point) with 10 "gold standard tapes" before coding interactions separately. Ten percent of the remaining tapes were randomly assigned to one research assistant to ensure reliability. Interrater agreement ranged from 87% to 100% agreement (exact and within 1-point agreement). Correlational estimates of interrater reliability ranged from .71 to .97. Coders of father – infant engagement were fluent in the language of the participants. Coders were unaware of fathers' ratings of the quality of the mother – father relationship.

Demographics. Fathers were interviewed about their residency (0 = *nonresident*, 1 = *resident*), marital status (0 = *unmarried*, 1 = *married*), age, race and ethnicity, primary language, educational background, monthly income, and parity. Their infants' gender (0 = *boy*, 1 = *girl*) and age and their families' urban/rural residency (0 = *not urban*, 1 = *urban*) were gathered from mother interviews.

Mother – father relationship. The quality of fathers' relationship with their infants' mothers was based on two questions at 8 and 16 months. Fathers were asked to respond on a 5-point Likert-type scale (1 = *poor* to 5 = *excellent*) to the following question: "In general, how would you rate the quality of your relationship with (CHILD'S) mother?" They were asked to respond on a 4-point Likert-type scale to the following question: "In general, how supportive would you say that your infant's mother is of your being a father to (CHILD)?" (1 = *tries to prevent you from having a relationship with child* to 4 = *very supportive*). Fathers overwhelmingly viewed their relationship with their infants' mothers positively, as indicated by their high scores on each scale at two ages (i.e., Quality of relationship: 8 months, $M = 3.80$, $SD = .52$; 16 months, $M = 3.85$, $SD = .43$; and Supportiveness: 8 months, $M = 4.03$, $SD = 1.02$; 16 months, $M = 3.85$, $SD = 1.17$). These four questions were converted to z-scores and combined into one scale that

TABLE 1
Father Behaviors

Behavior Items	Definitions	8 Months		16 Months	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Positive affect	Display enjoyment, approval, or affection through facial expressions and tone of voice	3.62	1.13	3.50	1.06
Negative affect	Display disapproval, anger, or impatience through facial expressions and tone of voice	1.38	.77	1.31	.62
Positive touch	Amount and quality of gentle, playful touch using hands, face, or body	3.61	1.17	3.36	1.43
Negative touch	Amount and quality of forceful, abrupt touch using hands, face, or body	1.85	1.00	2.01	1.01
Positive verbal statements	Expression of approval, praise, and positive reinforcement	1.89	.91	2.62	1.42
Negative verbal statements	Expression of disapproval for noncompliance and negative behavior	1.50	.78	1.62	1.00
Teasing	Contradict infant's actions in a playful or antagonistic manner	1.84	1.06	1.53	.86
Participation with infant	Amount of involvement with the infant, not the quality	4.19	.95	4.42	.95
Responsiveness to nonverbal cues	Contingent and appropriate responsiveness to infant's nonverbal cues	3.27	1.13	2.68	1.20
Responsiveness to vocalizations	Contingent and appropriate responsiveness to infant's verbal cues	2.14	1.39	2.91	1.37
Emotional attunement	Emulate infant's emotions using voice, gestures, and facial expressions	2.50	1.21	1.92	1.06
Flexibility	Willingness to let the infant direct an activity	3.91	1.11	4.20	.89
Intrusiveness	Interrupt, restrict, or hover over the infant's play	2.39	1.19	2.15	.92
Structuring	Organize environment and materials to maximize infants' play and learning	3.73	1.08	3.73	1.25
Achievement orientation	Encourage cognitive achievement through directive teaching	2.22	1.14	2.07	1.08
Toy play	Amount of the father's play with the toys, not sophistication of play	3.54	1.09	3.77	.90
Play sophistication	Use of symbolic play as opposed to functional nonsymbolic play	—	—	1.74	.66
Amount of language	Amount of verbal stimulation provided, regardless of content and style	2.96	1.21	3.36	.99
Quality of language	Quality of verbal stimulation; level of explanatory verbal style	2.76	1.33	2.45	1.06

measured mother – father relationship quality, which demonstrated adequate internal consistency with a coefficient alpha of .73.

RESULTS

Descriptions of Father and Infant Behaviors

The means and standard deviations of 8- and 16-month father C-CARES items are presented in Table 1. At both ages, father and infant items displayed modest to strong variation.

Father behaviors. At both 8 and 16 months, fathers received the highest scores on positive items such as participation, flexibility, toy play, structuring, and positive affect. Their lowest scores were on the items of negative affect, negative verbal statements, and teasing. Patterns were similar across ages, although fathers received higher scores on positive verbal statements and language amount at the 16-month versus 8-month assessment, $t_s(73) = -4.91$ and -3.18 , $ps < .001$. Fathers received lower scores on teasing at 16 months and were more responsive to infants' vocalizations at 16 months; they were less responsive to infants' nonverbal cues and less emotionally attuned to their infants at the 16-month assessment, $t_s(73) = 2.16$, -3.45 , 3.46 , and 3.49 , respectively, $ps < .05$. These mean level differences were likely explained by developmental changes in infants. Infants were beginning to communicate verbally by 16 months, and fathers met these changes with increased attentiveness to infants' vocalizations and less attentiveness to nonverbal forms of infant communication.

Infant behaviors. At both ages, infants received relatively high scores on toy play and persistence. They were rated lowest on negative affect and emotional attunement. The low scores on emotional attunement may be explained by the context of play; infants' attention to the toy materials might have inhibited emotional displays. Infants were more involved with and responsive toward their fathers, more emotionally regulated, persistent, involved in toy play, and communicative at 16 months, $t_s(73)$, range -2.01 to -5.47 , $ps < .05$.

Factor Analyses of Father and Infant Behavior

Exploratory factor analyses were conducted to examine whether the coded items might be reduced in a meaningful way. Consistent and interpretable solutions were identified for fathers and infants at both ages.

Father factor analyses. Two-factor solutions using principal component analysis with varimax rotation provided the most meaningful solutions for both 8-month and 16-month father behaviors on the C-CARES (see Table 2). These solutions paralleled those obtained in prior studies with other samples using the C-CARES when children were 8 months, 16 months, and 24 months of age (Shannon et al., 2002; Spellmann, Tamis-LeMonda, & Baumwell, 2000).

At both ages, the first factor, labeled Responsive – Didactic (12 items at 8 and 16 months), consisted of all positive items: positive affect, positive verbal statements, positive touch, participation, responsiveness to nonverbal cues, responsiveness to child vocalizations, emotional attunement, structuring, achievement orientation, toy play, amount of language, and quality of language and play sophistication (this item was only measured at 16

TABLE 2
Factor Analyses of Father Behaviors at 8 and 16 Months

Father Behavior Items	8-Month Factor Solution		16-Month Factor Solution	
	Responsive – Didactic	Negative – Overbearing	Responsive – Didactic	Negative – Overbearing
Positive affect	.76		.62	
Negative affect		.49		.64
Positive touch ^a	.32			
Negative touch		.62		.43
Positive verbal statements	.58		.46	
Negative verbal statements		.46		.42
Teasing		.62		.44
Participation with infant	.73		.53	
Responsiveness to nonverbal cues	.61		.69	
Responsiveness to vocalizations	.37		.21	
Emotional attunement	.56		.54	
Flexibility		-.86		-.85
Intrusiveness		.86		.75
Structuring	.52		.44	
Achievement orientation	.79		.39	
Toy play	.44		.55	
Play sophistication	—	—	.56	
Amount of language	.82		.72	
Quality of language	.77		.73	

Note: Extraction Method: Principal Component Analysis with Varimax Rotation.

^aPositive touch only loaded on 8-month factor. Although the loading was low on the “Responsive – Didactic” factor (.32) at 8 months, we maintained this item because parental touch (e.g., holding) is a common parenting behavior during infancy.

months). The second factor, labeled Negative – Overbearing (6 items at 8 and 16 months), consisted of all negative behaviors: negative affect, negative verbal statements, negative touch, teasing, and intrusiveness, and negatively loaded on flexibility. A scree plot of the factor eigenvalues 3.8 and 1.9 supported the two-factor solution at 8 months and eigenvalues 4.0 and 2.5 supported the two-factor solution at 16 months. Two factors accounted for 45% of the item variance at 8 months and 34% of the item variance at 16 months.

The only inconsistencies in the factor loadings across the two ages were “positive touch” and “responsiveness to vocalizations.” The “positive touch” item loaded on the Responsive – Didactic factor at 8 months. However, it did not load on either factor at 16 months and thus was eliminated from further analyses. The item “responsiveness to vocalizations” only weakly loaded on the Responsive – Didactic factor at 16 months. Nonetheless, we elected to retain this variable due to the predictive validity of responsiveness (Tamis-LeMonda, Bornstein, & Baumwell, 2001). The two scales at both ages demonstrated modest to good internal consistency with a coefficient alpha of .85 for Responsive – Didactic and .78 for Negative – Overbearing at 8 months, and .77 for Responsive – Didactic and .67 for Negative – Overbearing at 16 months.

At 8 months, fathers’ scores on the Responsive – Didactic scale negatively related to their scores on the Negative – Overbearing scale, $r(74) = -.30, p < .01$. There was no association between fathers’ scores on the two scales at 16 months, $r(74) = -.14, ns$. Fathers’ scale scores were moderately stable over time, $r(74) = .44, p < .01$, for Responsive – Didactic; and $r(74) = .24, p < .05$, for Negative – Overbearing. Fathers’ Responsive – Didactic scores did not vary at infant age of assessment; however, scores on Negative – Overbearing were negatively associated with infant age at 16 months, $r(74) = -.26, p < .05$.

Infant factor analyses. A two-factor solution using principal component analysis with varimax rotation for 8-month infant behaviors and a three-factor solution for 16-month behaviors on the C-CARES provided the most meaningful solutions. The two-factor solution at 8 months paralleled those identified in our prior studies of mother – infant interactions with their 8-month-olds (Spellmann et al., 2000). The three-factor solution at 16 months paralleled those identified in our prior research on father – child interactions with their 24-month-olds (Shannon et al., 2002).

The first factor at 8 and 16 months, labeled Mastery (four items at 8 months and five items at 16 months), consisted of emotional regulation, persistence, and involvement with toys, and negatively loaded on negative affect and negative touch (only measured at 16 months). The second factor at 8 months, labeled Social – Communication (five items), consisted

of positive affect, participation with caregiver, responsiveness to caregiver, emotional attunement, and amount of communication. This second factor was split further into two factors at 16 months — Social and Communication. The Social factor (four items) consisted of positive affect, participation with caregiver, responsiveness to caregiver, and emotional attunement. The Communication factor (three items) consisted of amount of communication, quality of communication, and play sophistication. The item “positive touch,” only at 16 months, did not load on any of the three factors and was excluded from further analyses.

A scree plot of the factor eigenvalues 3.8 and 1.9 supported the two-factor solution at 8 months and eigenvalues 3.9, 1.9, and 1.4 supported the three-factor solution at 16 months. The two factors at age 8 months accounted for 63% of the item variance at 8 months, whereas the three factors at 16 months accounted for 55% of the item variance. The scales at both ages demonstrated fair to strong internal consistency with coefficient alphas of .87 for Mastery and .76 for Social – Communication at 8 months; and .76 for Mastery, .64 for Social, and .64 for Communication at 16 months.

On average, infants frequently displayed mastery behaviors at both ages as indicated on their high Mastery scale scores (8 months: $M = 3.13$, $SD = .81$; 16 months: $M = 4.32$, $SD = .67$). Infants only rarely to occasionally displayed social and communicative behaviors at either age, as indicated by their low scores on the Social – Communication scale at 8 months ($M = 2.45$, $SD = .68$), and the Social ($M = 2.78$, $SD = .74$) and Communication ($M = 2.18$, $SD = .74$) scales at 16 months. Infant age at the 8-month assessment was unrelated to their scores on both child scale scores; however, age at the 16-month assessment was positively related to their mastery, cognitive, and social scale scores, $r_s(74) = .34$ to $.42$, $p < .01$. Infant gender was unrelated to any scale score, $r_s(74) = -.10$ to $.17$, ns .

Infants' Mastery and Social – Communication scale scores were positively associated, $r(74) = .38$, $p < .01$. At 16 months, toddler scores on Mastery, Social, and Communication scales all covaried, $r_s(74) = .31$ to $.40$, $p_s < .05$ and $.01$. Over time, infants' scale scores were unstable. Neither scale score at 8 months predicted any of the three infant scale scores at 16 months, $r_s(74) = -.06$ to $.19$, ns .

Concurrent Associations Between Father and Infant Scales at 8 and 16 Months

Because infant age was related to all 16-month infant scale scores and to fathers' Negative – Overbearing scores, partial correlations between the father and infant scales were examined with infant age at assessment serving as a covariate. Fathers' scores on the Responsive – Didactic scale at 8

months related positively to infants' scores on the Social – Communication scale, $r(74) = .41, p < .01$. Fathers' scores on the Negative – Overbearing scale related negatively to infants' scores on the Social – Communication scale, $r(74) = -.21, p < .05$. Neither father scale related to infants' scores on the Mastery scale, $rs(74) = -.06$ and $-.05, ns$.

Similar associations between father and infant scales were obtained at 16 months. Fathers' scores on the Responsive – Didactic scale positively related to infants' scores on Social and Communication scales, $rs(74) = .55$ and $.27, ps < .05$ and $.01$. Fathers' Negative – Overbearing scale scores were unrelated to any of the three infant scales, $rs(74) = -.11$ to $-.06, ns$.

Predictive Associations from 8 to 16 Months

Father and infant scale scores at 8 months were examined in relation to father and infant scale scores at 16 months after covarying infant age. Fathers' scores on the 8-month Responsive – Didactic scale marginally predicted infant Social scale scores, $r(74) = .22, p = .07$. Fathers' scores on the Negative – Overbearing scale at the 8-month assessment did not predict any infant scale scores at 16 months, $rs(74) = -.12$ to $.17, ns$. Similarly, infant scale scores at 8 months did not predict father scale scores at 16 months, $rs(74) = -.07$ to $.11, ns$.

Determinants of Fathering

Fathers' age, education, income, residency, marital status, and quality of their relationship with the child's mother were next examined in relation to fathers' scale scores and to patterns of fathering over time. Infant age was covaried in these analyses because infant age related to fathers' scores on the Negative – Overbearing scale.

Bivariate correlations. At 8 months, older fathers and those married to their infants' mother received higher Responsive – Didactic scores and lower Negative – Overbearing scores, $rs(74) = -.21$ to $.32, ps < .05$. Fathers who resided with their infants received lower scores on the Negative – Overbearing scale, and fathers with more education and higher incomes received higher scores on the Responsive – Didactic Scale, $rs(74) = -.32$ to $.28, ps < .05$. At 16 months, fathers' age was marginally associated with their scores on the Responsive – Didactic scale, $r(74) = .22, p = .06$. The quality of the mother – father relationship was associated with fathers' scores on the Responsive – Didactic scale at 16 months, $r(74) = .26, p < .05$.

Multiple regressions. A series of regressions was conducted to examine predictors of father engagement at each age separately. At 8 months, infant age and 8-month Social – Communication behaviors, fathers' age, and the quality of the mother – father relationship were entered as predictors of fathers' Responsive – Didactic and Negative – Overbearing behaviors. We initially included all significant parent demographic characteristics (father age, education, income, and marital status for the 8 month Responsive – Didactic scale; father age, resident status, and marital status for 8 month Negative – Overbearing scale), but only father age was significant when other demographic characteristics were included in the same equation. Therefore, all other demographic variables were dropped from the equations after we controlled for father age.

Given that the vast majority of families in this study (97%) were in Early Head Start or another early intervention program, we did not include treatment status in our multivariate analyses. At 16 months, infant age, infants' 16-month behaviors, fathers' age, fathers' 8-month behaviors, and the quality of the mother – father relationship were entered as predictors (see Tables 3 and 4).

Significant results were obtained for all four models, particularly in relation to fathers' Responsive – Didactic behaviors. Specifically, fathers with older infants were less Responsive – Didactic at 8 months and less Negative – Overbearing at 16 months. Infants with higher scale scores had fathers who were more Responsive – Didactic and less Negative – Overbearing at both ages. After accounting for infant contributions, older fathers were more Responsive – Didactic and less Negative – Overbearing at 8 months, and fathers' earlier behaviors predicted their later behaviors.

TABLE 3
Prediction of Fathering at 8 Months

Step	Variables	8-Month Father Scales			
		Responsive – Didactic		Negative – Overbearing	
		β	ΔR^2	β	ΔR^2
1	Infant age	-.21*	.01	.02	.00
2	Significant Infant Scale		.16***		.06*
	Social – Communication	.44***		-.23	
3	Father age	.28**	.09**	-.21	.04
4	Mother - Father Relationship Quality	.15	.02	.04	.00
	R ² total		.29		.10

Note: Beta weights presented are from the final regression equation.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

TABLE 4
Prediction of Fathering at 16 Months

Step	Variables	16-Month Father Scales			
		Responsive – Didactic		Negative – Overbearing	
		β	ΔR^2	β	ΔR^2
1	Infant age	-.05	.04	-.26*	.07*
2	Significant infant scales (block)		.29**		.00
	Social	.40**		.05	
	Communication	.21*		-.03	
3	Father age	.10	.04*	-.08	.02
4	Father scales (block)		.11**		.05*
	8 month Responsive – Didactic	.35**		—	—
	8 month Negative – Overbearing	—		.24*	
5	Mother - Father Relationship Quality	.21*	.04*	-.01	.00
	R^2 total		.52		.14

Note: Beta weights presented are from the final regression equation.

* $p \leq .05$. ** $p \leq .001$.

Finally, fathers who reported being in a higher quality relationship with their infants' mothers received higher Responsive – Didactic scores at 16 months, after controlling for all other predictors. At 8 months, the predictors explained 29% of the variance in fathers' Responsive – Didactic behaviors and 10% of the variance in fathers' Negative – Overbearing behaviors. By 16 months, the predictors explained 52% of the variance in fathers' Responsive – Didactic behaviors and 14% of fathers' Negative – Overbearing behaviors.

DISCUSSION

This longitudinal study builds on the growing body of research on low-income fathers by describing the nature and patterns of father – infant interactions when infants were 8 and 16 months. We examined associations between fathering and infant behaviors within and across time and explored demographics and the quality of the mother – father relationship as determinants of fathering.

This group of involved fathers interacted in ways that go beyond portrayals of fathers as “rough and tumble” playmates (see also Shannon et al., 2002). In the context of substantial individual variation, fathers were generally positive in their engagement with their infants at both ages, as

indicated by their relatively high scores on participation, responsiveness, and flexibility, and relatively low scores on intrusiveness, negative affect, and negative touch.

Two meaningful factors of fathering were identified: Responsive – Didactic and Negative – Overbearing. This taxonomy of fathering mirrors extant findings on parenting styles in fathers and mothers (e.g., Baumwell, Tamis-LeMonda, & Bornstein, 1997; Black et al., 1999; Brophy-Herb et al., 1999; Heermann, Jones, & Witkoff, 1994). In infants, two meaningful factors were identified at 8 months, Mastery and Social – Communication, and three factors emerged at 16 months, Mastery, and the Social – Communication factor at 8 months split into two distinct factors: Social and Communication.

Within each of the two infant ages, fathers with higher scores on the Responsive – Didactic scale had infants who were more social and communicative in their engagement, supporting a contemporaneous model of influence. Fathers' scores on the Negative – Overbearing scale were either unrelated or inversely related to infants' engagement. The separate loading of variables onto Social versus Communicative factors at 16 but not at 8 months reflects the developmental transition that infants make in their verbal and play abilities between the two ages, although it is safe to say that associations likely reflect a bidirectional process. Fathers who display higher levels of responsive and didactic behaviors are likely to promote communication and social skills in their infants, and infants who display higher levels of communicative and social abilities promote sensitive, didactic interactions in their fathers, which may then influence infants' further developmental progress.

In this regard, it is surprising that fathers' Responsive – Didactic behaviors at 8 months only marginally predicted infants' 16-month behaviors, refuting an early effects model. The relative lack of associations between early father – infant engagement and later infant behaviors might reflect qualitative changes that occur in infants' capacities over this time frame, as well as the fact that fathering was only modestly stable across the 8-month period. Indeed, exploratory analyses (not presented in the report) shed light on this modest stability and offered an alternative interpretation to the lack of lagged father – infant associations. When the Responsive – Didactic and Negative – Overbearing scores of individual fathers were examined at the two ages, 51 of the 74 fathers (69%) displayed relatively continuous levels of fathering over time (i.e., 28 fathers received consistently high ratings on their fathering, and 23 received consistently low ratings on their fathering). However, the remaining 23 fathers fluctuated in the quality of their engagement over time, with 10 improving and 13 declining. Fathers who received consistently high scores and those who improved over

time had infants who were more communicative and social at 16 months, supporting a contemporary model of fathering effects. These same parenting patterns were found in mothers of term and preterm infants (Landry, Smith, Swank, Assel, & Vellet, 2001). An optimistic interpretation of these data is that fathers' engagement in the second year can compensate for less than optimal engagement in the earlier infancy period when their fathers become or remain positively involved. Similarly, Landry and colleagues (2001) found that inconsistent or later maternal responsiveness is better for children than absence of responsiveness.

Our second goal was to examine whether fathers' demographics or the quality of the mother – father relationship predicted fathering within and across time. Fathers who were older, more educated, married to their partners, and who had higher incomes were better able to establish early connections with their infants, as reflected in positive associations between these variables and fathers' scores on the Responsive – Didactic scale at 8 months. By 16 months, however, fathers' age was the best single demographic predictor of fathering behavior.

Notably, the quality of the mother – father relationship positively predicted fathers' 16-month Responsive – Didactic behaviors over and above infant contributions, father age, and past Responsive – Didactic behaviors. Furthermore, the father – mother relationship reliably predicted patterns of fathers' engagement over time. Fathers who rated the quality of their relationships as high and who felt supported by their infant's mother were more likely to be either consistently high in their parenting quality or to increase in quality between the two ages. These findings parallel those on men from middle-income backgrounds, showing that those who feel supported by their partners in their role as father are more sensitive (Belsky, Youngblade, Rovine, & Volling, 1991; Brody, Pillegrini, & Sigel, 1986; Volling & Belsky, 1991) and playful (Levy-Shiff & Israelashvili, 1988) with their children than are fathers who are involved in less satisfying relationships. Similar results have been documented in low-income, adolescent parents (Lamb & Elster, 1985) and lower- to middle-income African American fathers (Ahmeduzzaman & Roopnarine, 1992). However, these associations between father – mother and father – infant relationships might be explained by variables not assessed in this study. For example, fathers in more supportive relationships with their partners were more responsive to their infants at 16 months, but not at 8 months. It may be that mother – father relationship quality predicts fathering over time, or alternatively, that fathers who are able to maintain "positive" relationships with their partners are those who are also able to remain "committed" (as in responsiveness) toward their infants a year after their babies' births. It may be that this ability to "commit" to rela-

tionships explains the covariance between the father – mother relationship and the father – infant relationship.

This study has several limitations that should be acknowledged. Participants were a select sample of men who were nominated for study inclusion by their partners and were themselves willing to participate. Consequently, assessments of fathering were likely biased toward positive engagement in this group of men. Moreover, these findings are limited to the settings and questions that were asked. For example, although the examination of fathering in the context of free play is important (Roggman et al., 2002), father – infant interactions in other settings might offer a different perspective on what fathers do with their infants. Similarly, evaluation of the mother – father relationship was based on two global questions that limit their scope and explanatory value, particularly in light of the modest sample size of 74 dyads. Nonetheless, these findings offer a glimpse into how involved, low-income fathers engage with and affect their infants' development over the foundational first to second year, and shed new light on the contributions that fathers' education, age, income, and support from partners make to early father – infant relationships.

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ACKNOWLEDGMENTS

We acknowledge our colleagues in the Early Head Start Father Studies Work Group, who are our partners in the commitment to better understand the roles of fathers in young children's lives. The Early Head Start Father Studies Work Group members represent the national Early Head Start evaluation contractor (Mathematica Policy Research and Columbia University), the funding agencies (the Ford Foundation; the Administration on Children, Youth and Families; and the National Institute of Child Health and Human Development, Office of the Assistant Secretary for Planning and Evaluation in Department of Health and Human Services), the local research universities participating in the Early Head Start Research Consortium, and program directors from the Early Head Start programs participating in the national evaluation. Catherine S. Tamis-LeMonda acknowledges funding from National Science Foundation for

New York University's Center for Research on Culture, Development and Education.

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