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## UNDERSTANDING THE CONTRIBUTION OF A FATHER'S WARMTH ON HIS CHILD'S SOCIAL SKILLS

*Secondary analyses from the NICHD Study of Early Child Care and Youth Development were conducted to investigate whether the impact of father-child relationship quality at 54 months and warmth in the father-child relationship at first grade were related to his child's social skills in the third grade, while controlling for mother-child interaction, father's personality, SES, and attachment. It was further investigated whether warmth in the relationship at first grade mediated the effect of the quality of the relationship on social skills. Participants included 856 families taken from the NICHD Study of Early Child Childcare for secondary analyses. Analyses indicated that the quality of interactions between a father and his 54-month old child was directly related to his child's social skills at 3<sup>rd</sup> grade. Latent variable structural equation modeling (SEM) found that the quality of early father-child interactions influences a child's later social outcomes through the development of a warm father-child relationship for daughters but not for sons. Implications for theory and future research are discussed.*

**Keywords:** *father-child relationship, father-daughter relationship, social skills, father warmth, father-child interactions*

The importance of mother-child relationships on later developmental outcomes has been well-documented (see Sroufe, Egeland, Carlson, & Collins, 2005; Weinfeld, Sroufe, Egeland, & Carlson, 2008, for a review), and there has been increasing interest in investigating how the quality of father-child interactions may differentially influence a child's development (Grossman et al., 2002; Lamb & Lewis, 2004; MacDonald & Parke, 1984; Martin, Ryan, & Brooks-Gunn, 2010; Paquette, 2004; Parke et al., 2004; Russell & Saebel, 1997; Trautmann-Villalba, Gschwendt, Schmidt,

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& Laucht, 2006). More recent research has moved away from the study of how much time the father is involved in interactions with his children to attempt to better understand the processes and mechanisms by which father-child interactions may impact development (Adamsons, O'Brien, & Pasley, 2007). Research on the distinctiveness of sex differences in parent-child relationships remains limited, however, when dyadic distinctiveness has been found, it has been at the level of relationship measures such as closeness and affectivity (Russell & Saebel, 1997). Attachment theory (Bowlby, 1982) proposes that a child's early experiences with the primary caregiver impacts the development of interpersonal relationships, and adaptive outcomes have had consistent relationships with caregiver sensitivity (de Wolff & van IJzendoorn, 1997). Bowlby (1979) argued that children who experience their caregivers as responsive and sensitive to their needs would develop internal working models of the self as worthy and competent and would expect others to be responsive to them as well. Parental sensitivity is thought to influence the development of emotion regulation skills, which, in turn, is important for the development of social competence in relationships with peers and adults (Eisenberg, Spinrad, & Smith, 2004). Warmth is a component of sensitivity and is influential in the development of social competence and interpersonal skills, as well as emotion regulation (Bugental & Grusec, 2006). Other aspects of parent-child relationships may also contribute to the development of a child's social skills. For example, providing encouragement and emotional support to children may help with emotion regulation and persistence in the face of conflict, and respecting autonomy and encouraging the child's independence may serve to encourage appropriate risk-taking (NICHD-SECC ECCRN, 2002). Nevertheless, parental warmth may provide a unique contribution to a child's social competence.

MacDonald (1992) argued that "the dimension of parent-child warmth has emerged independently in several factor analytic studies of parenting" (p. 754). Warmth has been found to be present across various cultures (Putnick et al., 2012), lending support to MacDonald's position that warmth is a universal, adaptive form of caregiving that has evolutionary advantages (although the patterning of warmth varies cross-culturally). Rohner's (2004) parental acceptance-rejection theory (PARTheory) describes parental acceptance-rejection on a single dimension with acceptance characterized by high levels of warmth and rejection characterized by hostility, rejection, and neglect (the opposite of warmth). A number of studies have demonstrated that parental warmth is associated with positive developmental outcomes including social competence (e.g., Brody et al., 2002; Kim, Han, & McCubbin, 2007; Lila, Garcia, & Gracia, 2007; Litovsky & Duseck, 1985; NICHD-SECC ECCRN, 2002; Rohner & Britner, 2002; Wang & Chang, 2008). The amount of available research on mother warmth, however, continues to outweigh the amount of research on father warmth in child relationships, thus clearly warranting more research on father warmth. In addition, there is evidence to suggest that there are differences in maternal versus paternal warmth (Gamble, Ramakumar, & Diaz, 2007; Putnick, et al., 2012; Winsler, Madigan, & Aquilino, 2005), and thus, there may be differential effects of mother's versus father's warmth on developmental outcomes. This study, therefore, attempts to understand how the component of warmth in the father-child relationship might uniquely impact his child's social skills, while controlling for the mother-child relationship.

### FATHER-CHILD RELATIONSHIPS

Paquette (2004) argues that fathers serve a unique role in opening up their children to the outside world, and he designates the term “activation relationship” to describe this paternal function. Although he acknowledges that both parents can provide sensitive and responsive caregiving to enhance the development of their children, he argues that fathers typically have a differentiated role with regards to parenting. He notes that the mother-child relationship usually functions to calm and soothe children while relationships with fathers serve to balance arousal and stimulation in well-modulated experiences such that children can learn to take chances and overcome limits while being confident of protection. The “activation” in the activation relationship refers to the tendency of fathers to excite and momentarily destabilize children, encouraging them to take reasonable risks in the safety of a protective relationship. Attachment theory differentiates between secure base behavior and haven of safety (Bowlby, 1979), and in some ways, the differentiated functions between mothers and fathers may serve to support and complement both forms of security with mothers typically providing a haven of safety by calming and soothing children when they are distressed and fathers providing a secure base from which children can safely explore their environment while keeping arousal at an optimal level. Paquette (2004) further argues that this increased activation of the exploratory system extends to the social as well as the physical environment. He cites rough-and-tumble play (e.g., wrestling which happens in a play context) as an example of how fathers seek to modulate the stimulation and aggressiveness of play to keep it balanced such that it is neither over- nor under-stimulating. Some research has found that fathers who are sensitive, cognitively stimulating, and who display positive regard, tend to play in a more complex manner with their toddlers. For example, Roggman, Boyce, Cooke, Christiansen, and Jones (2004) argue that high quality play between fathers and their children positively influence the child’s cognitive, emotional, and language developmental outcomes by providing appropriate stimulation within the context of a supportive relationship. Feldman (2003) found that this type of stimulating play between fathers and children was highly rewarding and increased the child’s positive arousal.

There is also some recent research that suggests that there are differential effects of oxytocin for mothers versus fathers, which lends support to the proposition that fathers interact differently than mothers with their children. Oxytocin is a neuropeptide that has been implicated in mammalian parent-infant attachment and bonding (e.g., Bakermans-Kranenburg & van IJzendoorn, 2008; Carter et al., 2005; Feldman et al., 2007; Neumann, 2008). Feldman and colleagues (2010) found that oxytocin elevations (as measured by both plasma and saliva) were associated with stimulatory touch for fathers and their four-to-sixth month old infants, but not to increased affectionate touch, while the reverse was found for mothers. In an intriguing study that experimentally manipulated oxytocin levels in fathers prior to a play interaction with their toddlers, Naber and colleagues (2010) found that intranasal oxytocin administration resulted in fathers engaging in more stimulating play. Both of these studies lend support to differential behavioral expressions of parenting that may be biologically based and are consistent with the functions of the attachment system in that children tend to turn towards their mother for comforting (haven of safety) and to their fathers for activation of the exploratory system (secure base).

**FATHER WARMTH AND SENSITIVITY**

Implicit in keeping a balanced level of stimulation during playful interactions is the notion of warmth and a sensitive awareness and responsiveness to the child's signals. Fathers must continually monitor their child's reactions and keep the play just within acceptable limits by constantly adjusting in the moment and as his child develops a capacity for stimulation over time. A father's warmth and sensitivity during playful interactions with his child may also have implications for his ability to recognize when his child attempts to show autonomy through initiative behavior (Billler, 1993). Father warmth and sensitivity may have implications for a child's later development of assertiveness, particularly from experiencing that attempts to direct instances of play are successful with a respected male figure. Research, although as yet still limited, suggests that involved, nurturing fathering has a positive association with social competence and empathic abilities in their children (e.g., Amato, 1994; Amato & Rivera, 1999).

Studies that have investigated the impact of a father's sensitivity on child outcomes while controlling for maternal sensitivity have found that fathers' sensitivity influences both cognitive and social development (Holmes & Huston, 2010; NICHD ECCRN, 2004; 2005; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004; Youngblade & Belsky, 1992). More specifically, the NICHD Early Child Care Research Network (2009) found that mother-child and father-child relationships had both direct and indirect effects on their children's attention regulation and social skills which indicates that mothers and fathers may have differential effects on specific aspects of their children's development. Specifically, and of particular interest to the present study, is that fathers were found to have a unique and possibly complementary role in the development of their children's attention regulatory processes and social skills. The researchers (NICHD ECCRN, 2009) hypothesized that fathers may be more involved in the regulation of states of arousal in their children during playful interactions, while mothers may influence attentional processes through the teaching of explicit strategies.

Researchers have also begun to investigate father-child sensitivity as a potential moderator that may buffer against low maternal warmth. For example, Martin, Ryan, and Brooks-Gunn (2010), utilizing data from the NICHD Study of Early Child Care and Youth Development, found that fathers may have a greater impact on children's school readiness (as measured by both academic and social outcomes) in situations in which the mother is less supportive. This finding again speaks to the unique contributions of fathers versus mothers. Of particular interest to the current study is the impact of paternal warmth on social outcomes. Harsh, rejecting, and hostile parenting has long been associated with negative developmental outcomes for children, particularly child conduct problems (e.g., Dadds & Salmon, 2003; Deater-Deckard et al., 2009; Hovee et al., 2009; Patterson, 1986; Viding et al., 2009), while warm and sensitive parenting has been associated with positive outcomes (Belsky et al., 2005; Clark & Ladd, 2000; NICHD-ECCRN, 2002). Warmth is a component of sensitivity and captures the positive affective quality of the relationship. It has been argued that parental warmth may have an indirect effect on children's social outcomes through the development of emotional responding and internalization of positive reciprocal relationships (Kochanska et al., 2008; 2009). Others have argued that warmth is associated with authoritative parenting (Udin, 2011), which in turn is associated with positive outcomes (Steinberg,

2001). It thus seems reasonable to postulate that fathers may have a unique impact on the development of children's social competence through the mechanism of warmth in the relationship, above and beyond that explained by the maternal-child relationship.

### THE ROLE OF PERSONALITY

Personality affects how an individual experiences the world, emotional states, and behavior (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007), including parenting (Belsky, Crnic, & Woodworth, 1995; Spinath, & O'Connor, 2003). Costa and McCrae's (1988) five-factor model of personality, known as the "Big Five" has received the most empirical support (Caspi & Shiner, 2006; DeYoung, Quilty, & Peterson, 2007; McCrae & Costa, 1999). The factors include: *neuroticism*—general mental and emotional stability/instability; *extraversion*—positive emotions and gregariousness; *openness*—valuing of ideas and novel experience; *agreeableness*—compassion and helpfulness; and *conscientiousness*—orderliness, self-discipline, and responsibility. Belsky (1984) hypothesized that the parent's personality affects emotional states, thoughts, and behavior, which in turn impact parenting. Prinzie et al. (2009) conducted a meta-analysis of 30 studies that investigated the relationship between the Big Five personality factors and three dimensions of parenting: warmth, behavioral control, and autonomy. They conducted separate analyses for both mothers and fathers and found that parental personality, as measured by the Big Five, was meaningfully, although modestly, related to parenting practices. Each of the personality constructs of the Big Five were related to the parenting practices of warmth for both mothers and fathers. Specifically, they found that parents who rated themselves as higher on extraversion, agreeableness, conscientiousness, and openness, and lower on neuroticism engaged in more warm and structured parenting, regardless of whether parenting was measured through self-report or observation.

Arguably, extraversion, agreeableness, and neuroticism (inversely) would be most likely related to the construct of warmth. Parents who are high on extraversion would be expected to evidence more sociability and positive affect in their interactions with their children—characteristics closely associated with warmth. Likewise, parents who score higher on agreeableness would be more likely to exhibit compassion and sensitivity towards their children. It could also be expected that parents who are higher in neuroticism would be more anxious and stressed, which would impede their ability to respond sensitively and promptly to their child's signals. These parents might be alternately intrusive (acting on their own needs and not the child's) or preoccupied with their own worries and concerns and unresponsive to their child's needs. Conscientiousness and openness, on the other hand, seem less related to sensitivity and warmth, although they may be directly related to other aspects of parenting such as discipline and negotiation of a goal-corrected partnership. Because personality may impact parenting, it seems important to control for the influence of personality when investigating the influence of warmth on child outcomes in order to determine that any variance explained is actually warmth and not a correlate.

### SOCIOECONOMIC STATUS

Previous studies, including some longitudinal studies, have found that lower socioe-

conomic status is associated with increased emotional and behavioral problems- a correlate of poor social skills (McLoyd, 1998; van Oort et al., 2011; Wadsworth & Achenbach, 2005). The main model proposed to explain the relationship between socioeconomic status and behavior problems is the social causation model, positing that adversity associated with poverty results in increased developmental challenges with fewer resources available for effective coping. Van Oort and colleagues (2011) argue for a diathesis-stress model in which poverty associated with low parental occupation may be associated with increased parental conflict and poor parenting skills and also unsafe neighborhoods and limited access to quality health care. Arguably, poverty and associated stress may serve to compromise the caregiving system such that parents are less sensitive to their child's needs, but there is some research that suggests that positive caregiving may provide a buffer against the effects of poverty (Gregory & Rimm-Kaufman, 2008; Supplee et al., 2004), although thus far this relationship has only been studied for mother-child relationships. Regardless of whether socioeconomic status is associated with poor social skills as a function of poor parenting or other factors, as with personality, it is important to control for its influence in order to determine the impact of warmth on social skills.

#### CHILD SEX AS A MODERATOR

Some research has found that the quality of paternal interactions influences social competence and externalizing behavior problems of sons and daughters differently (Boyum & Parke, 1995; MacDonald & Parke, 1984; Trautmann-Villalba et al., 2006). For example, MacDonald and Parke (1984) considered that father-child play may be particularly important for the child's development of social skills with gender as a potential moderator. Findings from their study indicated that fathers who engaged in physical play with their daughters and who were effective in eliciting affective behaviors but who were not directive positively influenced their daughters' peer competence (i.e., emotional expressivity, communicative clarity, creativity, and intellectual competence). They also found that directiveness by the father, but not by the mother, had a negative impact on daughters' peer competence. In contrast, boys' peer competence seemed to be positively influenced by a wider variety of maternal factors such as parental engagement, verbal stimulation, and physical play, whereas girls' peer competence was not (MacDonald & Parke, 1984). Here, it seems that the child's gender may moderate the influence of play interactions on peer competence. As yet, though, little is known about how fathers may differentially impact their son's versus their daughter's development, however, when dyadic distinctiveness has been found, it has been found at the level of relationship measures such as closeness and affection (Russell & Russell, 1989; Russell & Saebel, 1997).

At present, research investigating the relationship between father-child interactions during the preschool years and later social outcomes remains limited. Therefore, the current study performed secondary data analyses using the National Institute of Child Health and Development—Study of Early Child Care (NICHD-SECC) longitudinal data to investigate the relationship between early father-child interactions and a child's later social competence, while controlling for the mother-child relationship. The present study sought to address the following research questions: (1) Does the quality of in-

teractions between a father and his 54-month old child have a significant positive effect on his child's psychosocial development at 3<sup>rd</sup> grade after controlling for mother-infant attachment security at 36 months, the quality of mother-child interactions at 54 months, the father's personality, and socioeconomic status (SES)?; (2) Does sex moderate the effect of the quality of father-child interactions at 54 months on the child's 3<sup>rd</sup> grade social competence?; and, (3) Does the presence of warmth in the father-child relationship at 1<sup>st</sup> grade mediate the relationship between the quality of early father-child interactions at 54 months and a child's social outcomes in 3<sup>rd</sup> grade?

We hypothesized that father warmth during early childhood would have a positive influence on his child's social outcomes measured in middle childhood, independent of mother-daughter warmth and controlling for father personality factors and socioeconomic status.

## METHOD

### Participants

In 1991, the National Institute of Child Health and Development (NICHD) Study of Early Child Care (SECC) recruited families with newborn infants from 10 different states across the United States. A total of 1,364 families were enrolled in the study, and the families were representative of the sites from which they were recruited. Analyses in the present study were conducted on data belonging to those families in which a child was enrolled in the study and a male father figure (i.e. either the child's father or the mother's partner) resided in the home when the child was between 54 months and first grade. Families were excluded from the study when data indicated that the father figure did not reside in the home for any year during the 54 months to first grade span. The final sample consisted of 856 families. Descriptive statistics for demographic variables are included in Table 1.

### Materials

**Father Personality.** The father's personality was measured when the child was 6 months old using items from the NEO Personality Inventory (NEO PI; see Costa & McCrae, 1985) and the NEO Five-Factor Inventory (NEO-FFI; see Costa & McCrae, 1989). Fathers completed a self-report questionnaire and rated items on a 5 point Likert-type scale. Selected items from the NEO PI provided a measure of the father's adjustment and emotional volatility within the domains of anxiety, depression, and hostility (neuroticism), as well as the father's interpersonal warmth and demonstration of positive emotions (extroversion). Selected items from the NEO-FFI provided a measure of the father's cooperative behavior such as altruism, trust, and compliance (agreeableness). Items designed to measure neuroticism were reverse scored, and all items were then summed to provide an overall measure of the father's personality. Although the construct of a General Factor of Personality is debated in the literature (see Hopwood, Wright, & Donnellan, 2011; Loehlin, 2012; Muncer, 2011; Rushton & Irwing, 2008; Woods & Hardy, 2012), we believe that combining measures of neuroticism, extroversion, and agreeableness is warranted in this study for ease of interpretation and

Table 1  
*Sample Demographics for Sex, Race, Hispanic Status, and Mother's Education (n = 856)*

Variable	N		
	Mother	Father	Child
<i>Sex</i>			
Female			416
Male			440
<i>Race</i>			
American Indian, Eskimo, Aleutian	4	1	3
Asian or Pacific Islander	20	15	13
Black or Afro-American	49	51	46
White	775	776	767
Hispanic	31	25	43
Other	8	12	27
<i>Mother's Education</i>			
< 12th grade	45		
High school grad, GED	158		
Some College, Vocational School	269		
Bachelor's Degree	229		
> Bachelor's Degree	155		

because personality is only included to serve as a control variable. Cronbach's alpha for the father personality measure in the NICHD-SECC data set was .79.

**Attachment.** Attachment security rating was measured using the Strange Situation procedure (see Main & Solomon, 1990) in which mothers and their respective children were observed in a laboratory setting at 36 months. The mother and her child were asked to remain in a room containing toys and a chair. After three minutes, the mother was asked to leave the room. Three minutes later, the mother returned to the room. The mother left again after three minutes and returned five minutes later. Research assistants were trained and certified to conduct the Strange Situation procedure and after observing mother-child reunions, rated children's security on a global 9-point scale ranging from *very insecure* to *very secure*. Inter-rater reliability ranged .93 to .96 (NICHD: ECCRN, 1999). Validity for the Strange Situation procedure is evident in research demonstrating that infants who are classified as securely attached experience more sensitive mothering (Belsky, Rovine & Taylor, 1984) and demonstrate better peer competence later in childhood (Waters, Wippman & Sroufe, 1979).

**Parent-Child Interaction Quality.** Mother-child and father-child interaction quality were assessed using the Parent-Child Interaction Task in a laboratory setting at 54 months (see Egeland & Hiester, 1995). Mother-child dyads were provided with two

activities that were designed to be too challenging for a 54-month-old child to complete independently; accordingly, these tasks would require the mother to assist her child. Mother-child dyads were also given an activity to encourage free play. Father-child dyads were given one task that was designed to be too difficult for a 54-month-old child to complete independently and one activity designed to encourage free play. Qualities of parenting in the parent-child interaction tasks were rated from videotaped sessions by trained coders using a 7-point scale. These qualities of parenting included: confidence, adult supportive presence, respect for autonomy, hostility, cognitive stimulation, and quality of assistance. Inter-rater reliability estimates ranged from .64 to .85 for mothers and from .53 to .81 for other adult caregivers (the term “other adult caregiver” refers to fathers [89.4%], grandparents [2.8%], other relatives [1.3%], mothers’ partners [6.1%], and other adults [.4%]). Internal consistency was .90 for mothers and .89 for other adult caregivers (NICHD: ECCRN, 1999).

**Father Warmth.** Warmth in the father-child relationship was measured with the Parent-Child Relationship Scale (PCRS; see Pianta, 1992) in the first grade. The Parent-Child Relationship Scale is a 15-item questionnaire that instructs parents to rate how warmly they perceive their relationship with their respective children on items using a 5-point Likert-type scale. Fathers completed the questionnaire, negatively worded items were reverse coded, and all items were summed to provide a total positive relationship score, which was used for this study. The alpha level on this scale ranged from .81 to .87 (NICHD: ECCRN, 1999).

**Social Skills.** The child’s social skills, or socially acceptable behaviors that allow for effective interpersonal interactions, were measured with the Social Skills Rating System (SSRS) at third grade. SSRS questionnaires were completed by the child’s mother, father, and teachers, and their responses indicated the frequency of behaviors displayed by their respective children or students using a three-point scale. Items are then summed to form four subscale scores: cooperation, assertion, responsibility, and self-control; however, teachers do not complete the responsibility scale. Coefficient alphas for the Parent Form of the SSRS subscales completed by mothers are .72 for cooperation, .74 for assertion, .63 for responsibility, and .79 for self-control. Coefficient alphas for the Parent Form of the SSRS subscales completed by fathers are .69 for cooperation, .70 for assertion, .62 for responsibility, and .78 for self-control. Coefficient alphas for the Teacher Form of the SSRS subscales are .92 for cooperation, .86 for assertion, and .91 for self-control (Gresham & Elliott, 1990).

**Socioeconomic Status.** Mother’s education and the income-to-needs ratio were used to measure socioeconomic status (SES). The mother’s education variable is a measure of the number of years of schooling that had been completed by the mother when the child was one month old. The income-to-needs ratio is the family’s total income divided by the federal poverty threshold; families with an income-to-needs ratio of less than 1.0 are below the poverty line (U.S. Department of Health and Human Services, n.d.). The income-to-needs ratio data were gathered when the child was one month old.

## Data Analysis

Latent variable structural equation modeling (SEM) was used to determine the effect of the quality of interactions between a father and his 54-month-old child on the warmth in the father-child relationship measured at 1<sup>st</sup> grade and his child's psychosocial development measured at 3<sup>rd</sup> grade. Background variables included the quality of mother-child interactions, father personality, mother-infant attachment security at 36 months, and SES. Latent factors that were used as independent and background variables (i.e. quality of father-child interactions, quality of mother-child interactions, and SES) and the corresponding measured variables that were used to compose the factors are listed in Table 2. Cooperation, assertion, responsibility, and self-control latent factors were used as latent dependent variables. Each latent dependent variable was composed of the three corresponding SSRS subscales completed by the child's mother, father, and teacher. However, no teacher subscale was available for the responsibility factor.

In the first model, father-child interaction quality, mother-child interaction quality, father personality, mother-infant attachment security, and SES were allowed to covary. Allowing the background variables to covary accounts for the possibility that these variables might relate to each other (e.g. father personality may directly affect father-child interaction quality) without specifying how they relate to each other. The effects of each of these variables on 3<sup>rd</sup> grade cooperation, assertion, responsibility, and self-control were estimated. Error variances for latent cooperation, assertion, responsibility, and self-control variables were free to covary. Additionally, error variances for SSRS measures completed by the same rater were free to covary to account for possible method effects. Finally, error variances for the supportive presence and respect for autonomy variables of the PCIT were free to covary as were the error variances for the

Table 2  
*Latent Factors and Corresponding Measured Variables for Independent and Control Variables*

Latent Factor	Measured Variables
Parent-Child Interaction Task: Father	Confidence Supportive presence Respect for Autonomy Reversed Hostility Cognitive Stimulation Quality of assistance
Parent-Child Interaction Task: Mother	Confidence Supportive presence Respect for Autonomy Reversed Hostility Cognitive Stimulation Quality of assistance
Socioeconomic Status	Mother's Education Income-to-Needs Ratio

reversed hostility, cognitive stimulation, and quality of assistance variables. These error variances were allowed to covary because the corresponding measured variables were grouped into composite variables in the NICHD study and were thus believed to share more in common than a general parent-child interaction factor.

To determine whether sex moderates the effects of father-child-relationship quality on the child’s social skills, a multiple group structural equation model was estimated with factor loadings constrained to be equal. Paths from the latent quality of father-child interaction factor to the latent social skills factors were individually constrained to be equal across groups. Significant increases in  $c^2$  when constraining a path to be equal across groups suggested significant group differences between groups for that particular path.

The second model was similar to the previous multiple group model with the exception that the second model specified that warmth in the father-child relationship mediated the effects of the independent and control variables on 3<sup>rd</sup> grade cooperation, assertion, responsibility, and self-control (Figure 1). To determine whether or not warmth in the father-child relationship mediates the effect of father-child interaction quality on later social skills equally for sons and daughters, mediating paths were constrained to be equal across groups. Significant increases in  $c^2$  when constraining a path to be equal across groups suggested significant group differences between groups for that particular path.

Structural equation models are either retained or rejected based on the consistency between a model and the data. Multiple fit indices were used to determine whether to retain or reject the proposed model. The Comparative Fit Index (CFI) was used with Tucker-Lewis Index (TLI) and the Root Mean-Square Error of Approximation (RMSEA) to assess model fit. Values above .95 for the CFI and TLI and below .05 for the RMSEA suggest the model fits the data well (Hu & Bentler, 1998; 1999). Mplus Version 6.0 (Muthén & Muthén, 2010) was used to compute all SEM analyses. Missing data was estimated with full information maximum likelihood procedures.

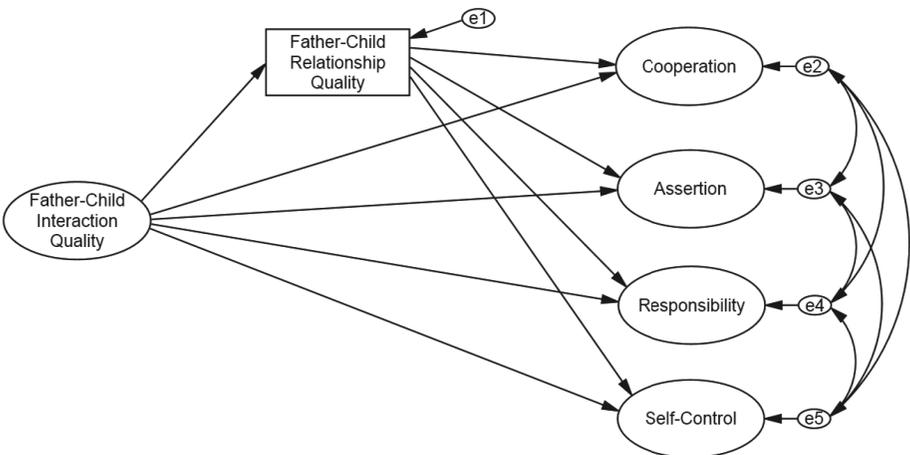


Figure 1. Effects of 54 month father-child interaction quality on 3<sup>rd</sup> grade social skills mediated by 1<sup>st</sup> grade father-child relationship quality. Note: Factor indicators are not shown in this model.

## RESULTS

Fit indices indicated that the first model fit the data well (CFI = .982, TLI = .977, RMSEA = .027). The effect of quality of interactions between a father and his 54-month-old child on the child's social skills at 3<sup>rd</sup> grade was significant in the areas of cooperation ( $\beta = .138, p = .010$ ), assertion ( $\beta = .138, p = .011$ ), responsibility ( $\beta = .212, p < .001$ ), and self-control ( $\beta = .155, p = .003$ ). The unstandardized and standardized path coefficients and the corresponding levels of significance for the effects of the control variables on children's social skills are shown in Table 3. All factor indicators were significant at a  $p < .001$  level. A correlation matrix of constructs included in the model is shown in Table 4.

The model was then tested to determine whether sex moderates the effect of the quality of father-child interactions on the child's later social skills. A multiple group model was estimated with factor loadings constrained to be equal across groups. The model fit the data well (CFI = .975, TLI = .970, RMSEA = .031). Paths from quality of father-child interaction to each of the social skills factors were individually constrained to be equal across groups in separate analyses. None of the constraints resulted in a significant increase in  $\chi^2$ , which indicates that the effects of father-child interaction quality on the child's later social skills were not significantly different for males and females (see Table 5). Thus, it was determined that the first model, which did not include paternal warmth as a mediator, should be interpreted for males and females combined into a single group.

Table 3  
*Unstandardized, Standardized, and Levels of Significance for Paths from Control Variables to Dependent Variables*

Control Variable	Dependent Variable	b	$\beta$	p
Attachment	Cooperation	.013	.010	.831
	Assertion	.025	.029	.564
	Responsibility	.054	.064	.213
	Self-Control	.045	.037	.434
Father Personality	Cooperation	.028	.177	.020
	Assertion	.031	.269	.001
	Responsibility	.010	.094	.227
	Self-Control	.033	.205	.007
SES	Cooperation	.204	.180	.024
	Assertion	.107	.130	.095
	Responsibility	.213	.271	.001
	Self-Control	.271	.238	.002
Mother-child Interaction Quality	Cooperation	.021	.011	.848
	Assertion	.115	.085	.156
	Responsibility	.005	.003	.957
	Self-Control	.180	.096	.098

Table 4  
*Correlation Matrix of Constructs Included In the Model*

Variable	1	2	3	4	5	6	7	8	9
(1) Father Personality									
(2) Attachment	0.100								
(3) Socioeconomic Status	0.335	0.177							
(4) Mother-Child Interaction Quality	0.218	0.206	0.429						
(5) Father-Child Interaction Quality	0.170	0.070	0.293	0.227					
(6) Father Warmth	0.317	0.102	0.149	0.051	0.13				
(7) Cooperation	0.290	0.070	0.262	0.159	0.213	0.429			
(8) Assertion	0.378	0.129	0.295	0.241	0.240	0.360	0.510		
(9) Responsibility	0.253	0.144	0.374	0.206	0.309	0.408	0.638	0.783	
(10) Self-control	0.357	0.124	0.375	0.281	0.274	0.553	0.655	0.578	0.700

Note: Variables 1, 2, and 6 are measured variables; variables 3, 4, 5, 7, 8, 9, and 10 are latent variables.

Table 5

*Fit of Competing Models: No Cross Group Constraints Versus Paths from Father-Child Interaction Quality to Various Social Skills Constrained to be Equal for Males and Females*

	$\chi^2$	df	$\Delta\chi^2$	$\Delta$ df	<i>p</i>	AIC	BIC
No Constraints	797.018	570				71514.33	72654.87
Cooperation	797.200	571	0.182	1	0.669660	71512.51	72648.30
Assertion	797.307	571	0.289	1	0.590862	71512.61	72648.41
Responsibility	797.244	571	0.226	1	0.634506	71512.55	72648.34
Self Control	797.453	571	0.435	1	0.509546	71512.76	72648.55

The second model was then analyzed with males and females in separate groups to determine whether sex moderates the effect of father-child interaction quality through warmth in the father-child relationship on social skills. Again, factor loadings were constrained to be equal across groups and the model fit the data well (CFI = .974, TLI = .968, RMSEA = .031). The path from father-child interaction quality to warmth in the father-child relationship was constrained to be equal across groups. This constraint resulted in a significant increase in  $c^2$ , which indicates that the effect of father-child interaction quality on warmth in the father-child relationship is significantly different for males and females (see Table 6). Accordingly, this constraint in the model was not retained. Instead, we interpreted a model wherein the path from father-child interaction quality to warmth in the father-child relationship was estimated separately for males and females.

The effect of father child interaction quality on warmth in the father-child relationship was non-significant for males ( $\beta = -.061, p = .351$ ); therefore, warmth in the father-child relationship could not mediate the effect of father-child interaction quality on social skill for males. However, the effect of father child interaction quality on warmth in the father-child relationship was significant for females ( $\beta = .176, p = .007$ ); thus, for every standard deviation increase in father-daughter interaction quality, warmth in the father-daughter relationship increases .176 standard deviations. Additionally, the effects of warmth in the father-daughter relationship on third grade daughter's cooperation ( $\beta = .338, p < .001$ ), assertion ( $\beta = .200, p = .006$ ), responsibility ( $\beta = .280, p < .001$ ), and self-control ( $\beta = .475, p < .001$ ) were significant.

Table 6

*Fit of Competing Models: No Cross Group Constraints Versus Paths from Father-Child Interaction Quality (FCIQ) to Warmth in the Father Child Relationship (WFCR) Constrained to be Equal for Males and Females*

	$\chi^2$	df	$\Delta\chi^2$	$\Delta$ df	<i>p</i>	AIC
No Constraints	847.786	606				75978.969
FCIQ to WFCR	854.208	607	6.422	1	0.011	75983.391

Indirect effects of father-daughter interaction quality at 54 months on the daughter's social skills at 3<sup>rd</sup> grade mediated by warmth in the father-daughter relationship at 1<sup>st</sup> grade were estimated. Ninety-five percent bootstrap confidence intervals were estimated for the indirect effects using 1000 draws. Results indicated that the indirect effects of father-daughter interaction quality on cooperation and self-control through warmth in the father-daughter relationship were significant. However, the indirect effect of father-daughter interaction quality on responsibility and assertion through warmth in the father-daughter relationship were not significant. Results indicated that for every standard deviation increase in father-daughter interaction quality, cooperation increased .060 standard deviations, 95% CI [.004, .115], and self-control increased .084 standard deviations, 95% CI [.011, .156], mediated by warmth in the father-daughter relationship. Direct, indirect, and total effects of father-child interaction quality on social skills are reported in Table 7.

To determine the effects of ethnicity on the results of the study, the second model was analyzed a second time without non-Caucasian ethnicities in the sample. The analysis yielded similar results with a few caveats. First, the direct and total effects of father-daughter interaction quality on responsibility, which were previously non-significant, became significant. Second, the direct effect of father-son interaction quality on responsibility was no longer significant. And, finally, the total effect of father-daughter interaction quality on assertion was no longer significant.

In sum, before warmth in the father-child relationship was added to the model, father-child interaction quality had a significant effect on the child's cooperation, assertion, responsibility, and self-control in 3<sup>rd</sup> grade, controlling for mother-child interaction quality, the father's personality, SES, and attachment status. For females, when warmth in the father-daughter relationship was added to the model, the direct effects of father-daughter interaction quality on cooperation, assertion, responsibility, and self-control were reduced and were not significant. However, the indirect effects of father-daughter interaction quality on cooperation, responsibility and self-control were significant, which indicates that, for females, warmth in the father-child relationship mediates the relationship between father-child interaction quality and many later social skills. Conversely, for males, when warmth in the father-son relationship was added to the model, the indirect effects of father-son interaction quality on cooperation, assertion, responsibility, and self-control were not significant.

## DISCUSSION

Fathers may interact differently than mothers with their children, and fathers may socialize their children in important and distinctive ways (e.g., Feldman, 2003; Lamb, 1997; Paquette, 2004; Parke et al., 2002) above and beyond the contributions to socialization that mothers provide. Results from this study suggested that fathers who engaged in sensitive and positive play with their children at 54 months had children who were reported as more cooperative, responsible, and self-confident during the middle elementary school years. Furthermore, results suggested that fathers who engaged in sensitive and positive play with their children at 54 months had warmer relationships with their daughters, but not their sons, in 1<sup>st</sup> grade. As such, the effect of the quality of play between fathers and their daughters on their daughter's later social skills was

Table 7  
*Direct, Indirect, and Total Effects of Father-Child Interaction Quality on Social Skills for Males and Females*

Dependent Variable	Group	Direct Effect			Indirect Effect			Total Effect		
		b	$\beta$	p	b	$\beta$	95% CI	b	$\beta$	95% CI
Cooperation	Male	.163	.085	.234	-.043	-.022	-.073 to .028	.120	.062	-.106 to .230
	Female	.151	.083	.279	.109	.060	.004 to .115	.260	.142	-.022 to .306
Assertion	Male	.125	.088	.240	-.025	-.018	-.060 to .024	.100	.070	-.100 to .240
	Female	.160	.128	.098	.044	.035	-.009 to .080	.204	.163	.011 to .315
Responsibility	Male	.226	.172	.027	-.029	-.022	-.074 to .029	.196	.150	-.032 to .331
	Female	.209	.158	.051	.065	.049	.000 to .098	.274	.207	.043 to .371
Self-Control	Male	.210	.110	.082	-.054	-.029	-.093 to .036	.155	.082	-.069 to .233
	Female	.158	.087	.214	.153	.084	.011 to .156	.311	.170	.025 to .316

mediated by warmth in the father-daughter relationship. These findings contribute to the growing understanding of the important (and statistically unique) contribution of the quality of father-child relationships on social skills, and more specifically, the role of father warmth on social skills in daughters. Some researchers have claimed that the quality of father's play with their children promotes anger regulation and modulation of intense affect (e.g., Carson, Burkes, & Parke, 1993; Paquette, 2004), both of which are arguably important in the development of social skills. The finding that warmth mediated the relationship for daughters and not for sons suggests that warmth may be particularly important for girls and may provide additional support for Paquette's (2004) proposition of the "activation relationship" – that is, the development of the exploratory system. Studies have shown that girls growing up without the presence of their father are prone to develop internalizing problems (see Parke et al., 2002), but little has been said about the positive aspects of the presence of a father for daughters or the developmental mechanisms by which these positive effects may occur. Paternal warmth may have particular importance for girls in the development of emotional responding to others (Kochanska et al., 2008; 2009) and in stress regulation (Byrd-Craven et al., 2012). Of interest is that this study found that warmth functioned as a mediator even with personality controlled. This is a stringent test, as one would expect that personality would be predictive of warmth. The finding that warmth predicted his daughter's social skills, independent of personality, suggests that warmth may be a property of the relationship rather than of the father's personality. The finding of the importance of warmth is consistent with Rohner's (2004) parental acceptance-rejection theory and previous research associating parental warmth with positive developmental outcomes (e.g. Brody et al., 2002; Kim, Han, & McCubbin, 2007; Lila, Garcia, & Gracia, 2007; Litovsky & Duseck, 1985; NICHD-SECC ECCRN, 2002; Rohner & Britner, 2002; Wang & Chang, 2008) but suggests that father-daughter warmth is of special importance.

The present study furthered our understanding of influences on social skills by examining a possible pathway through which early father-child interactions may influence later social outcomes in children. For instance, results indicate that the quality of early father-child interactions influence a child's later social outcomes through the development of a warm father-child relationship. This finding reveals the importance of continuity in the father-child relationship from high quality interactions during the preschool years to warm and sensitive relationships during the early school years. It is important to note that these findings do not suggest that a positive father-child relationship fully explains the statistical relationship between father-child interactions during early childhood and the development of positive social behaviors during middle childhood. Rather, it suggests that a warm and positive father-child relationship is one factor that supports the developmental pathway between early social interactions and later social outcomes. Nor do these results suggest that only fathers can provide these effects. Arguably, both mothers and fathers may provide high quality interactions that have similar effects on the development of their children. Pleck (2010a) has argued that there is nothing inherent to being a father that is distinctively important to child outcomes. Specifically, he posits that there are no important gender differences in parenting, and that all children benefit from sensitive and responsive parents regardless of whether they are male or female. Pleck does, however, advocate for research that investigates the unique (in the statistical sense) contributions of fathering that are inde-

pendent of mothering, and the current study's findings contribute to this knowledge base. As roles of both fathers and mothers change over time, with less traditional differentiation, future research may show a pathway through both parents (Pleck, 2010b).

Future research may wish to examine networks of factors and influences that are present throughout development rather than investigating simple longitudinal patterns and relationships. For example, are fathers more important for girls in some contexts and at particular developmental periods, and important for boys in others? Moreover, because the quality of father-child relationships has been found to be related to the quality of father-child interactions during play, there may be increased complexity in researching the effects of this relationship on a child's development (Grossman et al., 2002; Holmes & Huston, 2010; Lamb, 1997; NICHD-ECCRN, 2009). For example, Doherty et al. (1998) argue that father involvement is best understood as a function of reciprocal relationships within the family, as well as ecological and temporal influences. It would be important in future studies to understand how and under what circumstances fathers might influence mother's relationships with their children. Additionally, research may wish to consider the effects of interventions aimed at increasing fathers' responsiveness during play with their children. For example, Naber et al. (2010) found that intranasal oxytocin administered 45 minutes prior to a play session with their child resulted in the fathers increased stimulation of their child's exploration and decreased hostility.

Future research may wish to take into consideration the contribution of the marital relationship and sibling relationships on the father-daughter relationship. In addition, during the preschool years a child's social networks widen and begin to include peers outside the immediate home environment (Lewis, 1997); this factor may also influence parent-child relationships and other developmental outcomes related to social skills. Thus, the network of influences that affect the child's development becomes increasingly complex (Biller, 1993; Sroufe et al., 2005).

It is important to note that this study did not account for the amount of time that fathers spent with their children or the frequency of father-child play interactions. The effects of the quality of interactions may differ considerably from the effects of the quantity of interactions, and future studies may wish to investigate differential effects and whether they function as moderators of outcomes. Additionally, warmth was measured via self-report and not through observational methods. Self-report may be subject to social desirability and as such, may be less desirable than observational methods such as actual father-child interaction. Another limitation of the current study is the low percentage of non-Caucasian ethnicities in the sample. Removing individuals from non-Caucasian ethnicities altered the significance of some of the parameters in the study. Future research might examine the effect of father-child relationships on later social skills across ethnic groups. Finally, future research might also consider a child's perceptions and evaluations of his or her relationship with his or her father and examine specific memories of the father as a companion during play.

In conclusion, girls appear to benefit from having positive experiences with their fathers during the preschool years and warm, caring relationships with their fathers throughout childhood. While our understanding and our attempts at statistically examining early social influences have been difficult, they have nonetheless contributed to our knowledge base of human development. With this knowledge, it is important to in-

investigate indirect relationships between early experiences and later developmental outcomes in addition to investigating the nuances of father-child interactions and how these nuances change once children begin to form same-gender companions during the elementary school years (Billar, 1993). Furthermore, it is important to consider how cultural norms surrounding father-child relationships, as well as cultural norms within the context of play, influence the role that fathers have in the social development of their children and whether these roles change over time as Pleck (2010b) has hypothesized.

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