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ORIGINAL PAPER

Child-Related Interparental Conflict in Infancy Predicts Child Cognitive Functioning in a Nationally Representative Sample

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Abstract While associations between exposure to marital conflict and child development have been documented extensively in middle childhood and adolescence, few studies have examined the developmental consequences of conflict exposure in infancy. Moreover, those that have examined marital conflict in infancy tended to focus on consequences of conflict exposure on infants' attachment security, and various aspects of infants' physiological and emotion regulation. Virtually nothing is known about the longitudinal links between exposure to interparental conflict in infancy and later cognitive development. Using longitudinal data on a subsample of infants (N = 6,019) and their parents who participated in the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), this study examined links between the frequency of interparental conflict at 9 months and child cognitive development 15 months later. Combining data from parent interviews, birth certificates, in-home assessments of child cognitive development, and videotaped parent–child interactions, results showed significant negative associations between the frequency of child-related interparental conflict at 9 months of age and child cognitive ability at 24 months. The negative association reflects a direct effect that was not mediated by parental support or child attachment security measured at 24 months. Associations were calculated while considering children's prior cognitive functioning (at 9 months), and a wide range of child, parent and household characteristics.

Keywords Interparental conflict · Child-related conflict · Infancy · Cognitive development · ECLS-B

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Introduction

Research has consistently found significant associations between interparental conflict and various domains of child development (Buehler et al. 1997; Cummings and Davies 1994; Grych and Fincham 2001). However, results of the vast majority of marital conflict studies are based on data collected from children in middle childhood and adolescence. Our ability to make inferences about the developmental consequences of exposure to interparental conflict in infancy is thus extremely limited. In addition, marital discord studies conducted with infants focused mostly on implications for socioemotional and/or physiological aspects of development, rather than cognitive outcomes. Moreover, few studies with infants have calculated associations between conflict exposure and child outcomes, while accounting for direct and indirect contributions of potential confounding variables longitudinally.

Examining links between exposure to interparental conflict in infancy and subsequent development is warranted for several reasons. First, although relatively little is known about the extent to which infants are exposed to marital conflict, it is reasonable to suggest infants are exposed to interparental conflict. Studies have shown that couples are likely to experience reduced marital satisfaction during the transition to parenthood (Belsky and Rovine 1990; Cox et al. 1999; Doss et al. 2009), which may give rise to marital conflict. There is also evidence to suggest

that very young children are more likely than older children to be exposed to parent conflict (Fantuzzo et al. 1997). Second, the developmental literature suggests that infants may be especially vulnerable to conflict exposure. Emotionally challenging environments can have a significant long term impact on neurological and physiological systems undergoing rapid development (Panksepp 2001; Pollack 2005; Schore 2000; Siegel 2001). The relative immaturity of infants and the developmental nature of self-regulatory processes during this period (e.g., Fox 1994; Rothbart and Bates 1998) suggest the possibility of a sensitive period for its impact on the development of physiological regulatory systems and development in interdependent domains. Third, infancy represents a developmental period in children's lives characterized by a high level of dependence on parents for regulating emotional and physiological arousal, the development of attachment relationships, and an inability to make cognitive attributions about, or understand explanations of, negative interactions in the family (Bowlby 1969; Field 1981, 1995; Grych and Fincham 1990). Since parents' ability to consistently engage in sensitive and responsive parenting behaviors in support of developing secure attachments and adaptive physiological and emotion regulation is likely to be compromised (Erel and Burman 1995), infants may be affected by exposure indirectly. In fact, prior studies have shown direct and indirect links between interparental relationship dynamics and infant development, including effects on infant attachment security (Cowan and Cowan 1992; Frosch et al. 2000; Isabella and Belsky 1985), emotion regulation (Crockenberg et al. 2007), and cardiac vagal modulation (Graham et al. 2010; Moore 2010; Porter et al. 2003). Interestingly, the few studies investigating links between conflict exposure and development in infancy have examined links to socio-emotional and physiological domains of development, while associations between parental conflict and infant cognitive development remain virtually unexplored.

Examining links between conflict exposure in infancy and child cognitive functioning in toddlerhood is important for the following reasons. First, child cognitive ability is a central domain of child development that plays a critical role in later cognitive skill building and academic achievement, social competence, mental health, and overall wellbeing (Shonkoff and Phillips 2000). As such, it is important to understand the salient variables that influence its development. Second, there is evidence from marital discord studies with older children suggesting negative links between marital conflict exposure and aspects related to cognitive functioning, including grades, academic motivation, achievement, and high school completion (Doyle and Markiewicz 2005; Ghazarian and Buehler 2010; Hanson 1999; Musick and Bumpass 1999; Musick and Meier 2010). Even though these links are based on studies with older children, it is not unreasonable to suggest that a portion of that variance–although measured in adolescence–may reflect effect the (cumulative) effects of conflict exposure on cognitive ability.

Although the empirical evidence is limited, there is some evidence to suggest that these links may operate as early as in infancy. In a study that was conducted to demonstrated linkages between marital quality (e.g., love, conflict) and the emotional regulation and cardiac vagal tone of 6-month old infants, Porter et al. (2003) found that maternal reports of marital conflict were significantly and negatively associated with infants' developmental status as measured with the Mental Development Index (MDI) from the Bayley Scales of Infant Development (BSID II). In addition, they found that higher levels of 'marital sentiments of love' were found to be related to higher scores on the MDI. Unfortunately, since associations were examined in a relatively small sample ($N = 56$) of low-risk, mostly white infants of first-time mothers, living in intact, married families, findings are not generalizable to the American population. Similarly, since evidence suggests that marital discord is associated with various other aspects of individual and couple wellbeing (e.g., parental depression, parenting quality), it may be useful to re-examine found associations while considering these influences. Also, given the complexity of estimating contributions to individual differences in cognitive development longitudinally, it would be useful to examine these links while controlling for important child, parent and household characteristics associated with cognitive development, as well as consider possible mediating mechanisms.

Porter et al. (2003) speculated that infants exposed to higher levels of discord may have mothers who are less emotionally available to them. As a result, they suggested that infants living in higher conflict homes may have fewer opportunities for synchronous dyadic interactions and less opportunity to engage in cognitively stimulating social exchanges, known to enhance cognitive development. Conversely, a reversed pathway was hypothesized to exist for children living in families comprised of greater levels of marital harmony. Maybe the extent to which the parents have the energy and desire to provide cognitively stimulating experiences for the child (e.g., reading to children, playing educational games with them) is also negatively affected through reduced motivation of more conflictual parents. This idea is also empirically supported by recent work that suggests that parents' engagement in cognitive stimulation is negatively affected by marital conflict, although associations are moderated by parents' ethnicity and acculturation (Sotomayor-Peterson et al. 2011). Also, we know from meta-analytic reviews that interparental conflict tends to 'spillover' to affect the quality of parent–

child interactions (for review see Erel and Burman 1995) and parents' emotional functioning (for review see Whisman 2001).

Associations between exposure to conflict in infancy and later child cognitive ability may also be influenced by the dynamic interplay between attachment security, synchronicity and child exploratory behavior. First, conflict exposure in infancy has been associated with infant attachment security (Cowan and Cowan 1992; Frosch et al. 2000; Isabella and Belsky 1985), which has been found to be related to higher cognitive functioning and academic adaptability and performance (Bus and Van Ijzendoorn 1988; Moss and St-Laurent 2001; Seuss et al. 1992). Securely attached children also show greater enthusiasm, compliance, and positive affect (and less frustration and aggression) during shared tasks with their mothers (Frankel and Bates 1990; Matas et al. 1978) and more compliance during free play (Londerville and Main 1981). At the same time, mothers of securely attached children act consistently more supportive, sensitively and helpful towards their children, which may explain why securely attached children show longer and higher quality of free play in the second year of life (Londerville and Main 1981; Slade 1987). It is easy to see how the presence of such a mutual interpersonal orientation of positive reciprocity (Maccoby 1983,1984) would heighten the child's receptivity to socialization influences directed at the development of cognitive competence as well as engagement in exploratory, rather than attachment seeking behavior (see Waters et al. 1991). In fact, past research has found links between maternal responsiveness during face to face episodes with infants and later cognitive development particularly as measured by performance on the Bayley Scales at 21 months of age (Crockenberg 1983). In sum, further examination of cognitive stimulation, parental sensitivity, intrusiveness, and child attachment security as potential mediating variables is a reasonable approach.

Prior research also indicates that the informational content of disagreements informs the degree to which marital conflict is distressing to children (Cummings et al. 2004). For example, research with older children shows that–compared to exposure to general interparental conflict–children are more threatened by child-related conflict and more likely to intervene (Grych and Fincham 1993). In fact, considering whether interparental conflict is child-related is known to be important for understanding its impact on child development (Block et al. 1981; Grych and Fincham 1993; Jouriles et al. 1991; Snyder et al. 1988). While most studies that consider thematic content of conflict has been conducted with older children, there is evidence to suggest that very young children too can discern whether conflict is child-related. Dunn and Munn (1985) found that children as young as 18 months responded differently to mother-sibling conflict depending on the topic of the conflict; children laughed in response to conflict about family rules, but displayed negative affect when conflict centered on sibling aggression. In addition, in a sample of 2-year old children, longitudinal associations have been found between exposure to child-related conflict measured at 2 years of age and child externalizing behavior problems when the child was 5-years old (Ingoldsby et al. 1999). Although there is no prior empirical work suggesting that infants as young as 9 months can distinguish between child-related or general conflict, there are theoretical considerations for examining associations between child-related conflict in infancy and later cognitive functioning.

Despite infants' limited cognitive capacity, infants may be sensitive to child-related conflict through the following mechanisms. Compared to general conflict, child-related conflict may be more intensely expressed which may lead to greater physiological and emotional arousal of children and parents. A second explanation may be that children are more often exposed to child-related conflict than general conflict, due to a greater likelihood of child-related conflict occurring in the presence of the infant. Although not tested directly, previous work with older children by Papp et al. (2002) may give some credence to both interpretations. Using a diary method, researchers instructed parents to record conflict characteristics, including their use of conflict tactics and emotions, the duration of the conflict, who initiated it, and the topic(s) of the conflict over a fifteen-day period. In addition, parents reported on whether children were present during these interactions. They found that more conflict took place in the absence of the child than in the presence; however, when children were present parents' were more likely to use destructive conflict tactics (e.g., aggression, personal insult) than constructive conflict tactics. Along with destructive conflict tactics, conflicts were more likely to include displays of more negative parental emotion when children were present, and that arguments in the presence of children were more likely to be child-related than when children were absent.

Although no empirical work has examined these processes in infancy, it is not unreasonable to suggest that the meaning and relevance of child-related conflict may be transmitted through the infant's awareness of the greater hostility and negative valence of verbal and emotional expressions of parents through social referencing. For example, infants tend to rely on other people's emotional reaction to interpret uncertain situations which influences their behavior including wariness of strangers (Rosen et al. 1992), play (Klinnert 1984), and willingness to cross an illusionary visual cliff (Sorce et al. 1985; Walden and Ogan 1988). If child-related conflict is more upsetting to parents due to its intensity, (negative) visual cues infants receive

from parents may further intensify their physiological stress response, which may have affective and behavioral consequences for the infant as evidenced by increased vigilance and reactivity to conflict (Cummings and Cummings 1988; Cummings and Davies 2002). Also, considering that infants rely on parents to help them regulate their physiological and emotional arousal, the intensity of child-related conflict may interfere with parents' effectiveness in helping their children regulate their physiological and emotional arousal during those moments of exposure.

Using data drawn from a large, nationally representative sample of infants and their parents (N = 10,688), the aim of the current study was to calculate the association between the level of child-related interparental conflict in infancy and child cognitive ability at 24 months, while considering relevant child, parent, parent–child and household characteristics, including prior child cognitive functioning. In addition, contributions of infant attachment security and parental support were examined as potential mediating variables underlying associations between parental conflict and later child cognitive functioning. The main goal of the study was to provide an unbiased estimate of the *magnitude* of these associations, to decide if the level of child-related conflict in infancy has an independent effect on later cognitive development.

One of the main analytic challenges of the study involves disentangling whether child-related conflict in infancy negatively affects the rate of children's cognitive development, or whether infants who are cognitively less developed have parents who argue more about them. To isolate unbiased estimates of the influence of child-related conflict in infancy on later cognitive development, associations were modeled using a longitudinal lagged regression approach, where child cognitive development at Time 2 (i.e., when the child was approximately 24 months of age) was expressed as a function of child-related conflict at Time 1 (i.e., when the child was approximately 9 months of age). The same observational measure used to estimate child cognitive development at Time 2, was included as an additional Time 1 covariate in the model to reduce omitted (unmeasured), time-invariant differences in children that were present at the Time 1 interview (Cain 1975). To reduce the threat that measured individual differences in child cognitive functioning are systematically related to greater levels of child-related conflict in the home, important factors potentially related to levels of child-related conflict and child cognitive functioning measured at Time 1 (e.g., level of general interparental conflict, parental responsiveness, parenting style, parent depression, child age controlling for prematurity, and age between assessments etc.) were also included in the model as covariates.

Additional, potentially confounding contributions were added incrementally, including child characteristics (e.g., negative emotionality, birth status, birth weight, race, gender), and parent and household factors (e.g., marital satisfaction, marital status, parent age, education, income, presence of other children in the home, childcare use). Our hypothesis was that the level of child-related conflict in infancy would be significantly related to later child cognitive ability at 24 months. A second goal was to examine whether a significant association between the level of child-related conflict in infancy and later child cognitive functioning was mediated by infant attachment security and/or parental support at 24 months. Using the same model parameters, individual pathway models for each of these variables were estimated. While we are not arguing that the proposed mediating mechanisms would pertain only to associations between levels of child-related conflict and cognitive development- and not general conflict-, the hypothesis we tested was that attachment security and parental support would significantly mediate associations between levels of child-related conflict and later child-cognitive ability.

Method

Data Source

The study used two waves of data from the Early Childhood Longitudinal Study-Birth cohort (ECLS-B; Nord et al. 2006), a large-scale, longitudinal study sponsored by the U.S. Department of Education and several other federal agencies. The ECLS-B is a multi-source, multi-method study, conducted by the National Center on Education Statistics (NCES), designed to assess the growth and development of a nationally representative sample of children born in 2001, with an oversampling of specific minority groups (e.g., Native American, Pacific Islander), infants with low birth weight and twins. Baseline data on 10,688 children were collected at approximately 9 months of age and again at age 24 months of age. Data were collected using personal interviewing, self-administered questionnaires, birth certificate data, videotaped parent–child interactions, and developmental assessments. More information is available from NCES at the ECLS web-site (http://nces.ed.gov/ecls).

Sample Selection

Study participants were included based on the following criteria. Infants' resident parent (biological or non-biological) had to have completed the in-home interview and developmental assessment of the main outcome variable, child cogtnitive ability. Since the study focused on

interparental conflict and the quality of *couples*' relationship functioning during the transition to parenthood, infants whose parent did not report on couple relationship functioning with their resident partner over both data collection periods were excluded. The ECLS-B study design called for the child's biological mother to be the respondent for the parent instruments whenever possible, although occasionally respondents included stepparents, adoptive parents, foster parents, grandparents, relatives and non-relative guardians. Since our main variable of interests relates to interparental conflict, only respondents who were resident mothers were included in this sample, which included biological mothers, adoptive, foster and stepmothers.

The vast majority of children in our sample (N = 6,019; 51.6 % male) were living with their biological mother and biological father (98.8 %), while just over 1 % percent of children lived with their biological mother and a biologically unrelated father-figure i.e., stepfather (.2 %), adoptive father (.2 %) or their mother's live-in partner (.7 %), or with two adoptive parents (.2 %). Children's mean chronological age at the 9-month data collection was 10.4 months (SD = 1.89), and 24.3 months of age (SD = 1.07) at the 24-month data collection. Children were living in homes with slightly higher total household incomes ($M = 59{,}307$, SD = 45.32; $t\ [6530] = 4.87$, $p < .001$) than those not participating ($M = 45{,}597$, SD = 36.98), as would be expected in a sample of two-parent families. Mothers and fathers of children in our sample completed more years of education ($M = 13.36$, SD = 2.86; $t\ [6530] = 4.88$, $p < .001$ for mothers; $M = 13.22$, SD = 3.07; $t\,[6530] = 3.96$, $p < .001$ for fathers) than mothers and fathers of non-participating children ($M = 12.13$, SD = 3.75 for mothers; $M = 12.22$, SD = 3.70 for fathers). There were no significant differences between included and excluded children in maternal or paternal age, or the likelihood of the child being male or white.

Measures

Dependent Variable Measured at Approximately 24 Months

Child cognitive ability was assessed in the home by observers during the 24-month data collection visits using the Child Mental Scale of the Bayley Short Form Research Edition (BSF-R), a standardized, shortened version of the Bayley Scales of Infant Development-II (BSID-II; Bayley 1993). Observers worked one-on-one with each child, using standardized toys, verbal prompts, and modeling to administer a variety of developmental tasks. A score for each child's cognitive ability ($\alpha_{\text{Time 2}} = .87$) was calculated based on evaluating the child's sensory and perceptual acuities, discriminations, acquisition of object constancy, memory, learning and problem-solving, vocalization, early verbal communication and abstract thinking, habituation, mental mapping, complex language, and mathematical concept formation. This observational measure was also used to assess child cognitive ability at 9 months of age ($\alpha_{\text{Time 1}} = .94$).

Primary Independent Variables Measured at Approximately 9 Months

Interparental conflict was measured using a self-administered questionnaire, which asked respondents to indicate on a 4–point scale (from *1 = never to 4 = often*) how often they and their partner argued about a wide series of topics. A score for level of *child-related conflict* in infancy was derived by asking respondents to indicate "how often they and their partner argued about their child or childrearing issues." A score for level of *general interparental conflict* was derived by asking respondents to indicate on a 4-point scale (from *1 = never to 4 = often*) how often they and their partner argued about general conflict topics (e.g., showing affection, chores and responsibilities, in-laws, money, sex, affection, leisure) and averaging scores into a composite variable ($\alpha = .76$). To account for contributions of couples' general relationship quality respondents were also asked to rate their marriage/relationship quality on a 3-point scale as '*very happy,' 'fairly happy,' or 'not too happy*,' from which a score for *marital satisfaction* was derived reflecting higher scores for increased marital satisfaction. Using information from the parent interview, an indicator for *whether married* was created.

Parental responsiveness was assessed during the Time 1 home visit using the parent scale of Nursing Child Assessment Satellite Training, Teaching Scale (NCATS), a standardized observational measure that assesses caregiver sensitivity to child's cues, caregiver responsiveness to distress, socioemotional growth fostering and cognitive growth fostering (Sumner and Spietz 1994). We used the parent score ($\alpha = .74$), provided by NCES, which was based on combining composite scores of the aforementioned subscales. A high score on the parent scale indicates that the parent is responsive to the child cues and needs, and provides a supportive learning environment. The coefficient alpha reported in this section is based on averaging alpha values obtained from ECLS-B coders with those calculated by NCAST coders who conducted reliability coding (see Table 16 in Andreassen and Fletcher 2005). The interviewer videotaped a parent–child interaction in which the parent taught the child how to do a new and previously unknown activity. The interviewer helped the parent choose an activity from a standard list of age–appropriate activities based on a standard set of toys or materials. Per the NCATS design, interactions typically

lasted no longer than 5 min and 30 s. This assessment tool has been used in other large sample studies, such as the Early Head Start Research and Evaluation Project (Love et al. 2005) and has a standardized training for trainers and for coders ($\alpha = .74$).

Authoritarianism was assessed at the Time 1 interview by asking respondents to identify which of a set of statements about five different child-rearing topics best matched their ideas on childrearing. Examples included: 'you can spoil a baby when you pick him up every time he/she cries' versus 'you cannot spoil a baby by picking him/her up every time he/she cries' and 'it is important to see that a young child does not form bad habits' and 'most mothers nowadays let their children get away with too much.' Indicator variables for each authoritarian statement were created (*1 = yes, 0 = no*) and scores across the five items were summed to create a continuous score for *authoritarianism* ranging from *0 = low* to *5 = high* ($\alpha = .78$).

Depressive Mood was assessed during the Time 1 home visit using a self-administered, modified version of the Center for Epidemiologic Studies' Depression Scale (CES-D; Radloff 1977). Respondents were asked to rate the frequency with which they had experienced 12 symptoms of depression (e.g., not being able to shake off the blues even with help from family and friends, feeling sad), anxiety (i.e., feeling fearful, trouble keeping mind on what they were doing) and somatization (i.e., experiencing restless sleep, loss of appetite), within the past week, using a one to four metric (*1 = less than 1 day to 4 = most or all of 5–7 days*). Raw scores were reversed-scored where necessary and summed, such that higher scores reflected increased depressive symptoms ($\alpha = .85$).

Child, Parent and Household Characteristics at 9 Months

Child cognitive ability was assessed in the home by observers during Time 1 data collection visit using the same measure used at Time 2 assessment, the Child Mental Scale of the Bayley Short Form Research Edition (BSF-R), a standardized, shortened version of the Bayley Scales of Infant Development-II (BSID-II; Bayley 1993). Observers worked one-on-one with each child, using standardized toys, verbal prompts, and modeling to administer a variety of developmental tasks described in the previous section ($\alpha_{\text{Time 1}} = .94$).

Child Negative Emotionality was measured during the Time 1 home visit using the Infant/Toddler Symptom Checklist (ITSC; DeGangi et al. 1995). The ITSC is a screening measure that assesses young children's self-regulation and aspects of temperament by identifying any regulatory problems that may be arising, such as fussiness, going quickly from a whimper to a loud cry, and sleeping and eating difficulties. This instrument was chosen for the ECLS-B because of its theoretical underpinnings, consistent with the increasing attention of the research literature to the development of self-regulation. The parent was asked to rate the extent to which the child is 'fussy or irritable', 'goes from whimpering to crying', 'demands attention and company', 'wakes up three or more times', 'needs help falling asleep', 'is startled by loud noises', and 'cries for food or toys.' The parent could respond *never*, *used to be*, *sometimes*, or *most times*. Scores were subjected to an exploratory principal component factor analysis with varimax rotation. A composite score was derived by averaging variables that loaded on the negative emotionality factor (fussy or irritable, goes from whimpering to crying, demands attention or company, cries for food or toys; $\alpha = .78$).

A number of child, parent and household variables known to be associated with interparental conflict and child cognitive ability were considered, including child gender, race and ethnicity, childcare use, birth weight, birth status (singleton or multiple births), mother and father age and education, and household income. Age differences at the Time 1 home visit and prematurity (i.e., when children were born at least 21 days early) were controlled by subtracting the amount of prematurity from the child's chronological age at the time of assessment. Since 15 % of our sample was born prematurely ($M = 7.8$ days), our strategy towards ensuring that the potential non-linear effects of prematurity were controlled for, was to include indicator variables based on child-prematurity-adjusted-assessment-age, each representing approximately 10 % of the population in our sample (*1 = lowest through 8.5 months of age, 2 = 8.6–8.8 months of age, 3 = 8.9–9.1 month of age*).

Respondents were also asked to indicate the number of household members under 18 years of age, and an indicator variable was created to indicate whether infants were receiving childcare by a non-parent caregiver. Because there were no significant differences in demographic variables between the 2 waves, we used the Time 1 variables rather than developing composite variables to indicate change with one exception. To control for children's age at the Time 2 assessment at 24 months of age, the age-difference in months between the two assessment periods was calculated and entered into the model as a control variable.

Mediating Variables Measured at 24 Months

Parental support was measured at the Time 2 home using the Two Bags Task, a videotaped activity during which parent and child are asked to play for 10 min with two different sets of toys, a small set of dishes, and the children's picture book "Good Night, Gorilla" (Rathmann 1994). The accompanying videotape coding system was the

same as that used for the Three Bags Task, which was developed for the Early Head Start Research and Evaluation Project (Brady-Smith et al. 1999). The coding scheme used a 7-point scale to rate parents' positive and negative regard for the child, parental sensitivity, intrusiveness, stimulation of cognitive development, and engagement with the child resulting in a composite score for parental support ($\alpha = .72$). Across the nine coders, percent agreement reliabilities with the coding supervisor averaged at 95 % agreement.

Attachment security was assessed using the Toddler Attachment Sort-45 (TAS-45), a modified version of the Attachment Q-Sort (Waters and Deane 1985; Waters et al. 1995). Field interviewers sorted piles of cards containing descriptions of child behaviors relevant to attachment security during a 3-h home visit. A thorough description of TAS-45 items, rationale of item selection procedures, field staff training procedures, and field testing results is provided in Andreassen and West (2007). Based on the TAS-45, NCES staff created variables representing the classical classifications (A–avoidant, B–secure, C–anxious/resistant and D–disorganized), which we used in our mediation analyses.

General Analytic Plan

In Model 1, using lagged dependent variable modeling and multiple linear regression techniques, we examined the lagged effect of the level of child-related interparental conflict in infancy measured at Time 1 on children's cognitive ability measured at Time 2, while accounting for contributions of children's prior cognitive ability, parenting behavior (e.g., parental responsiveness, authoritarianism), and parent depression measured at Time 1, while also controlling for child age, months between the Time 1 and Time 2 assessments, and missing variable indicators. Subsequent models added additional child characteristics (Model 2), and parent and household characteristics (Model 3). All models are presented in Table 3, but only results from the final model are discussed in detail. Next, we examined whether found associations were mediated by aspects of parental support or child attachment security, both measured at Time 2, results of which are discussed in the text.

Results

Descriptive Statistics

The means and standard deviations of the primary dependent and independent variables included in the analyses are presented in Table 1. Averages for the children's cognitive ability as measured with the MDI fall in the normal range (Bayley 1993). Mean level of general interparental conflict in infancy measured at Time 1 was relatively low ($M = 1.78$, SD = .44); respondents reported on a scale (*from 1 = never to 4 = often*), that they *hardly ever* argued. Respondents indicated that when they did argue, the three topics they were most likely to argue about were chores and responsibilities ($M = 2.35$, SD = .88), money ($M = 2.31$, SD = .92), and their children ($M = 2.01$, SD = .84). There were no statistically significant differences (t [6019] = 1.43, $p = .157$) in mean levels of child-related conflict in infancy based on a couple's marital status; married couples ($M = 2.03$, SD = .83) argued just as often about their children as non-married couples ($M = 1.96$, SD = .93). Satisfaction with the couple relationship in the sample was high ($M = 2.77$, SD = .44) with most respondents reporting that they are *very happy* with their partner. Simple correlations among children's cognitive ability at both time points and primary independent variables of interest measured at Time 1 are presented in Table 2. Rather than reviewing these associations in detail, we will focus on presenting Model 3 of the multivariate analyses, also presented in Table 3. Throughout the results, effects that are described as significant were associated with test statistics with $p < .05$. All models and standard error estimates were calculated to account for the two-stage sampling design and post-stratification weighting used in the ECLS-B.

Level of Child-Related Interparental Conflict in Infancy and Child Cognitive Ability at 24 Months

Results indicate a significant negative association ($p = .033$) between the level of child-related conflict in infancy and child cognitive ability at 24 months, indicating that a 1 SD increase in the level of child-related conflict in infancy is related to a .44 point decrease in later child cognitive ability (Table 3, Model 3). It is important to note that this association is significant, while controlling for the effects of prior cognitive ability measured at approximately 9 months, which contributes a substantial portion of the variance to the model ($\beta = 4.18$, $p < .001$). The association is also independent of significant positive contributions to later cognitive ability by parental responsiveness measured at Time 1 ($\beta = .11$, $p < .001$). While parental responsiveness ($\beta = .42$, $p < .001$) was positively associated with later cognitive ability, interestingly, parent depression ($p = .14$) and authoritarianism ($p = .29$) at Time 1 were not associated with later child cognitive growth when various important child, parental and household factors were included in the final model. In addition to the main variables of interest in our model, we point readers to examine several other significant contributions

Table 1 Weighted means and standard deviations of primary dependent and independent variables

Variable	*M*	SD	Min	Max
Child characteristics and functioning				
Cognitive ability time 1 (BSF-R)	76.69	9.67	32.04	124.74
Cognitive ability time 2	127.90	10.66	92.61	174.14
Child negative emotionality	1.41	.67	.00	3.00
White	80 %			
Black	9 %			
Hispanic	25 %			
Asian	5 %			
Pacific Islander	1 %			
Native American	2 %			
Normal birth weight	94 %			
Moderate to low birth weight	5 %			
Very low birth weight	1 %			
Twin	3 %			
Higher-order birth	1 %			
Parent and household characteristics				
Child-related conflict	2.01	.84	1.00	4.00
General conflict	1.74	.46	1.00	4.00
Marital satisfaction	2.77	.44	1.00	3.00
Depressive symptoms	16.43	5.02	12.0	48.0
Parental responsiveness	35.03	4.47	15.0	49.0
Authoritarianism	1.92	1.08	.00	5.00
Maternal age	29.54	5.87	15.0	52.0
Paternal age	31.94	6.48	17.0	75.0
Maternal education (Years)	13.36	2.86	.00	17.0
Paternal education (Years)	13.22	3.07	4.50	17.0
Total household income (In thousands $)	59.31	45.32	<5.0	200.00 or >
# Of resident children under 18	2.11	1.15	1.00	11.0
Childcare use	56 %			

of parental and household characteristics to later child cognitive ability, such as expected associations for parental education (β *maternal* $= .44$, $p < .001$; β *paternal* $= .36$, $p < .001$) and household income ($\beta = .88$, $p < .001$), as well as a rather large negative association for children solely receiving parental care in the first year of life ($\beta = -1.01$, $p < .001$). We also noted that child-prematurity-adjusted-assessment-age did not contribute significant variance to our model ($\beta_{\text{greatest}} = -.867$, $p < .492$; $\beta_{\text{smallest}} = .071$, $p < .943$).

To examine whether the association between the level of child-related conflict in infancy and child cognitive ability at 24 months was mediated by potential spillover effects of levels of child-related conflict in infancy on parental support at 24 months, we examined associations between the level of child-related conflict in infancy and later parental support, the first step in testing evidence of mediation. Findings showed that the level of child-related conflict in infancy did not predict parental support at 24 months ($p = .58$), suggesting that associations between the level of child-related conflict in infancy and later child cognitive ability were not mediated by spillover effects of parental support at 24 months.

Similarly, to examine whether attachment security significantly mediated the found association between the level of child-related conflict in infancy and later child cognitive ability, we first calculated associations using a logit regression model using a categorical indicator variable *securely attached* as a dependent variable and found no significant association ($p = .55$). There was no evidence to suggest that mediation occurred for one specific type of attachment insecurity only (i.e., insecure avoidant, insecure resistant, disorganized). In sum, we found a negative, direct effect of the level of child-related conflict in infancy on child cognitive ability at 24 months, which was not mediated by parenting behavior or child attachment security at 24 months.

Discussion

This study responds to calls in the field to focus attention on developmental periods when children may be particularly vulnerable to the effects of marital conflict and to consider various dimensions of marital conflict (Margolin et al. 2001). The primary objective of this study was to provide an unbiased estimate of the magnitude of the

Table 2 Correlations between primary variables

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Cognitive ability 2	1						
2. Cognitive ability 1	.207**	1					
3. Parental responsiveness	.184**	.167**	1				
4. Depressive symptoms	−.072**	−.039**	−.078**	1			
5. Authoritarianism	−.109**	.015	−.100**	.062**	1		
6. General conflict	−.045**	−.010	−.067**	.320**	.019	1	
7. Child-related conflict	−.047**	−.024	−.027	.188**	.020	.619**	1

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

Table 3 Effect of child-related conflict level at 9 months on child cognitive ability at 24 months, while controlling for child cognitive functioning at 9 months (N = 6019)

Variable	Model 1		Model 2		Model 3	
	β	*p*	*β*	*p*	*β*	*p*
Primary variables						
Constant	100.82	.00	107.01	.00	107.17	.00
Child-related conflict time 1	−.54	.00	−.41	.03	−.44	.03
Non-child related conflict time 1	.42	.06	.29	.18	.21	.65
Child cognitive ability time 1	4.55	.00	4.31	.00	4.18	.00
Parental responsiveness time 1	1.34	.00	.94	.00	.42	.00
Authoritarianism time 1	−.90	.00	−.53	.00	−.19	.14
Depressive mood time 1	−.057	.01	−.48	.02	−.04	.29
Child characteristics						
Male			−3.53	.00	−3.59	.00
Black			−3.64	.00	−3.21	.00
Hispanic			−5.51	.00	−3.62	.00
Asian			−1.50	.00	−2.56	.00
Pacific Islander			−2.57	.13	−1.67	.39
Native American			−1.55	.12	−.58	.45
Moderate to low birth weight			−1.57	.00	−1.44	.01
Very low birth weight			−4.16	.00	−4.10	.00
Twin status			−1.58	.00	−1.79	.00
Higher order birth			.38	.86	.23	.89
Negative emotionality time 1			−.34	.02	−.27	.15
Parental and household characteristics						
Maternal age time 1					−.05	.16
Paternal age time 1					−.02	.61
Maternal education time 1					.44	.00
Paternal education time 1					.36	.00
Total household income time 1					.88	.00
Whether married time 1					.96	.08
Marital satisfaction time 1					−.45	.20
# Of household members under 18 time 1					−.50	.15
Whether child in parental care only time 1					−1.01	.00
Control variables						
Indicator variables of child-prematurity-adjusted-assessment-age at assessment						
Missing variable indicators						
Months between assessments						

association between the level of child-related interparental conflict in infancy and child cognitive ability in toddlerhood by accounting for relevant family context variables and prior cognitive functioning. In addition, the role of parenting behaviors and infant attachment security as potential mediators of these associations was explored. As such, this study attends to a significant gap in the current literature on marital discord in infancy.

We found significant negative effects of levels of child-related conflict in infancy on children's cognitive ability at 24 months. Our findings are in line with Porter et al. (2003), who noted significant negative (cross-sectional) associations between marital conflict and child development status using the same outcome measure as employed in this study, although thematic content or prior developmental status were not considered in that investigation. Our effects represent independent effects observed *after* taking into account stability in cognitive ability over time, effectively modeling the rate of change in cognitive ability. The effect of the level of child-related conflict in infancy on later child cognitive development was relatively small, as important contributions of child, parental, and household characteristics related to interparental conflict and/or cognitive functioning frequently omitted in prior research were considered simultaneously. The study did not identify mediating mechanisms for attachment security and parental support measured at 24 months. The finding suggests that the found link thus represents a direct effect of exposure to child-related conflict in infancy on later child cognitive ability that is independent from potential spillover effects on parenting behavior and/or attachment security. Due to the longitudinal approach and rigorous statistical control of potentially confounding influences, this work provides credible evidence that individual differences in the level of exposure to child-related interparental conflict in infancy may contribute to individual differences in cognitive development in early childhood.

The findings give rise to the following considerations. First, we do not suggest that infants have the ability to *cognitively* evaluate the content of conflict and appraise child-related conflict to be more threatening due solely to its thematic content. Rather, the findings are an indication that direct consequences of higher level of child-related conflict in the home are operative, and that these effects may be different from those posed by levels of general conflict. Although speculative, one explanation is that child-related conflict may be more intensely expressed. Consistent with research with older children showing that the way in which conflict is handled predicts its effects (Cummings and Davies 2010), infants too have been known to show differential responses to destructive, depressive, and constructive forms of marital conflict, such that destructive conflict resolution styles were associated with greater infant distress (Du Rocher Schudlich et al. 2011). Furthermore, Cummings et al. (1981) examined mothers' reports of 10- to 20-month old infants' responses to naturally occurring and simulated expressions of anger and affection by others, and found that infants differentially responded to affectionate versus angry demonstrations with anger eliciting distress and other negative emotional reactions. While there is some evidence to suggest that the use

of verbal aggression may indeed mediate the link between mothers report of child-related disagreements and internalizing problems in preschool-aged boys (Lee et al. 2005), the notion that negative effects of child-related conflict in infancy on child outcomes may be mediated by conflict intensity should be further tested in subsequent research. In addition, the assumption that infants may be exposed to a greater proportion of child-related and/or emotionally negative conflict because they are often in the presence of parents, while plausible, has yet to be tested empirically.

The negative association between levels of child-related conflict in infancy and later child cognitive development–while small–is of concern as it may have implications. While speculative, it is possible that children's slightly lower cognitive capacity at this point may put them at increased risk for being less able to make healthy cognitive contributions about interparental conflict as they get older. Second, children with slightly lower cognitive capacity may be less adaptive to change and perceived by parents as less behaviorally compliant, giving rise to additional interparental conflict about them. Also, since little is known about the progression or stability of exposure to child-related conflict and its association with cognitive development, individual differences in cognitive growth related to varying levels of child-related conflict exposure may become more pronounced over time.

Surprisingly, the results of this study did not indicate that associations between levels of child-related conflict in infancy and child cognitive development in toddlerhood were mediated by infant attachment security or parental support. This suggests that interparental conflict may affect certain aspects of parental support, but not others, as such reducing the variance explained by the composite variable used in our analyses. For example, Pauli-Pott and Beckmann (2007) and Fish and Stifter (1993) did not find significant associations between interparental conflict and maternal sensitivity, while McElwain and Volling (1999) found significant associations with maternal intrusiveness, constructs that are included in the parental support composite variable used in our study, provided by NCES. Similarly, links between parenting behavior and cognitive development may also be construct specific and could vary depending on the nature and timing of emerging abilities. For example, maternal synchrony and quality of mother–child interactions in the first year of life predict toddler's symbolic abilities (Feldman and Greenbaum 1997) and child representational skills (Bornstein et al. 1996), while parental sensitivity, cognitive stimulation, and positive regard have been shown to be important to the development of cognitive skills such as language acquisition (Snow 1994), preliteracy (Bus and Van Ijzendoorn 1988; Whitehurst and Fischel 1994), problem solving, exploratory behavior and attachment (Arend et al. 1979; Matas et al. 1978). Although this study did not find mediating effects of child-related conflict on child cognitive functioning, we cannot conclude that the found association therefore reflects a direct association. Instead, it is possible that biobehavioral variables not considered in this study may underlie the found associations, as there is evidence that interparental conflict has been found to impact children's cortisol levels (Pendry and Adam 2003, 2007), vagal suppression to stressors (El-Sheikh and Arsiwalla 2011), electrodermal responding (El-Sheikh and Cummings 1992), and disruptions in the quality and duration of child sleep (El-Sheikh et al. 2006), which are thought to influence cognitive functioning and development.

This study does have several limitations which merit consideration when interpreting its results. First, a major shortcoming of this study relates to the use of non-standardized measurements. In particular, the level of child-related conflict was assessed using one survey item that focused exclusively on the level and thematic content, while other dimensions of interparental conflict with implications for child adjustment (Grych and Fincham 1990) were ignored (e.g., whether the child was present, intensity, duration, resolution). In particular, it would have been helpful to model the proportions of child-related and general conflict that occurred in the child's presence in order to elucidate the proposed role of conflict intensity–and differences therein–in underlying the found associations. Similarly, the ECLS-B assessments are conducted in the child's home, which is more susceptible to distractions and interruptions, and the ECLS-B, like other national studies, relies on a field staff with a wide range of experiences in varied fields. Many have extensive backgrounds in administering survey instruments, but most do not have an extensive knowledge base in child development. Thus, it has been necessary to adapt instruments that are often used by child development experts in laboratory or clinical settings to the ECLS-B field environment. Challenges include the limited time available for the home visit, the need to reduce respondent and interviewer burden, and the need for measures that are straightforward and not laden with clinical terminology. However, in our opinion, the methodological advantages of using a large sample representative of the American population of infants balance this limitation.

A second limitation is that the reported association is small, which brings into question whether we should be concerned about effects of child-related conflict on later cognitive development specifically. The results suggest that we should not assume that very young children are not adversely affected by child-related conflict based merely on their limited cognitive ability to interpret it. Also, we know little about the extent to which children's slightly lower rate of cognitive growth may present a challenge to

parents and shape the development of subsequent interparental conflict, child-related or general. Third, the concurrent assessment of mediator variables and outcomes variables constitutes a limitation, especially with regards to examining the potential mediating role of parental support. Specifically, there is not enough theoretical or empirical evidence to suggest that parental support measured at 24 months reflects a stable pattern of engagement developed throughout the second year, unaffected by fluctuations in context known to affect parental support (e.g., parental levels of depression, exposure to daily stress, temporary health issues). As such, the lack of mediation evidence can be attributed to the concurrent timing of its measurement. On the other hand, we believe that the examination of attachment security, while also assessed concurrently, is reasonable for the following reason. There is evidence in the developmental literature that the measurement of attachment style using a Q-sort approach effectively captures the behavioral manifestations of children's underlying internal working model of attachment (Cassidy and Shaver 1999). The internal working model–and the behavioral manifestations that accompany it–are thought to emerge throughout the second year of life as children develop symbolic, representational thinking and language. Since the internal working model reflecting the child's attachment style is thought to be relatively stable in early childhood, the concurrent timing of the measurement of the behavioral of manifestation of this internal model using the Q-sort–which captures a snapshot of a relatively stable, previously developed construct–was in our opinion still worth examining, despite the fact that no evidence supported mediation through this variable.

This study has several strengths. First, the results contribute to a relatively small body of prior research on interparental conflict in infancy and later child development, a topic about which relatively little is known. An important contribution is that this study highlights effects of conflict on later child cognitive development, an outcome rarely studied in the marital discord literature, especially in infancy. A major strength of this study is its use of a large, comprehensive, longitudinal dataset, which allowed us to model associations while controlling for many potentially confounding influences that include prior cognitive development, important aspects of parents' relationship functioning and home environment known to be associated with interparental conflict and cognitive development. This is important as families who experience conflict often experience concomitant stressors, including strains of poverty, and low levels of parent education that may contribute independently to children's cognitive development. In addition, the study uniquely combines the advantages of a large sample with the use of reliable, in-home, developmental assessments on child cognitive ability and parenting relations by trained observers at two points in time. As such, this study is not confounded by shared method variance, which results from reliance on a single informant, usually the mother, to report on measures of conflict, child outcomes, and possible mediating variables. Furthermore, although one could argue that the statistical significance of associations may be inflated by the use of a large sample, an advantage of this dataset is that findings can be generalized to the population of American infants living in two-parent families. Lastly, this study builds on the prior literature regarding the importance of considering thematic content when examining impact of conflict on young children by showing that infants too appear to be differentially affected by conflict that is child-related. Since the study did not identify mediating mechanisms, it generates additional research questions about the role of the intensity of child-related conflict, as well as the potential likelihood of greater exposure to child-related conflict.

Despite its limitations, this study provides new insights in understanding consequences of varying levels of exposure to child-related interparental conflict in infancy. The results also highlight the value of examining specific dimensions of conflict when examining effects of interparental conflict, even with very young children. Since underlying pathways were not revealed by this study, future work should explore what may be potential underlying mechanisms (i.e., presence, intensity and physiological arousal) to explain why child-related conflict may be salient for very young children. As such, this study illustrates the enduring value of first-generation research in generating testable hypotheses and informing future empirical research on interparental conflict and child development.

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