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Intimate Partner Violence, Maternal Sensitive Parenting Behaviors, and Children's Executive Functioning

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Abstract

Objective—Despite knowledge that intimate partner violence (IPV) can negatively affect children's socioemotional and behavioral development, less is known about the impact of IPV on children's cognitive development, including whether it influences their executive functioning (EF). The goal of the current study was to address this gap in the literature, by examining the association between IPV that occurs early in life and EF at school entry. This study also allowed for the investigation of maternal sensitive parenting behaviors as a possible mediator of this relation.

Method—Using longitudinal data from a socioeconomically and racially diverse sample of families ($n = 154$), we investigated the association between IPV measured when children were 24, 30, and 36 months old and their EF when they were 60 months old. We also tested whether maternal sensitive parenting behaviors (measured when children were 24, 36, and 60 months old) mediated this association.

Results—Results indicate that, even after controlling for a number of family- and child-level covariates, IPV occurring early in children's lives was negatively associated with their EF at school entry. This relation was mediated by maternal sensitive parenting behaviors, such that higher levels of IPV were associated with lower levels of sensitive parenting behaviors, which in turn were positively associated with children's EF.

Conclusions—These findings add to a limited body of literature that links IPV and children's cognitive functioning, and suggest that intervention efforts aimed at improving children's EF may want to simultaneously consider IPV and maternal sensitive parenting behaviors.

Keywords

Intimate Partner Violence; Executive Functioning; Maternal Parenting Behaviors; Domestic Violence; Cognitive Development

An estimated 15.5 million children in the United States live in domestically violent homes (McDonald, Jouriles, Ramisetty-Mikler, Caetano, & Green, 2006). Given the striking prevalence of intimate partner violence (IPV) in the general population, it is important to study how living in a physically violent home may influence children's development. Although children of all ages have been shown to be impacted by IPV (Kitzmann, Gaylord, Holt, & Kenny, 2003; Wolfe, Crooks, Lee, McIntyre-Smith, & Jaffe, 2003), young children have been argued to be more vulnerable to its influence, both because children under the age of five are more likely than older children to live in homes characterized by IPV (Fantuzzo, Boruch, Berima, Atkins, & Marcus, 1997) and because disturbances in early foundational skills may have implications for both children's concurrent development, and their later functioning. Despite this potential increased vulnerability, relatively little research has investigated the impact of IPV on skills that emerge during early childhood. Studies examining the impact of IPV on children's emerging cognitive abilities are particularly lacking, despite knowledge that cognitive development is among the many domains of child functioning that may be affected by IPV (e.g., Graham-Bermann, Howell, Miller, Kwek, & Lilly, 2010; Huth-Bocks, Levendosky, & Semel, 2001; Koenen, Moffitt, Caspi, Taylor, & Purcell, 2003). The current study addresses some of the limitations of the extant literature by investigating the association between IPV occurring early in life and executive functioning (EF) at school entry.

IPV and Child EF

Executive functions, an umbrella term that refers to the cognitive abilities involved in the control and coordination of goal-directed behaviors, have been shown to emerge and undergo substantial development over the first five years of a child's life (Garon, Bryson, & Smith, 2008). Composed of three interrelated but separate components, attentional flexibility, inhibitory control, and working memory (Garon, Bryson, & Smith, 2008; Miyake, Friedman, Emerson, Witzki, Howerter, & Wager, 2000), children's EF at school entry has been linked with multiple dimensions of their school success (Blair & Razza, 2007; Bull, Espy, & Wiebe, 2008). For example, Blair and Razza (2007), using a sample of 141 children recruited from Head Start programs, found that children's EF assessed at the end of the preschool years was related to their math and reading ability during the spring of their kindergarten year, independent of other cognitive abilities (e.g., IQ and language) and emotion regulatory skills (i.e., effortful control). Similarly, Neuenschwander and colleagues (2012), using data from 459 children recruited from Kindergarten and mixed-grade classes, found that children's EF (above and beyond the influence of their effortful control and fluid intelligence) was related to their learning-related behaviors as well as their reading, writing, and math performance one year later. These studies suggest that EF around school entry has important and unique implications for children's long term school success, and thus, the focus of the current study was on children's EF when they were 60 months old, as they were transitioning to Kindergarten.

Although the importance of EF for children's development has been well established, less is known about contextual factors that may influence children's EF. That is, relative to the vast literature on the emergence and academic and social correlate of children's EF, less is known about factors that may influence EF early in life. Past research has established a link

between EF and contextual variables such as household poverty (e.g., Blair et al., 2011; Raver, Blair, & Willoughby, 2012) and the quality of the home environment (e.g., Sarsour et al., 2011). However, little is known about how violent interactions within the home (i.e., IPV) may influence children's EF at school entry. According to emotional security theory (EST; Davies & Cummings, 1994), witnessing violence is distressing and dysregulating for children, and repeated exposure to IPV undermines their sense of safety and security in the family. These chronic security concerns, in turn, can interfere with their ability to acquire age-appropriate skills in a variety of domains. Guided by EST and other frameworks, past research has demonstrated a link between IPV and other dimensions of children's cognitive functioning (e.g., IQ, language, memory; Graham-Bermann, Howell, Miller, Kwek, & Lilly, 2010; Jouriles et al., 2008; Koenen, Moffitt, Caspi, Taylor, & Purcell, 2003). However, we are unaware of a study that has linked IPV with children's EF, a higher-order dimension of cognition that has been shown to be a) distinct from other forms of cognition and b) important for children's long term success.

Despite limited empirical evidence that speaks to the relation between IPV and children's EF specifically, there is reason to believe that these two variables may be linked. Past research guided by EST has revealed a link between IPV and children's early attentional skills (Davies, Woitach, Winter, & Cummings, 2008; Towe-Goodman et al., 2011), their inhibitory control (Gustafsson, Cox, Blair, & the FLP Key Investigators, 2012; Thompson & Calkins, 1996), and their working memory performance (Gustafsson et al., 2013). These findings have obvious applications to the study of EF, as these three domains (i.e., attention shifting, inhibitory control, and working memory) are the three central aspects of EF (Garon, Bryson, & Smith, 2008; Miyake et al., 2000). Investigating whether IPV is associated with children's performance on EF tasks (performance on which requires not only proficiency in these three individual domains, but also the coordination of these skills) seems an important extension of this previous work.

Maternal Sensitive Parenting Behavior as a Mediator

Although establishing a link between IPV and children's EF in itself contributes to our understanding of the consequences of violence occurring in homes with young children, identifying the mechanisms through which IPV exerts its influence is additionally important. Past research suggests that maternal parenting behaviors may be one such mechanism, such that lower levels of maternal sensitive parenting behaviors may partially account for the relation between IPV and children's EF. According to the *spillover hypothesis*, emotions engendered in the adult-adult relationship can carry over into the parent-child relationship, and it is at least in part through disturbances in the parent-child relationship that IPV influences child outcomes (Cummings & Davies, 2002; Krishnakumar & Buehler, 2000). That is, physically violent interactions between parents may result in mothers feeling detached, withdrawn, or apathetic toward her partner. These feelings may 'spillover' into her interactions with other family members and may manifest in less sensitive, less engaged, and less positive interactions between the mother and her child. These parenting behaviors, in turn, have the potential to impact children's developing EF, as interactions with sensitive, positive caregivers are posited to offer children structured and supported opportunities to develop the skills central to EF (Carlson, 2009). Although past research has established a

link between IPV and less sensitive maternal parenting behaviors (Casanueva, Martin, Runyan, Barth, & Bradley, 2008; Levendosky & Graham-Bermann, 2001), and sensitive parenting behaviors have been positively associated with children's EF (Bernier, Carlson, & Whipple, 2010; Rhoades, Greenberg, Lanza, & Blair, 2011), no study has simultaneously considered all three of these variables.

The Current Study

Using data from a sample of racially and economically diverse families, the current study allowed for an exploration of the aforementioned gaps in our knowledge about the linkages between IPV, maternal sensitive parenting behaviors, and child EF. Specifically, the goal of the current study was to investigate the following research questions: (1) *Is IPV that occurs early in children's lives related to their EF as they transition into school?* and (2) *Is this relation mediated by maternal sensitive parenting behaviors?* We hypothesized that IPV measured when the child was 24, 30, and 36 months old would be related to EF as assessed at 60 months. Additionally, we hypothesized that this relation would be partially mediated by maternal sensitive parenting behaviors, assessed when children were 24, 36, and 60 months old.

Past research has identified a number of correlates of IPV and children's EF. For example, IPV has been shown to be more common among low-income, less educated, and African American individuals (Caetano, Cunradi, Clark, & Schaefer, 2000; Thompson et al., 2006; Tolman & Raphael, 2002). Similarly, family income and other metrics of family SES have been associated with children's EF (Noble, Norman, & Farah, 2005; Rhoades, Greenberg, Lanza, & Blair, 2011). In order to account for the possibility that these factors are partially responsible for the relation between IPV and EF, we incorporated each of these variables as covariates in the current investigation. Past research has demonstrated a correlation between IPV and a couple's verbal aggression, yet these two types of interparental conflict have been demonstrated to be distinct from one another (Stets, 1990) and have been shown to have different causes, correlates, and consequences. In order to isolate the effect of IPV from that of the couple's non-physical conflict, the couple's verbal aggression was also included as a covariate in all analyses.

Method

Participants

Participants in this study were a subsample of the Durham Child Health and Development Study (DCHDS), a longitudinal study of 206 socioeconomically and racially diverse families living in and around a mid-sized southeastern city. Families with healthy, full-term infants were recruited via fliers at birth and parenting classes, as well as through phone contact via birth records. Recruitment procedures specified approximately equal numbers of European American and African American families sampled from both low- and middle-income groups. The subsample used in the current study included families in which the target child's mother had a romantic partner at the 24 month timepoint ($n = 160$). Although all children enrolled in the DCHDS were full-term, healthy infants, six of these 160 were identified as having a developmental delay by the 60 month assessment. These six children

were not included in the current analyses, yielding a final sample of 154 families. In this subsample, 49% of the children were female, 50.6% were African American (49.4% were European American), and the median household income when the child was 60 months old was \$77,600 ($M = \$88,778$, $SD = \$65,194.33$, range: \$1,110-\$400,000). This subsample did not differ significantly from the complete sample on any of these variables. Forty-three (26.88%) of the mothers in this subsample reported at least one incident of IPV. This figure is consistent with previously published reports that suggest that 10-21% of US couples have experienced at least one instance of IPV in the previous year (McDonald, Jouriles, Ramisetty-Mikler, Caetano, & Green, 2006; Straus & Gelles, 1990). Thirty-five (24%) of the 145 families who met criteria for inclusion in the current study were unavailable for follow up assessment at the 60 month assessment timepoint. However, families who did and did not participate in the 60 month assessment did not differ significantly from one another on any of the variables included in the current study.

Procedure

Data used in the current study came from a series of laboratory visits, completed when the child was 24, 30, 36, and 60 months old. At each of these visits, children were administered a battery of assessments while mothers completed questionnaires and reported family demographic information. Additionally, at the 24, 36, and 60 month assessment timepoints, mothers and children participated in parent-child interactions that were videotaped for later coding.

Measures

Intimate partner physical violence—IPV was assessed using the Conflict Tactics Scale – Couple Form R (CTS-R; Straus & Gelles, 1990), a 19 item self-report measure completed by the mothers when their child was 24, 30, and 36 months old. Each of these items lists a possible response to marital conflict; respondents were asked to rate on a seven point likert-type scale (where 0 = *Never* and 6 = *More than 20*) how often in the past 12 months they engaged in specific behavior in response to an argument. They were also asked to rate how often in the past 12 months their partner engaged in each behavior (e.g., how often in the past 12 months have you/your partner] kicked, bit, or hit him/her/you with a fist). The 9 item physical violence subscale of this measure (i.e., the mean of these 9 items) was used in this study. Nearly 28% ($n = 43$) of the mothers in our subsample reported that she or her partner had perpetrated at least one physically violent act at one of the three assessment timepoints. Consistent with other studies of IPV occurring in community samples (Archer, 2000; Caetano, Vaeth, & Ramisetty-Mikler, 2008), the majority of this IPV (66.66%) was dual-perpetrated. Of the remaining physically violent relationships, 6 (14.29%) were characterized by exclusively female-to-male IPV and 8 (19.05%) were characterized by exclusively male perpetrated IPV. Although IPV in this sample was more commonly ‘minor’ (e.g., “slapped”), all items on the CTS-R were endorsed by at least one mother in this subsample. In accordance with previously published work (e.g., Jouriles et al., 2008; Straus & Gelles, 1990), and in an effort to more comprehensively capture the violent climate of the mother's relationship at each timepoint, the mother's report of her own IPV and her report of her partner's IPV were summed, to create a total score which represents the total amount of IPV experienced in the household (α ranged from .91 to .97). The total IPV

scores from the 24, 30, and 36 month timepoints were used as indicators of the latent variable IPV.

Verbal aggression—The couple's verbal aggression was assessed using the verbal aggression subscale of the CTS-R (that contains items such as “insulted or swore at him/her/you”). Mother's report of her own and her partners' verbal aggression were summed in order to capture a measure of the total verbal aggression in the relationship. The 12-item verbal aggression scores from the 24, 30, and 36 month assessments were used as three indicators of a latent variable that mirrored the one constructed for IPV (α ranged from .88 to .92).

Demographic variables—At each visit, mothers reported information on a variety of household demographic variables, including the total household income from all possible sources, the number of individuals living in the home, and the sex and race of the target child (0 = *Female*, 1 = *Male*; 0 = *African American*, 1 = *European American*). Income-to-needs ratios were calculated at each timepoint by dividing total household income by the federally determined yearly poverty threshold for the number of people living in the household (income-to-needs ratios above 1.0 indicate that a family is able to provide for basic needs). The income-to-needs ratio from the 60 month assessment was used in the current study. These demographic variables were included as control variables.

Maternal parenting behaviors—Maternal parenting behaviors were assessed during parent-child interactions that occurred when the target child was 24, 36, and 60 months old. At the 24- and 36-month assessments, mothers and children completed a 10 minute puzzle task. Parents were given three puzzles of increasing difficulty and told that this was a task for the child to complete, but that they could provide any assistance that they deemed necessary. At the 60 month assessment, mothers and children were presented with two tasks, a block design task and a card game, that lasted for 15 minutes. For the first half of the interaction, mothers and children were instructed to put a set of blocks of varying shapes together to make a “tower” (a rectangular cube) that resembled an example block. The dyad was asked to make as many “towers” as they could; similar to the earlier timepoints, parents were told that it was a task for the child but that they could provide assistance. For the second half of the interaction, mothers and children played the card game slapjack. In this game, players take turns turning over a single card into a common pile. If either player turns over a card on which there is a picture of a jack (i.e., a picture of a man with the letter J in the corner), then both players should try to touch the card as quickly as possible. The player who touches the card first gets to add all of the cards that accumulated in the common pile to their personal deck; the goal of the game is to accumulate as many cards as possible. Mothers were told that this was a fun game that she and the child should play together.

All interactions were videotaped for later coding by an ethnically diverse team of coders who were blind to other information about the families. Using global rating scales (Cox & Crnic, 2002) adapted from those used by the NICHD Study of Early Child Care (NICHD ECCRN, 1999), coders rated parenting behaviors on a 7 point scale (where 1 = *not at all characteristic* and 7 = *very characteristic*). The current analyses focused on the parental scales of Sensitivity/Supportive Presence, Detachment/Disengagement, Stimulation of Cognitive Development, Positive Regard, and Animation in interacting with the child.

Informed by an exploratory factor analysis with an oblique rotation (promax), the individual subscales were composited in order to obtain overall sensitive parenting scores (the mean of Sensitivity, Stimulation, Positive Regard, Animation, and reverse scored Detachment) at each assessment timepoint. The three assessments of sensitive parenting (i.e., 24, 36, and 60 month) were used as three indicators of the maternal sensitive parenting behaviors latent variable.

Coders underwent training until acceptable reliability (ICC > .80) was achieved and maintained for each coder on every scale. In order to assess reliability after formal coding began, a random selection of at least 20% of interactions was coded by both coders. Coders met biweekly to reconcile scoring discrepancies; the final scores that they arrived at by consensus were used in all analyses. Inter-rater reliability for this subsample, assessed using an Intraclass Correlation (ICC), was .91, .93, and .94 for the sensitive parenting composites at the 24, 36, and 60 month assessment timepoints, respectively.

Child executive functioning—Children's executive functioning was measured using three widely used tasks that were administered to the child when he or she was 60 months old: the day-night task (an inhibitory control EF task), the backward digit span task (a measure of working memory), and the flexible item selection task (an attention shifting task). Consistent with past research that has found that EF at this age is a unitary construct (e.g., Hughes, Ensor, Wilson & Graham, 2009; Blair et al., 2011), the current study found that these three measures loaded onto a single EF latent variable; this latent variable was used as our measure of EF in all analyses.

Day-night task—In this Stroop-like task (Gerstadt, Hong, & Diamond, 1994), children were presented with a series of white and black cards on which a yellow sun (white card) and a moon and stars (black card) were depicted. After establishing that the child associated the sun with daytime and the moon and stars with nighttime, the experimenter instructed the child to say “day” when shown the moon and stars, and to say “night” when shown the sun. Up to five practice trials were conducted (including corrective prompts when necessary), until the child successfully labeled each card correctly once. After passing the practice trials, the child was presented with 20 test trials that were administered in a fixed random order. No feedback was provided during this phase. The proportion of test trials that the child answered correctly was used as the analysis variable for this task.

Backward digit span task—Children's EF was also measured using a backward digit span task (McCarthy, 1972), administered when the child was 60 months old. Following standardized procedures, two backward span trials were administered. On each trial, strings of numbers of increasing length were presented, with the child's task being that of stating the numbers in reverse order. The child's span was measured as the length of the longest backward string of digits that could be produced without error.

Flexible item selection task—The flexible item selection task (FIST; Jacques & Zelazo, 2001) was also administered at the 60 month assessment. In this task, children are presented with pictures of three items that vary along a combination of two of three dimensions (i.e., size, shape, and color). In an example trial, the experimenter shows the child how two of the

three items “go together in one way” and how two of the items “go together in another way.” That is, the experimenter demonstrates how two of the three items are similar along one dimension (e.g., size) and how a different two items are similar along a second dimension (e.g., color). In two practice trials and a subsequent 12 test trials, children are instructed to point to two of the three items that are similar along one dimension, and then to two of the three items that are similar along a second dimension. The proportion of times that the child correctly demonstrated that two items were similar along a second dimension was used in the current study.

Analytic Strategy

Structural equation modeling (SEM) was used to test our research questions (Schumacker & Lomax, 1996). Models were parameterized using the *Mplus* 6.0 software package (Muthén & Muthén, 1998-2010), using the maximum likelihood estimator. Model fit was examined using a number of fit indices, including the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), and the root mean squared error of approximation (RMSEA; Browne & Cudeck, 1993). CFI and TLI values above .90 and RMSEA values below .05 indicate adequate model fit. The scale of each latent variable was set by fixing the first factor loading to 1.0. Mediation was tested using the *model indirect* command in *Mplus*; asymmetrical 95% confidence intervals were calculated using this program's *bootstrap* commands.

As mentioned above, 35 families were missing data on one or more study indicators. Rather than eliminating these observations when testing our research questions, we conducted all analyses using full information maximum likelihood (FIML; Arbuckle, 1996), a missing data technique that uses all available information to produce estimates that have been shown to be unbiased and more efficient than those produced via other methods of handling data that are missing at random (e.g., listwise deletion, pairwise deletion; Allison, 2003). In order to strengthen our confidence in the robustness of our findings, we repeated all analyses without these 35 observations included. Both methods of handling this missing data yielded the same pattern of results. Thus, we present the results from the models in which FIML was used, given its demonstrated strengths.

In order to address our first research question (i.e., *Is IPV that occurs early in children's lives related to their EF as they transition into school?*), the EF latent variable was regressed on the IPV latent variable, as well as on the family's income-to-needs ratio, the child's race and sex, the highest level of education that the mother completed, and the verbal aggression latent variable. In order to address our second research question (i.e., *Is this relation mediated by maternal sensitive parenting behaviors?*), the maternal sensitive parenting behaviors latent variable was added to the aforementioned model, such that the EF latent variable was regressed on both the IPV latent variable and the maternal sensitive parenting behaviors latent variable. The maternal sensitive parenting behaviors latent variable was also regressed on the IPV latent variable. Paths were also estimated between the aforementioned covariates to the EF latent variable. Non-significant paths from control variables to the EF latent variable were removed from the presented models in order to preserve model parsimony.

Results

Means, standard deviations, and bivariate correlations among study variables are presented in Table 1. Associations among variables were largely as expected, such that the various measures of IPV were negatively associated with various measures of maternal sensitive parenting, as well as most of the measures of child EF.

Research question one: Linking IPV and EF

As described above, we approached our first research question by regressing the child EF latent variable on the IPV latent variable. Results indicate that, even after controlling for the family's income-to-needs ratio, the child's race and sex, the highest level of education that the mother completed, and the couple's verbal aggression, IPV was negatively associated with child EF ($\beta = -.32, p = .02$). This model fit the data well, $\chi^2 = (7, N = 154) = 5.81, p = .56, CFI = 1.00, TLI = 1.01, RMSEA = .00$ and accounted for 10.30% of the variance in children's EF scores.

Research question two: Maternal sensitive parenting behaviors as a mediator

In order to test our second research question, two nested models were estimated. In the first model, the maternal sensitive parenting behaviors latent variable was added to the model used to test research question one. This model, which did not include the proposed mediated pathway, fit the data adequately, $\chi^2 = (24, N = 154) = 35.30, p = .06, CFI = .98, TLI = .96, RMSEA = .06$. In the second model, paths from the IPV latent variable to the maternal sensitive parenting behaviors latent variable and from maternal sensitive parenting behaviors latent variable to the child EF latent variable were estimated. This model fit the data well, $\chi^2 = (23, N = 154) = 24.10, p = .40, CFI = 1.00, TLI = 1.00, RMSEA = .02$, and accounted for 25% of the variance in children's EF scores. This model fit the data significantly better than the model that did not include this mediated pathway, $\chi^2 = -11.20$.

Results from the second model appear in Figure 1. As can be seen in this figure, IPV was negatively associated with maternal sensitive parenting behaviors ($\beta = -.35, p < .01$), which in turn were positively associated with child EF ($\beta = .40, p < .01$); when considered in a model with sensitive parenting behaviors, the relation between the IPV latent variable and the child EF latent variable was not significant ($p = .10$). This indirect path (from IPV to child EF, through maternal sensitive parenting behaviors) was statistically significant ($\beta = -.14, p = .04$). This significant indirect effect, paired with the non-significant direct effect ($\beta = -.19, p = .10$) suggests that the effect of IPV on child EF was fully mediated by maternal sensitive parenting behaviors. Bootstrapping methods were used to calculate asymmetric 95% confidence intervals (CI; MacKinnon, 2008; MacKinnon, Fritz, Williams, & Lockwood, 2007). These results indicate that the indirect path involving IPV, maternal sensitive parenting behaviors, and child EF was significantly different from 0, 95% CI [-.12, -.01], further supporting mediation. None of the covariates were significantly associated with the child EF latent variable when considered in a model with the IPV latent variable, and thus these variables were not included in the final model.

Discussion

In the current study, we used data from a diverse sample of families to investigate whether IPV that occurred early in children's lives was linked with their EF as they transitioned to Kindergarten. Consistent with expectation, the data support a link between IPV and children's EF, such that higher levels of IPV were associated with lower scores on an EF latent variable. That is, even after controlling for a number of child- and family-level covariates, IPV reported when children were 24, 30, and 36 months old was negatively associated with their EF when they were 60 months old. This finding adds to a limited body of literature that links IPV and children's cognitive development and suggests that EF is among the many dimensions of child functioning that may be negatively impacted by physical violence among parents.

The current study also tested a potential mediator of the relation between IPV and children's EF, namely maternal sensitive parenting behaviors. Results indicate that maternal sensitive parenting behaviors assessed when children were 24, 36, and 60 months old fully mediated the relation between IPV and child EF, such that IPV that occurred early in the child's life was associated with lower levels of maternal sensitive parenting over the toddler years, which in turn were predictive of child EF at school entry. These findings not only help to further our understanding of the mechanisms through which IPV impacts children's emerging cognition, but also points to an area for potential intervention. That is, these findings suggest that interventions aimed at helping families in which IPV has occurred may want to target both IPV and maternal sensitive parenting behaviors in order to bolster children's EF.

Limitations

The current study adds to the extant literature in a number of ways. For example, this study utilized longitudinal data that were collected over the first five years of the child's life. Not only are longitudinal data relatively uncommon in studies of IPV (Levendosky, Bogat, & von Eye, 2007), but children under the age of five remain an understudied population in the IPV literature, despite evidence that children in this age range are disproportionately represented in households characterized by physical violence (Fantuzzo, Boruch, Berima, Atkins, & Marcus, 1997). A second contribution of this study is that it examined the influence of IPV on an underexplored dimension of children's cognitive functioning, namely EF. The use of multiple laboratory measures of children's EF and the rich observational measures of maternal parenting behaviors also represent strengths.

Despite these strengths, this study also had a number of limitations. For example, our study was limited to families with young children living in and around a medium-sized southeastern city. Although this sample was both racially and economically diverse, it is not representative of all children living in physically violent homes. Future research, therefore, should explore the extent to which these findings replicate in different populations, and with children of different ages. Additionally limiting is the fact that we relied exclusively on maternal report for our measure of IPV. Although incorporating information from multiple informants is generally considered to lead to more accurate data, research comparing male and female reports of IPV has concluded that women tend to be more accurate reporters of

physical aggression relative to men (Stets & Straus, 1989; Straus & Sweet, 1992). The focus on maternal reports of IPV, therefore, may not be as limiting as single-informant reports of other constructs. Also limiting is the fact that, despite the fact that we measured the total amount of IPV that the mother was exposed to, our study did not include a measure of how much of the IPV the child directly witnessed. Future research should investigate whether the magnitude or nature of the observed relations vary based on the amount of IPV that the child witnessed.

It is also important to note that although the models that we tested in the current study proposed a directionality of effect (both theoretically, and based on the timing of the measures included in the analyses), this is correlational research, and should be acknowledged as such. Although the temporal ordering of our measures (i.e., IPV that occurred between 1-3 years of child age and parenting behaviors assessed when children were 2-5 years old), strengthens our confidence that the effect is in the proposed direction, there is significant overlap in the timing of these measures, which limits our ability to make conclusions about the directionality of the relation between these variables. Indeed, the most that one can confidently state about these findings is that IPV occurring early in the child's life does not predict later EF after controlling for its concurrent association with maternal sensitive parenting behaviors. The fact that this study did not control for children's EF at earlier ages also limits our ability to confidently make conclusions about the directionality of these associations. Although it seems unlikely that IPV would be the consequence of children's EF, this study did not explicitly eliminate this alternative characterization of the data. The fact that EF is described as emerging during the age period examined in the current study is further suggestion that IPV may be influencing EF, however, future research that controls for earlier child EF or that examines changes in child EF is needed.

Research Implications

This study points to a number of areas for future research. Although one strength is that it identified one of the mechanisms through which IPV influences children's EF (i.e., through maternal sensitive parenting behaviors), it did not test all possible mediators of this association, nor did it explore all possible dimensions of parenting behaviors that may be relevant in this context. Future research questions, therefore, should include whether harsh-intrusive or more strongly atypical (e.g., abusive or neglectful) behaviors may play a role in these associations. Another possible research direction could include a consideration of whether fathering plays a role in explaining or modifying the associations examined in the current study.

Clinical and Policy Implications

These findings also have important implications for clinicians and for interventions that are designed to help families in which IPV has occurred. For example, previous research investigating the sequelae of witnessing violence has largely focused on the socioemotional and behavioral consequences of IPV. Although these are undoubtedly important targets for intervention, the current study points to an additional area for intervention, specifically children's cognitive development. That is, the observed negative association between IPV and children's EF suggests that clinicians who work with children living in physically

violent homes may also want to assess, address, and ultimately scaffold children's emerging cognition, as IPV seems to undermine its development. This study's second finding, that maternal sensitive parenting behaviors mediate the association between IPV and children's EF, also has important clinical implications. Not only does this finding inform our understanding of the mechanisms through which IPV impacts children (information which can inform preventive efforts), but it also suggests that clinicians working with families affected by IPV may want to simultaneously address IPV and maternal sensitive parenting behaviors.

Summary and Conclusions

Using longitudinal data from a diverse sample of families raising young children, the current study investigated the impact of IPV occurring early in the child's life on his or her EF at school entry. Results indicate that, even after controlling for a number of family- and child-level variables, IPV was associated with children's EF. This relation, however, was fully mediated by maternal sensitive parenting behaviors measured when children were 24, 36, and 60 months old, suggesting that IPV exerts its influence on children's EF through its impact on maternal sensitive parenting behaviors. These findings add to a limited body of literature linking IPV and children's cognitive functioning, and suggest that intervention efforts aimed at improving children's EF may want to simultaneously consider IPV and maternal sensitive parenting behaviors.

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References

- Allison PD. Missing data techniques for structural equation modeling. *Journal of Abnormal Psychology*. 2003; 112:545–557. [PubMed: 14674868]
- Arbuckle, JL. Full information estimation in the presence of incomplete data. In: Marcoulides, GA.; Schumacker, RE., editors. *Advanced structural equation modeling*. Mahwah, NJ: Erlbaum; 1996. p. 243-277.
- Archer J. Sex differences in aggression between heterosexual partners: a meta-analytic review. *Psychological Bulletin*. 2000; 126(5):651–680. [PubMed: 10989615]
- Bentler PM. Comparative fit indexes in structural models. *Psychological Bulletin*. 1990; 107:238–246. [PubMed: 2320703]
- Blair C, Granger DA, Willoughby M, Mills-Koonce R, Cox M, Greenberg MT, Kivlighan K, Fortunato CK. Salivary cortisol mediates effects of poverty and parenting on executive functions in early childhood. *Child Development*. 2011; 82:1970–1984. [PubMed: 22026915]
- Blair C, Razza RP. Relating Effortful Control, Executive Function, and False Belief Understanding to Emerging Math and Literacy Ability in Kindergarten. *Child Development*. 2007; 78(2):647–663. [PubMed: 17381795]
- Bernier A, Carlson SM, Whipple N. From External Regulation to Self-Regulation: Early Parenting Precursors of Young Children's Executive Functioning. *Child Development*. 2010; 81(1):326–339. [PubMed: 20331670]

- Browne, MW.; Cudeck, R. Alternative ways of assessing model fit. In: Bollen, KA.; Long, JS., editors. Testing structural equation models. Newbury Park, CA: Sage; 1993. p. 136-162.
- Bull R, Espy KA, Wiebe SA. Short-term memory, working memory, and executive functioning in preschoolers: Longitudinal predictors of mathematical achievement at age 7 years. *Developmental Neuropsychology*. 2008; 33(3):205–228. [PubMed: 18473197]
- Caetano CB, Cunradi R, Clark C, Schaefer J. Neighborhood poverty as a predictor of intimate partner violence among white, black, and Hispanic couples in the United States: A multilevel analysis. *Annals of Epidemiology*. 2000; 10(5):297–308. [PubMed: 10942878]
- Caetano R, Vaeth PAC, Ramisetty-Mikler S. Intimate partner violence victim and perpetrator characteristics among couples in the United States. *Journal of Family Violence*. 2008; 23(6):507–518.
- Carlson SM. Social origins of executive function development. *New Directions for Child and Adolescent Development*. 2009; 123:87–98. [PubMed: 19306276]
- Casanueva C, Martin SL, Runyan DK, Barth RP, Bradley RH. Quality of maternal parenting among intimate-partner violence victims involved with the child welfare system. *Journal of Family Violence*. 2008; 23(6):413–427.
- Cox, MJ.; Crnic, K. Qualitative ratings for parent–child interaction at 3-12 months of age. University of North Carolina; Chapel Hill: 2002. Unpublished manuscript
- Cummings EM, Davies PT. Effects of marital conflict on children: recent advances and emerging themes in process-oriented research. *Journal of Child Psychology and Psychiatry*. 2002; 43:31–63. [PubMed: 11848336]
- Davies PT, Cummings EM. Marital conflict and child adjustment: An emotional security hypothesis. *Psychological Bulletin*. 1994; 116(3):387–411. [PubMed: 7809306]
- Davies P, Woitach M, Winter M, Cummings EM. Children's insecure representations of the interparental relationship and their school adjustment: The mediating role of attention difficulties. *Child Development*. 2008; 79(5):1570–1582. [PubMed: 18826543]
- Fantuzzo J, Boruch R, Berima A, Atkins M, Marcus S. Domestic violence and children: Prevalence and risk in five major cities. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1997; 36(1):116–122. [PubMed: 9000789]
- Garon N, Bryson SE, Smith IM. Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin*. 2008; 134(1):31–60. [PubMed: 18193994]
- Gerstadt GL, Hong YJ, Diamond A. The relationship between cognition and action: Performance of children 3.5 -7 years old on a Stroop-like day-night test. *Cognition*. 1994; 53(2):129–153. [PubMed: 7805351]
- Graham-Bermann SA, Howell KH, Miller LE, Kwek J, Lilly MM. Traumatic events and maternal educations as predictors of verbal ability for preschool children exposed to intimate partner violence. *Journal of Family Violence*. 2010; 25:383–392.
- Gustafsson HC, Coffman JL, Harris LS, Langley HA, Ornstein PA, Cox MJ. Intimate partner violence and children's memory. *Journal of Family Psychology*. 2013; 27(6):937–944. [PubMed: 24188084]
- Gustafsson HC, Cox MJ, Blair C. Family Life Project Key Investigators. Maternal parenting as a mediator of the relationship between intimate partner violence and effortful control. *Journal of Family Psychology*. 2012; 26(1):115–124. [PubMed: 22142253]
- Hughes C, Ensor R, Wilson A, Graham A. Tracking executive function across the transition to school: A latent variable approach. *Developmental Neuropsychology*. 2010; 35(1):20–36. [PubMed: 20390590]
- Huth-Bocks AC, Levendosky AA, Semel MA. The direct and indirect effects of domestic violence on young children's intellectual functioning. *Journal of Family Violence*. 2001; 16(3):269–290.
- Jacques S, Zelazo P. The Flexible Item Selection Task (FIST): A Measure of Executive Function in Preschoolers. *Developmental Neuropsychology*. 2001; 20(3):573–591. [PubMed: 12002094]
- Jouriles EN, Brown AS, McDonald R, Rosenfield D, Leahy MM, Silver C. Intimate partner violence and preschoolers' explicit memory functioning. *Journal of Family Psychology*. 2008; 22:420–428. [PubMed: 18540770]

- Jouriles EN, McDonald E, Slep AMS, Heyman RE, Garrido E. Child abuse in the context of domestic violence: Prevalence, explanations, and practice implications. *Violence and Victims*. 2008; 23(2): 221–235. [PubMed: 18624091]
- Kitzmann KM, Gaylord NK, Holt AR, Kenny ED. Child witnesses to domestic violence: A meta-analytic review. *Journal of Consulting and Clinical Psychology*. 2003; 71(2):339–352. [PubMed: 12699028]
- Koenen KC, Moffitt TE, Caspi A, Taylor A, Purcell S. Domestic violence is associated with environmental suppression of IQ in young children. *Development and Psychopathology*. 2003; 15:297–311. [PubMed: 12931829]
- Krishnakumar A, Buehler C. Inter-parental conflict and parenting behaviors: A meta-analytic review. *Family Relations*. 2000; 49(1):25–44.
- Levendosky AA, Bogat GA, von Eye A. New directions for research on intimate partner violence and children. *European Psychologist*. 2007; 12(1):1–5.
- Levendosky AA, Graham-Bermann SA. Parenting in battered women: The effects of domestic violence on women and their children. *Journal of Family Violence*. 2001; 16(2):171–192.
- McCarthy, DA. Manual for the McCarthy scales of children's abilities. New York: The Psychological Corporation; 1972.
- McDonald R, Jouriles EN, Ramisetty-Mikler S, Caetano R, Green CE. Estimating the number of children living in partner-violent families. *Journal of Family Psychology*. 2006; 20(1):137–142. [PubMed: 16569098]
- McDonald R, Jouriles EN, Tart CD, Minze LC. Children's adjustment problems in families characterized by men's severe violence toward women: Does other family violence matter? *Child Abuse and Neglect*. 2009; 33(2):94–101. [PubMed: 19303141]
- Miyake A, Friedman NP, Emerson MJ, Witzki AH, Howerter A, Wager TD. The unity and diversity of executive functions and their contributions to complex “frontal lobe” tasks: A latent variable analysis. *Cognitive Psychology*. 2000; 41(1):49–100. [PubMed: 10945922]
- Muthén, LK.; Muthén, BO. *Mplus User's Guide*. Sixth. Los Angeles, CA: Muthén & Muthén; 1998-2010.
- Neuenschwander R, Röthlisberger M, Cimeli P, Roebbers CM. How do different aspects of self-regulation predict successful adaptation to school? *Journal of Experimental Child Psychology*. 2012; 113(3):353–371. [PubMed: 22920433]
- NICHD Early Child Care Research Network. Child care and mother–child interaction in the first 3 years of life. *Developmental Psychology*. 1999; 35:1399–1413. [PubMed: 10563730]
- Pleck, JH.; Masciadrelli, BP. Paternal involvement by U.S. residential fathers: Levels, sources, and consequences. In: Lamb, ME., editor. *The role of the father in child development*. 4th. New York: Wiley; 2004. p. 222-271.
- MacKinnon, DP. *Introduction to statistical mediation analysis*. New York: Lawrence Erlbaum Associates; 2008.
- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*. 2002; 7:83–104. [PubMed: 11928892]
- Noble KG, Norman MF, Farah MJ. Neurocognitive correlates of socioeconomic status in kindergarten children. *Developmental Science*. 2005; 8(1):74–87. [PubMed: 15647068]
- Raver CC, Blair CB, Willoughby M. Poverty as a predictor of 4-year-olds' executive function: New perspectives on models of differential susceptibility. *Developmental Psychology*. 2012
- Rhoades BL, Greenberg MT, Lanza ST, Blair C. Demographic and familial predictors of early executive function development: Contribution of a person-centered perspective. *Journal of Experimental Child Psychology*. 2011; 108(3):638–62. [PubMed: 20828709]
- Sarsour K, Sheridan M, Jutte D, Nuru-Jeter A, Hinshaw S, Boyce WT. Family socioeconomic status and child executive functions: the roles of language, home environment, and single parenthood. *Journal of the International Neuropsychological Society*. 2010; 17(1):120–132. [PubMed: 21073770]
- Schumacker, RE.; Lomax, RG. *A beginner's guide to structural equation modeling*. Mahwah, NJ: Erlbaum; 1996.

- Stets. Verbal and physical aggression in marriage. *Journal of Marriage and Family*. 1990; 52:501–514.
- Stets J, Straus M. The marriage license as a hitting license: A comparison of assaults in dating, cohabiting, and married couples. *Journal of Family Violence*. 1989; 4(2):161–180.
- Straus, MA.; Gelles, RJ. *Physical violence in American families: Risk factors and adaptations to violence in 8,145 families*. New Brunswick, NJ: Transaction; 1990.
- Straus M, Sweet S. Verbal/symbolic aggression in couples: Incidence rates and relationships to personal characteristics. *Journal of Marriage and the Family*. 1992; 54(2):346–357.
- Thompson RS, Bonomi AE, Anderson M, Reid RJ, Dimer JA, Carrell D, Rivara FP. Intimate partner violence: Prevalence, types, and chronicity in adult women. *American Journal of Preventive Medicine*. 2006; 30(6):447–457. [PubMed: 16704937]
- Thompson RA, Calkins SD. The double-edged sword: Emotion regulation in high risk children. *Development and Psychopathology*. 1996; 8(1):163–182.
- Towe-Goodman NR, Stifter CA, Coccia MA, Cox MJ. Family Life Project Key Investigators. Interparental aggression, attention skills, and early childhood behavior problems. *Development and Psychopathology*. 2011; 23(2):563–576. [PubMed: 23786696]
- Tucker LR, Lewis C. A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*. 1973; 38:1–10.
- Wolfe DA, Crooks CV, Lee V, McIntyre-Smith A, Jaffe PG. The effects of children's exposure to domestic violence: A meta-analysis and critique. *Clinical Child and Family Psychology Review*. 2003; 6(3):171–187. [PubMed: 14620578]

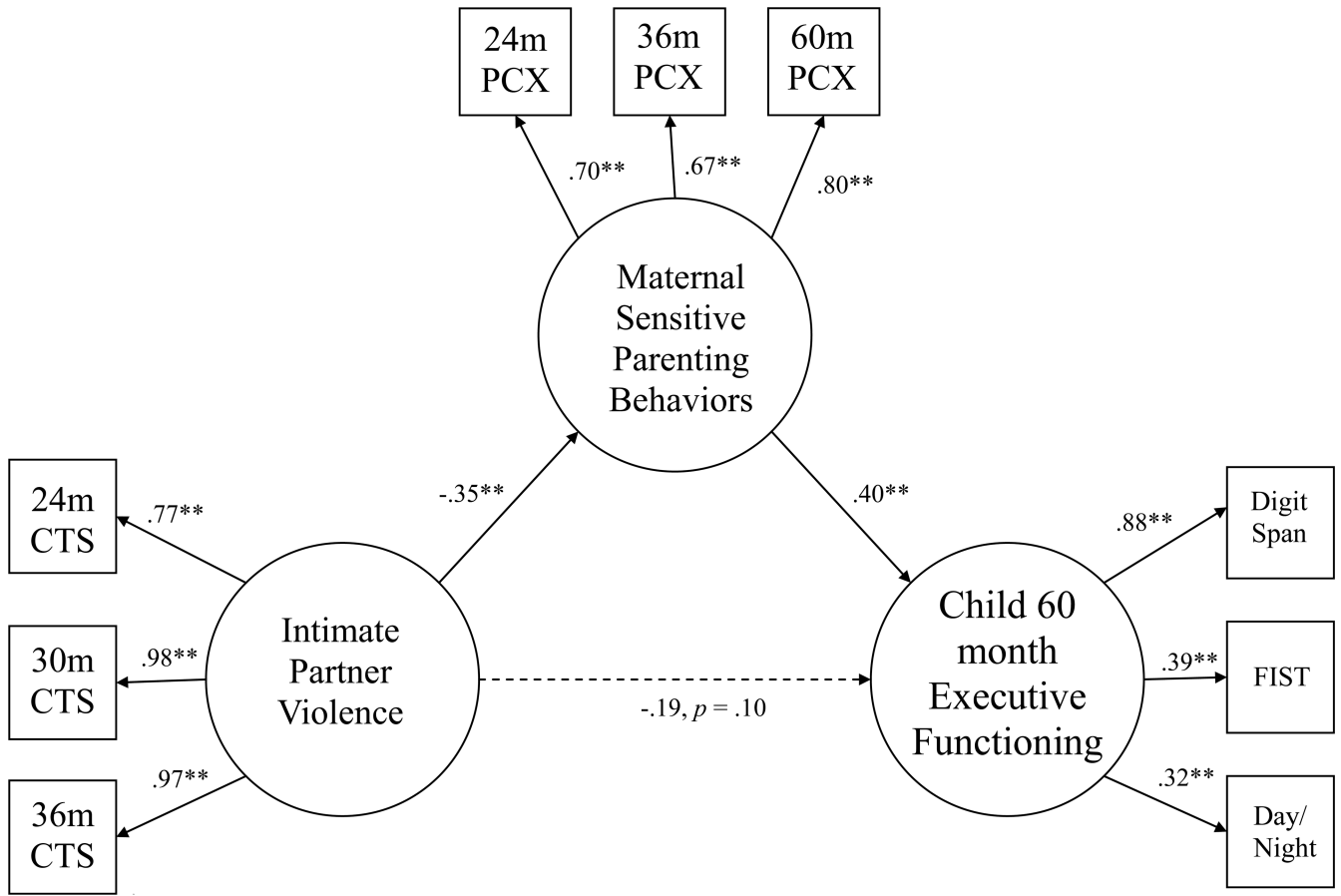


Figure 1. Final Model in Which Maternal Sensitive Parenting Behaviors are Included as a Mediator of the Relation Between IPV and Child EF

Note: χ^2 (23, N = 154) = 24.10, $p = .40$, CFI = 1.00, TLI = 1.00, RMSEA = .02. CTS = Physical violence subscale of the Conflict Tactics Scale, PCX = Sensitive parenting composite score from the parent-child interaction, m = Months. Digit Span = Backward digit span task, FIST = Flexible item selection task, Day/Night = day-night task. The dashed line in this figure indicates the path that was no longer significant, once the maternal sensitive parenting behaviors latent variable was included in the model. * $p < .05$, ** $p < .01$. All parameter estimates are standardized.

Table 1
Descriptive Statistics and Bivariate Correlations Between Dependent and Independent Variables (N = 154)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. 24m IPV	--															
2. 30m IPV	.71**	--														
3. 36m IPV	.81**	.93**	--													
4. 24m Verbal Aggression	.50**	.32**	.26**	--												
5. 30m Verbal Aggression	.38**	.59**	.55**	.69**	--											
6. 36m Verbal Aggression	.26**	.39**	.37**	.55**	.78**	--										
7. Day/Night	.01	-.17	-.16	-.03	-.17	-.22*	--									
8. Digit Span - Backwards	-.26**	-.32**	-.35**	-.04	-.17	-.14	.29**	--								
9. FIST	-.08	-.10	-.15	-.03	-.07	-.19	.11	.12	--							
10. 24m Sensitive Parenting	-.25**	-.22*	-.20*	-.19*	-.14	-.24**	.21*	.31**	.27**	--						
11. 36m Sensitive Parenting	-.25**	-.26**	-.23*	-.02	-.08	-.07	.05	.25**	.12	.47**	--					
12. 60m Sensitive Parenting	-.35**	-.25*	-.24*	-.12	-.14	-.05	.05	.28**	.11	.56**	.56**	--				
13. Income-to-Needs Ratio	-.13	-.11	-.09	.00	-.11	-.06	.04	.25**	.12	.27**	.21*	.35**	--			
14. Child Race ^a	-.24**	-.18*	-.20*	-.14	-.16	-.15	.08	.31**	.12	.37**	.28**	.57**	.26**	--		
15. Child Sex ^b	-.09	.07	.01	-.01	.01	-.06	-.03	-.05	.12	.000	.010	.23*	.04	.14	--	
16. Maternal Education	-.29**	-.19*	-.20*	-.07	-.19*	-.17	.15	.31**	.13	.44**	.39**	.54**	.61**	.33**	.07	--
Mean (SD)	.37 (1.29)	.08 (.43)	.14 (.69)	2.51 (2.44)	2.26 (1.98)	1.96 (2.07)	.80 (.23)	2.32 (1.14)	.84 (.66)	4.61 (1.23)	4.49 (1.14)	4.08 (1.31)	4.68 (3.55)	--	--	14.62 (2.60)
Range	0-8	0-4.44	0-6.11	0-12	0-11.67	0-9	.05-1	0-4	0-1	1-7	1.20-6.60	1.75-6.50	.05-24.33	--	--	8-20

Note:

* $p < .05$

** $p < .01$;

^a 0 = African American 1 = European American;

^b 0 = Female 1 = Male;

m = months;

IPV = Physical Violence Subscale of the Conflict Tactics Scale

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