Child Exposure to Parental Violence and Psychological Distress Associated With Delayed Milestones

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KEY WORDS

child development, computerized clinical decision support, developmental milestones, intimate partner violence, parental psychological distress

ABBREVIATIONS

aOR—adjusted odds ratio
CHICA—Child Health Improvement through Computer Automation
CI—confidence interval
EHR—electronic health record
EPDS-3—Edinburgh Postnatal Depression Scale
IPV—intimate partner violence
PHQ-2—Patient Health Questionnaire-2
PPD—parental psychological distress
PSF—prescreener form
PWS—physician worksheet

Ms Gilbert conceptualized and designed the original study, conducted the primary analysis and interpretation of the data, and drafted the original manuscript; Drs Bauer and Carroll made substantial contributions to the study design and analysis and interpretation of the data, and provided critical revision of the manuscript for important intellectual content; Dr Downs made substantial contributions to the study design and analysis and interpretation of the data, provided critical revision of the manuscript for important intellectual content, was responsible for obtaining funding that helped support the study, and provided study supervision; and all authors approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: It has previously been shown that exposure to intimate partner violence and/or parental depression or anxiety may increase a child's risk for specific adverse health outcomes.

WHAT THIS STUDY ADDS: By using a large pediatric primary care sample, this study examined associations of child exposure to intimate partner violence and parental psychological distress with developmental milestone attainment by analyzing their combined and separate effects while adjusting for other family factors.

abstract

OBJECTIVE: To examine the association between parental report of intimate partner violence (IPV) and parental psychological distress (PPD) with child attainment of developmental milestones.

METHODS: By using data collected from a large cohort of primary care patients, this cross-sectional study examined the relationship between parental report of IPV and/or PPD and the attainment of developmental milestones within the first 72 months of a child's life. Multivariate logistic regression analyses were used to adjust for parental report of child abuse concern and sociodemographic characteristics.

RESULTS: Our study population included 16 595 subjects. Children of parents reporting both IPV and PPD (n = 88; 0.5%) were more likely to fail at least 1 milestone across the following developmental domains: language (adjusted odds ratio [aOR] 2.1; 95% confidence interval [CI] 1.3–3.3), personal-social (aOR 1.9; 95% CI 1.2–2.9), and gross motor (aOR 3.0; 95% CI 1.8–5.0). Significant associations for those reporting IPV-only (n = 331; 2.0%) were found for language (aOR 1.4; 95% CI 1.1–1.9), personal-social (aOR 1.7; 95% CI 1.4–2.2), and fine motor-adaptive (aOR 1.7; 95% CI 1.0–2.7). Significant associations for those reporting PPD-only (n = 1920; 11.6%) were found for: language (aOR 1.5; 95% CI 1.3–1.7), personal-social (aOR 1.6; 95% CI 1.5–1.8), gross motor (aOR 1.6; 95% CI 1.4–1.8), and fine-motor adaptive (aOR 1.6; 95% CI 1.3–2.0).

CONCLUSIONS: Screening children for IPV and PPD helps identify those at risk for poor developmental outcomes who may benefit from early intervention. *Pediatrics* 2013;132:e1577–e1583

Intimate partner violence (IPV) directly affects an estimated 1.5 million women and 835 000 men annually,[1,2] and these numbers may well be underestimated because of inadequate screening methods and fear of disclosure.[3,4] IPV has repeatedly been shown to increase the likelihood of long-term adverse physical and mental health outcomes for those who experience it,[5–7] but those directly affected by IPV are not its only victims. An estimated 10 million children in the United States are exposed to IPV each year,[8] and empirical evidence shows that such exposure increases a child's risk of negative health consequences, including internalizing and externalizing adjustment disorders, as well as other behavioral, social, and developmental impairments.[8–11] One explanation of the causal mechanism is that the trauma and toxic stress associated with IPV exposure and/or other forms of household violence may disrupt the normal development of critical neurologic and biochemical pathways in children's brains, resulting in lifelong problems.[12,13]

Another condition that has been correlated with IPV, and shown to impact child health, is parental depression, which may impede healthy attachment.[7,14] Exposure to parental depression independent of IPV puts children at greater risk for decreased cognitive ability and increased behavioral problems.[15,16] Exposure to parental depression concurrent with IPV has been associated with poor school functioning[17] and behavioral problems.[18] Exposure to parental anxiety, which frequently co-occurs with depression,[19,20] has also been associated with increased risk of behavioral problems.[21]

This study examines the relationship between parental report of IPV and/or parental psychological distress (PPD), such as anxiety or depression, and the attainment of developmental milestones within the first 6 years (72 months) of a child's life. It is distinguished from, and complements, more than 20 years of inquiry into the relationship between IPV exposure and adverse child health outcomes in several important ways. First, our large sample comprises all patients receiving care at 4 pediatric primary care practices over an extended period of nearly 9 years. Also, in recognition of the already well-documented association between IPV and PPD, this study examines the relative contribution of each risk factor by analyzing their combined and separate effects. Finally, this study takes into consideration other child and family factors, including potential child abuse, that may mitigate the association between these parental risk factors and a child's attainment of developmental milestones.

METHODS

Study Design

Using data collected from a large cohort of patients receiving care at any 1 of 4 Indianapolis pediatric primary care clinics over a period of ~9 years, this cross-sectional study examines the relationship between parental report of IPV and/or PPD and the attainment of developmental milestones within the first 72 months of a child's life. Analyses were adjusted for parental report of child abuse concern and sociodemographic characteristics. This study was approved by the Indiana University Office of Research Administration–Human Subjects.

Data Source

Data for this study were extracted from the Child Health Improvement through Computer Automation (CHICA) system, a comprehensive computerized clinical decision support system linked to the Regenstrief electronic health record (EHR) system.[22–25] To summarize relevant features of the CHICA system, when a family checks into a participating clinic, CHICA generates a tailored prescreener form (PSF) that includes 20 dichotomous health-screening questions derived both from information already contained in the EHR and age-appropriate clinical guidelines. For all children younger than 12 years, the accompanying parent is asked to complete the PSF while in the waiting room and then return it to a clinical staff member to be scanned back into the system before the medical encounter. The PSF is printed in English on 1 side and Spanish on the other, and the side the parent completes is electronically recorded as the preferred language. CHICA immediately integrates these new PSF data into the EHR, informing a second scannable form called the physician worksheet (PWS). The PWS includes as many as 6 prompts alerting the physician to specific information reported on the PSF, which may then be used to help inform and guide the medical encounter.

Study Population

Our cohort comprised all patients receiving care at any 1 of 4 pediatric primary care clinics served by the CHICA system between November 1, 2004, and June 29, 2013. Within this population, we extracted data for all patients younger than 72 months whose parent responded to at least 1 CHICA-generated IPV screening question, and at least 1 CHICA-generated developmental milestone screening question, at any visit within the study period. A total of 31 patients were excluded from the final analyses because of missing data.

Measures

IPV

CHICA screens all children younger than 11 years for parental report of IPV on an annual basis using the PSF question "Has your partner kicked, hit, or slapped you?" This question is a derivation of a surveillance question included on the validated Partner Violence Screen.[26] We classified a child as having parental report of IPV if there was a positive

response to this question at any visit between birth and 72 months. If no affirmative responses were captured during this time, the child was classified as having no exposure.

PPD

CHICA includes PPD screening questions on the PSF every 90 days for children younger than 15 months, absent any preexisting documentation of parental depression in the EHR.[27] From 2004 through 2010, CHICA used 2 questions derived from the validated Patient Health Questionnaire-2 (PHQ-2)[28] to screen for PPD: "Parents often get depressed. In the past month, how often have you felt down, depressed, or hopeless?" and "In the past month, have you lost interest or pleasure in doing things?" In 2010, these questions were replaced by adaptations of the 3 anxiety subscale questions from the Edinburgh Postnatal Depression Scale (EPDS-3), which has been shown to have high sensitivity (95%) and a negative predictive value (98%) for postpartum depression.[29] Although the EPDS-3 questions specifically assess symptoms of anxiety, which is diagnostically distinct from depression, anxiety and depression have been demonstrated to be highly correlated,[19,20] particularly in the case of postpartum depression, which often presents with anxiety symptoms.[30] The 3 EPDS-3 questions that CHICA uses are the following: "In the past 7 days, have you blamed yourself unnecessarily when things went wrong?"; "In the past 7 days, have you felt scared or panicky for not a very good reason?"; and "In the past 7 days, have you been anxious or worried for no good reason?" We classified a child as being exposed to PPD if there was a positive response to any PHQ-2 or EPDS-3 question at any visit between birth and 72 months. If no affirmative responses were captured during this time, the child was classified as having no exposure.

Child Abuse Concern

CHICA includes a child abuse concern screening question on the PSF every 6 months for children younger than 2 years, and every 12 months for children between the ages of 2 and 11. This question reads: "Are you concerned that your spouse or another adult may be hurting or threatening your child?" We classified a child as having parental report of abuse concern if there was a positive response to this question at any visit between birth and 72 months. If no affirmative responses were captured, the child was classified as having no parental report of abuse concern.

Sociodemographic Characteristics

Gender, race/ethnicity, clinic, last-recorded insurance type, and preferred language were all obtained from the CHICA database.

Developmental Milestones

CHICA assesses all children on the attainment of developmental milestones using a series of age-appropriate items from the Denver Developmental Screening Test II[31,32] specific to 4 developmental domains: personal-social, language, fine motor-adaptive, and gross motor. To ascertain achievement, CHICA assesses performance on the last milestone in each domain that the child should have passed at the 90th percentile according to the child's age. Milestone questions were answered by the parent on the PSF and/or by the physician on the PWS. CHICA provides the most appropriate, age-based developmental milestone for each domain on the PWS and prompts the physician to indicate which milestones were passed and whether any were failed.

To classify the outcomes of interest, we coded the passing or failing of developmental milestones as Boolean variables for all responses across all domains. Failure of any milestone question asked at any visit within a given developmental domain was classified as failure for that domain. An absence of any failed milestone questions within a given domain was classified as passing. An absence of any response to any milestone question asked at any visit within a given developmental domain was classified as missing, and these data were excluded from all analyses for that domain.

Statistical Analysis

To explore the relationship between the exposure variables of IPV and PPD, we performed a bivariate analysis using the χ^2 test. Given the demonstrated correlation ($P \leq .001$) between these variables, we elected to create a new exposure variable, parental risk, which would allow us to ascertain the relative contribution of each variable to the attainment of developmental milestones when considered independently and together. This new parental risk exposure variable included the following 4 categories: IPV-only, PPD-only, both IPV and PPD, and neither IPV nor PPD. We then built multivariate logistic regression models for each type of developmental milestone category (language, personal-social, fine motor-adaptive, gross motor) plus a category that combined all 4. Each model was adjusted to account for parental report of child abuse concern and sociodemographic characteristics, including gender, race/ethnicity, clinic, language, and insurance type. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were calculated for each model. All analyses were performed by using Stata version 12 (StataCorp LP, College Station, TX).

RESULTS

Our study population included 16 595 subjects younger than 72 months whose parent responded to at least 1 CHICA-generated IPV screening question and 1 CHICA-generated developmental milestone screening question. See Table 1 for characteristics of this sample, which was 46.6% black, 36.8% Hispanic, and

12.1% white. Most families (58.2%) identified English as their primary language, although many spoke Spanish (21.5%). Most subjects had public insurance (82.4%), and approximately half were boys (50.1%).

Parents of 419 (2.5%) subjects reported IPV; 2008 (12.1%) parents reported PPD; and 92 (0.6%) reported child abuse concern. In looking at the combined parental risk exposure variable, 88 (0.5%) reported both IPV and PPD, 331 (2.0%) reported IPV-only, 1920 (11.6%) reported PPD-only, and 14 256 (85.9%) reported neither IPV nor PPD.

For the developmental milestone domains, 37.5% of all subjects failed a milestone in at least 1 domain, with 19.0% failing at least 1 language milestone; 24.4% failing at least 1 personal-social milestone; 8.7% failing at least 1 gross motor milestone; and 3.7% failing at least 1 fine motor-adaptive milestone.

TABLE 1 Sample Characteristics

Variables	*n* (%)[a]
Sociodemographic	
Gender	
Male	8425 (50.8)
Female	8139 (49.0)
Missing/unknown[b]	31 (0.2)
Race/ethnicity	
Black	7733 (46.6)
Hispanic/Latino	6108 (36.8)
White	2000 (12.1)
Other	754 (4.5)
Insurance type	
Medicaid/public	13 679 (82.4)
Other/unknown	1207 (7.3)
Self-pay/uninsured	1095 (6.6)
Commercial/private	614 (3.7)
Language	
English	9660 (58.2)
Spanish	3572 (21.5)
Other/unknown	3363 (20.3)
Parental risk exposures	
Report of any IPV	419 (2.5)
Report of any PPD	2008 (12.1)
Report of child abuse concern	92 (0.6)
Combined parental risk exposures	
IPV-only	331 (2.0)
PPD-only	1920 (11.6)
Both IPV and PPD	88 (0.5)
Neither IPV nor PPD	14256 (85.9)
Developmental milestone failure	
Personal-social	4047 (24.4)
Language	3147 (19.0)
Gross motor	1443 (8.7)
Fine motor-adaptive	606 (3.7)

[a] *n* = 16 493.

[b] Subjects with missing or unknown gender were excluded from all analyses.

Results of multivariate logistic regression demonstrated significant associations between parental report of both IPV and PPD, parental report of IPV-only, and parental report of PPD-only, with failure of at least 1 developmental milestone question in any domain (aOR 2.5, 95% CI 1.6–3.9; aOR 1.5, 95% CI 1.2–1.9; and aOR 1.8, 95% CI 1.6–2.0, respectively). When we analyzed each developmental milestone category separately, we found that parental report of both IPV and PPD was significantly associated with failure of at least 1 milestone question in each of the following developmental categories: language (aOR 2.1, 95% CI 1.3–3.3), personal-social (aOR 1.9, 95% CI 1.2–2.9), and gross motor (aOR 3.0, 95% CI 1.8–5.0). Parental report of IPV-only was significantly associated with failure of at least 1 language milestone question (aOR 1.4, 95% CI 1.1–1.9), 1 personal-social milestone question (aOR 1.7, 95% CI 1.4–2.2), and 1 fine motor-adaptive milestone question (aOR 1.7, 95% CI 1.0–2.7). For those reporting PPD-only, significant associations were found across all 4 developmental domains: language (aOR 1.5, 95% CI 1.3–1.7), personal-social (aOR 1.6, 95% CI 1.5–1.8), gross motor (aOR 1.6, 95% CI 1.4–1.8), and fine-motor adaptive (aOR 1.6, 95% CI 1.3–2.0). See Table 2.

DISCUSSION

The findings of this study complement and expand on those of previous studies showing that IPV is positively associated with adverse child health outcomes,[8–10] and support the 1998 American Academy of Pediatrics' recommendation that pediatricians should routinely screen for IPV and intervene when appropriate for the benefit of the children they treat.[33] The parents of 11.6% of all subjects in our population reported PPD, likewise supporting the American Academy of Pediatrics' recommendation that pediatricians should also actively screen for parental depression.[34] Although the rate of co-occurrence between IPV and PPD was not particularly high in our population, a demonstrated correlation does exist and pediatricians may also consider screening parents with known IPV for depressive symptoms, and vice versa, so that both may be effectively addressed.

What most markedly distinguishes this study from its predecessors, other than its large primary care pediatric sample, is its differential examination of the relative contribution of both IPV and PPD on the attainment of specific developmental milestones. As our results demonstrate, parental report of both IPV and PPD is significantly associated with failure of at least 1 developmental milestone question across all 4 domains. This strong association persists for 3 of the 4 domains (language, personal-social, and gross motor) when considered separately. Parental report of IPV-only and PPD-only are also significantly associated with failure of at least 1 developmental milestone question when examined across all domains, and when examined in each category alone. Although causation cannot be inferred from these findings due to our cross-sectional study design and other potentially confounding factors that we cannot completely control for, children with known exposures to either IPV or PPD should be carefully monitored for failed developmental milestones so that referrals for early intervention may be made as appropriate. Likewise, children who fail to attain key developmental milestones should be preferentially screened for the presence of parental risk factors, such as IPV and PPD. This research highlights the need for a longitudinal, pediatric primary care cohort study that is specifically designed

TABLE 2 Associations of IPV and PPD With Failure of Developmental Milestones

Developmental Milestone Domain	Parental Risk Exposure, aOR (95% CI)		
	IPV and PPD	IPV-only	PPD-only
Any	2.5 (1.6–3.9)	1.5 (1.2–1.9)	1.8 (1.6–2.0)
Personal-Social	1.9 (1.2–2.9)	1.7 (1.4–2.2)	1.6 (1.5–1.8)
Language	2.1 (1.3–3.3)	1.4 (1.1–1.9)	1.5 (1.3–1.7)
Gross Motor	3.0 (1.8–5.0)	1.2 (0.8–1.7)	1.6 (1.4–1.8)
Fine Motor-Adaptive	1.8 (0.8–4.0)	1.7 (1.0–2.7)	1.6 (1.3–2.0)

Multivariate logistic regression with robust estimates, adjusting for child abuse concern, gender, race/ethnicity, language, clinic, and insurance type.

to ascertain the directionality of these demonstrated relationships between IPV and PPD and a child's attainment of developmental milestones.

In interpreting our findings, it is important to note their potential limitations. First, parent responses to PSF questions regarding IPV, PPD, and the attainment of developmental milestones represent screening results only, not clinical diagnoses. Positive parental responses to these questions do not confirm their presence. For example, a parent may indicate having "lost interest or pleasure in doing things" for reasons other than depression (eg, a physical injury). This effect, however, serves to create a bias toward the null, in which case the strong positive associations shown may suggest an even stronger real effect. It should also be noted that parent report of IPV is not a confirmation that a child actually witnessed such violence, but studies have shown that children need not witness IPV directly to be adversely affected by it.[35,36]

We also acknowledge that the prevalence of IPV in our study population (2.5%) falls below the range of rates previously reported in other pediatric settings (3.2%–16.5%).[37–42] This could be a function of our single-question IPV screening method, which asks only whether a parent has been "kicked, hit, or slapped," and may lack the sensitivity of a more comprehensive tool. This question, however, mirrors a validated surveillance question from the Partner Violence Screen[26] that has been significantly correlated with IPV and successfully used, both alone[43] and as part of a brief screening tool,[44] to help detect IPV in primary care settings. Despite this potential lack of sensitivity, which would again tend to bias our findings toward the null, we demonstrated associations between IPV and the attainment of developmental milestones in this study that may be clinically useful.

With regard to developmental delay, it has been found that prescreening for parental concern may be as effective as using a more in-depth developmental screening tool if parental concerns are systematically elicited and categorized, as they are here.[45] Also, although the Denver Developmental Screening Text II has largely been replaced by instruments more predictive of developmental outcomes, this tool has been normed on a general population and shown to correlate with developmental outcomes.[46]

It is important to note that the screening questions used by CHICA to help detect PPD changed over the course of the study from the PHQ-2 to the EPDS-3. Although both are valid tools for detecting depression in primary care,[28,29] the EPDS-3 was specifically validated for detecting postpartum depression,[29] a potential risk factor of particular interest to the CHICA community. Scores from the EPDS-3 and PHQ-9, the tool from which the PHQ-2 is derived, have been demonstrated to be concordant when screening for major depressive disorder in a clinical care setting.[47]

Also, as with all research, there exists the possibility of confounding. Family chaos and/or low socioeconomic status, for example, may predispose a parent to both IPV and PPD, and also portend a generally dysfunctional environment that could delay a child's acquisition of developmental milestones. We made every effort to control for the most salient confounders in our sample, however, by adjusting for child abuse concern and a variety of sociodemographic characteristics, including gender, race/ethnicity, language, and insurance type. Regardless of causality, physician knowledge of the associations among these factors will help inform future screening and intervention practices.

CONCLUSIONS

Parental report of both IPV and PPD during the first 72 months of a child's life is significantly associated with developmental milestone failure across all 4 developmental domains and within the domains of language, personal-social, and gross motor development. Parental report of PPD-only is significantly associated with the failure of at least 1 developmental milestone question across, and within, all domains. Last, parental report of IPV-only is significantly associated with failure of at least 1 developmental milestone question across all 4 developmental domains and within the domains of language, personal-social, and fine-motor adaptive development. This study highlights the importance of screening for both IPV and PPD in pediatric primary care settings, and initiating referrals for early intervention when these parental risk factors are present.

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