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Physical Health Outcomes of Childhood Exposure to Intimate Partner Violence: A Systematic Review

Megan H. Bair-Merritt, MD^a, Mercedes Blackstone, MD^b, Chris Feudtner, MD, PhD, MPH^{a,c}

^aPediatric Generalist Research Group, Division of General Pediatrics, and ^bDivision of Emergency Medicine, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania; ^cLeonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, Pennsylvania

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ABSTRACT

BACKGROUND. Children exposed to intimate partner violence (IPV) are at increased risk for adverse mental and behavioral health sequelae, as has been documented by both systematic reviews and meta-analyses. Studies addressing the physical health impact of childhood IPV exposure, however, have not been summarized in a manner that might facilitate additional hypothesis-driven research and accelerate the development of targeted interventions.

METHODS. To identify a comprehensive set of articles examining the association between childhood IPV exposure and physical health, we searched online bibliographic databases including Medline, CINAHL, PsychInfo, and Sociological Abstracts using the keywords "domestic" or "intimate partner violence" and "infant," "child," or "pediatric." From >2000 articles retrieved in the initial search, we used online abstract and bibliographic information to identify 94 articles potentially meeting the inclusion criteria of studies that (1) examined a postnatal physical health outcome related to IPV exposure and (2) had a contemporaneous control group. Thorough review of these 94 published studies yielded 22 that met these inclusion criteria. The data then were abstracted independently by 2 of the authors, and differences were settled with the assistance of a third author.

RESULTS. Childhood exposure to IPV increases the likelihood of risk-taking behaviors during adolescence and adulthood and is likely associated with underimmunization. Minimal data and study limitations preclude establishing a clear connection between IPV exposure and general health and use of health services, breastfeeding, or weight gain.

CONCLUSIONS. The impact on physical health from exposure to IPV during childhood is still uncertain. Future studies should be grounded in a theoretical model that specifies how IPV exposure can affect child health, should adjust for confounders adequately, should include a community-based sample, and should be of larger scale.

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Key Words

domestic violence, outcome, pediatric

Abbreviations

IPV—intimate partner violence
FTT—failure to thrive
DV—domestic violence
WIC—Supplemental Nutrition Program for Women, Infants, and Children
ACE—adverse childhood experience

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Address correspondence to Megan H. Bair-Merritt, MD, General Pediatrics, 3535 Market St, 15th Floor, Room 1550, Children's Hospital of Philadelphia-North, Philadelphia, PA 19104.
E-mail: merritt@email.chop.edu

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EACH YEAR IN the United States, between 3.3 and 10 million children are estimated to be exposed to intimate partner violence (IPV).^{1,2} Although some of these children are “caught in the crossfire” and directly injured³ (leading potentially to intervention by child protective services), many more children who reside in homes mired by conflict and aggression are affected in a less direct manner by a multicausal pathway linking a “risky family environment” to ultimate poor mental and physical health.⁴

Evidence linking poor mental health outcomes and IPV exposure is mounting as several recent review articles and meta-analyses have aggregated existing studies.⁵⁻⁷ In particular, IPV-exposed children seem to have higher rates of both internalizing and externalizing problems than non-IPV-exposed children, leading to maladaptive emotional and behavioral development.^{5,7} Specifically observed problems include anxiety, depression, posttraumatic stress, and aggressiveness.⁸ On the basis of these observations, intervention programs have been designed and tested to ameliorate these untoward mental health outcomes.^{9,10}

In comparison, evidence linking physical health outcomes and IPV exposure remains unsummarized. Consequently, we may underestimate the full adverse impact of IPV on children and underconceptualize the myriad ways by which IPV exposure may be harming children’s physical health, thereby hampering our capacity to develop hypothesis-driven research that ultimately would guide interventions to improve outcomes.

We therefore conducted a comprehensive systematic review of the published literature that addresses the association between childhood IPV exposure and physical health in an effort to benchmark current knowledge and accelerate the development of effective, specific interventions to mitigate these problems.

METHODS

Data collection and organization were divided into 2 phases. During the first phase, described below, we broadly searched the medical literature with the goal of obtaining a comprehensive collection of existing studies to answer the question, “Does childhood exposure to IPV affect physical health?” After assembling relevant studies, 4 categories were established to organize and frame our results: general health and use of health services, breastfeeding, failure to thrive (FTT), and risk-taking behaviors.

Data Sources

We searched the published medical literature from 1966 to 2003, including Medline via Ovid and the Institute of Science, Cumulative Index to Nursing and Allied Health, PsychInfo, and Sociological Abstracts. Articles written in all languages were included in the search, and the assis-

tance of a fluent speaker for translation was obtained when needed.

These databases were searched by using key words including “domestic violence,” “intimate partner violence,” “battered women,” “partner abuse,” or “spouse abuse” and “infant,” “child,” “adolescent,” or “pediatric.” We augmented this search with a review of the bibliographies of related articles.

Study Eligibility

Eligible studies were limited to trials that investigated postneonatal physical health outcomes related to exposure to IPV. Studies without a contemporaneous control group were excluded. The primary outcome of a “physical health problem” was defined as any phenomenon that impacts the bodies’ structure, function, or form. We elected to include intermediate outcomes such as physician visits, immunizations, and risk behaviors that, through omission or commission, directly impact physical health.⁴

Developmental delay and IQ were deemed to be related more closely to mental and behavioral health and were not considered for the purposes of this review. In addition, direct trauma from a parent either as the result of child abuse or involvement in a dispute between parents was not considered. Finally, studies that did not clearly examine violence between caregiving adults, such as works that included violence between siblings in the definition of family violence, were excluded.

Study Selection

The initial literature search yielded >2000 articles. Titles of articles were reviewed to screen for eligibility. If insufficient data were available from the online databases to determine if a study met criteria, the abstract was obtained and reviewed. Furthermore, citations included in articles reporting eligible studies were reviewed and pertinent abstracts retrieved.

After reviewing this information, 94 articles remained. Two authors (M.H.B.-M. and M.B.) independently read the text of these selected articles to determine inclusion. Several articles that were clearly ineligible, such as review articles, were excluded based on the abstract. The full text, however, of the majority of the 94 articles was reviewed to determine relevant studies. Disagreements were resolved by discussion and consensus mediated by the third author (C.F.).

Data Extraction

The full text of all eligible articles was abstracted according to a prespecified abstraction form by 2 authors (M.H.B.-M. and M.B.). Abstracted data included information regarding the study population, design, outcome measures, statistical analyses, and study limitations. Differences in abstracted data were resolved by review of the study under question, discussion, and consensus

mediated by the third author (C.F.). Final review of the abstracted data winnowed the initial set of articles that met inclusion criteria down to 22.¹¹⁻³² Reasons for exclusion are detailed in Fig 1.^{8,33-103}

RESULTS

We present our results organized around the 4 most common categories of outcome reported in these studies: (1) general health and use of health services¹¹⁻¹⁸; (2) breastfeeding¹⁹; (3) FTT^{20,21}; and (4) risk-taking behaviors.²²⁻³²

General Health and Use of Health Services

Questions

Do patterns of illness and illness-related visits differ between children in homes with IPV and those in homes without IPV? Are children in homes in which IPV occurs less likely to receive routine health maintenance such as immunizations or well-child visits?

Findings

Evidence likely supports that children exposed to IPV are at risk for underimmunization; the evidence is inconclusive regarding overall health status and use of health services.

Eight studies addressed these issues (Table 1).¹¹⁻¹⁸ In 2 related articles, Attala et al^{11,12} compared a composite

physical health index, immunization rate, hemoglobin, lead, general physical examination, and weight of children of women in 3 groups: nonabused women in the community, abused women in the community, and women residing in an IPV shelter. They concluded that IPV-exposed community children were more likely to be underimmunized than non-IPV-exposed community children and that IPV-exposed, sheltered children were less likely to have a normal physical examination than IPV-exposed community children. Additionally, sheltered children had lower physical health index scores than community, non-IPV-exposed children. None of the children involved were known victims of child abuse.

Although inclusion of a community sample of IPV-exposed children strengthened these studies, the small number of children in each group potentially precluded Attala et al from detecting additional differences between the groups. In addition, Attala et al commented that the 3 groups were different with regards to factors such as race and age but did not control for confounding in the analysis.

Also accessing a shelter population, Brooks et al¹³ used information from a nationally representative database in Wales to compare actual immunization rates and well-child visits in a convenience sample of children who were residing in an IPV shelter with the expected

FIGURE 1

Flowchart of study selection. Articles may have been excluded for more than one reason. ^aFor example, examined only community violence, general family violence, child abuse, etc, and did not specifically look at the role of violence between caregiving adults on children's outcomes.

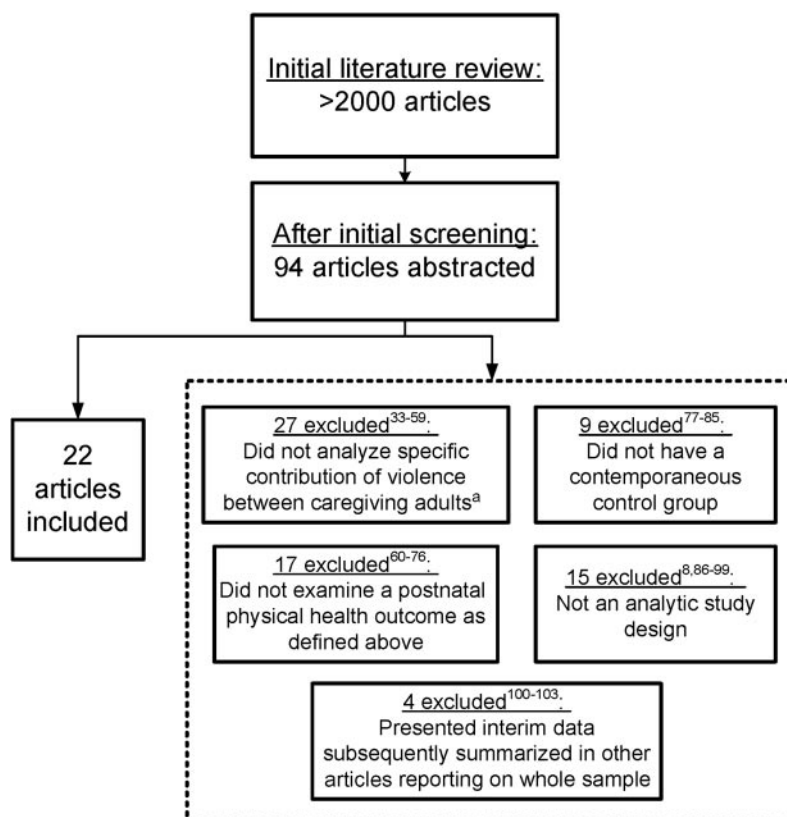


TABLE 1 General Health and Use of Health Services

Authors, Year, and Study Type	Age, Sample Size, and Setting	IPV Measure	Outcome Variable	Study Findings	Reported Statistics
Atala and Summers ¹² (1999); prospective cohort	2–6 y, 53 children of women in IPV shelters compared with 62 children of nonabused women from a community health department	Conflict Tactics Scale	Physical Health Index scored 0–6 including hemoglobin, lead, accidents, weight, physical assessment, and immunizations	Poorer overall physical health index for sheltered children than for nonexposed community controls	Mean score for sheltered children: 1.74; mean score for community children: 1.21; $P = .015$
Atala and McSweeney ¹ (1997); prospective cohort	Same as above with inclusion of 15 children of abused women from a community health department	Conflict Tactics Scale	Physical assessment	Fewer normal physical exams for children of sheltered, battered women than for children of community/battered women	48.1% vs 93.3%; statistics not given
			Hemoglobin/lead	No difference in hemoglobin/lead levels	Not given
			Weight	No difference in weight	Not given
			Immunizations	Less complete immunization for children of community battered women than children of nonbattered community women	$P = .03$
Brooks et al ¹³ (1998); retrospective cohort	<1–16 y, 71 children of women in IPV shelters compared with current child population (98 690) and 1 general practice (745)	IPV shelter population	Immunizations	Less complete immunization for children in DV shelter than for population and practice	$P < .05$
			Health surveillance visits	Fewer well-child visits for sheltered children	$P < .05$
Kernic et al ¹⁴ (2002); retrospective cohort	5–16 y, 153 children whose mothers experienced police- or court-reported IPV compared with children attending school within the same system within the study period	Police- or court-reported IPV	Both were measured a using universal centralized database Database of school nurse visits: for general health for alcohol/drugs	No difference in general health visits Possibly more alcohol/drug-related visits	RR: 1.1 (95% CI: 1.0–1.3) RR: 3.9 (95% CI: 1.0–15.3)
			leading to speech pathology referral resulting in being sent home	More speech pathology referrals for IPV-exposed children	RR: 7.5 (95% CI: 1.9–29.6)
English et al ¹⁵ (2003); retrospective cohort	6 y, 238 children with data in the Northwest Longitudinal Studies of Child Abuse and Neglect sample	4 separate measures including questions from an unpublished questionnaire, the Conflict Tactics Scale, child report, and case worker report/records	Global health score by asking caregivers about problems such as: hearing speech vision chronic illness	In multivariate analysis, IPV did not impact global child health score	Not provided
Arcos et al ¹⁶ (2003); prospective cohort	0–11 mo, 76 children of abused women and 46 children of nonabused women; all mothers were recruited through a prenatal clinic in Chile	Abuse Assessment Screen; all women were screened during pregnancy, and nonabused women were additionally screened at delivery	Data obtained from medical records: well-child visits anthropometric measurements sick visits to primary care physician	Similar completion of well-child care, but with delays in timing in DV group No differences in anthropometric measurements Increased sickness-related physician visits	$P < .05$ All RR: cross 1 $P < .05$

TABLE 1 Continued

Authors, Year, and Study Type	Age, Sample Size, and Setting	IPV Measure	Outcome Variable	Study Findings	Reported Statistics
Martin et al ¹⁷ (2001); mailed and telephone survey asking mothers about current and prior abuse and well-child visits	Infants, 2384 infant-mother dyads with data from the North Carolina Pregnancy Risk Assessment Monitoring System	1 question about abuse similar to the one used in the Abuse Assessment Screen	Data obtained via self-report: well-child visits (yes/no)	No difference in absolute or mean number of well-child visits between abused and nonabused women	No statistically significant differences; numbers not reported.
Bensley et al ¹⁸ (2003); telephone survey asking about childhood IPV exposure and current health status	> 18 y, 3527 women participating in Behavioral Risk Factor Surveillance System telephone survey	1 nonvalidated question	mean number of well-child visits Self-assessment of general adult health, from excellent to poor	No association between witnessing IPV and adult self-rating of poor health Having 2 or 3 of the following: witnessing IPV, childhood physical abuse, or childhood sexual abuse, did increase odds of poor health	OR: 1.1 (95% CI: 0.6–1.8) 2 types: OR: 2.1 (95% CI: 1.3–3.2); 3 types: OR: 1.8 (95% CI: 1.1–3.1)

RR indicates relative risk; CI, confidence interval; OR, odds ratio.

rates based on the current local child population and child patients from 1 socioeconomically depressed general practice. Children in the shelter were significantly less likely than their counterparts in both communities to be properly immunized and also were less likely to have received appropriate well-child care. The authors did not discuss measurement of, or adjustment for, potential confounders.

Kernic et al¹⁴ investigated the link between childhood IPV exposure and academic and school health concerns by comparing the children of women who initiated police or court reports of IPV and children who were enrolled in a local public school. The children of abused women were more likely than their peers to have a nursing visit that resulted in being sent home from school and were much more likely to receive a speech pathology referral. IPV-exposed children also were 4 times as likely to visit the school nurse secondary to alcohol or drug use, but this did not reach statistical significance. In this work, the authors considered potential confounders and effect modifiers and accounted for them in their description of the analysis. Additional strengths of this work include the use of a community-based sample and separate analyses for children with comorbid IPV and child abuse.

Using data obtained from the Longitudinal Studies of Child Abuse and Neglect, English et al¹⁵ sought to determine if, in a group of children reported to child protective services, a global physical health score was poorer for children exposed to IPV than for children not exposed to IPV. They concluded that “the influence of DV [domestic violence] [on global health score] ... drops out when controlling for caregiver depression, conflict tactics, family health and competence, and the number of CPS [child protective services] referrals,” stating that the effect of IPV is likely indirect.

Arcos et al¹⁶ studied the infants of abused and nonabused women by comparing the 2 groups for well-child care, anthropometric measurements, and sickness-related physician visits. Both groups sought appropriate well-child care, although the abused women were less likely to complete visits at the normally scheduled times, and no difference existed in anthropometric measurements. In both the neonatal and postneonatal period, children exposed to IPV were significantly more likely to have sickness-related physician visits. Although the majority of the children of these women were followed for 6 months (90.8% in the DV group; 91.3% in the control group), by 11 months only 47.4% of the children originally in the IPV-exposed group and 58.7% of children in the non-IPV-exposed group remained enrolled in the study. Although the authors mentioned that the 2 groups were similar with regards to biopsychosocial variables, the specifics were not presented, and no mention was made with regards to adjustment for confounders or consideration of effect modification.

Using the North Carolina Pregnancy Risk Assessment Monitoring System, Martin et al¹⁷ examined, among other objectives, the impact of abuse before, during, and after pregnancy on both the presence of well-child care after delivery and the mean number of well-child visits during infancy. Using bivariate analyses, they found no differences in either outcome and emphasized the importance of pediatric IPV screening based on their finding that abused women “do take their infants to well-infant care visits.”¹⁷

Interested in the impact of childhood IPV exposure on adult women’s health, Bensley et al¹⁸ analyzed data from the Washington State Behavioral Risk Factor Surveillance System. Using a logistic-regression model with adjustment for factors such as age, education, and income, witnessing IPV without concurrent child abuse was not associated with poor self-reported health status. The authors did not comment on examining for effect modification. The response rate for the survey was 57%, and the exposure and outcome variables were assessed via self-report.

Breastfeeding

Question

Are women who are abused by their partners less likely to breastfeed than their nonabused peers?

Findings

The evidence is insufficient to draw a conclusion.

One study examined this question (Table 2).¹⁹ In a trial of women from 2 Supplemental Nutrition Programs for Women, Infants, and Children (WIC) clinics, Bullock et al¹⁹ compared initiation and duration of breastfeeding between abused and nonabused women and found no significant difference in either outcome. Breastfeeding initiation was investigated by using a χ^2 test for difference of proportions. The authors provided some power calculations and noted that they had 80% power to find a 28% difference in breastfeeding initiation by using a 1-sided test; what constituted a clinically meaningful difference in breastfeeding between the 2 groups was not addressed. Using survival analyses to investigate breastfeeding duration, the authors considered covariates including lifetime abuse, age, marital status, and ethnicity.

TABLE 2 Breastfeeding

Author, Year, and Study Type	Sample Size and Setting	IPV Measure	Outcome Variable	Study Findings	Reported Statistics
Bullock et al ¹⁹ (2001); prospective cohort	150 women (21 abused and 129 nonabused) from 2 WIC clinics	Abuse Assessment Screen	Determined by WIC vouchers:	No difference in breastfeeding initiation	$P = .98$
			Breastfeeding initiation	No difference in breastfeeding duration	
			Breastfeeding duration		$P < .65$

FTT

Question

Are infants who are born to abused mothers more likely to have poor weight gain than infants who are born to mothers who are not abused?

Finding

The evidence is insufficient to draw a conclusion.

Two studies addressed this issue (Table 3).^{20,21} McFarlane and Soeken²⁰ studied infants from 0 to 12 months born to women who were known to be in relationships with IPV to determine if changing abuse status led to differences in relative weight gain at 6 and 12 months. Although weight gain between 0 and 6 months was not affected by abuse status at either 6 or 12 months, the rate of weight gain was significantly greater ($P = .019$) between 6 and 12 months for infants whose mothers stated that the abuse ended by 6 months and did not resume by 12 months than for infants in families with continuing abuse. In addition to comparing weights by using *t* tests, McFarlane and Soeken analyzed the data by using a linear-regression model that considered ethnicity and parity as potential covariates.

In a second study by Bithoney and Newberger,²¹ hospitalized children with nonorganic FTT were matched with hospitalized children with normal growth to determine, in part, familial characteristics associated with FTT. Using a stepwise-regression model to determine statistically significant variables, the authors determined that children without FTT were more likely to live in homes in which frequent violent disagreements occurred between parents ($P < .07$); this statistical method, however, did not mention accounting for the matched pairs, and thus the statistical significance of this finding is potentially overstated.

Risk-Taking Behaviors

Question

Are children who are exposed to IPV more likely to engage in risk-taking behaviors as adolescents or adults?

Finding

Evidence exists to support the link between IPV exposure and adolescent and adult risk-taking behaviors.

TABLE 3 FTT

Author, Year, and Study Type	Age, Sample Size, and Setting	IPV Measure	Outcome Variable	Study Findings	Reported Statistics
McFarlane and Soeken ²⁰ (1999); prospective cohort	0–12 mo, 121 abused mothers recruited in an urban public health clinic	Abuse Screen derived from the Abuse Assessment Screen; assessed at baseline and 6 and 12 mo	Relative weight gain from 0 to 6 mo and from 6 to 12 mo	Rate of weight gain from 6–12 mo: better weight gain in group with no IPV compared to group with IPV at 6 and 12 mo better weight gain in group with no IPV than group with IPV at 12 mo better weight gain in group with no IPV than group with IPV at 6 mo Rate of weight gain from 0–6 mo: no difference between group with no IPV and group with IPV at 12 mo no difference between group with no IPV and with IPV at 6 mo	$P = .019$ $P = .046$ $P = .012$ Not given $P = .16$
Bithoney and Newberger ²¹ (1987); case control	2–34 mo, 41 hospitalized children with nonorganic FTT matched with 41 controls	Unclear	Nonorganic FTT	Children without FTT were more likely to live in homes in which frequent violent disagreements occurred between parents	$P < .07$

Seven publications conducted within the greater context of the Adverse Childhood Experiences (ACEs) Study met criteria for inclusion.^{22–28} Using a large population of adults enrolled in the Kaiser Health system, the authors of these articles conducted a large, survey-based study that examined the strength of relationship between ACE and adult health behaviors and health outcomes. The study was conducted in 2 waves (ie, 2 distinct time periods). During wave 1, 70% of the people returned surveys. In the second wave of the survey, which contained several additional questions, 65% of the people returned surveys. Previously developed and validated questionnaires were used in the construction of the larger survey. The ACE investigation included exposure to a battered mother; childhood emotional, physical, or sexual abuse; household substance abuse; mental illness in or incarceration of a member of the household; and parental separation or divorce. In a series of articles, the authors separately analyzed the contributions of individual and summed total of ACEs to outcomes including, but not limited to, smoking, alcohol abuse, drug abuse, sexually transmitted diseases, and teen pregnancy/unintended adult pregnancy. This group considered the causal pathway connecting ACEs and poor health outcomes and was careful in their statistical adjustment for confounders. The results of these studies are summarized in Table 4.

Four studies, in addition to the ACE studies, investigated the link between childhood IPV exposure and later risk-taking behaviors (Table 5).^{29–32} Using a nationwide sample, Caetano et al²⁹ interviewed adults about childhood exposure to IPV and recent alcohol problems.

Stratifying by race and gender in a χ^2 analysis, they concluded that exposure to IPV was related to alcohol problems in black men but not in Hispanic or white men or in women of any ethnicity. In a logistic-regression model that controlled for age, income, marital status, employment, and, interestingly, alcohol consumption, Caetano et al found that both men and women who had childhood IPV exposure were more likely than those who had not to have adult alcohol problems. Finally, they stated that, within this regression model, men who witnessed IPV and had been abused themselves were less likely to have alcohol problems.

Although one of the objectives of Caetano et al was to look at ethnic differences in the impact of childhood exposure to IPV on alcohol problems, they did not discuss looking for effect modification in the stratified analyses or describe testing for interaction between ethnicity and childhood exposure in the regression model.

Carlson³⁰ recruited subjects from residential drug-treatment centers and from a shelter for runaway adolescents to explore the relationship between child abuse and/or childhood IPV exposure and, among other outcomes, substance abuse. Using a 2×2 analysis of variance to examine potential interaction between child abuse and witnessing IPV, Carlson commented that substance abuse was unrelated to witnessing IPV but did not provide these statistics. In addition, power calculations were not presented.

Fergusson and Horwood³¹ investigated the relationship between childhood IPV exposure and poor psychosocial adjustment, including substance abuse/dependence, in adolescence. Using a χ^2 test, they determined

TABLE 4 Summary of Included ACE Mailed Survey-Based Studies on Risk Behaviors

Survey Wave	Study Population	Outcome	Results
1 ²³	9215 men and women with complete data	Current smoking Smoking initiation at <4 y old	OR: 1.6 (95% CI: 1.3–2.0) ^a OR: 1.7 (95% CI: 1.4–2.0) ^a
1 and 2 ²⁵	17 337 men and women with complete data	Self-reported alcoholism	IPV exposure once or twice: OR: 1.7 (95% CI: 1.4–2.0) IPV exposure sometimes: OR: 2.2 (95% CI: 1.9–2.7) IPV exposure often: OR: 3.3 (95% CI: 2.5–4.4) IPV exposure very often: OR: 3.6 (95% CI: 2.4–5.4)
1 and 2 ²⁵	17 337 men and women with complete data	Illicit drug use	IPV exposure once or twice: OR: 1.5 (95% CI: 1.3–1.7) IPV exposure sometimes: OR: 1.8 (95% CI: 1.5–2.1) IPV exposure often: OR: 2.3 (95% CI: 1.8–2.9) IPV exposure very often: OR: 2.3 (95% CI: 1.6–3.2)
1 and 2 ²⁵	17 337 men and women with complete data	Intravenous drug use	IPV exposure once or twice: OR: 1.8 (95% CI: 1.2–2.7) IPV exposure sometimes: OR: 2.5 (95% CI: 1.6–3.7) IPV exposure often: OR: 3.0 (95% CI: 1.7–5.5) IPV exposure very often: OR: 3.2 (95% CI: 1.4–7.5)
1 ²⁶	9323 men and women with complete data	Sexually transmitted diseases	Men: OR: 1.5 (95% CI: 1.1–2.0) Women: OR: 1.4 (95% CI: 1.1–1.9)
1 ²⁷	5060 women with complete data	First intercourse at <15 y old	IPV exposure sometimes: OR: 1.8 (95% CI: 1.3–2.6) IPV exposure often or very often: OR: 2.5 (95% CI: 1.8–3.6)
		>30 lifetime sexual partners	IPV exposure sometimes: OR: 1.2 (95% CI: 0.6–2.5) IPV exposure often or very often: OR: 2.2 (95% CI: 1.2–4.3)
		Self-perceived AIDS risk	IPV exposure sometimes: OR: 2.8 (95% CI: 1.8–4.4) IPV exposure often or very often: OR: 1.7 (95% CI: 1.0–3.1)
1 and 2 ²²	7399 men with completed data	Involvement in an adolescent pregnancy/paternity	OR: 1.6 (95% CI: 1.4–1.9)
1 and 2 ²⁸	9159 women with completed data	Adolescent pregnancy	RR: 1.6 (95% CI: 1.4–1.7)
1 ²⁴	1193 women: 20–50 y old; first pregnancy at >20 y of age; complete data	Unintended adult pregnancy	$P = <.05$ when comparing percentage of unintended pregnancies in the non-IPV-exposed and the infrequently IPV-exposed groups and when comparing the non-IPV-exposed and frequently IPV-exposed groups

OR indicates odds ratio; CI, confidence interval.

^a As the frequency of IPV exposure increased, the risk of this outcome similarly increased, but data were not provided.

that a relationship existed between IPV exposure and all types of substance abuse/dependence. With the exception of alcohol abuse/dependence after witnessing mother-perpetrated IPV, the association between IPV and substance abuse/dependence disappeared after adjusting for covariates related to “family context.”

Conducting a secondary data analysis, Elliott et al³² examined a sample of adolescent girls to investigate the link between experiencing or witnessing family violence and sexually risky behavior. Using a logistic-regression model that considered multiple covariates and interaction between child abuse and IPV, either witnessing IPV or experiencing violence increased the odds of engaging in sexually risky behavior, but the occurrence of both together decreased this association.

DISCUSSION

Exposure to IPV during childhood seems to increase the likelihood of engaging in health-adverse behaviors later in life and likely increases risk for underimmunization. Because of limitations of the published studies and a

relative paucity of data addressing certain key questions, we cannot determine if a connection exists between childhood IPV exposure and general health and use of health services, breastfeeding, or weight gain. Specifically, our ability to draw strong conclusions were hampered by 4 major threats to drawing valid scientific inferences that we found among the included studies:

1. Poorly specified theoretical model of cause and effect: Childhood IPV exposure potentially leads to poor physical health indirectly through a series of interrelated intermediaries that function along a causal pathway, an example of which (designed by Repetti et al⁴) is depicted in Fig 2. In investigating the diverse repercussions of IPV exposure, factors along this causal pathway (such as maternal depression or substance abuse, chaotic home environment, or poor role modeling) should be considered as cascading forces that lead to poor outcomes rather than as confounders. Studies that treated these intermediary influences as confounding influences and adjusted for

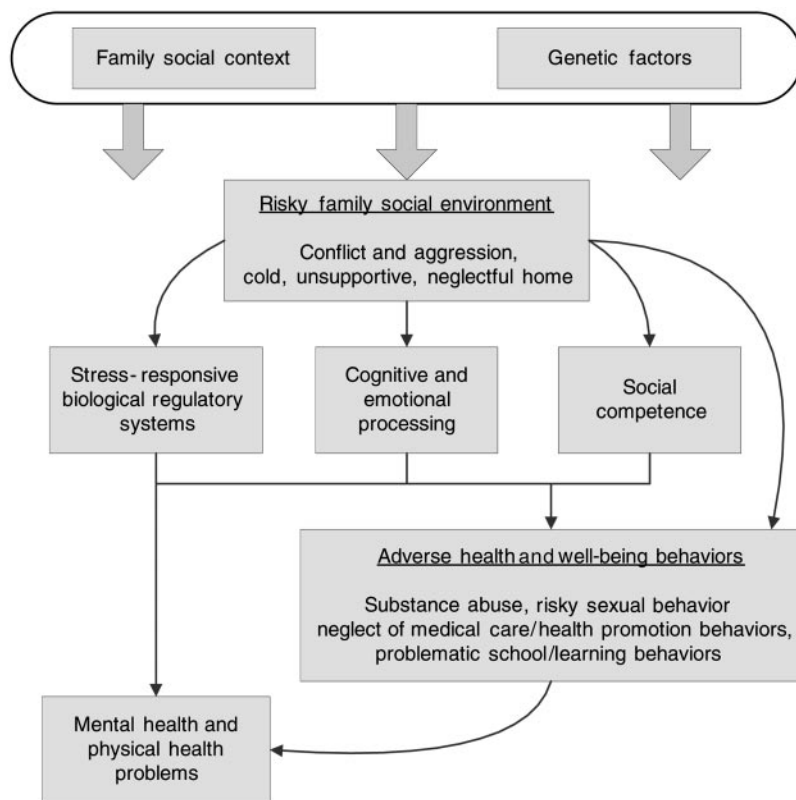
TABLE 5 Risk-Taking Behaviors

Author, Year, and Study Design	Age, Sample Size, and Setting	IPV Measure	Outcome Variable	Study Findings	Reported Statistics
Caetano et al ²⁹ (2003); face-to-face survey asking about prior childhood IPV exposure and current alcohol use	> 18 y, 1440 couples interviewed in their homes; participants were obtained through national household probability sampling	1 nonvalidated question	Alcohol problems in adulthood such as withdrawal symptoms, driving under the influence, and loss of a job because of drinking	From stratified analyses: Increased rates of alcohol problems in black men who had witnessed IPV From regression: Increased rates of alcohol problems in both men and women who witnessed IPV Decreased rates of alcohol problems in men who had witnessed IPV and who were abused themselves Substance abuse not affected by witnessing IPV	$P < .001$ Men, OR: 4.7 (95% CI: 2–10.9); Women, OR: 6.3 (95% CI: 1.7–22.7) OR: = 0.2 (95% CI: 0.06–0.7) Statistics not presented
Carlson ³⁰ (1991); face-to-face survey asking about prior childhood IPV exposure and current substance use	13–18 y, 101 adolescents in a residential treatment center or in runaway shelter	1 nonvalidated question	Substance abuse measured with questions about frequency of use of particular substances	Substance abuse not affected by witnessing IPV	Statistics not presented
Ferguson and Horwood ³¹ (1997); face-to-face survey asking about prior childhood IPV exposure and current substance abuse	18 y, 1025 participants in the Christchurch Health and Development Study of children in New Zealand	Questions about childhood IPV exposure based on Conflict Tactics Scale	Substance abuse/dependence measured by questions about extent of substance use and questions from the Composite International Diagnostic Interview	Increasing risk of substance abuse/dependence with increasing IPV exposure No increase risk of substance abuse with exposure to father-against-mother IPV, controlling for family context Increase in risk of alcohol abuse/dependence only with exposure to mother-against-father IPV, controlling for family context Odds of risky sexual activity increase in girls exposed to IPV Exposure to child abuse and IPV decreases odds of risky sexual behavior compared to IPV exposure alone	$P < .05$ for all substances $P > .3$ for all categories $P < .01$ OR: 3.7
Elliott et al ³² (2002); interview-based survey asking about prior childhood IPV exposure and current sexual activity	14–17 y, 500 girls interviewed as part of the 1995 National Survey of Family Growth	1 nonvalidated question	Risky sexual activity as measured by having >2 sexual partners in the past year or having a partner who had engaged in risky behaviors		

OR, indicates odds ratio; CI, confidence interval.

FIGURE 2

Theoretical model linking a risky family environment and poor health. (Adapted with modifications from Repetti RL, Taylor SE, Seeman TE. Risky families: family social environments and the mental and physical health of offspring. *Psychol Bull.* 2002;128:330–366.)



- them in the analyses may well have inadvertently attenuated the association between IPV exposure and physical health outcomes.^{15,18,29,31}
2. Failure to consider confounding and effect modification: The complex, intricate relationship between childhood IPV exposure and health outcomes is certainly entangled by common confounding influences and likely modified by both protective and accentuating factors. In addition to specifying the hypothesized chain or web of cause and effect, investigators should specify a priori which additional factors are thought to confound or modify any relationship between IPV exposure and physical health. Each of these variables then should be measured appropriately and considered in an adjusted analysis.
 3. Limited generalizability because of sampling from shelters: Several studies enrolled as subjects children of women who were in IPV shelters. Women who leave a violent relationship and enter a shelter are a self-selecting population that potentially differs from women who either remain in a violent relationship or seek refuge elsewhere. The shelter population may have experienced more severe violence or may have fewer financial resources than a nonsheltered group. These differences may distinguish not only the women but their children as well, as suggested by the finding that children residing in the community have a different risk profile compared with sheltered chil-

dren.^{11,12} To enhance generalizability, future studies should seek a broader source population than IPV shelters.

4. Samples of small size: Several articles included in this review had small sample sizes, which raises concern that the ensuing analyses may have been underpowered to find true differences in unadjusted analyses and more certainly underpowered to detect interactions. Yet, few studies reported power calculations. A greater number of studies conducted with larger samples and clear reporting of their power to detect clinically meaningful effects are needed.

A few aspects of our review warrant close consideration. First, we used demanding inclusion criteria, which necessitated, for example, that studies have a contemporaneous control group to be included. Although enforcing these strict criteria decreased the total number of studies, this degree of methodologic rigor is required to determine if an association exists between childhood IPV exposure and physical health sequelae. We also required that studies examine the specific impact of IPV, as opposed to community violence, child abuse, or general family violence. Although violence exposure in general certainly impacts children negatively, better delineating the impact of specific forms of violence (such as IPV) may enable the design of specific interventions that target individuals who are exposed to certain violent inter-

actions. Our restrictive definition of physical health likely further narrowed the spectrum of included articles. Finally, despite our efforts to conduct a thorough search, our search strategy may have inadvertently missed relevant studies.

These caveats notwithstanding, this review emphasizes the need for a better understanding of the physical health outcomes for children exposed to IPV, which in turn will require a clearer conceptualization of the causal pathway linking the two, including, for example, additional exploration of the impact of IPV on children's physiologic regulatory systems (Fig 2).⁴ Such knowledge ultimately will enhance our ability to intervene to improve the well-being of these individuals as children and, subsequently, as adults.

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**Physical Health Outcomes of Childhood Exposure to Intimate Partner Violence:
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Megan H. Bair-Merritt, Mercedes Blackstone and Chris Feudtner

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