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Physical Violence During Pregnancy: Maternal Complications and Birth Outcomes

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Objective: To assess the association between physical violence during the 12 months before delivery and maternal complications and birth outcomes.

Methods: We used population-based data from 6143 women who delivered live-born infants between 1993 and 1995 in South Carolina. Data on women's physical violence during pregnancy were based on self-reports of "partner-inflicted physical hurt and being involved in a physical fight." Outcome data included maternal antenatal hospitalizations, labor and delivery complications, low birth weights, and preterm births. Odds ratios and 95% confidence intervals were calculated to measure the associations between physical violence, maternal morbidity, and birth outcomes.

Results: The prevalence of physical violence was 11.1%. Among women who experienced physical violence, 54% reported having been involved in physical fights only and 46% had been hurt by husbands or partners. In the latter group, 70% also reported having been involved in fighting. Compared with those not reporting physical violence, women who did were more likely to deliver by cesarean and be hospitalized before delivery for maternal complications such as kidney infection, premature labor, and trauma due to falls or blows to the abdomen.

Conclusion: Physical violence during the 12 months before delivery is common and is associated with adverse maternal conditions. The findings support the need for research on how to screen for physical violence early in pregnancy and to prevent its consequences. (*Obstet Gynecol* 1999;93:661-6. © 1999 by The American College of Obstetricians and Gynecologists.)

Intimate partner violence against pregnant women is not unusual. Studies have shown a prevalence of phys-

ical violence during pregnancy of between 0.9% and 20%.¹ Violence during pregnancy affects women and might lead to pregnancy complications or adverse birth outcomes.^{2,3}

Violence can affect pregnancy through direct or indirect mechanisms.^{2,3} A blow to a pregnant woman's abdomen can cause adverse outcomes directly (ie, fetal injury and death, or complications such as preterm labor). The indirect mechanism relates to a woman's victimization experience from intimate-partner violence and how it can induce intermediary risks (ie, psychological stress or insufficient access to medical care) that could cause poor outcomes.^{2,3}

Five studies⁴⁻⁸ showed no association between physical violence and low birth weights (LBWs) or preterm births, whereas two others^{9,10} found modest increases in risk of LBWs among women who experienced intimate-partner violence during pregnancy. Differing study populations, sample sizes, study designs, and varying measures of physical violence might explain discrepant findings among studies.

An understanding of the relationship between physical violence during pregnancy, adverse maternal conditions, and birth outcomes could have important clinical and public health implications. Early identification and intervention to prevent violence against pregnant women might reduce adverse outcomes in pregnancy. Using a population-based, cross-sectional study sample, we assessed the independent association of physical violence during pregnancy with maternal antenatal hospitalizations, labor and delivery complications, LBWs, and preterm births, while controlling for potential confounders.

Materials and Methods

We analyzed data from the South Carolina Pregnancy Risk Assessment Monitoring System,¹¹ a population-based survey developed to monitor selected self-

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reported maternal behaviors and experiences occurring before, during, and after pregnancy among women who delivered live-born infants. A systematic birth weight-stratified random sample of new mothers (200–240 women) was drawn monthly from the South Carolina birth registry. Because of the low frequency of births of LBW infants in the population, oversampling of LBW infants is used to achieve large cell-sample size, relative to normal birth weight infants. Between 1993 and 1995, 9563 women 2 and 6 months postpartum were surveyed and 6718 participated (70% response). All mothers in the sample were mailed a 14-page questionnaire (up to three times) and monetary incentives were used to enhance response rates. If there was still no response, telephone follow-up was done (98% of women responded by mail). Information in the analyses came from mothers' completed surveys and their infants' birth certificates. We excluded 346 women with multiple gestations because their infants were at greater risk for prematurity and LBW, 74 women who did not identify themselves as black or white, 115 women with missing data on physical violence, and 52 women with implausible birth weight–gestational age combinations. The final sample consisted of 6143 women who had singleton live births between 1993 and 1995. The data was weighted to adjust for nonresponse differentials by maternal sociodemographic status and for sampling probabilities. Weighted estimates were adjusted for nonresponse on the assumption that women in a particular subgroup who responded represent those who did not respond.

We defined physical violence during pregnancy using two questions within an 18-item inventory of stressful life events.¹² Women who reported being “physically hurt by their husbands or partners” or “involved in a physical fight” during the 12 months before delivery were classified as having been exposed to physical violence during pregnancy. We reported elsewhere that women who experienced partner physical violence were similar to those who were involved in physical fights during pregnancy.¹³ Women denying violent stressors constituted the comparison group. The survey did not include additional questions on timing, severity, and frequency of violence during pregnancy or any questions about emotional or sexual violence by partners during pregnancy.

In the survey, women were asked about hospitalizations before delivery. We categorized their responses as diabetes, high blood pressure, kidney infections, premature labor, nausea, vomiting or dehydration, and vaginal bleeding or placenta problems. Specific conditions originally listed as “other” were recoded as other infections, loss of the infant, or trauma due to falls or blows to the abdominal region. Women who reported

no antenatal hospitalizations made up the referent group. For about 1.6% of the study sample, data on hospitalizations were missing. Birth certificates provided information on complications of labor and delivery (including febrile conditions, prolonged or dysfunctional labors, abruptio placentae, premature rupture of membranes [PROM], other excessive bleeding, and “fetal distress”) or cesarean delivery. Data on complications of labor and delivery were missing for only five women. From birth certificate data, birth weights were classified as less than 2500 g (LBW) and 2500 g or more. Infants whose gestational age was less than 37 weeks were considered preterm and those whose gestational age was 37 weeks or more were considered term. We also combined birth weight and prematurity categories to create LBW-preterm, LBW-term, normal birth weight-preterm, and normal birth weight-term (comparison group) categories.

Potential confounders of the association between violence during pregnancy, maternal complications, and adverse birth outcomes were maternal race, maternal age, maternal education, poverty status, marital status plus infant's paternity information, number of previous children, adequacy of prenatal care utilization index,¹⁴ smoking and alcohol use during the last trimester of pregnancy, and pregnancy intent at conception.

Simple categorical analyses and logistic regression models using weighted survey data were conducted with Survey Data Analysis (SUDAAN 7.4; Research Triangle Institute, Research Triangle Park, NC) software to adjust standard errors to account for selection and response probabilities of the survey design. We initially examined the prevalence distribution of physical violence during pregnancy. We compared the prevalence of reporting physical violence with selected maternal characteristics and calculated the prevalence odds ratios (ORs) and 95% confidence intervals (CIs) adjusted for potential confounders.

We used logistic regression to calculate ORs and 95% CIs to estimate the association between physical violence during pregnancy (independent variable), maternal conditions, and birth outcomes. The dependent variables in each of the respective models were maternal morbidity (antenatal maternal cause-specific hospitalizations and specific complications of labor and delivery) and birth outcomes (LBW and prematurity). These associations were adjusted for important confounders, including age, poverty status, obtainment of prenatal care, smoking during the third trimester, maternal race, and parity. Confounders were selected for inclusion in the multivariate model if they were associated with the respective outcome and physical violence and if their addition to the model changed the crude OR by 10%.¹⁵

Table 1. Prevalence of Physical Violence During the 12 Months Before Delivery

Characterization of physical violence during pregnancy	Unweighted no. (n = 6143)	Prevalence*
Physically hurt by husband or partner	330	5.1 (2.0, 7.1)
Involved in physical fight	583	9.6 (8.2, 10.2)
Involved in physical fight or physically hurt by husband or partner	680	11.1 (10.3, 12.4)
Involved in a physical fight only; not physically hurt by husband or partner	350	6.0 (5.2, 7.0)
Physically hurt by husband or partner only; not involved in physical fight	97	1.5 (1.1, 1.9)
Physically hurt by husband or partner and involved in physical fight	233	3.6 (2.9, 4.3)

* Weighted prevalence percent and 95% confidence interval of prevalence percent.

Results

Eleven percent of women reported physical violence (either “being physically hurt by husband or partner” or “being involved in a physical fight”) within the 12 months of delivering a live infant (Table 1). The prevalence of being involved in a physical fight during the year before delivery (9.6%) was twice as high as the prevalence of partner-perpetrated physical violence (5.1%). Also shown in Table 1 are the mutually exclusive categories of physical violence during pregnancy. Those data showed that more than half (54%) of the physical violence was the result of being involved in fights only, and 46% were hurt by husbands or partners. Of the women who reported partner-perpetrated physical violence, 70% said they had been involved in fights.

Table 2 shows the weighted prevalence of reporting physical violence by select sociodemographic and maternal behavioral characteristics, along with the adjusted prevalence ORs between physical violence and select maternal characteristics. Because some of those findings were described elsewhere,¹³ we will summarize the results briefly. Women with greater odds of physical violence have characteristics associated with greater risks for adverse pregnancy outcomes (eg, young age, poverty, unmarried status, unwanted pregnancy, and smoking and drinking alcohol during pregnancy).

The prevalence distribution of self-reported maternal morbidity among women who experienced violence during pregnancy is presented in Table 3, along with the adjusted ORs with 95% CIs for the association between violence and those maternal conditions adjusted for confounding. Among women who had expe-

Table 2. Prevalence of Physical Violence During Pregnancy, by Selected Maternal Characteristics

Correlate	Physical violence (n = 680)	No physical violence (n = 5463)	OR* (95% CI)
Race			
Black	16.2% (1.1)	83.8% (1.1)	1.3 (0.9, 1.7)
White	7.9% (0.6)	92.1% (0.6)	1.0
Age (y)			
<20	21.8% (1.8)	78.2% (1.8)	3.0 (1.9, 4.8)
20–29	11.0% (0.8)	89.0% (0.8)	1.8 (1.2, 2.7)
>29	4.6% (0.7)	95.4% (0.7)	1.0
Education (y)			
<12	20.8% (1.6)	79.2% (1.6)	1.8 (1.2, 2.8)
12	11.7% (0.9)	88.3% (0.9)	1.3 (0.8, 1.8)
≥13	5.4% (0.7)	94.6% (0.7)	1.0
Poverty (poverty rate)			
≤100%	17.4% (1.0)	82.6% (1.0)	5.6 (3.4, 9.1)
>100–185%	9.9% (1.3)	90.1% (1.3)	3.2 (1.9, 5.5)
>185%	2.8% (0.5)	97.2% (0.5)	1.0
Marital status plus infant’s paternity information			
Unmarried with paternity data missing	20.1% (1.3%)	79.9% (1.3)	2.6 (1.8, 3.8)
Married with paternity data refused	37.4% (6.3)	62.6% (6.3)	8.4 (4.2, 16.9)
Unmarried with paternity acknowledgment	18.0% (2.6)	82.0% (2.6)	2.5 (1.5, 4.1)
Married with paternity data	4.8% (0.5)	95.2% (0.5)	1.0
Number of previous children			
≥3	17.2% (2.9)	82.8% (2.9)	2.3 (1.3, 3.9)
2	11.2% (1.5)	88.8% (1.5)	1.4 (0.9, 2.2)
1	10.7% (1.0)	89.3% (1.0)	1.3 (1.0, 1.8)
0	10.9% (0.8)	89.1% (0.8)	1.0
Adequacy of obtainment of prenatal care			
Inadequate/no prenatal care	19.8% (2.0)	80.2% (2.0)	1.3 (0.9, 1.9)
Intermediate	8.0% (1.3)	92.0% (1.3)	0.8 (0.5, 1.2)
Adequate plus (intensive)	11.0% (1.1)	89.0% (1.1)	1.2 (0.8, 1.6)
Adequate	9.9% (0.7)	90.1% (0.7)	1.0
Smoking/alcohol-drinking status during 3rd trimester			
Smoked and drank	21.9% (5.9)	78.1% (5.9)	3.7 (1.6, 8.4)
Smoked or drank	17.5% (1.7)	82.5% (1.7)	2.0 (1.5, 2.8)
Neither smoked nor drank	9.8% (0.6)	90.2% (0.6)	1.0
Pregnancy intent			
Unwanted	21.3% (2.1)	78.7% (2.1)	2.3 (1.6, 3.4)
Mistimed	14.0% (1.1)	86.0% (1.1)	1.4 (1.0, 1.9)
Wanted	6.6% (0.6)	93.4% (0.6)	1.0

OR = odds ratio; CI = confidence interval.

Data are presented as % (standard error).

Percentages are weighted to account for sampling scheme.

* Odds ratios were adjusted for age and poverty.

Table 3. Association Between Maternal Morbidity and Physical Violence During Pregnancy

Maternal hospitalization	Physical violence (<i>n</i> = 680)		No physical violence (<i>n</i> = 5463)		OR* (95% CI)
	No.	%	No.	%	
Any hospitalization before delivery	269	27.2% (2.4)	1661	18.3% (0.7)	1.5 (1.1, 2.0)
Hospitalization for					
Diabetes	6	1.3% (0.8)	59	0.9% (0.2)	1.3 (0.3, 5.7)
High blood pressure	54	6.4% (1.5)	422	3.6% (0.3)	1.8 (1.0, 3.4)
Kidney infection	32	6.4% (1.6)	112	1.9% (0.3)	2.7 (1.3, 5.5)
Premature labor	145	14.2% (2.0)	772	7.5% (0.5)	1.8 (1.2, 2.7)
Nausea, vomiting, or dehydration	33	5.8% (1.4)	170	3.2% (0.4)	1.8 (0.9, 3.7)
Vaginal bleeding, placenta problems	45	2.0% (0.6)	269	2.2% (0.3)	0.8 (0.3, 1.9)
Other infections [†]	11	2.7% (1.0)	45	1.0% (0.2)	2.3 (0.9, 6.4)
Miscarriage [†]	1	0.01% (0.01)	4	0.01% (0.01)	2.3 (0.5, 13.3)
Trauma due to fall or blow to stomach area [†]	4	1.2% (0.7)	8	0.1% (0.04)	20.2 (1.9, 206.0)

Abbreviations as in Table 2.

Data are presented as *n* or % (standard error).

Comparison group was women who were not hospitalized before delivery.

* Adjusted for age, poverty, obtainment of prenatal care, and smoking during pregnancy.

[†] Categories were developed through recoding of conditions originally listed as "other."

rienced violence, 27.2% reported antenatal hospitalizations before delivery. After adjustment for confounding factors, the following maternal conditions leading to hospitalizations were found to be associated with reporting physical violence: kidney infections (OR 2.7, 95% CI 1.3, 5.5), premature labor (OR 1.8, 95% CI 1.2, 2.7), and trauma due to falls or blows to the abdomen (OR 20.2, 95% CI 1.9, 206.0).

The prevalence of complications of labor and delivery and birth outcomes are given in Table 4. After controlling for age, poverty, obtainment of prenatal care, and smoking status during pregnancy, we found that women who experienced physical violence during pregnancy were 1.5 times more likely to deliver by cesarean. Physical violence was not significantly associated with risk of LBW, preterm birth, or LBW-premature birth combinations.

Discussion

Violence against women is difficult to measure for various reasons, including the fact that a standardized definition is lacking, and the fact that some women are unwilling to disclose violence, because of social stigma or cultural sanctioning of violence.¹⁶ Thus, the best prevalence estimates are probably underestimates. Given this and the similar effects on maternal outcomes of being involved in a fight, we included data on women's involvement in fights in our assessment of physical violence against pregnant women. Fighting often leads to injuries, which range from minor to

serious. Our estimate of physical violence during pregnancy (11%) falls within the range of prevalence estimates reported elsewhere.¹

Of the self-reported maternal conditions leading to antenatal hospitalizations, kidney infections, premature labor, and trauma due to falls or blows to the abdominal region were associated with physical violence during pregnancy. We believe that a direct mechanism is most likely indicated by those observations. We are limited in trying to explicate further this mechanism of action because we do not know the timing or severity of violence. Physical violence during pregnancy is the second leading cause of trauma during pregnancy, after motor vehicle accidents.¹⁷ In our study, too few women reported trauma to the abdominal area (as expected, given that our study sample was population based and not taken from an emergency department population), so we lacked power to address adequately the association between physical violence and that adverse outcome. Trauma research studies showed that severe physical trauma to the maternal abdomen might lead to hospitalizations that might cause premature labor or delivery.^{10,18,19} Many women in abusive intimate relationships also experience sexual assault^{4,10,16} and are at increased risk of contracting sexually transmitted diseases (STDs) from their partners.⁴ Research established an association between STDs and preterm labor.²⁰ We found that reporting antenatal hospitalization for premature labor was significantly associated with physical violence during pregnancy. That finding might be important for clinical management of high-risk patients by

Table 4. Association Between Maternal Complications During Labor, Delivery and Birth Outcomes, and Physical Violence During Pregnancy

Outcome	Physical violence (<i>n</i> = 680)		No physical violence (<i>n</i> = 5463)		OR (95% CI)
	No.	%	No.	%	
Complication of labor and delivery					
Had complication of labor and delivery*	323	37.7% (2.6)	2507	36.7% (0.9)	1.1 [†] (0.8, 1.4)
Cesarean delivery*	198	25.5% (2.4)	1575	21.8% (0.8)	1.5 [†] (1.1, 2.0)
Premature rupture of membranes*	72	2.7% (1.0)	496	4.3% (0.4)	2.0 [†] (0.7, 7.3)
Fetal distress*	44	8.3% (1.6)	272	5.3% (0.6)	1.8 [‡] (1.0, 3.3)
Birth outcome					
Low birth weight [§]	327	9.4% (0.8)	2388	7.8% (0.1)	1.0 (0.8, 1.2)
Preterm [¶]	275	11.1% (1.4)	1954	8.2% (0.4)	1.2% (0.9, 1.7)
Combination of low birth weight–prematurity					
Preterm–low birth weight**	256	5.8% (0.5)	1846	4.9% (0.1)	1.0 (0.7, 1.3)
Preterm–normal birth weight	19	5.3% (1.3)	108	3.3% (0.3)	1.9 (1.0, 3.7)
Term–low birth weight	71	3.6% (0.5)	513	2.9% (0.1)	1.0 (0.7, 1.4)

Abbreviations as in Table 2.

Data are presented as *n* or % (standard error).

* Comparison group was women who did not have any complications of labor and delivery.

[†] Adjusted for age, poverty, obtainment of prenatal care, and smoking during pregnancy.

[‡] Adjusted for age, poverty, and obtainment of prenatal care.

[§] Comparison group was women with normal birth weight infants.

^{||} Adjusted for age, poverty, obtainment of prenatal care, and race.

[¶] Comparison group was women with term infants.

** Comparison group was women with normal birth weight–term infants.

obstetricians and perinatologists because preterm labor correlates with premature birth. Preterm birth and LBW are among the leading causes of perinatal morbidity and mortality.²¹ We also showed a significant association between physical violence and kidney infections. The effect of physical violence on pregnant women appears to be extensive and such violence is likely to affect every organ system.²

This report showed that physical violence is associated with maternal smoking and drinking of alcohol during pregnancy, which was corroborated by other studies.^{2,3,4,13} Such risky behavior might be connected to greater levels of stress associated with violence-related victimization,^{2,3,16} which suggests the need for early identification of intimate-partner violence among pregnant women in substance abuse treatment and cessation programs and the need for appropriate interventions between those treatment programs and shelters for persons who have experienced domestic violence.

We found an association between physical violence during pregnancy and cesarean delivery, independent of other confounding factors (age, poverty, obtainment of prenatal care, and smoking during pregnancy). We cannot rule out other potential confounders, such as previous cesarean delivery and malpresentation, in this association. However, the observed relationship might

be due to the fact that women reporting physical violence have various maternal complications and undergo hospitalizations before delivery and thus are monitored medically for untoward outcomes.

After adjustments for maternal age, poverty, involvement in prenatal care, and maternal smoking during pregnancy, we found no association between physical violence during pregnancy and LBW or prematurity. Although those findings are consistent with those of other studies,^{4–8} two studies^{9,10} found positive associations between physical violence and LBW. More research is needed to determine how violence can affect birth outcomes.

Our study strengths were the use of a population-based sample that allowed inferences to the entire population of women who had live-born infants, high response rates, and many data on women that served as potential confounders. However, several factors limited the interpretation of our findings. The cross-sectional design precluded examining physical violence as an antecedent factor to some outcomes. Some women might have underreported their physical violence experiences during pregnancy. We did not assess physical violence by timing, severity, and frequency. The self-reported maternal hospitalizations and data on labor and delivery complications from birth certificates could not be verified using medical records. Other important

confounders were not assessed, including illicit drug use. Those factors might lead to nondifferential misclassification, which would result in underestimation of the association of physical violence during pregnancy and those outcomes. In future studies, attempts should be made specifically to assess not only physical violence before and during pregnancy but also sexual and emotional violence and the potential effects of these forms of violence on maternal and birth outcomes.

Health professionals must regard violence during pregnancy as a serious public health problem, one requiring the same alertness currently focused on gestational diabetes, preeclampsia, and PROM. Routine screening has been recommended at the various entry points of contact between pregnant women and medical care (eg, primary care, prenatal care, obstetric, and gynecologic services).²²

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