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1 Intimate Partner Violence during Pregnancy: Victim or Perpetrator? Does it make a difference?

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15 Running Title: Women as Perpetrators

16

17 **Abstract**

18 **Objectives:** To differentiate between forms of intimate partner violence (IPV)(victim only,
19 perpetrator only, or participating in reciprocal violence) and examine risk profiles and
20 pregnancy outcomes.

21 **Design:** Prospective

22 **Setting:** Washington, DC, July 2001 to October 2003

23 **Sample:** 1044 high-risk African-American pregnant women who participated in a randomized
24 controlled trial to address IPV, depression, smoking, and environmental tobacco smoke
25 exposure.

26 **Methods:** Multivariable linear and logistic regression

27 **Main outcome measures:** Low and very low birth weight, preterm and very preterm birth

28 **Results:** 5% of women were victims only, 12% were perpetrators only, 27% participated in
29 reciprocal violence, and 55% reported no IPV. Women reporting reciprocal violence in the past
30 year were more likely to drink, use illicit drugs, and experience environmental tobacco smoke
31 exposure and were less likely to be very happy about their pregnancies. Women reporting any
32 type of IPV were more likely to be depressed than those reporting no IPV. Women experiencing
33 reciprocal violence reported highest levels of depression. Women who were victims of IPV were
34 more likely to give birth prior prematurely and deliver low and very low birth weight infants.

35 **Conclusions:** We conclude that women were at highest risk for pregnancy risk factors when
36 they participated in reciprocal violence and thus might be at higher risk for long-term
37 consequences, but women who were victims of intimate partner violence were more likely to

38 show proximal negative outcomes like preterm birth and low birth weight. Different types of
39 interventions may be needed for these two forms of intimate partner violence.

40 **Keywords:** Intimate partner violence, pregnancy outcomes, risk factors

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42

43 **INTRODUCTION**

44 The Centers for Disease Control and Prevention defines intimate partner violence (IPV)
45 as physical, sexual or psychological harm by a current or former spouse or partner,¹ with
46 serious psychosocial and physical sequelae. The National Violence against Women Survey found
47 that 22.1 percent of women and 7.4 percent of men report any violence by an intimate partner
48 during their lifetimes. Annually, in the U.S approximately 1.3 million women and 835,000 men
49 report physical assault by an intimate partner.² Using the Behavior Risk Factor Surveillance
50 System, Breiding and colleagues³ found a lifetime prevalence of IPV was 26.4 percent in women
51 and 15.9 percent in men. They also found that the lifetime prevalence of IPV was similar for
52 non-Hispanic African-American and non-Hispanic white women, whereas the rate for the 12-
53 month period preceding the survey was almost twice as high among African-Americans.³

54 There are a myriad of factors associated with or causally linked to IPV. Women who
55 were younger, had less education and lower income, and those who were single mothers
56 reported more lifetime IPV than their counterparts.^{4,5} A prevalence study from Canada used
57 data from the Canadian Perinatal Surveillance System which questioned women on abuse
58 before, during and after pregnancy. Overall, the prevalence was 10.9% of women reporting
59 abuse during the two years preceding interviews. Women who were low income (21.2%
60 abused), single, divorced, separated or widowed (35.3% abused), < 19 years old (40.7% abused)
61 and Aboriginal mothers (30.6% abused) had a higher prevalence of abuse.⁶ These findings
62 reinforce those by Bhandari et al. who reported that family stressors such as financial issues,
63 lack of social support, legal and transportation issues put women at increased risk for abuse.⁷

64 There are conflicting reports in the literature about whether pregnancy raises or lowers the risk
65 of intimate partner violence.^{8,9} Alcohol use has consistently been associated with IPV. A World
66 Health Organization multi-country study found that when one or both partners abused alcohol,
67 there were significantly higher rates of IPV experienced by women.⁵ Kiely and colleagues¹⁰
68 reported that women with continued IPV during pregnancy were significantly more likely to use
69 alcohol. Breiding et al.¹¹ reported that IPV victimization in women was associated with heavy or
70 binge drinking and cigarette smoking. Illicit drug use has been associated with physical partner
71 violence.^{12,13} Physical, sexual or psychological IPV have been associated with depressive
72 symptoms.^{10,14,15} Mistimed or unintended pregnancies were linked to higher rates of IPV in the
73 year before conception or during pregnancy.¹⁶ Alcohol,⁹ tobacco and drug use,¹⁷ depression¹⁸
74 and unintended pregnancy⁹ are not only associated with IPV but are also considered as known
75 risk factors for IPV during pregnancy. Thus, it is important to note if these risk factors are
76 present in women who experience IPV to ensure they receive proper care during pregnancy
77 and post-partum.

78 IPV increases both pregnancy complications (e.g., inadequate weight gain, maternal
79 infections and bleeding) as well as adverse pregnancy outcomes (low birth weight (LBW),
80 preterm birth (PTB) and neonatal death).¹⁹⁻²¹ Kiely et al. report that among women
81 experiencing IPV victimization throughout pregnancy and postpartum, those randomized to the
82 intervention compared to usual care had significantly fewer very preterm births (VPTB) (<33
83 weeks gestation) and significantly longer mean gestational age at delivery.¹⁰ A Pregnancy Risk
84 Assessment Monitoring System study found that women reporting IPV in the year before
85 pregnancy were more likely to deliver prematurely and to have LBW infants.²² Other studies

86 have found similar associations between abuse during pregnancy and LBW, PTB, and maternal
87 infections, low gestational weight gain, smoking, alcohol and illicit drug use.^{19,21,23}

88 While the link between victimization and negative outcomes is established, there may
89 also be an association between women's aggression and physical and psychological sequelae.
90 Girls who are aggressive in adolescence have higher rates of early pregnancy, have higher rates
91 of obstetric and delivery complications, and score higher for depression and anxiety than their
92 non-aggressive counterparts.²⁴

93 Partners experience perpetration and victimization differently. The types of violence
94 reported tend to differ, with men reporting more verbal or psychological abuse and women
95 reporting more physical or sexual abuse.²⁵ It has been posited that women react to violence in
96 their relationships, while men initiate it.²⁶ Women are injured more²⁷⁻²⁹ and have more
97 psychological consequences.^{3, 15}

98 Few, if any, studies have examined the different ways that pregnant women experience
99 IPV and the risk profiles of each form of IPV (victim, perpetrator or reciprocal). The purpose of
100 this study is to examine the different forms of IPV present in a sample of high-risk pregnant
101 women. We examine risk profiles (alcohol, illicit drug and tobacco use, pregnancy wantedness,
102 and depression) by the form of IPV and pregnancy outcome.

103 **METHODS**

104 This study uses data from the National Institutes of Health - District of Columbia
105 Initiative to Reduce Infant Mortality in Minority Populations, a congressionally mandated
106 project to improve maternal and child health outcomes in African-Americans living in the
107 District. The data presented here are from the Healthy Outcomes of Pregnancy Education

108 study, or DC-HOPE, a randomized controlled trial (RCT) designed to address smoking, exposure
109 to environmental tobacco smoke (ETSE), IPV and depression, by providing an integrated
110 behavioral intervention and following the women throughout pregnancy and postpartum. The
111 methods and intervention have been previously described.³⁰

112 Participants

113 Women were recruited from six prenatal care clinics in DC from July 2001 to October
114 2003. Women were screened for eligibility in two stages, first based on demographic
115 characteristics (self-identifying as black, African-American or Latina, 18 years old or older, ≤ 28
116 weeks gestation, DC resident and English speaking). Those who were demographically eligible
117 were consented and screened by audio-computer assisted self-interview for one of the
118 following risks: smoking, ETSE, IPV, and/or depression. An average of 9 days after screening,
119 they completed the baseline interview and were then consented to participate in the
120 randomized controlled trial. A total of 2,913 women were screened for eligibility. Of those,
121 1,191 women consented to participate in the study and 1,070 (90%) completed baseline phone
122 interviews and were further randomized into intervention and usual care groups by using site-
123 and risk-specific block randomization. Follow-up data collection by telephone, conducted by
124 interviewers blinded to care group, occurred during the second and third trimesters of
125 pregnancy (22-26 and 34-38 weeks gestation, respectively) and 8-10 weeks postpartum. Data
126 on maternal and infant outcomes were abstracted from medical records. Figure 1 displays the
127 eligibility, consent and randomization process of DC-HOPE. The current analysis includes the
128 1,044 African-American women who were still pregnant at the time of the baseline

129 questionnaire. These analyses include the data on women in the intervention and control
130 groups.

131 Measures

132 *Intimate Partner Violence.* IPV was measured by the Revised Conflict Tactics Scale.³¹ During the
133 baseline interview, women reported IPV they experienced or perpetrated during the previous
134 year. During the follow-up interviews, the period of IPV was since the previous interview. For
135 each item on the Revised Conflict Tactics Scale, the women rated the frequency that a
136 particular event happened to them and the frequency with which the women used violence on
137 their partner. Women who reported only being the victim were classified as victims only;
138 women who reported that they used violence on their partner, but their partner did not, were
139 considered perpetrators; and women who were both victims and perpetrators were classified
140 as participating in reciprocal violence. This study used the physical assault and sexual coercion
141 subscales. The minor items on the physical assault subscale include twisting a partner's arm or
142 hair, pushing or shoving, or grabbing, while the severe items include punching, choking, kicking,
143 or using a knife or a gun with a partner. The sexual coercion scale includes asking about minor
144 items such as insisting on oral, anal or vaginal sex, and more severe items include using force
145 and threats to make a partner have oral, anal or vaginal sex. We report on severe and minor
146 physical IPV, severe and minor sexual IPV, and three different forms of IPV: perpetration,
147 victimization, reciprocal.

148 *Pregnancy Risk Factors.* The pregnancy risk factors assessed at baseline and analyzed
149 include alcohol and illicit drug use during pregnancy, depression, smoking, ETSE, pregnancy
150 wantedness, and pregnancy happiness. These were chosen because previous studies found

151 associations between these factors and negative pregnancy and infant outcomes, such as LBW
152 and PTB.

153 Alcohol use questions asked about frequency of use during pregnancy of different
154 alcoholic beverages (beer, wine, wine coolers, and liquor). For this analysis, if women reported
155 any type or quantity of drinking during pregnancy, alcohol use was considered to have
156 occurred. Women were coded as using illicit drugs if they reported using marijuana, cocaine,
157 heroin, LSD, amphetamines, sedatives or tranquilizers, or any other drugs since learning they
158 were pregnant (yes/no).

159 Depression was assessed using the Hopkins Symptom Check List.³² This scale consists of
160 20 questions asking participants about how they have felt in the past month and whether they
161 were distressed by these symptoms. The symptoms include feeling hopeless about the future,
162 poor appetite, trouble falling asleep, thoughts of death, feeling worthless, and difficulty making
163 decisions. The responses were on a five-point Likert scale ranging from “Not at all” to
164 “Extremely.” Depression was defined as a mean Hopkins score >0.75 .

165 Smoking at baseline was considered to be present if the participant reported smoking
166 currently or within the last 6 months and verified by salivary cotinine, and had smoked a total
167 of more than 100 cigarettes in her lifetime. ETSE was marked as present if the participants
168 reported being exposed to one or more cigarettes smoked by someone else inside the home or
169 in other places in the past 7 days.

170 Pregnancy wantedness was determined by participants reporting having an intended
171 pregnancy or one that was not intended currently but wanted eventually. All other women
172 were considered to have an unwanted pregnancy. Finally, happiness about pregnancy was

173 measured by one question that queried participants about the level of their happiness on a
174 scale of 1 to 10. Those who reported happiness levels of 1 to 3 were categorized as unhappy,
175 those who reported happiness of 4 to 7 were categorized as moderately happy, and a report of
176 greater than 7 was considered very happy.

177 *Pregnancy and Birth Outcomes.* We measured pregnancy and birth outcomes in the
178 current study. PTB was defined as gestation less than 37 weeks and very preterm birth (VPTB)
179 was defined as gestation less than 34 weeks. Birth weight was measured in grams. LBW was
180 defined as less than 2,500 grams and very low birth weight (VLBW) as less than 1,500 grams at
181 delivery. Finally, small for gestational age (SGA) was based on sex of the infant, birth weight and
182 gestation at delivery. Infants who weighed less than the 10th percentile of weight for
183 gestational age were considered as small for gestational age. These variables were coded as
184 dichotomous for statistical analysis.

185 *Demographic Variables.* We used demographic variables previously associated with both
186 IPV and pregnancy outcomes to control the relationships that were tested in the analyses.
187 Maternal education was used as a proxy of socio-economic status and trichotomized as less
188 than high school, high school diploma or GED, and some college. A woman's relationship status
189 was dichotomized into single (which included divorced, separated, and widowed) or partnered
190 (which included married or having a significant other). We also used maternal age as a
191 continuous control variable in the analyses.

192 Statistical Analysis

193 We performed analyses using SAS version 9.1 (SAS Institute, Cary, NC). In order to
194 examine the associations between different forms of IPV and pregnancy risk factors, we used

195 linear and logistic regression procedures, depending on the type of variable. Adjusted odds
196 ratios were estimated in multivariable logistic regressions for the relationship of interest while
197 controlling for the effects of maternal age, maternal education, and relationship status.
198 Similarly, multivariable linear regressions were estimated with demographic variables and the
199 IPV indicator variables. Finally, happiness to be pregnant is an ordinal variable; therefore, we
200 used multinomial logistic regression.

201 Similar testing was performed with the pregnancy-related outcomes – all of the
202 outcome variables were dichotomous. Because pregnancy outcomes were determined
203 postpartum and some women were lost to follow-up, only data for the women (n=832) who
204 remained in the study were used in these analyses. We analyzed the baseline data collected for
205 women who did and did not have complete data at follow-up to determine if there were any
206 differences, using ANOVA and Mantel-Haenszel chi-square. Furthermore, since some women
207 received the intervention meant to reduce risky behaviors and exposures, we controlled for
208 care group in the analysis. Finally, we controlled for other risk factors in the fully adjusted
209 models of pregnancy outcomes (preterm birth (PTB), LBW, VLBW, and SGA) if those risk factors
210 showed an association with the outcome at the $p \leq 0.10$ level of significance. Therefore, some
211 fully adjusted models include smoking, depression, and alcohol or illicit drug use.

212 **RESULTS**

213 The women ranged in age from 17 to 51, with a mean age of 24.57 years. All of the
214 participants included in these analyses were African-American. At the time of the baseline
215 interview, women were on average 19 weeks pregnant. A large majority of the women were
216 single. Table 1 presents the sociodemographic characteristics and psycho-behavioral risks at

217 baseline between women who reported any IPV perpetration (n=127), IPV victimization (n=51),
218 reciprocal IPV (n=285) and those who reported no IPV (n=577). Women who reported any IPV
219 at baseline had significantly higher rates of alcohol and illicit drug use, higher depression, and
220 reported more ETSE. Women who dropped out of the study reported higher depression at
221 baseline (mean = 16.48±13.42 for those who remained vs. 19.28±16.18 for those who dropped
222 out, $p<0.01$) and were more likely to be single ($p<0.05$) (data not shown).

223 Table 2 displays the adjusted odds ratios for the associations between different IPV
224 forms and other pregnancy risk factors. The no IPV category is the referent group in the
225 analyses. The most consistent finding is that regardless of type of violence (any, minor, severe,
226 physical or sexual) these women are depressed. There is a clear linear trend for increasingly
227 higher levels of depression going from perpetrator only to victim only to reciprocal violence. For
228 women with minor IPV, those participating in reciprocal violence were significantly more likely
229 to use alcohol (OR=2.76, 95% CI=1.95-3.90) and illicit drugs (OR=2.01, 95% CI=1.31-3.07).
230 Women experiencing severe IPV (all forms) were significantly more likely to use alcohol.
231 Women who perpetrate only were significantly more likely to use illicit drugs (OR=1.89, 95%
232 CI=1.02-3.50) as were women who participated in reciprocal violence (OR=3.05, 95% CI=1.83-
233 5.06). For physical IPV, there is a clear linear trend for increasingly significant odds of alcohol
234 use going from perpetrator only (OR=1.63, 95% CI=1.02-2.60) to victim only (OR=2.04, 95%
235 CI=1.00-4.13) to reciprocal (OR=2.89, 95% CI=2.03-4.11). For women reporting sexual IPV,
236 alcohol use was significant for victims (OR=2.17, 95% CI=1.33-3.53) and women participating in
237 reciprocal violence (OR=3.06, 95% CI=1.79-5.23). The women who participate in reciprocal
238 violence were significantly more likely to use illicit drugs (OR=2.11, 95% CI=1.11-4.01).

239 Table 3 presents the adjusted odds ratios from the models associating baseline reports
240 of IPV types and forms with pregnancy and infant outcomes (PTB, VPTB, LBW, VLBW, SGA),
241 while controlling for demographic and risk factors. Women who were perpetrators only, were
242 not at significantly increased risk of any of the adverse infant outcomes. Women who reported
243 physical IPV and participated in reciprocal violence were more likely to have a PTB (OR=1.60,
244 95% CI=1.00-2.57). Women who were victims only were the ones with significantly worse birth
245 outcomes. Victims reporting any type of IPV were more likely to have a LBW infant (OR=2.21,
246 95% CI=1.04-4.72) or VLBW infant (OR=4.54, 95% CI=1.06-19.44). Victims were more likely to
247 have a VPTB if they reported minor IPV (OR=3.66, 95% CI=1.22-10.97), severe IPV (OR=2.78,
248 95% CI=1.10-7.06) or physical IPV (OR=3.52, 95% CI=1.06-11.65). Victims reporting physical IPV
249 had significantly more LBW (OR=2.49, 95% CI=1.13-5.52) and VLBW (OR=5.67, 95% CI=1.29-
250 25.02) infants. Victims reporting sexual IPV had significantly more VLBW infants (OR=3.74, 95%
251 CI=1.09-12.85).

252 **DISCUSSION**

253 **Main Findings**

254 The current study was novel in that we analyzed different forms of IPV – perpetrators,
255 victims, and women participating in reciprocal violence – in a sample targeted specifically at
256 high-risk African-American pregnant women. IPV affects millions of women regardless of
257 economic status, race or ethnicity. The results point to different risk profiles for different kinds
258 of violence. Women who reported reciprocal violence in the past year had higher odds of
259 consuming alcohol and illicit drugs during pregnancy, ETSE exposure, and were the most
260 depressed, which supports and extends findings linked to reciprocal violence in couples.³³

261 Women who reported only victimization in the past year were more likely to smoke and had
262 elevated levels of depression. To our knowledge, few studies have linked various forms of IPV
263 with different types of pregnancy risk.^{34,35} Although women who reported reciprocal violence
264 had the worst risk profiles, their birth outcomes were similar to women not experiencing IPV.
265 Previous research reported that reciprocal violence being associated with higher injury rates,³⁶
266 but no one has studied IPV forms as predictors of pregnancy outcomes.

267 There has been controversy in the literature regarding perpetration, with one side
268 asserting that female perpetration has been ignored³⁷ and the other emphasizing male
269 perpetrators.³⁸ The current study accounts for female perpetration and finds clearly delineated
270 risk profiles for different forms of IPV, especially for victims and reciprocal violence. Women
271 were willing to and did report reciprocal violence, more than victimization only. Previous
272 studies have found that women engaging in violence often do so in the context of responding
273 to partner violence. Swan and Snow³⁹ reported that 75% of women studied stated that their
274 violence was in self-defense. Women also acknowledged fear,^{40, 41} defense of their
275 children,^{42,43} relationship control,^{39,40} and retribution, often for being emotionally hurt^{39, 44} as
276 their motivations for violence. Women experience coercive control, including sexual coercion,
277 while rarely being coercively controlling themselves.⁴⁰ Future studies should endeavor to gain
278 more insight into the context of IPV during pregnancy.

279 Studies of IPV generally do not report reciprocal violence because most scales do not
280 ask about perpetration. This may be a reflection that it is not asked simultaneously and
281 researcher's own biases about the likelihood that women would perpetrate violence. A
282 compendium by the CDC⁴⁵ reveals that only two scales ask about both victimization and

283 perpetration: the Revised Conflicts Tactics Scale,³¹ and the Multidimensional Measure of
284 Emotional Abuse.^{46,47}

285 Alcohol and drug use are often studied in association with IPV, as risk factors or coping
286 mechanisms. Alcohol use has been linked to victimization and perpetration of IPV. Some studies
287 report drinking as a coping mechanism for dealing with IPV,^{48,49} while others posit drinking as a
288 risk factor for victimization,³⁴ and some find that alcohol use was directly related to
289 perpetration.³⁵ Causality is unclear in our study, but the results point to alcohol use as a
290 particular problem for women who participate in reciprocal violence. It is possible that alcohol
291 use could be linked to more aggressive behavior in this group of women; however, there is no
292 way to determine if drinking led to aggressive behavior or if it were used as a coping
293 mechanism. Contrary to current literature, we found that women who were perpetrators only
294 were less likely to acknowledge either alcohol or illicit drug use.⁵⁰⁻⁵² This may be partially
295 explained by the fact that most researchers do not refine perpetration as we did. Our findings
296 suggest providers of services should question women on both perpetration and victimization.

297 The literature supports our findings that women who experience IPV as victims are more
298 likely to have negative birth outcomes.^{19,20} However, our study is the first, to our knowledge, to
299 separate the forms of violence and point to victimized women as particularly at risk for LWB
300 and PTB. . Previous studies have found that psychosocial stress and stressful life events are
301 linked with LBW specifically in African-Americans .^{53,54} If IPV increases stress, these episodes
302 may exacerbate the risk of poor pregnancy outcomes. Victims may have been unable to
303 marshal the resourcefulness needed to fight back when abused and may have internalized the

304 stress caused by the abuse. Future studies should include the necessary measures to
305 understand this phenomenon.

306 Our results emphasize the need to understand how these risk factors interact and act as
307 mediating mechanisms between IPV and pregnancy outcomes.⁵⁵ during Addressing health
308 behaviors may require a deeper understanding of the temporality and reasons (i.e. coping
309 mechanisms). Likewise, we found that depression during pregnancy was elevated for all forms
310 of IPV and should be addressed in the context of abusive relationships.

311 Strengths and Limitations

312 These results should be interpreted in light of study limitations. The sample population
313 is high-risk African-American pregnant women residing in Washington, DC, and thus are not
314 necessarily generalizable a wider population. However, the results inform the kind of elevated
315 risk that affects pregnant women who are already vulnerable. These analyses are longitudinal,
316 involving data collected during pregnancy and including birth outcomes. While there were few
317 differences between women retained and lost to follow-up, the higher depression levels in
318 women who were lost suggest that this group was at higher risk and that our results would
319 have been stronger with complete follow-up. The data on risk factors and IPV were self-
320 reported, which may have led to under-reporting due to social desirability. However, the data
321 on pregnancy outcomes were collected through record abstraction, and thus should be
322 considered reliable. The RCT was not originally powered to detect differences in birth
323 outcomes, but rather risk resolution. The original study randomization did not account for
324 different IPV. Future research should include a broader population of pregnant women.

325 Following women longer would facilitate understanding the detrimental effects of different
326 forms of IPV on long-term maternal and child health outcomes.

327 Interpretation

328 Despite the limitations, the results provide important insight into differences in the risk
329 profiles of pregnant women experiencing various forms of IPV. We confirm that women who
330 participate in reciprocal violence tend to suffer many negative consequences⁴⁰ and have serious
331 pregnancy risk profiles. We also add to the literature describing the relationship between IPV
332 and negative birth outcomes, specifically in women who report victimization only. We found
333 clear delineations between forms of violence experienced and risk profiles and outcomes,
334 which may have implications for future research on IPV and clinicians' practice.

335 Previous studies reported the benefits of screening for IPV in clinical settings.^{56,57} Expanding the
336 identification of IPV to include the type and form(s) should be possible within the clinical setting
337 with a similar time investment. This would allow beneficial interventions to alleviate a
338 woman's behavioral and mental health issues. This knowledge can help providers guide the
339 patient's pregnancy and birth care decisions. Our results support the recent American Congress
340 of Obstetricians and Gynecologists opinion that screening for IPV should be a routine part of

341 preventive care for women.⁵⁸ **Conclusions:** We conclude that women have the most pregnancy
342 risk factors when they are participating in reciprocal violence and thus might be at higher risk
343 for long-term consequences, but women who are victims of IPV are more likely to show
344 proximal negative outcomes like PTB and LBW. When women present for care, their provider
345 should consider perpetration as well as victimization. Different types of interventions may be
346 needed for these two forms of IPV.

347

348

349 **DISCLOSURE OF INTERESTS**

350 Neither of the authors has any competing interests to declare.

351 **CONTRIBUTION TO AUTHORSHIP**

352 YS performed the statistical analyses, participated in the interpretation of the results and the writing of
353 the manuscript. YS has given final approval of the manuscript.

354 MK, as the NICHD Project Officer, oversaw all the activities of the study while it was in the field. She
355 participated in the analysis and interpretation of the results. MK did a significant amount of the original
356 writing of the manuscript, as well as revising it critically for important intellectual content. MK has given
357 final approval of the manuscript.

358 **DETAILS OF ETHICS APPROVAL**

359 This study was approved by the Human Subjects Committees at Howard University (for the clinical sites),
360 RTI International (the data coordinating center) and the *Eunice Kennedy Shriver* National Institute of
361 Child Health and Human Development. Copies of the Institutional Review Board approval have been
362 archived and I no longer have access to them. The data were collected as part of a clinical trial,
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375 **WORD COUNT: 3840**

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602 **TABLE CAPTIONS**

603 Table 1. Select descriptive characteristics of sample at baseline.

604 Table 2. Adjusted odds ratios (95% confidence intervals) associating risk factors of pregnancy
605 and IPV forms

606 Table 3. Adjusted odds ratios (95% confidence intervals) in the model associating pregnancy-
607 related outcomes and IPV forms (any IPV)

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Table 1. Select descriptive characteristics of sample at baseline.

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Table 1. Select descriptive characteristics of sample at baseline.

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Variables	Women who reported perpetrating IPV (n = 127) Mean \pm SD/ Percent (n)	Women who reported being victims of IPV (n = 51) Mean \pm SD/ Percent (n)	Women who reported reciprocal IPV (n = 285) Mean \pm SD/ Percent (n)	Women who reported no IPV (n = 577) Mean \pm SD/ Percent (n)	Difference tests p-value
Maternal age (years)	23.94\pm5.10	26.31\pm6.67	24.17\pm5.27	24.74\pm5.40	0.03
Gestational age (weeks)	20.25 \pm 6.98	18.24 \pm 8.80	18.92 \pm 6.90	18.72 \pm 6.80	0.13
Education:					
Less than high school	33.86 (43)	19.61 (10)	34.04 (97)	28.60 (165)	0.16
High school or GED	51.97 (66)	43.14 (22)	42.81 (122)	47.49 (274)	
Some college	14.17 (18)	37.25 (19)	23.16 (66)	23.92 (138)	
Relationship status:					
Married/significant other	28.35 (36)	23.53 (12)	24.56 (70)	22.18 (128)	0.14
Single/divorced/widowed/separated	71.65 (91)	76.47 (29)	75.44 (215)	77.82 (449)	
Medicaid	86.51 (109)	66.00 (33)	80.99 (230)	75.83 (436)	0.04
WIC	49.21 (62)	41.18 (21)	45.26 (129)	41.59 (240)	0.13
Currently employed	31.50 (40)	35.29 (18)	37.68 (107)	37.09 (214)	0.29
Risk factors:					
Alcohol use during pregnancy	18.90 (24)	25.49 (13)	32.98 (94)	15.80 (91)	<0.001
Illicit drug use during pregnancy	12.60 (16)	11.76 (6)	17.54 (50)	8.84 (51)	<0.01
Active smoking	18.11 (23)	29.41 (15)	20.70 (59)	17.33 (100)	0.15
ETSE	76.86 (93)	66.67 (34)	80.00 (224)	68.37 (389)	<0.01
Depression	17.34 \pm13.36	19.37\pm14.19	23.16\pm14.68	13.76 \pm12.81	<0.001
In intervention group	13.68 (71)	4.82 (25)	27.75 (144)	48.35 (279)	0.15
Wanted pregnancy	76.98 (97)	71.43 (35)	74.11 (209)	77.60 (447)	0.58
Happiness about pregnancy:					
Unhappy	14.17 (18)	31.37 (16)	22.81 (65)	18.20 (105)	0.03
Moderately happy	44.09 (56)	33.33 (17)	42.81 (122)	38.30 (221)	
Very happy	41.73 (53)	35.29 (18)	34.39 (98)	43.50 (251)	

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Note: Differences in means or proportions are denoted by bolded text.

617 Table 2. Adjusted odds ratios (95% confidence intervals) associating risk factors of pregnancy
618 and IPV forms
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Risk factors	Perpetrator only	Victim only	Reciprocal
Any IPV			
Maternal Age - B (SE) ^a	-0.80 (0.53)	1.58 (0.79)	-0.57 (0.39)
Relationship status ^a	0.72 (0.47, 1.11)	0.93 (0.47, 1.82)	0.88 (0.63, 1.22)
Maternal Education: ^a			
Less than high school	2.00 (1.10, 3.62)	0.44 (0.20, 0.98)	1.23 (0.84, 1.81)
High school graduate	1.85 (1.06, 3.23)	0.58 (0.31, 1.11)	0.93 (0.65, 1.34)
Alcohol use	1.36 (0.82, 2.26)	1.63 (0.82, 3.25)	2.80 (1.99, 3.95)
Illicit drug use	1.43 (0.78, 2.62)	1.56 (0.63, 3.88)	2.12 (1.39, 3.25)
Smoking	1.05 (0.62, 1.78)	2.08 (1.04, 4.15)	1.27 (0.87, 1.85)
ETSE	1.44 (0.91, 2.29)	1.02 (0.55, 1.90)	1.83 (1.30, 2.59)
Depression ^b – B (SE)	3.93 (1.31)	5.06 (1.96)	9.40 (0.97)
Pregnancy wantedness	0.96 (0.60, 1.53)	0.72 (0.37, 1.40)	0.80 (0.57, 1.12)
Pregnancy happiness ^c :			
Unhappy	0.72 (0.40, 1.30)	1.85 (0.89, 3.85)	1.17 (0.79, 1.71)
Very happy	0.81 (0.53, 1.23)	0.92 (0.46, 1.8.)	0.71 (0.51, 0.96)
Minor IPV			
Maternal Age - B (SE) ^a	-0.68 (0.53)	2.42 (0.79)	-0.63 (0.39)
Relationship status ^a	0.76 (0.50, 1.17)	0.93 (0.48, 1.84)	0.86 (0.62, 1.20)
Maternal Education: ^a			
Less than high school	1.69 (0.95, 3.01)	0.43 (0.19, 0.96)	1.26 (0.85, 1.86)
High school graduate	1.67 (0.97, 2.86)	0.58 (0.31, 1.12)	0.97 (0.67, 1.40)
Alcohol use	1.41 (0.85, 2.33)	1.68 (0.85, 3.31)	2.76 (1.95, 3.90)
Illicit drug use	1.39 (0.76, 2.55)	1.23 (0.46, 3.28)	2.01 (1.31, 3.07)
Smoking	1.06 (0.63, 1.79)	2.13 (1.07, 4.22)	1.27 (0.87, 1.85)
ETSE	1.36 (0.86, 2.15)	1.01 (0.54, 1.87)	1.75 (1.23, 2.47)
Depression ^b – B (SE)	3.84 (1.31)	4.61 (1.96)	9.57 (0.97)
Pregnancy wantedness	1.02 (0.64, 1.64)	0.77 (0.39, 1.50)	0.82 (0.59, 1.15)
Pregnancy happiness ^c :			
Unhappy	0.81 (0.46, 1.45)	2.34 (1.12, 4.88)	1.14 (0.78, 1.69)
Very happy	0.91 (0.60, 1.39)	1.04 (0.51, 2.13)	0.71 (0.51, 0.98)
Severe IPV			
Maternal Age - B (SE) ^a	-0.97 (0.60)	0.22 (0.65)	-0.58 (0.56)
Relationship status ^a	0.88 (0.53, 1.45)	1.00 (0.58, 1.74)	1.02 (0.63, 1.64)
Maternal Education: ^a			
Less than high school	2.00 (1.02, 3.94)	0.92 (0.49, 1.72)	1.47 (0.86, 2.52)
High school graduate	1.74 (0.92, 3.31)	0.79 (0.45, 1.40)	0.88 (0.52, 1.50)
Alcohol use	3.05 (1.85, 5.01)	2.53 (1.49, 4.29)	4.03 (2.59, 6.27)

Illicit drug use	1.89 (1.02, 3.50)	1.47 (0.72, 3.01)	3.05 (1.83, 5.06)
Smoking	1.38 (0.79, 2.43)	1.05 (0.56, 1.98)	1.78 (1.10, 2.91)
ETSE	1.99 (1.11, 3.57)	2.43 (1.28, 4.64)	1.39 (0.85, 2.27)
Depression ^b – B (SE)	6.79 (1.51)	7.87 (1.61)	9.59 (1.39)
Pregnancy wantedness	0.89 (0.53, 1.50)	0.98 (0.55, 1.74)	0.71 (0.45, 1.12)
Pregnancy happiness ^c :			
Unhappy	0.82 (0.43, 1.57)	1.76 (0.99, 3.16)	1.21 (0.72, 2.05)
Very happy	0.85 (0.52, 1.38)	0.76 (0.43, 1.34)	0.69 (0.43, 1.11)
Physical IPV			
Maternal Age - B (SE) ^a	-1.05 (0.50)	1.63 (0.84)	-0.69 (0.40)
Relationship status ^a	0.67 (0.44, 1.00)	0.84 (0.42, 1.71)	0.89 (0.63, 1.27)
Maternal Education: ^a			
Less than high school	1.68 (0.98, 2.88)	0.35 (0.14, 0.86)	1.34 (0.90, 2.00)
High school graduate	1.53 (0.92, 2.52)	0.59 (0.30, 1.16)	0.95 (0.65, 1.39)
Alcohol use	1.63 (1.02, 2.60)	2.04 (1.00, 4.13)	2.89 (2.03, 4.11)
Illicit drug use	1.24 (0.69, 2.23)	1.15 (0.39, 3.37)	2.08 (1.35, 3.19)
Smoking	0.98 (0.59, 1.61)	1.16 (0.51, 2.63)	1.26 (0.86, 1.85)
ETSE	1.57 (1.01, 2.45)	1.81 (0.86, 3.81)	1.74 (1.21, 2.48)
Depression ^b – B (SE)	5.18 (1.25)	7.51 (2.10)	9.16 (1.01)
Pregnancy wantedness	0.82 (0.53, 1.27)	1.09 (0.50, 2.36)	0.76 (0.54, 1.08)
Pregnancy happiness ^c :			
Unhappy	0.81 (0.48, 1.39)	1.39 (0.59, 3.25)	1.23 (0.83, 1.81)
Very happy	0.78 (0.52, 1.16)	1.25 (0.61, 2.55)	0.67 (0.48, 0.94)
Sexual IPV			
Maternal Age - B (SE) ^a	-1.38 (0.88)	1.15 (0.61)	-0.99 (0.69)
Relationship status ^a	0.92 (0.44, 1.92)	0.87 (0.53, 1.44)	2.05 (1.00, 4.21)
Maternal Education: ^a			
Less than high school	2.42 (0.87, 6.73)	0.57 (0.33, 1.00)	1.29 (0.65, 2.58)
High school graduate	1.67 (0.61, 4.57)	0.39 (0.23, 0.67)	0.96 (0.50, 1.86)
Alcohol use	1.69 (0.79, 3.60)	2.17 (1.33, 3.53)	3.06 (1.79, 5.23)
Illicit drug use	1.99 (0.87, 4.54)	1.42 (0.73, 2.76)	2.11 (1.11, 4.01)
Smoking	1.97 (0.92, 4.24)	1.80 (1.04, 3.10)	1.94 (1.07, 3.53)
ETSE	1.31 (0.58, 2.93)	1.25 (0.74, 2.11)	2.42 (1.16, 5.02)
Depression ^b – B (SE)	6.91 (2.23)	7.18 (1.55)	8.83 (1.73)
Pregnancy wantedness	2.70 (0.94, 7.76)	0.69 (0.42, 1.16)	1.19 (0.64, 2.21)
Pregnancy happiness ^c :			
Unhappy	0.31 (0.07, 1.36)	1.65 (0.95, 2.86)	1.14 (0.58, 2.25)
Very happy	1.49 (0.76, 2.94)	0.77 (0.45, 1.32)	1.11 (0.63, 1.95)

621 Note. The odds ratios are adjusted for maternal age, maternal education, and relationships status

622 ^a These relationships are bivariate between age, relationship status and maternal education and the different
623 forms of IPV

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625 ^b Depression is a continuous variable; therefore, the coefficients presented are from a linear regression

626 ^c Moderately happy category is the reference group
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629 Table 3. Adjusted odds ratios (95% confidence intervals) in the model associating pregnancy-
 630 related outcomes and IPV forms (any IPV)
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Pregnancy outcomes	Perpetrator only	Victim only	Reciprocal
Any IPV			
PTB (< 37 weeks)	0.74 (0.36, 1.53)	1.52 (0.68, 3.36)	1.40 (0.87, 2.23)
VPTB (< 34 weeks)	0.61 (0.13, 2.76)	2.93 (0.90, 9.54)	2.06 (0.92, 4.58)
LBW (< 2,500 grams)	0.89 (0.44, 1.72)	2.21 (1.04, 4.72)	1.07 (0.49, 1.48)
VLBW (< 1,500 grams)	NE ^a	4.54 (1.06, 19.44)	1.72 (0.51, 5.81)
SGA	0.87 (0.49, 1.56)	1.85 (0.92, 3.72)	0.62 (0.38, 1.00)
Minor IPV			
PTB (< 37 weeks)	0.89 (0.46, 1.75)	1.64 (0.76, 3.55)	1.33 (0.82, 2.15)
VPTB (< 34 weeks)	0.61 (0.13, 2.76)	3.66 (1.22, 10.97)	2.01 (0.89, 4.56)
LBW (< 2,500 grams)	1.02 (0.53, 1.94)	1.83 (0.84, 3.98)	0.96 (0.57, 1.61)
VLBW (< 1,500 grams)	NE ^a	4.24 (0.98, 18.30)	1.87 (0.55, 6.32)
SGA	0.87 (0.49, 1.55)	1.81 (0.90, 3.63)	0.59 (0.36, 0.96)
Severe IPV			
PTB (< 37 weeks)	0.75 (0.63, 2.62)	1.28 (0.75, 2.57)	1.39 (0.57, 1.26)
VPTB (< 34 weeks)	0.31 (0.04, 2.39)	2.78 (1.10, 7.06)	1.13 (0.37, 3.46)
LBW (< 2,500 grams)	0.51 (0.21, 1.25)	1.66 (0.84, 3.28)	1.06 (0.54, 2.07)
VLBW (< 1,500 grams)	1.07 (0.13, 8.74)	3.28 (0.85, 12.65)	0.81 (0.10, 6.59)
SGA	0.40 (0.17, 0.95)	0.92 (0.45, 1.89)	0.88 (0.47, 1.65)
Physical IPV			
PTB (< 37 weeks)	0.74 (0.37, 1.47)	1.41 (0.58, 3.41)	1.60 (1.00, 2.57)
VPTB (< 34 weeks)	0.54 (0.12, 2.43)	3.52 (1.06, 11.65)	2.15 (0.96, 4.79)
LBW (< 2,500 grams)	0.72 (0.36, 1.45)	2.49 (1.13, 5.52)	1.28 (0.77, 2.13)
VLBW (< 1,500 grams)	NE ^a	5.67 (1.29, 25.02)	2.06 (0.61, 6.98)
SGA	0.75 (0.43, 1.34)	1.62 (0.75, 3.48)	0.65 (0.39, 1.05)
Sexual IPV			
PTB (< 37 weeks)	1.30 (0.52, 3.28)	1.08 (0.55, 2.13)	0.98 (0.44, 2.21)
VPTB (< 34 weeks)	0.67 (0.09, 5.25)	1.57 (0.56, 4.36)	1.30 (0.36, 4.67)
LBW (< 2,500 grams)	1.21 (0.47, 3.06)	1.12 (0.55, 2.26)	0.61 (0.23, 1.62)
VLBW (< 1,500 grams)	2.43 (0.29, 20.54)	3.74 (1.09, 12.85)	NE ^a
SGA	0.62 (0.21, 1.81)	1.32 (0.71, 2.45)	0.77 (0.33, 1.77)

632 Note: The odds ratios are adjusted for maternal age, maternal education, relationship status, care group and
 633 baseline risk factors (the latter only if they attained a significant association with the outcome at the p ≤ .01
 634 level)

635 ^a NE – Not estimated because no women participating in reciprocal violence delivered a VLBW infant..