An Integrated Intervention to Reduce Intimate Partner Violence in Pregnancy

A Randomized Controlled Trial

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OBJECTIVE: To estimate the efficacy of a psycho-behavioral intervention in reducing intimate partner violence recurrence during pregnancy and postpartum and in improving birth outcomes in African-American women.

METHODS: We conducted a randomized controlled trial for which 1,044 women were recruited. Women were randomly assigned to receive either intervention (n=521) or usual care (n=523). Individually tailored counseling sessions were adapted from evidence-based interventions for intimate partner violence and other risks. Logistic regression was used to model intimate partner violence victimization recurrence and to predict minor, severe, physical, and sexual intimate partner violence.

RESULTS: Women randomly assigned to the intervention group were less likely to have recurrent episodes of intimate partner violence victimization (odds ratio [OR] 0.48, 95% confidence interval [CI] 0.29–0.80). Women with minor intimate partner violence were significantly less likely to experience further episodes during pregnancy (OR 0.48, 95% CI 0.26–0.86, OR 0.53, 95% CI 0.28–0.99) and postpartum (OR 0.56, 95% CI 0.34–0.93). Numbers needed to treat were 17, 12, and 22, respectively, as compared with the usual care group. Women with severe intimate partner violence showed significantly reduced episodes postpartum (OR 0.39, 95% CI 0.18–0.82); the number needed to treat was 27. Women who experienced physical intimate partner violence showed significant reduction at the first follow-up (OR 0.49, 95% CI 0.27–0.91) and postpartum (OR 0.47, 95% CI 0.27–0.82); the numbers needed to treat were 18 and 20, respectively. Women in the intervention group had significantly fewer very preterm neonates (1.5% intervention group, 6.6% usual care group; $P=.03$) and an increased mean gestational age (38.2±3.3 intervention group, 36.9±5.9 usual care group; $P=.016$).

CONCLUSION: A relatively brief intervention during pregnancy had discernible effects on intimate partner violence and pregnancy outcomes. Screening for intimate partner violence as well as other psychosocial and behavioral risks and incorporating similar interventions in prenatal care is strongly recommended.

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Intimate partner violence is defined as a pattern of assaultive and coercive behaviors that includes the threat or infliction of physical, sexual, or psychological abuse that is used by perpetrators for the purpose of intimidation and control over the victim.[1–3] There is no agreement regarding what set of signs, symptoms, or illnesses are considered the standard International Classification of Diseases, 9th Revision, Clinical Modification constellation for a diagnosis of intimate partner violence.[4,5]

The Centers for Disease Control and Prevention reports that approximately 4.8 million episodes of intimate partner violence occur every year in the United States in women 18 years and older.[6] The literature is inconsistent as to whether minorities are at increased risk, with some studies reporting signifi-

cant differences[7–10] and others finding no racial or ethnic differences.[11,12] The most recent and largest nationally representative study found no differences in lifetime prevalence of intimate partner violence by race/ethnicity, whereas the rate for the 12 months preceding the survey was almost twice as high among African Americans.[13] Although some authors link intimate partner violence to socioeconomically deprived communities, it is by no means limited to the economically disadvantaged. Families with conflicting priorities and stressors associated with limited psycho-social reserves may be at greatest risk.[14] Factors including housing conditions, poverty, and street violence are associated with a higher prevalence of violence inside the home environment. Political disenfranchisement and cultural isolation also may be mediators for intimate partner violence. Women living under such conditions are more likely to be victimized as compared with women living in more stable and better organized communities.[15–17]

Exposure to intimate partner violence is associated with a range of negative psycho-behavioral risks and health outcomes including increased risk of poor physical health, physical disability, psychological distress, mental illness, and heightened substance use including alcohol and illicit drugs.[18] Sexual and physical intimate partner violence has been linked significantly with depression, suicidality, and posttraumatic stress disorder.[19–22] Women who suffer from intimate partner violence are more likely to have sexually transmitted diseases, vaginal bleeding or infection, and urinary tract infections.[23] Abuse during pregnancy has been shown to be associated with significantly higher rates of depression and suicide attempts as well as use of tobacco, alcohol, and illicit drugs.[24–31] Intimate partner violence has been linked to both pregnancy complications (eg, inadequate weight gain, infections, and bleeding) and adverse pregnancy outcomes (low birth weight [LBW], preterm delivery, and neonatal death).[32–34] Intimate partner violence among minority populations, already at higher risk for poor pregnancy outcomes, may be a significant contributor to the health disparities observed in reproductive outcomes among African-American women.

The objective of this study was to estimate the efficacy of a cognitive behavioral intervention administered as part of a randomized controlled trial (RCT) during prenatal care in reducing the recurrence of intimate partner violence during pregnancy and improving birth outcomes (LBW and preterm delivery) in a population of African-American residents of Washington, DC (DC).

PARTICIPANTS AND METHODS

The NIH-DC Initiative to Reduce Infant Mortality in Minority Populations is a collaboration between Children's National Medical Center, Georgetown University, George Washington University Medical Center, Howard University, the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, the National Center on Minority Health and Health Disparities, and RTI International. As part of this collaboration, we conducted an RCT to evaluate the efficacy of an integrated behavioral intervention delivered during prenatal care in reducing cigarette smoking, environmental tobacco smoke exposure, depression, and intimate partner violence during pregnancy and in improving pregnancy outcome. This study was reviewed and approved by the institutional review boards of all participating institutions.

Women were screened at six community-based prenatal care sites serving mainly minority women in DC between July 2001 and October 2003. Women were demographically eligible if they self-identified as being a minority and were at least 18 years old, 28 weeks pregnant or less, a DC resident, and English speaking. Almost two thirds (63.4%) were recruited before 22 weeks of gestation, 16.9% were recruited between 22 and 25 weeks of gestation, and 19.7% were recruited between 26 and 28 weeks of gestation. The women who were demographically eligible went through a two-stage consent and enrollment process. After initial consent, participants were screened for the four risk factors (cigarette smoking, environmental tobacco smoke exposure, depression, and intimate partner violence) using an audio computer assisted self interview, which also confirmed their demographic eligibility. An average of 9 days after screening, a baseline interview took place during which more detailed information on socio-demographics, reproductive history, and behavioral risks was collected. After this interview, women were considered to have consented to participate. Follow up data collection by telephone interviews occurred during the second and third trimesters of pregnancy (22–26 and 34–38 weeks of gestation, respectively) and 8–10 weeks postpartum. Intervention and follow-up activities continued until July 2004. Details are published in El-Khorazaty et al.[35]

A total of 2,913 women were screened, and 1,398 met the eligibility criteria (Fig. 1). Of these, 85% (n = 1,191) consented to participate in a baseline telephone interview before randomization; 1,070 (89.9%) were reached and participated. Eligible women were randomly assigned to the intervention group or the

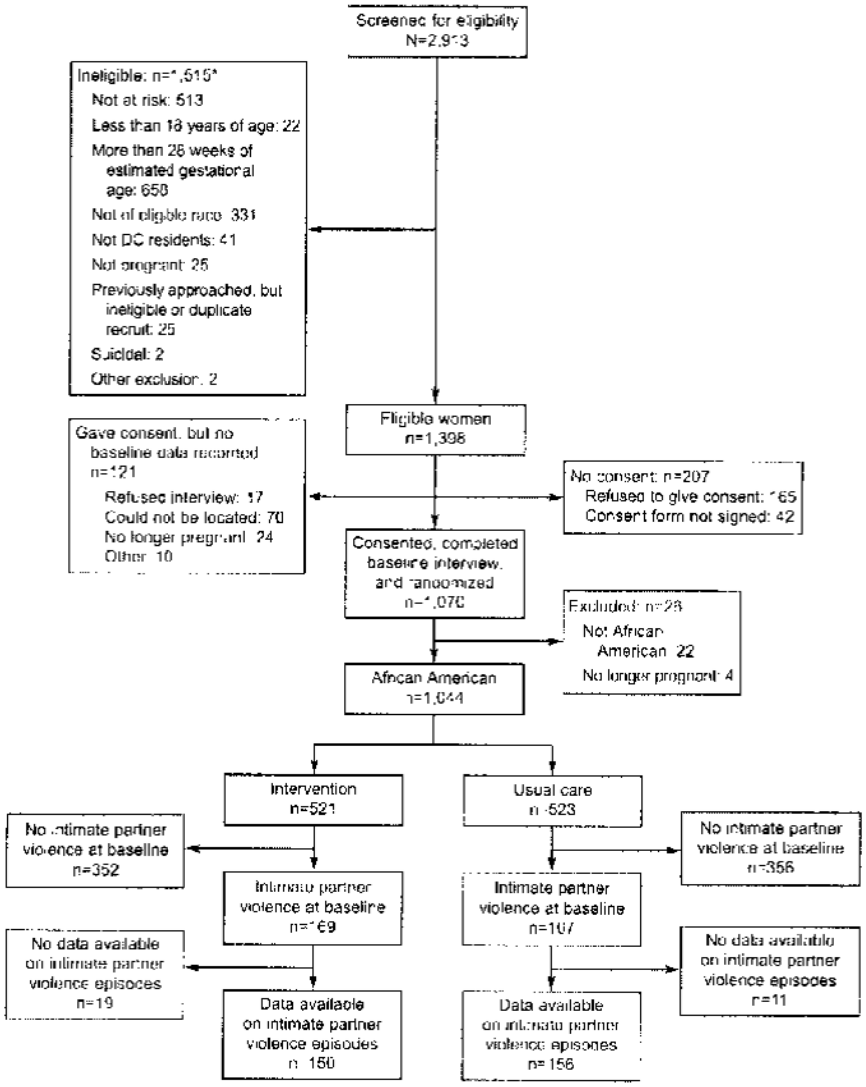

Fig. 1. Screening, eligibility, recruitment, and retention for Project District of Columbia Healthy Outcomes of Pregnancy. *More than one reason for ineligibility may apply. Modified from El-Khorazaty MN, Johnson AA, Kiely M, El-Mohandes AAE, Subramanian S, Laryea HA, Murray KB, Thornberry JS, Joseph JG. Recruitment and retention of low-income minority women in a behavioral intervention to reduce smoking, depression, and intimate partner violence during pregnancy. BMC Public Health 2007;7:233.

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usual care group. Of these women, 1,044 were African-American and still pregnant at the time of the baseline interview. Included in the analyses were 521 randomly assigned to the intervention group and 523 randomly assigned to the usual care group.

Women randomly assigned to the intervention group received an integrated cognitive behavioral intervention, and women randomly assigned to the usual care group received their usual prenatal care as determined by the standard procedures at the prenatal care clinic. A total of 336 women reported intimate partner violence victimization in the past year during the baseline interview, and this group could be categorized further as having minor or severe intimate partner violence or both and physical or sexual intimate partner violence or both based on the Conflict Tactics Scale.[36] A woman may experience multiple types of violence; thus, these categories are not mutually exclusive. Minor intimate partner violence was defined as the woman's partner slapping, grabbing, pushing, or shoving her, throwing something at her, twisting her arm or hair, or insisting, without using force, on anal sex, vaginal sex, or sex without using a condom. Major intimate partner violence was defined as the woman's partner kicking, biting, punching, beating up, hitting, choking, or slamming her, using a knife or gun, burning or scalding her on purpose, or using force or threats to have anal or vaginal sex. Physical intimate partner violence was defined as the woman's partner throwing something at her, pushing or shoving her, using a knife or gun, or hitting, choking, slamming, grabbing, burning, or kicking her. Sexual intimate partner violence was defined as the woman's partner forcing sex without

using a condom, forcing her to have sex, or threatening or insisting on having sex (oral, anal, or vaginal) against her will.

The intervention used in this RCT was delivered during routine prenatal care visits at the clinics by interventionists (master's level social workers or psychologists) trained specifically to deliver this intervention. The intervention was evidence-based and specific to each of the designated psycho behavioral risks.[37] At each intervention session, the woman identified which of the four risks she was experiencing. The intervention was delivered by the interventionist and targeted to address all risks reported at each session, regardless of previously reported risks. The intervention for intimate partner violence emphasized safety behaviors and was based on the structured intervention developed by Parker and colleagues[38] and based on Dutton's[39] Empowerment Theory. This intervention provided information about the types of abuse (eg, emotional, physical, and sexual) and the cycle of violence (eg, escalating, intimate partner violence, honeymoon period), a danger assessment component to assess risks, and preventive options women might consider (eg, filing a protection order) as well as the development of a safety plan (eg, leaving important documents and papers with others). In addition, a list of community resources with addresses and phone numbers was provided. The interventions for smoking and environmental tobacco smoke exposure were combined and based on Smoking Cessation or Reduction in Program Treatment (Windsor RA. Counseling smokers in Medicaid maternity care: the SCRIPT project [abstract]. Tob Control 2009;9(suppl):162). This intervention was cognitive–behavioral and based on a woman's stage of readiness for behavioral change.[40] The depression intervention was developed by Miranda and Munoz[41] based on cognitive behavioral theory and focused on mood management, increasing pleasurable activities, and increasing positive social interactions.

The components of the intervention were designed for delivery in a minimum of four sessions, with eight prenatal sessions required for a complete intervention based on the highest number of sessions required for a specific risk. Fifty-one percent of the women randomly assigned to the intervention group received four or more sessions; one quarter of the women attended no intervention sessions. Individualized counseling sessions provided an integrated approach to multiple risks responsive to a woman's specific risk combination. Two additional postpartum booster sessions were provided to reinforce risk-specific intervention goals and support women through the postpartum period. Intervention sessions were conducted privately in a room proximate to or within the prenatal care clinics and occurred immediately before or after routine prenatal care. Intervention activities addressing all of the individually identified risks at each session lasted for an average of 35 ± 15 minutes. Women in the intervention group received $10 for each intervention session and additional $15 and $25 gift certificates for the first and second postpartum intervention sessions, respectively.

During screening or follow-up, women reporting suicidal ideation were referred immediately to the mental health consultation team. Women were evaluated and referred as necessary. Those found to be potentially suicidal ($n=10$) were excluded from the study.

The sample size was powered to test the reduction in psycho-behavioral risk, with the theory that a reduction in risk would help improve pregnancy outcomes. Assuming a 5% level of significance, 80% power would allow the detection of 10–20% reductions in risk specific factors among women in the intervention group from a prevalence of 100% at recruitment. A sample of 1,050 women needed to be retained at the end of the follow-up period (525 women each in the intervention and usual care groups). The anticipated number of women reporting intimate partner violence needed to detect significance in reducing risk was 337 split between the two care groups. This sample size also was sufficient to detect a 25% reduction in preterm birth and LBW combined in the intervention group compared with that for the usual care group (estimated at 20%). Based on a declining birth rate in DC, the recruitment period was extended 4 months to reach the required sample size.

Site- and risk-specific permuted block randomization to the intervention or usual care group was conducted. Both the investigators and the field workers were blinded to block size. A computer generated randomization scheme was used to consider all the possible risk combinations within each of the recruitment sites. When a woman completed the baseline interview and was ready for randomization, the recruitment staff would call the data coordinating center, where the participant's assignment was determined.

Validated instruments were used for each of the data-collection time points. During screening, intimate partner violence was identified by the Abuse Assessment Screen, a measure designed and validated for use in pregnancy if a woman reported physical or

sexual abuse by a partner in the previous year.[42] During the baseline and follow-up interviews, the frequency of physical assault and sexual coercion (partner to self) was measured by the Conflict Tactics Scale.[36] A more detailed description of instruments used for other risks is available in Katz et al.[37]

Telephone interviewers and their supervisors were blinded to the participants' randomization group. Research staff maintained confidentiality when communicating with participants outside the clinic setting. Addresses were collected to facilitate tracing efforts, but the women were informed that they would not receive mail from Project District of Columbia—Healthy Outcomes of Pregnancy. For women experiencing intimate partner violence, staff did not want to raise women's risk for abuse by having them receive mail from the study that might be regarded negatively by an abusive partner or would expose the pregnancy. Women also were asked whether or not telephone messages from project staff could be left on their telephone answering machines. If not, this was noted in the participant's computerized record, which was accessible by all project teams. As financial incentives, the women received $5 for the screening, a 30 minute telephone card for providing main study consent, and $15 for each telephone interview. At the time of recruitment, medical records were abstracted and, on delivery, data on neonatal and pregnancy outcomes were recorded.

To preserve the randomization, participant data were analyzed according to their care-group assignment, regardless of receipt of intervention, using an intent-to-treat approach. All statistical analyses were conducting using SAS 9.1.3 (SAS Institute, Cary, NC). Bivariate analyses were conducted to compare the baseline characteristics and pregnancy outcomes of women assigned to the intervention and usual care groups and to compare women who reported a recurrence of intimate partner violence during pregnancy or postpartum with those who did not. *t* tests compared groups based on continuous variables (using the TTEST procedure in SAS), and χ^2 tests compared the groups with respect to categorical variables (using SAS's FREQ procedure). Logistic regression was used to model recurrence of intimate partner violence based on care-group assignment, controlling for relevant covariates (using the LOGISTIC procedure). Logistic models also were created to predict minor, severe, physical, and sexual intimate partner violence reported at each interview. Adjusted odd ratios were produced by models that included care group plus other covariates.

RESULTS

Table 1 presents the sociodemographic characteristics and psycho-behavioral risks at baseline between women randomly assigned to the intervention group (n=521) or to the usual care group (n=523). There were no significant differences between these two groups. During the baseline interview, 336 women (32.2%) reported intimate partner violence in the previous year. Of these women, 169 were in the intervention group and 167 were in the usual care group (Fig. 1). In this subgroup, there were no significant differences between the women in the two randomization groups (Table 1). The mean age of the participants was 24.5 years. On average, participants initiated prenatal care at 13 weeks of gestation. Seventy-six percent were single, 68% had at least a high school education, and 79% were enrolled in Medicaid. In this population, 22% of the participants admitted to active smoking during pregnancy, 78% self-identified as being at risk for environmental tobacco smoke exposure, and 62% were depressed as measured by the Hopkins Scale. In addition, 32% admitted to using alcohol, and 17% admitted to illicit drug use during pregnancy.

Of those women reporting intimate partner violence at baseline, 306 (91.1%) completed at least one of the follow-up or postpartum interviews. No significant differences were found between those with follow up data (n=306) and those without (n=30), nor were the women randomly assigned to the intervention group (n=150) significantly different from those randomly assigned to the usual care group (n=156).

Women reporting continued intimate partner violence during pregnancy or postpartum (n=94) were significantly different from those who reported no further episodes of intimate partner violence (n=212) beyond baseline with respect to care group (P=.006), gestational age at baseline (P=.035), alcohol use during pregnancy (P=.014), and depression at baseline (P=.009).

Controlling for these four variables in the logistic regression, only care group, alcohol use, and depression were significant in the reduced model. Logistic regression results for continued intimate partner violence at all interviews during pregnancy and postpartum (n=94) showed that women in the intervention group were less likely to have recurrent episodes of intimate partner violence (adjusted odds ratio [OR] 0.48, 95% confidence interval [CI] 0.29–0.80). Alcohol use during pregnancy measured at baseline and depression were associated with the chance of recurrent episodes of intimate partner violence (adjusted

Table 1. Characteristics of All Participants and Those Acknowledging Intimate Partner Violence Victimization at Baseline

Characteristic	All Participants		Women With IPV at Baseline	
	Intervention (n=521)	Usual Care (n=523)	Intervention (n=169)	Usual Care (n=167)
Maternal age (y)	24.4±5.5	24.8±5.3	24.5±5.8	24.5±5.4
Gestational age at enrollment (wk)	19.3±6.9	18.6±6.8	19.2±6.8	18.3±6.9
Education level				
Less than high school	159 (30.5)	157 (30.0)	54 (32.0)	53 (31.7)
High school graduate/GED	245 (47.0)	241 (46.1)	77(45.6)	67 (40.1)
At least some college	117 (22.5)	125 (23.9)	38 (22.5)	47 (28.1)
Employment status				
Working now	185 (35.5)	196 (37.5)	58 (34.3)	67 (40.4)
Not working now, worked previous to pregnancy	185 (35.5)	193 (36.9)	67 (39.6)	59 (35.5)
Not working now, did not work previous to pregnancy	150 (28.8)	130 (24.9)	44 (26.0)	40 (24.1)
Relationship status				
Single/separated/widowed/divorced	396 (76.0)	401 (76.7)	132 (78.1)	122 (73.1)
Married or living with partner	125 (24.0)	122 (23.3)	37 (21.9)	45 (27.0)
Emotional support from partner	36.9±20.6	37.3±20.5	32.8±20.9	32.7±19.7
Emotional support from others	39.4±15.1	40.8±14.7	37.7±14.9	39.3±14.9
Emotional support from partner prior to delivery	34.3±21.6	33.9±21.8	31.0±21.9	29.6±21.6
Emotional support from others prior to delivery	41.8±12.7	41.7±13.4	40.5±13.7	39.9±14.7
Trimester of PNC initiation				
First	305 (61.60)	300 (58.9)	94 (58.8)	98 (60.9)
Second	179 (36.2)	201 (39.5)	60 (37.5)	60 (37.3)
Third	11 (2.2)	8 (1.6)	6 (3.8)	3 (1.9)
Medicaid (yes)	411 (78.9)	402 (76.8)	134 (79.8)	129 (77.7)
WIC (yes)	226 (43.4)	228 (43.6)	74 (43.8)	76 (45.5)
Supplemental food program (yes)	369 (71.1)	382 (73.0)	168 (99.4)	162 (97.0)
Public assistance/TANF (yes)	213 (41.0)	223 (42.7)	73 (43.2)	69 (41.3)
Alcohol use in this pregnancy (yes)	111 (21.3)	112 (21.4)	58 (34.3)	49 (29.3)
Illicit drug use in this pregnancy (yes)	67 (12.9)	56 (10.7)	26 (15.4)	30 (18.0)
Marijuana use (yes)	62 (11.9)	52 (9.9)	23 (13.6)	28 (16.8)
Cocaine use (yes)	6 (1.2)	7 (1.3)	5 (3.0)	3 (1.8)
Pregnancy wanted (yes)	403 (77.4)	395 (75.5)	127 (76.1)	117 (71.3)
Previous pregnancy (yes)	425 (81.6)	443 (84.7)	141 (83.4)	144 (86.2)
Previous live birth (yes)	173 (33.2)	163 (31.2)	112 (69.5)	116 (69.5)
Number of live births (women with previous pregnancy)	2.1±1.5	2.2±1.4	1.9±1.7	1.7±1.5
Previous preterm delivery (yes)	72 (14.2)	66 (12.7)	30 (22.2)	23 (16.4)
Previous stillbirth, miscarriage and loss (women with previous pregnancy) (yes)	181 (42.6)	192 (43.3)	59 (42.1)	68 (47.2)
Gestational diabetes (yes)	25 (5.8)	32 (7.0)	8 (5.6)	11 (7.5)
Preconception diabetes (yes)	19 (3.7)	18 (3.4)	7 (4.2)	4 (2.4)
Gestational hypertension (yes)	14 (3.3)	20 (4.4)	3 (2.1)	6 (4.1)
Chronic hypertension (yes)	31 (6.0)	29 (5.5)	13 (7.8)	5 (3.0)
Active smoking at baseline (yes)	106 (20.3)	92 (17.6)	38 (22.5)	36 (21.6)
ETSE at baseline (yes)	365 (71.4)	377 (73.3)	128 (77.1)	130 (78.8)
Depression at baseline (yes)	229 (44.0)	234 (44.7)	101 (59.8)	106 (63.5)
IPV at baseline (yes)	169 (32.4)	167 (31.9)		—
Active smoking prior to delivery (yes)	70 (16.6)	65 (15.2)	24 (17.8)	26 (19.6)
ETSE prior to delivery (yes)	247 (58.7)	277 (65.2)	82 (61.2)	89 (66.9)
Depression prior to delivery (yes)	152 (35.9)	170 (39.8)	71 (52.6)	73 (53.4)
Active smoking postpartum (yes)	89 (21.9)	106 (25.0)	31 (22.8)	44 (31.9)
ETSE postpartum (yes)	196 (48.5)	233 (55.9)	63 (46.7)	85 (63.0)
Depression postpartum (yes)	90 (22.2)	118 (27.8)	39 (28.9)	51 (37.0)

IPV, intimate partner violence; GED, general equivalency diploma; PNC, prenatal care; WIC, Supplemental Nutrition Program for Women, Infants, and Children; TANF, Temporary Assistance for Needy Families; ETSE, environmental tobacco smoke exposure.
Data are mean±standard deviation or n (%).
All characteristics are measured at baseline except when noted otherwise.

OR 1.85, 95% CI 1.09–3.12 and adjusted OR 1.90, 95% CI 1.11–3.25, respectively). Women in the intervention group were less likely to be victimized by their partners at the first or second follow-up interviews (second or third trimester) (Table 2). Although the trend remains, the difference does not reach significance in the postpartum period.

Table 3 presents adjusted ORs and numbers needed to treat for the effect of the intervention on minor intimate partner violence, severe intimate partner violence, physical intimate partner violence, and sexual intimate partner violence at baseline and at each of the follow-up interviews. It should be noted that reported intimate partner violence at baseline refers to the 1 year preceding the interview, whereas, at each of the three subsequent interviews, the reference period was since the previous interview (on average 9–10 weeks during pregnancy and 14 weeks between the second follow-up and the postpartum interview). At baseline, no significant differences between groups were observed for any of these four categories. Women with minor intimate partner violence who were randomly assigned to the intervention group were significantly less likely to experience further episodes at all of the follow-up points. Women categorized with severe intimate partner violence in the intervention group showed a significantly reduced incidence of episodes postpartum compared with those in the usual care group. Women experiencing physical intimate partner violence in the intervention group were significantly less likely to experience episodes at first follow-up or at postpartum interviews compared with those in the usual care group. For women experiencing sexual intimate partner violence, the intervention did not significantly reduce their incidence of episodes at any follow-up visit during pregnancy or postpartum.

For women experiencing intimate partner violence victimization throughout pregnancy and postpartum, Table 4 presents a comparison of women in the intervention and usual care groups with respect to various adverse pregnancy outcomes. The results indicate that rates of LBW (less than 2,500 g) were not different in the two groups (intervention: 12.8%, usual care: 18.5%, $P=.204$) and that rates of very low birth weight (VLBW) (less than 1,500 g) were lower among women in the intervention group (intervention: 0.8%, usual care: 4.6%, $P=.052$). In addition, rates of preterm births (37 weeks of gestation) were not statistically different in the two groups (13.0% compared with 19.7%, $P=.135$). However, the two groups of women were significantly different with respect to very preterm delivery (less than 33 weeks of gestation) (1.5% compared with 6.6%, $P=.030$). Also, the two groups were significantly different for mean gestational age at delivery (38.2 weeks compared with 36.9 weeks, $P=.016$).

Table 2. Comparison of the Intervention and Usual Care Groups by Continued Intimate Partner Violence

Characteristic	Intervention	Usual Care	*P*
IPV victim at FU1	14/92 (15.2)	32/105 (30.5)	.012
IPV victim at FU2	10/110 (9.1)	20/110 (18.2)	.050
IPV victim PP	17/134 (12.7)	29/137 (21.2)	.063
IPV victim at all (FU1, FU2, and PP)	35/150 (23.3)	59/156 (37.8)	.006

IPV, intimate partner violence; FU1, first follow-up interview (22–26 weeks of gestation); FU2, second follow-up interview (34–38 weeks gestation); PP, postpartum interview.
Data are n/N (%).

DISCUSSION

This study evaluates the efficacy of a psycho-behavioral intervention during prenatal and postpartum care on the reduction of intimate partner violence recurrence and improved pregnancy outcomes in African American women reporting intimate partner violence victimization. We were able to recruit 330 women acknowledging intimate partner violence victimization within the past year during the baseline interview and who were willing to participate in the intervention. In addition, 91% of these women continued to participate in this randomized trial during pregnancy, postpartum, or both pregnancy and postpartum. This finding emphasizes the relative ease of recruitment of high-risk African-American women to intimate partner violence–reduction programs in the prenatal care setting. The recruitment staff were trained to be culturally sensitive, and the screening tool was both simple and administered confidentially. These women are also willing to maintain participation in a program that provided cognitive behavioral strategies relevant to psycho-behavioral problems they experienced during pregnancy.

The integrated intervention provided women with suggestions to deal with depression and tobacco exposure in addition to strategies aimed at reducing the risk of intimate partner violence. Alternative explanations for our findings were considered. For other services for which we queried the women, there were no differences between women experiencing intimate partner violence and those not. We also considered whether women's previous reproductive history might explain why the intervention group had significantly better outcomes. None of the factors

Table 3. Adjusted Odds Ratios* for the Effect of the Intervention on Various Categories of Intimate Partner Violence Victimization During Pregnancy and Postpartum

Intervention Compared With Usual Care	Minor IPV	Severe IPV	Physical IPV	Sexual IPV
Baseline				
n (%)	327 (31.4)	185 (17.7)	295 (28.3)	153 (14.7)
AOR (95% CI)	1.07 (0.81–1.40)	0.97 (0.70–1.35)	1.07 (0.81–1.42)	1.03 (0.72–1.47)
Absolute risk difference†	0.014	0.004	0.014	0.004
Number needed to treat (95% CI)‡	—	—	—	—
FU1				
n (%)	56 (9.5)	24 (4.1)	52 (8.8)	22 (3.7)
AOR (95% CI)	0.48 (0.26–0.86)	0.53 (0.22–1.27)	0.49 (0.27–0.91)	0.39 (0.15–1.03)
Absolute risk difference†	0.061	0.024	0.054	0.031
Number needed to treat (95% CI)‡	17 (11–67)	—	18 (12–108)	—
FU2				
n (%)	49 (6.8)	16 (2.2)	34 (4.7)	23 (3.2)
AOR (95% CI)	0.53 (0.28–0.99)	0.85 (0.31–2.33)	0.56 (0.27–1.17)	0.55 (0.23–1.32)
Absolute risk difference†	0.083	0.004	0.026	0.018
Number needed to treat (95% CI)‡	12 (5–642)	—	—	—
PP				
n (%)	72 (8.7)	36 (4.4)	62 (7.5)	27 (3.3)
AOR (95% CI)	0.56 (0.34–0.93)	0.39 (0.18–0.82)	0.47 (0.27–0.82)	0.99 (0.46–2.16)
Absolute risk difference	0.045	0.037	0.030	0.001
Number needed to treat (95% CI)‡	22 (14–146)	27 (20–96)	20 (14–61)	—

IPV, intimate partner violence; AOR, adjusted odds ratio; CI, confidence interval; FU1, first follow-up interview (22–26 weeks of gestation); FU2, second follow-up interview (34–38 weeks of gestation); PP, postpartum.

* Adjusted for alcohol use during pregnancy and depression at baseline.

† Absolute difference between intervention and usual care groups.

‡ Number needed to treat is calculated for significant adjusted odds ratios and significant risk differences.

(previous preterm delivery, previous miscarriage, previous stillbirth, number of previous voluntary interruptions of pregnancy) that might predict poor reproductive outcomes were different between the two care groups. Finally we considered whether medical conditions that might influence pregnancy outcomes (preconception and gestational diabetes, chronic and gestational hypertension, sexually transmitted infections) were significantly different between the two care groups. None of these medical conditions were significantly different between the two care groups.

Table 4. Pregnancy Outcomes Among Women Experiencing Intimate Partner Violence Throughout Pregnancy and Postpartum by Care Group

Characteristic	Intervention (n=150)	Usual Care (n=156)	P
LBW	17 (12.8)	24 (18.5)	.204
VLBW	1 (0.8)	6 (4.6)	.052
Birth weight (g)	3,139±593	3,098±717	.618
PTB	18 (13.0)	27 (19.7)	.135
VPTB	2 (1.5)	9 (6.6)	030
Gestational age at delivery (wk)	38.2±3.3	36.9±5.9	.016

LBW, low birth weight; VLBW, very low birth weight; PTB, preterm birth; VPTB, very preterm birth.

Data are n (%) or mean±standard deviation unless otherwise specified.

The American College of Obstetricians and Gynecologists identifies the response to domestic violence against women as a priority and recommends screening within primary care settings.[43] They also recommend the Patient Health Questionnaire as a screening instrument for intimate partner violence, depression, and anxiety. This questionnaire recognizes the co-occurrence of these psycho-social risks, and it screens for substance exposure known to occur more frequently in victims of intimate partner violence.[24–27,31] The findings of our study confirm the importance of emphasizing a more global approach to risk assessment and service provision in this population of high-risk African-American women.

Intimate partner violence has been associated with poor pregnancy outcomes in the literature.[28,30,32–34,44–47] Our study found reductions in adverse pregnancy outcomes despite previous evidence of associations between intimate partner violence during pregnancy and LBW.[28,30,32–34] The intervention model targeting multiple risk factors in African-American women suffering from intimate partner violence victimization shows promising results that could be translated into reduction of neonatal mortality within that popula-

tion. The current literature agrees that very preterm neonates make up more than 90% of the overall infant mortality rate among preterm infants.[48] The intervention affected multiple pregnancy outcomes, especially those with the highest level of neonatal risk–VLBW and very preterm delivery. The significant reduction of VLBW and very preterm delivery in our intervention group may have important implications for reducing the rates of poor pregnancy outcomes and infant mortality among African-Americans.

Whether or not our analyses were adjusted for alcohol use and depression, the intervention universally reduced minor intimate partner violence during pregnancy and postpartum. It is important to recognize that the classification of minor intimate partner violence on the Conflict Tactics Scale includes acts of assault such as slapping, grabbing, pushing, and shoving as well as twisting of the arm or hair. Although such actions may be considered minor on the Conflict Tactics Scale, they are significant acts of aggression and violence. The intervention was unable to affect more severe acts, described as using a knife or gun, choking, burning, scalding, or kicking. The lack of effect on sexual intimate partner violence could be attributed to the reluctance or discomfort of the study participants to divulge or discuss these topics. The intervention team was instructed to show sensitivity to the level of comfort of the study participants in this domain. The intervention as designed and implemented reduced only the recurrence of minor and physical intimate partner violence, but it could have reduced other associated risks.

The effect of intimate partner violence on pregnancy outcome is complicated by its co-occurrence with depression and alcohol use.[47,49–51] The behavioral intervention for depression could have contributed significantly to our success. Among the women reporting intimate partner violence at baseline, 62% reported being depressed and 32% reported alcohol use during pregnancy. Addressing intimate partner violence and depression together may have helped women implement suggested strategies to assess risks, consider preventive options, and develop safety plans. We also detected a significant association between intimate partner violence and illicit drug use (16.7%) and active smoking (22%), both known to be risks for preterm delivery and LBW.[52,53] In reduced logistical models, alcohol use during pregnancy and depression measured at baseline continued to exert a significant influence on perpetuating intimate partner violence during pregnancy and postpartum. This describes a cycle where co-occurring risk factors are immutably entangled.

A limitation of the study was that it was not powered to test the efficacy of the intervention with respect to adverse pregnancy outcomes but rather resolution of the psycho-behavioral risks. Women were invested only modestly in participating in the intervention. Despite the fact that we were able to deliver the minimum number of intervention sessions to 59% of participants with intimate partner violence, women randomly assigned to the intervention group were successful in risk reduction. These rates of participation may be a reflection of difficult life circumstances among poor urban women. These women encountered other behavioral challenges during pregnancy, such as alcohol and drug use, that were not addressed by the intervention. Had we addressed these, we might have been even more successful. The intervention effect(s) we found may apply only to high-risk minority pregnant women. It would be important to test this intervention in other racial or sociodemographic groups to confirm generalizability. Larger studies testing the effectiveness of implementing such interventions in community-based clinics providing prenatal care could have important health-policy implications.

There is evidence that this intervention for pregnant African-American women reduced intimate partner violence victimization during pregnancy and improved pregnancy outcome. If generalizable, our results should encourage health care providers and third party payers to go beyond screening for psychosocial and behavioral risks to providing services during prenatal care to address such risks. The potential cost savings associated with reduction of births within the highest risk category may be substantial.

REFERENCES

1. Gunter J. Intimate partner violence. Obstet Gynecol Clin North Am 2007;34:367–88.
2. Violence against women. Geneva: World Health Organization; 1996. Available at: http://whqlibdoc.who.int/hq/1996/FRH_WHD_96.27.pdf. Retrieved February 17, 2009.
3. Saltzman LE, Fanslow JL, McMahon PM, Shelley GA. Intimate partner violence surveillance: uniform definitions and recommended data elements, version 1.0. Atlanta (GA): National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 1999.
4. Campbell J, Jones AS, Dienemann J, Kub J, Schollenberger J, O'Campo P, et al. Intimate partner violence and physical health consequences. Arch Intern Med 2002;162:1157–63.
5. Mullerman R, Lenaghan PA, Pakieser RA. Battered women: injury locations and types. Ann Emerg Med 1996;28:486–92.
6. CDC National Center for Prevention and Control. Intimate partner violence: fact sheet, 2006. Available at: www.cdc.gov/violenceprevention/pdf/ipv-factsheet-a.pdf. Retrieved March 9, 2009.

7. Dietz PM, Gamararian JA, Goodwin MM, Bruce FC, Johnson CH, Rochat RW. Delayed entry into prenatal care: effect of physical violence. Obstet Gynecol 1997;90:221–4.
8. Cunradi CB, Caetano R, Clark C, Schafer J. Neighborhood poverty as a predictor of intimate partner violence among white, black, and Hispanic couples in the United States: a multilevel analysis. Ann Epidemiol 2000;10:297–308.
9. Goodwin MM, Gazmararian JA, Johnson CH, Gilbert BC, Saltzman LE. Pregnancy intendedness and physical abuse around the time of pregnancy: findings from the pregnancy risk assessment monitoring system, 1996–1997. PRAMS Working Group. Pregnancy Risk Assessment Monitoring System. Matern Child Health J 2000;4:85–92.
10. Caetano R, Field CA, Ramisetty-Mikler S, McGrath C. The 5-year course of intimate partner violence among White, Black, and Hispanic couples in the United States. J Interpers Violence 2005;20:1039–57.
11. Wiemann CM, Agurcia CA, Berenson AB, Volk RJ, Rickert VI. Pregnant adolescents: experiences and behaviors associated with physical assault by an intimate partner. Matern Child Health J 2000;4:93–101.
12. Rencker PR. Physical abuse, social support, self-care, and pregnancy outcomes of older adolescents. J Obstet Gynecol Neonatal Nurs 1999;28:377–88.
13. Breiding MJ, Black MC, Ryan GW. Prevalence and risk factors of intimate partner violence in eighteen U.S. states/territories, 2005. Am J Prev Med 2008;34:112–8.
14. Bhandari S, Levitch AH, Ellis KK, Ball K, Everett K, Geden E. Comparative analyses of stressors experienced by rural low-income pregnant women experiencing intimate partner violence and those who are not. J Obstet Gynecol Neonatal Nurs 2008;37:492–501.
15. Pavao J, Alvarez J, Baumrind N, Induni M, Kimerling R. Intimate partner violence and housing instability. Am J Prev Med 2007;32:143–6.
16. Stueve A, O'Donnell L. Urban young women's experiences of discrimination and community violence and intimate partner violence. J Urban Health 2008;85:386–401.
17. Raghavan C, Rajah V, Gentile K, Collado L, Kavanagh AM. Community Violence, Social Support Networks, Ethnic Group Differences, and Male Perpetration of Intimate Partner Violence. J Interpers Violence 2009;24:1615–32.
18. Field CA, Caetano R. Longitudinal model predicting partner violence among white, black, and Hispanic couples in the United States. Alcohol Clin Exp Res 2003;27:1451–8.
19. Reviere SL, Farber EW, Twomey H, Okun A, Jackson E, Zanville H, et al. Intimate partner violence and suicidality in low-income African-American women: a multimethod assessment of coping factors. Violence Against Women 2007;13:1113–29.
20. Martin SL, Macy RJ, Sullivan K, Magee ML. Pregnancy-associated violent deaths: the role of intimate partner violence. Trauma Violence Abuse 2007;8:135–48.
21. Hazen AL, Connelly CD, Soriano FI, Landsverk JA. Intimate partner violence and psychological functioning in Latina women. Health Care Women Int 2008;29:282–99.
22. Perez S, Johnson DM. PTSD compromises battered women's future safety. J Interpers Violence 2008;23:635–51.
23. Campbell J, Jones AS, Dienemann J, Kub J, Schollenberger J, O'Campo P, et al. Intimate partner violence and physical health consequences. Arch Intern Med 2002;162:1157–63.
24. Amaro H, Fried L, Cabral H, Zuckerman B. Violence during pregnancy and substance use. Am J Public Health 1990;80:575–9.
25. Martin SL, English KT, Clark KA, Cilenti D, Kupper LL. Violence and substance abuse among North Carolina pregnant women. Am J Public Health 1996;86:991–8.
26. Martin SL, Beaumont JL, Kupper LL. Substance use before and during pregnancy: links to intimate partner violence. Am J Drug Alcohol Abuse 2003;29:599–617.
27. Berenson A, Suglich N, Wilkinson G, Anderson G. Drug abuse and other risk factors for physical abuse in pregnancy among white non Hispanic, black, and Hispanic women. Am J Obstet Gynecol 1991;164:491–6.
28. Berenson AB, Wiemann CM, Wilkinson GS, Jones WA, Anderson GD. Perinatal morbidity associated with violence experienced by pregnant women. Am J Obstet Gynecol 1994;170:1760–6.
29. Campbell J, Poland M, Waller J, Ager J. Correlates of battering during pregnancy. Res Nurs Health 1992;15:219–26.
30. McFarlane J, Parker B, Soeken K. Abuse during pregnancy: associations with maternal health and infant birth weight. Nurs Res 1996;45:37–42.
31. McFarlane J, Parker B, Soeken K. Physical abuse, smoking, and substance use during pregnancy: prevalence, interrelationships and effects on birth weight. J Obstet Gynecol Neonatal Nurs 1996;25:313–20.
32. Moraes CL, Amorim AR, Reichenheim ME. Gestational weight gain differentials in the presence of intimate partner violence. Int J Gynaecol Obstet 2006;95:254–60.
33. Yost NP, Bloom SL, McIntire DD, Leveno KJ. A prospective observational study of domestic violence during pregnancy. Obstet Gynecol 2005;106:61–5.
34. Janssen PA, Holt VL, Sugg NK, Emanuel I, Critchlow CM, Henderson AD. Intimate partner violence and adverse pregnancy outcomes: a population-based study. Am J Obstet Gynecol 2003;188:1341–7.
35. El-Khorazaty MN, Johnson AA, Kiely M, El-Mohandes AAE, Subramanian S, Laryea HA, et al. Recruitment and retention of low-income minority women in a behavioral intervention to reduce smoking, depression, and intimate partner violence during pregnancy. BMC Public Health 2007;7:233.
36. Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The Revised Conflict Tactics Scale (CTS2): development and preliminary psychometric data. J Fam Issues 1996;17:283–316.
37. Katz KS, Blake SM, Milligan RA, Sharps PW, White DB, Rodan MF, et al. The design, implementation and acceptability of an integrated intervention to address multiple behavioral and psychosocial risk factors among pregnant African American women. BMC Pregnancy and Childbirth 2008;8:22.
38. Parker B, McFarlane J, Soeken K, Silva C, Reel S. Testing an intervention to prevent further abuse to pregnant women. Res Nurs Health 1999;22:59–66.
39. Dutton MA. Empowering and healing battered women. New York (NY): Springer; 1992.
40. DiClemente CC, Prochaska J, Fairhurst SK, Velicer WF, Velasquez MM, Rossi JS. The process of smoking cessation: an analysis of precontemplation, contemplation, and preparation stages of change. J Consult Clin Psychol 1991;59:295–304.
41. Miranda J, Munoz R. Intervention for minor depression in primary care patients. Psychosomatic Medicine 1994;56:136–41.
42. McFarlane J, Parker B, Soeken K, Bullock L. Assessing for abuse during pregnancy. JAMA 1992;267:3176–8.
43. Durant T, Colley Gilbert B, Saltzman LE, Johnson CH. Opportunities for intervention: discussing physical abuse during prenatal care visits. Am J Prev Med 2000;19:238–44.

44. Neggers Y, Goldenberg R, Cliver S, Hauth J. Effects of domestic violence on preterm birth and low birth weight. Acta Obstet Gynecol Scand 2004;83:455–60.

45. Fried LE, Cabral H, Amaro H, Aschengrau A. Lifetime and during pregnancy experience of violence and the risk of low birth weight and preterm birth. J Midwifery Womens Health 2008;53:522–8.

46. Rodrigues T, Rocha I, Barros H. Physical abuse during pregnancy and preterm delivery. Am J Obstet Gynecol 2008; 198:171.e1–6

47. Brown SJ, McDonald EA, Krastev AH. Fear of an intimate partner and women's health in early pregnancy: findings from the Maternal Health Study. Birth 2008;35:293–302.

48. Callaghan WM, MacDorman MF, Rasmussen SA, Qin C, Lackritz EM. The contribution of preterm birth to infant mortality rates in the United States. Pediatrics 2006;118: 1566–73.

49. Bailey BA, Daugherty RA. Intimate partner violence during pregnancy: incidence and associated health behaviors in a rural population. Matern Child Health J 2007;11:495–503.

50. Fife RS, Ebersole C, Bigatti S, Lane KA, Brunner Huber LR. Assessment of the relationship of demographic and social factors with intimate partner violence among Latinas in Indianapolis. J Women's Health 2008;17:769–75.

51. Paranjape A, Heron S, Thompson M, Bethea K, Wallace T, Kaslow N. Are alcohol problems linked with an increase in depressive symptoms in abused, inner-city African American women? Womens Health Issues 2007;17:37–43.

52. Cnattingius S. The epidemiology of smoking during pregnancy: smoking prevalence, maternal characteristics, and pregnancy outcomes. Nicotine Tob Res 2004;6 Suppl 2:S125–40.

53. Windham GC, Hopkins B, Fenster L, Swan SH. Prenatal active or passive tobacco smoke exposure and the risk of preterm delivery or low birth weight. Epidemiology 2000;11:427–33.