
Neighborhood and Individual-Level Violence and Unintended Pregnancy

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ABSTRACT *As many as half of all pregnancies are unintended, and unintended pregnancy has been linked to a variety of adverse pregnancy and infant health outcomes. Our aim was to determine if urban women who experience high levels of neighborhood and/or individual-level violence are at an increased risk of reporting an unintended pregnancy. One thousand five hundred thirty-six pregnant women seeking care in an emergency department in Philadelphia, Pennsylvania were recruited in their first or second trimester and completed in-person interviews. Information on demographic characteristics, social support, substance abuse, current experience and history of interpersonal violence, perceptions of current neighborhood-level violence, and the intendedness of their current pregnancy were gathered. Multiple logistic regression analyses were conducted to assess the relationship between violence indicators and pregnancy intendedness. Six hundred twenty-seven women (41%) reported an unintended pregnancy. Not feeling safe in one's neighborhood was significantly associated with reporting an unintended pregnancy (odds ratio (OR), 1.28; 95% confidence interval (CI), 1.02–1.61) when demographic, other neighborhood, and individual-level violence indicators were accounted for. Furthermore, history of sexual abuse (OR, 1.5; 95% CI, 1.11–2.04), violence in previous pregnancy (OR=1.7, 95% CI, 1.15–2.51), and a high index of spousal abuse score (OR=1.6; 95% CI, 1.32–2.04) were also associated with unintended pregnancy in multiple logistic regression models. These findings indicate that neighborhood-level violence and other individual-level violence indicators may be important when examining factors related to unintended pregnancy among young, urban women.*

KEYWORDS *Pregnancy intendedness, Neighborhood violence, Individual violence*

INTRODUCTION

An unintended pregnancy is a pregnancy that is either mistimed or unwanted at the time of conception and is commonly the result of various risk factors often associated with fertility control. It is estimated that one half of all pregnancies in the USA are unintended, and unintended pregnancy has been linked to numerous adverse maternal and child health outcomes including delayed prenatal care and increased rates of elective abortion, substance abuse during pregnancy, infant mortality, reduced breastfeeding, child and maternal abuse, and maternal depression.^{1–4} A variety of sociodemographic risk factors for unintended pregnancy have been identified in the literature with particularly high rates of unintended pregnancy occurring among unmarried women, minority women, urban women, women with

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limited education, women living in poverty, and women at the youngest and oldest spectrum of their reproductive years.^{1,5-7} In fact, the rates of unintended pregnancy among low-income women have increased by 29% nationally, while rates for non-poor women have decreased by 22% over the past 5 years.⁸ Given the ongoing epidemic of unintended pregnancy in the USA, a reduction in the rate of unintended pregnancy has been listed as a national priority and a national goal set to decrease unintended pregnancies to 30% by 2010.

Much of the literature to date examining the role of violence and unintended pregnancy has focused on the evaluation of individual-level or intimate partner violence. Research has assessed the role of intimate partner violence among women who were pregnant or women who have just delivered, and these studies found a strong relationship between experiencing physical and sexual violence and unintended pregnancy. Gao et al. examined women who recently delivered and found over a 50% increased risk of unplanned pregnancy among women reporting at least one episode of intimate partner violence (odds ratio (OR)=1.52; 95% confidence interval (CI), 1.01-2.26).⁹ Among Peruvian women following delivery, those women experiencing both physical and sexual abuse in their lifetime were three times more likely to report that the pregnancy was unintended (OR=3.31), and the number of physical violence episodes and the severity of episodes increased during the pregnancy if the pregnancy was unintended.¹⁰ Fanslow et al. conducted a large study of over 2,300 women who had ever been pregnant and found that experiencing violence during pregnancy resulted in a lower proportion of women reporting wanting the pregnancy (28% vs. 55%), and a higher proportion of women reporting later access to prenatal care, smoking, and/or alcohol use during the pregnancy (67% vs. 22% and 31% vs. 20%, respectively).¹¹

Although both the prevalence of unintended pregnancy and its consequences are well documented, the literature is very limited with respect to environmental factors such as community and neighborhood-level violence and unintended pregnancy rates, particularly in urban areas. To our knowledge, only one study has explored the role of violence in the community as it relates to unintended pregnancy. Pallitto and O'Campo found that after controlling for individual factors and personal experience of intimate partner violence, living in a community with high rates of intimate partner violence increased the odds of an unintended pregnancy by more than twofold (OR=2.5; 95% CI, 1.16-6.75).³ We designed this study to examine the role of a woman's perception of violence in her neighborhood and her report of an unintended pregnancy. We examined the role of perceptions of neighborhood-level violence and self-reported prior and current experience of individual-level violence and the intendedness of a pregnancy among a population of urban, low-income pregnant women.

MATERIALS AND METHODS

Study Design and Participants

Women enrolled in this study were identified among all women aged 14-40 years presenting to the emergency department (ED) at the Hospital of the University of Pennsylvania (HUP) between January 1999 and August 2001 and residing in selected ZIP codes in Philadelphia. The selected ZIP codes represent the immediate West Philadelphia catchment area of HUP and the group of pregnant women most likely to utilize the ED for primary care purposes.

Each woman meeting these criteria was screened for pregnancy. Women self-reporting a current pregnancy greater than 22 weeks of gestation, a history of hysterectomy, or a normal menstrual cycle in the past 28 days were excluded from the pregnancy screening process, as the probability of early pregnancy was negligible. Women who were postpartum or had a therapeutic or spontaneous abortion in the previous 14 days were also not screened for pregnancy. Urine pregnancy tests were conducted on all other women regardless of the reason for the ED visit. One thousand six hundred seventy-three women had a positive urine pregnancy test at the time of screening in the ED, we further excluded women for non-English speaking ($n=9$); women diagnosed with an ectopic, molar, or twin pregnancy ($n=42$); birth of a child ($n=19$); or women who presented to the ED with an acute mental illness ($n=3$). Among the remaining eligible pregnant women, 96% agreed to participate in the study ($n=1,536$). For this analysis, with the goal of examining the role of individual and neighborhood-level violence related to the intendedness of the current pregnancy, all eligible pregnant women were included in the assessment ($n=1,536$), including the subset of women who subsequently received a therapeutic abortion following enrollment ($n=210$).

At enrollment, each woman completed an extensive in-person interview administered by a nurse interviewer. Data were collected on sociodemographic factors, prior and current reproductive and medical history, current level of social support, current living arrangements, prior and current substance abuse, current levels of psychosocial stress and depressive symptoms, self-reports of current and past exposure to individual-level violence, and perceptions of neighborhood-level violence. All women provided written informed consent, and the protocol and consent forms were approved by the institutional review board of the University of Pennsylvania and Temple University.

Study Measures

The degree of pregnancy intendedness (yes/no) was the main dependent variable in this assessment. The intendedness of the pregnancy was captured by two questions concerning feeling happy or sad at the time the pregnancy was first confirmed and current plans to terminate the pregnancy. In this study, a woman was identified as reporting an unintended pregnancy if she felt sad (compared to happy) when she first learned of the pregnancy or she planned to/considered terminating the pregnancy. The specific questions were “When you found out you were pregnant did you feel mostly happy or sad?” and “Do/did you plan to do anything to try to end this pregnancy?”

Although the literature frequently uses the construct of pregnancy intendedness, prior studies have also utilized negative and/or ambivalent thoughts regarding the pregnancy to infer pregnancy intention.^{12–14} In these studies, measures of happiness regarding the pregnancy were related to adverse pregnancy behaviors and outcomes and may yield stronger associations between initiation/utilization of prenatal care. Thus, the assessment of neighborhood-level violence on pregnancy intendedness may also identify a method to improve birth outcomes among urban women.¹⁵

The main independent variables of interest included measures of individual-level and perceptions of neighborhood-level violence. Neighborhood-level violence was assessed through a variety of self-reported questions meant to determine how safe the woman has felt in her current neighborhood over the past year. Specific questions include “How safe do you feel walking in your neighborhood after dark?” “In the past year, how many times have you heard the sound of gunfire in

your neighborhood?," "In the past year, how many times in your neighborhood have you felt afraid or thought that you would get hurt?," "In the past year, how many times has anyone been jumped or attacked in your neighborhood?," and "In the past year, how many times have you seen someone carrying or holding a gun or knife in your neighborhood, not including police or security officers?"

To characterize the woman's prior and current exposure to individual-level violence, we used a variety of self-reported questions as well as a modified version of the index of spousal abuse (ISA).¹⁶ To measure individual-level violence, information concerning the presence (and amount) of physical and sexual abuse during childhood, adulthood, and during the current pregnancy was collected. Violence was broadly identified using the question: "During any argument or fight, did you get pushed, slapped, or hurt in any way?" The subsequent set of questions identified the number of times the violence had occurred and the relationship of the perpetrator to the woman, which allowed the classification of the perpetrator as an intimate partner, family member, acquaintance, or stranger. Episodes of rape were identified through two questions focusing on childhood or adult rape (i.e., "Before you were 16 years old, did anyone ever force you to have sex when you didn't want to?" and "After you were 16 years old, did anyone ever force you to have sex when you didn't want to?").

We assessed the presence and severity of nonphysical and emotional abuse inflicted on a woman by the most recent intimate partner using the ISA. Designed by Hudson and McIntosh, the original ISA contains 30 items and has been found to have very high reliability and validity among African American women.¹⁶ For this project, we modified the ISA to include eight statements that focused solely on the nonphysical or controlling behavior a woman has experienced by her most recent intimate partner. Specific questions include "My partner does not want me to go out with my friends," "My partner tells me I am ugly and unattractive," "My partner insults or shames me in front of others," "My partner is a kind person," "My partner becomes angry if I disagree with his point of view," "My partner is generous in giving me enough money," "My partner demands sex whether I want it or not," and "My partner is jealous of other men." Women were asked to indicate the frequency of nonphysical/controlling behaviors using a five-item Likert scale ranging from 1 (never) to 5 (very frequently). Items were summed with a possible range of scores from 0 to 40, with a higher score representing increasing severity of nonphysical abuse.

Social support was assessed through the self-reported number of people each woman reported that she could count on in times of need, number of close friends, and number of people who could care for her child/children if needed.

Data Analysis

Women reporting an unintended pregnancy were compared to those reporting a wanted/intended pregnancy on multiple constructs and characteristics, particularly, perceptions of current neighborhood-level violence and prior/current individual-level violence. Univariate statistical significance was assessed using *t* tests, Wilcoxon rank sum, and Chi-squared tests as appropriate. We also conducted logistic regression analyses with unintended pregnancy (yes/no) as the outcome measure. Based on previous studies and our univariate results which identified potential confounders with *p* values <0.05, we assessed the role of four potential confounders when examining the relationship between neighborhood-level violence, individual-level violence, and pregnancy intendedness: race (black vs. non-black), educational

attainment (high school graduate; yes/no), social support (number of people women reported they could count on), and marital status (single; yes/no).⁶

Multivariate models were created separately for each neighborhood-level and individual-level violence marker adjusting for race, educational attainment, social support, and marital status. An all-inclusive neighborhood violence multivariate model was also created to examine the independent role of neighborhood-level violence on pregnancy intendedness adjusting for the woman's prior/current experience of individual-level violence and the confounding factors described above. Prior to creating this model, each violence measure was assessed for collinearity, and collinear variables were not included in this all-inclusive model. In particular, the neighborhood-level violence indicator, which measured the number of times anyone was jumped or attacked in your neighborhood, was removed from the all-inclusive neighborhood-level violence model since this measure had high collinearity with individual-level violence. The final all-inclusive neighborhood-level violence model included "feeling safe in the neighborhood" as the independent variable of interest, individual-level violence as measure by whether the woman had experienced any violence since age 16, and the confounding factors listed above. STATA statistical software version 9.0 (College Station, TX, USA) was used to analyze these data.

RESULTS

One thousand five hundred thirty-six pregnant women met the study inclusion criteria and were categorized by the intendedness of their current pregnancy. The mean age of women enrolled in the study was 23 (range, 14–40 years), with 378 women (25%) under the age of 20. The study sample was largely African American (92%), single/never married (76%), and employed/working for pay (73%). Five hundred seven women (33%) had less than a high school education. Furthermore, 627 women (41%) were classified as reporting that the pregnancy was unintended.

Univariate analyses indicated that reporting an unintended pregnancy was associated with many previously identified sociodemographic characteristics such as younger age, African American race, lower educational attainment, and single status (Table 1). Furthermore, reporting an unintended pregnancy was associated with various measures of poor social support including having fewer people to count on in times of need ($p < .01$) and fewer people able to watch your children if needed ($p = .01$).

On the univariate level, multiple measure of neighborhood-level and individual-level violence were associated with unintended pregnancy (Table 2). A significantly higher proportion of women reporting an unintended pregnancy reported currently not feeling safe in her neighborhood (38% vs. 33%; $p = .02$), a higher mean frequency of jumps/attacks in her neighborhood in the past year (21 attacks vs. 15 attacks; $p \leq .01$), and a higher mean frequency of feeling afraid in her neighborhood in the past year (22 times vs. mean 17 times; $p \leq .01$). For measures of individual-level violence, women reporting an unintended pregnancy reported a significantly higher mean number of times being forced to have sex at least once prior to or after age 16 (16 times vs. 12 times; $p = .01$ and 17 times vs. 12 times; $p < .01$, respectively). In addition, women reporting an unintended pregnancy reported significantly higher mean values of the ISA (15 vs. 14; $p < .01$; Table 2).

Neighborhood-level violence. Multiple logistic regression models, which adjusted for race, educational attainment, social support, and marital status, revealed that

TABLE 1 Sociodemographic characteristics and unintended pregnancy

Attribute	Intended	Unintended	<i>p</i> value
Age (mean)	23.7	23.1	.04
Race			
White (%)	3.4	1.6	.03
Black (%)	89.9	94.6	<.01
Education			
<High school (%)	29.6	37.7	<.01
Employed/working for pay (%)	74.1	72.5	.48
Living in public housing	22.1	19.0	.13
Never married/single (%)	69.6	84.9	<.01
First pregnancy	19.7	15.2	.02
Live child/children	75.9	83.9	<.01
Number of close friends (mean number)	3.0	2.5	.16
Number of people that you can count on (mean number)	5.2	4.2	<.01
Number of people who could care for your child/children if needed (mean number)	3.9	3.5	.01

among the multiple measures of neighborhood-level violence, only perceptions of safety in a woman's neighborhood, as measured by not feeling safe in your neighborhood, remained significantly related to reporting an unintended pregnancy (OR=1.34; 95% CI, 1.08–1.67; Table 3). This association remained when other measures of neighborhood-level violence (number of times seen someone carrying a gun or knife, number of gunshots, and number of times felt afraid) and a measure of individual-level violence (any violence since age 16) were incorporated into an all-inclusive, neighborhood-level violence model (OR=1.28; 95% CI, 1.02–1.61; data not shown).

Individual-level violence. In Table 3, the results of the multiple logistic regression models examining the independent role of the various measures of individual-level violence on pregnancy intendedness found many indicators of individual-level violence were related to pregnancy intendedness. For example, women who reported at least one episode of forced sex before aged 16 years were significantly more likely to report an unintended pregnancy after adjustment for race, educational attainment, social support and marital status (OR=1.51; 95% CI, 1.11–2.04). In addition, women reported forced sex after age 16 (OR=1.54; 95% CI, 1.14–2.07), women reporting a high ISA score in the current pregnancy (OR, 1.64; 95% CI, 1.32–2.04), and women reporting physical violence in a previous pregnancy (OR, 1.70; 95% CI, 1.15–2.51) had a significantly higher odds of reporting an unintended pregnancy after adjustment for race, educational attainment, social support, and marital status.

DISCUSSION

This study explored the association between individual-level and perceptions of neighborhood-level violence and unintended pregnancy among a group of urban,

TABLE 2 Neighborhood and individual-level violence and unintended pregnancy

Construct/attribute	Intended (mean or percent)	Unintended (mean or percent)	<i>p</i> value
Neighborhood-level violence			
Do not feel safe walking in your neighborhood	32.5	38.4	.02
Number of times felt afraid in your neighborhood (mean number)	16.8	22.4	<.01
Number of times anyone jumped or attacked in your neighborhood (mean number)	14.7	21.0	<.01
Number of times seen someone carrying a gun or knife in your neighborhood (mean number)	13.5	13.9	.07
Number of times heard sound of gunfire in your neighborhood (mean number)	34.6	37.5	.05
Prior individual-level violence			
Prior intimate partner violence in a pregnancy	6.4	9.7	.02
Number of times slapped, pushed, or hurt by sexual partner since age 16 (mean number)	8.1	9.8	.08
Forced sex before age 16	11.7	16.2	.01
Forced sex since age 16	12.2	17.3	<.01
Any past child abuse	29.3	29.5	.92
Current violence			
Violence during any fight in the current pregnancy	12.6	17.0	.02
Since current pregnancy, violence not improved or became worse	5.9	6.9	.47
Index of spousal abuse (summary score)	13.7	15.5	<.01

predominately African American, low-income women. These women constitute a particularly vulnerable group, in which both unintended pregnancy and individual and neighborhood violence are common. As mentioned, this is one of the first

TABLE 3 Multivariable models of violence-related measures and unintended pregnancy

Independent variable of interest	OR	95% confidence interval
Individual-level violence indicators		
Forced sex before age 16	1.5	1.11–2.04
Forced sex after age 16	1.5	1.14–2.07
Physical violence in previous pregnancy	1.7	1.15–2.51
High ISA score in current pregnancy	1.6	1.32–2.04
Neighborhood-level violence indicator		
Not feeling safe in the neighborhood	1.3	1.08–1.67

All models adjusted for the following covariates: race, educational attainment, social support, and marital status

Individuals were classified as having experienced intimate partner violence if they reported having been slapped, pushed, or hurt by a sexual partner one or more times since age 16

studies to explore the relationship between perceptions of neighborhood-level violence and unintended pregnancy. We found that the experience of not feeling safe in one's neighborhood was significantly related to reporting an unintended pregnancy even when other measures of neighborhood and individual-level violence and demographic factors were accounted for. While feelings and general perceptions of neighborhood safety were related to pregnancy intendedness, more specific measures of actual neighborhood violence (i.e., sounds of gunfire or number of times anyone was jumped/attacked) were not. There is a body of literature on the health effects of neighborhood-level violence which reported that subjective perceptions of neighborhood violence in addition to actual experiences of victimization and objective crime rate data have been independently linked to a variety of health outcomes such as depression, psychological distress, and physical inactivity.¹⁷⁻¹⁹

It is not hard to imagine that neighborhood-level violence measures indicating high levels of perceived neighborhood violence (i.e., feeling threatened or not feeling safe) may also be related to higher rates of unintended pregnancy. Because neighborhood-level influences on health and health behaviors must ultimately operate through some mechanism in the individual, it is important to recognize pathways, such as depression, fear, and stress/anxiety, through which neighborhood and community factors such as violence influence an individual's health. For example, a young, reproductive-age woman who perceives high levels of community violence may experience depression, and her negative feelings and feelings of hopelessness may contribute to apathy regarding birth control and lack of motivation to take protective actions such as becoming informed regarding birth control options. In addition, a young, reproductive-age woman who perceives high levels of community violence may be reluctant to walk in her neighborhood and travel. This general fear of going out contributes to a lack of access to family planning resources and infrequent medical encounters (e.g., physician visits where she would get counseled regarding family planning issues). Finally, a young, reproductive-age woman who perceives high levels of community violence may experience stress and anxiety. To alleviate stress, she may then engage in high-risk behaviors and self-medicate with drugs, alcohol, and high-risk sex. Since a woman engaging in sexual activity under the influence is less likely to take measures to protect herself from STDs and pregnancy, she exposes herself to greater risk of unintended pregnancy. Future research on the effect of neighborhood-level violence on pregnancy intendedness and fertility control would benefit from exploring the impact of various individual-level measures operating within a context of neighborhood violence.

Similar to other studies in the literature, we found that women who reported current and prior individual-level violence had greater odds of reporting an unintended pregnancy after controlling for confounding demographic factors.^{3,20,21} Few prior studies have distinguished between physical and sexual violence when examining pregnancy intendedness.²¹ Our findings indicated that there is something uniquely salient about sexual violence (either in childhood or adulthood) as a risk factor for a future unintended pregnancy. Perhaps sexual violence is particularly likely to leave women feeling powerless over their fertility and decisions regarding contraception. In addition, it should be recognized that the report of sexual violence may directly result in pregnancies that are unwanted. Thus, it is important that future studies separate out the types of individual-level violence and examine current and prior physical and sexual violence separately. Furthermore, exploring how neighborhood violence and individual-level violence may interact to influence unintended pregnancy is an area that has yet to be studied.

We did not identify an association between history of child abuse and unintended pregnancy, although the only other study that we are aware of to explore this relationship did identify a link.⁶ Perhaps the results are conflicting because of differences in study design. Dietz et al. inquired about pregnancy intention after the birth of the child, and this study examined pregnancy intendedness during the pregnancy. Additional research that uses strong prospective study designs and characterizes various types of current, prior, and childhood physical and sexual abuse are warranted.

This study had several limitations. First, the measure of unintended pregnancy used in this analysis did not capture all the possible dimensions of pregnancy intendedness or wantedness, such as mistimed pregnancies, unwanted pregnancies, and lack of fertility control measures, as proposed by complex theoretical models. However, other studies have also used negative and/or ambivalent responses toward the pregnancy as an assessment of an unwanted/unintended pregnancy and found relationships between prenatal/postpartum behaviors and offspring schizophrenia-spectrum disorder and unintended pregnancy.¹²⁻¹⁴ Future surveys should measure pregnancy intention on a continuum and capture data on fertility control, use of contraception, appropriate timing of pregnancy and motherhood, efforts in achieving pregnancy, desire for pregnancy, partner's attitude, and adoption of positive health actions to prepare for pregnancy.²²⁻²⁴ Second, by surveying women early in pregnancy, we used a unique study design compared to many other studies that capture pregnancy intention after the birth of the child; however, the ideal study would survey women at multiple times both prior to and throughout pregnancy, since evidence suggests that a woman's report of the intendedness of a pregnancy may change over time and may be influenced by the subsequent outcome of the pregnancy (i.e., premature birth).⁵ Third, our measurement of prior and current individual-level violence was based on self-report of "ever being slapped, pushed, or hurt" or "being slapped, pushed, or hurt since the last menstrual period (LMP)," which may have included minor physical aggression thus resulting in high levels of individual-level violence found in these analyses. However, we feel that even these acts of individual-level violence are important and were found to be related to an increase in unintended pregnancy. In fact, a more intensive measure of individual-level violence may result in an even stronger relationship between violence and unintended pregnancy. Finally, our measures of neighborhood-level violence focus on self-reported feelings/perceptions of neighborhood-level violence such as fear and actual exposures to violence. Gathering objective, geographically linked data (i.e., crime rates and proximity to homicide) may provide additional informative data to describe neighborhood-level violence. In addition, unmeasured and/or underlying personality factors may account for the associations we found between perceived neighborhood violence and unwanted pregnancy such that these factors may account for both a woman's perceptions of violence and tendencies to report a pregnancy as unwanted.

In conclusion, this study uniquely recruited women from an urban ED and thus did not limit its sample to women seeking prenatal care. Also, our focus on a particularly high-risk population of pregnant women and exploration of a novel research question relating neighborhood-level violence and unintended pregnancy were the strengths of this study. We found that neighborhood-level violence and a variety of indicators of individual-level violence including a history of sexual abuse and intimate partner violence during a prior pregnancy were related to pregnancy intendedness. Our findings have important implications not only for future research

examining violence and pregnancy intendedness but also for interventions to identify women who are at increased risk of experiencing an unintended pregnancy such as those with a history of sexual violence and those who feel unsafe in their communities. Our findings add to the current research, which suggest that efforts to reduce neighborhood-level violence may indirectly influence women's health outcomes and unintended pregnancy rates, providing additional evidence that a woman's neighborhood and environment have profound impacts on human health.

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