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Physical and Sexual Violence and Incident Sexually Transmitted Infections

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Abstract

Objective: To investigate whether women aged 13–35 who were victims of interpersonal violence were more likely than nonvictims to experience incident sexually transmitted infections (STIs).

Methods: We examined 542 women aged 13–35 enrolled in Project PROTECT, a randomized clinical trial that compared two different methods of computer-based intervention to promote the use of dual methods of contraception. Participants completed a baseline questionnaire that included questions about their history of interpersonal violence and were followed for incident STIs over the 2-year study period. We compared the incidence of STIs in women with and without a history of interpersonal violence using bivariate analyses and multiple logistic regression.

Results: In the bivariate analyses, STI incidence was found to be significantly associated with African American race/ethnicity, a higher number of sexual partners in the past month, and a lower likelihood of avoidance of sexual partners who pressure to have sex without a condom. In both crude and adjusted regression analyses, time to STI incidence was faster among women who reported physical or sexual abuse in the year before study enrollment (HRR_{adj} = 1.68, 95% CI 1.06, 2.65).

Conclusions: Women with a recent history of abuse are at significantly increased risk of STI incidence than are nonvictims.

Introduction

VIOLENCE AGAINST WOMEN is common. Approximately 25% of women have experienced some type of physical, sexual, or emotional violence during their lifetime,^{1,2} and nearly two thirds of this violence is perpetrated by current or former partners.³ Lifetime history of violence is associated with a host of health conditions and risk behaviors. According to data from the Behavioral Risk Factor Surveillance System (BRFSS), women with a history of violence have higher odds of stroke and heart disease as well as increased odds of risk factors associated with sexually transmitted infections (STIs) and HIV.⁴ Women with a history of intimate partner violence (IPV) were three times more likely to report some sexual risk behavior.

Sexual risk behaviors associated with violence history include condom use, exchanging sex for drugs or money, having unprotected intercourse, and using intravenous drugs. In a study of adolescent girls, Silverman et al.⁵ found that a history of physical violence was associated with high-risk

sexual practices, such as not using a condom during or substance abuse prior to the last intercourse. Wingood and DiClemente⁶ found that women with physically abusive partners were significantly less likely to request condom use during sexual intercourse for fear of abandonment or retaliation by their partners. Similarly, among women in domestic violence shelters, “fear of negotiating condom use” was significantly associated with a history of STIs.⁷ Low sexual assertiveness has also been associated with both increased violence and lower rates of condom use⁸ even when examining predictors of violence prospectively.⁹

Men who abuse their partners are significantly more likely to have multiple sex partners. In their study of women in domestic violence shelters, Wingood et al.⁷ found that self-reported STI prevalence was significantly higher among women who stated that their partners had more than one sex partner. A study in Indian men found that partner abuse was associated with a significantly increased risk of extramarital relations and of STI symptoms.¹⁰

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Moreover, women at the greatest risk for violence may also be in the highest-risk categories of STIs. Violence against women is highest among younger women, women without a high school education, and low-income women.^{2,11} Women between the ages of 12 and 30 are at greatest risk for victimization¹² and the highest risk for STIs; nearly half of all incident STIs in the United States occur in women aged 15–24.¹³ Finally, violence is more common among African American women, who have significantly higher rates of STIs and HIV.^{2,14}

Past studies of interpersonal violence and STIs have often relied on cross-sectional data. Our aim was to investigate whether an association exists between a history of violence and an incident STI. We analyzed the data of 542 women participating in Project PROTECT, a randomized controlled trial comparing two interventions that promote dual-method contraception use.¹⁵ Our hypothesis was that women who were victims of interpersonal violence were more likely than were nonvictims to have a higher incidence of STIs during the study period.

Materials and Methods

We analyzed the data collected in Project PROTECT, a randomized trial to compare two different methods of counseling to promote the use of dual methods of contraception. A complete and detailed description of the methods of Project PROTECT was published recently.¹⁵ Women were recruited from Women and Infants Hospital of Rhode Island, Pawtucket Memorial Hospital, and Planned Parenthood of Rhode Island and by referral from clinicians or study participants. Eligible participants were women between the ages of 13 and 35 years who were sexually active with a male partner in the preceding 6 months and who wished to avoid pregnancy in the ensuing 24 months. All sexually active women aged 13–24 and high-risk sexually active women aged 25–35 were eligible. All women under 25 were considered high risk based on the high rates of STIs in this age group. Women 25 and older were considered to be high risk if they had a history of one or more of the following: unplanned pregnancy or STI, inconsistent contraception use, more than one sexual partner in the past 6 months, or reported history of illicit drug use. Potential participants were excluded if they were consistently using dual methods of contraception; did not speak English, were not competent to give consent; were currently pregnant or desiring pregnancy in the ensuing 24 months, or were not sexually active with a male in the past 6 months. Between October 1999 and October 2003, 542 women were recruited into the study. Informed consent, including parental consent and, when applicable, minor assent was obtained for all participants. Prior to initiation of the study, the Women and Infants Hospital Institutional Review Board approved the study.

All study participants completed a baseline questionnaire regarding age, Hispanic ethnicity, history of alcohol, cigarette and illicit drug, stress, past experiences of violence, sexual history, and contraceptive use.

Interpersonal violence

We used a modified version of the Abuse Assessment Screen to quantify history of violence.¹⁶ This screen was developed for assessing abuse in pregnant women, with established reliability and concurrent validity,^{16,17} as well as other populations.¹⁸ Three questions specifically relating to inter-

personal violence were (1) Have you ever been emotionally or physically abused by your partner or someone important to you? (2) Within the past 1 year, have you been hit, slapped, kicked, or otherwise physically hurt by someone? (3) Within the past 1 year, has anyone forced you to have sexual activities? The response options for each question were yes and no. In our analyses, we examined baseline report of lifetime abuse (ever emotionally or physically abused) and reported abuse in the past year (any abuse and specific type of abuse).

Sexually transmitted infections

At the first study visit, physicians or nurse practitioners obtained a gynecological history, performed a pelvic examination, and tested each participant for the presence of STIs. Tenderness on pelvic examination indicated the possibility of pelvic inflammatory disease (PID). Participants were evaluated for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* via strand-based nucleic acid amplification testing (Amplified DNA Assay, Becton-Dickinson, Sparks, MD). Infection with syphilis was determined by serological testing. To diagnose trichomoniasis, vaginal pH was determined. If there was an absence of trichomonads on saline wet preparation in spite of pH >4.5, a *Trichomonas* culture was obtained using InPouch (Biomed Diagnostics, San Jose, CA). Participants were also examined for signs and symptoms of incident herpes simplex virus (HSV) infection, but there were no incident infections suspected after enrollment.

At 12 and 24 months after baseline, participants were tested again for trichomoniasis, *N. gonorrhoeae*, *C. trachomatis*, and syphilis and were examined for signs of HSV infection and PID. In addition, throughout the study period, participants were to notify the research team at any time if they experienced signs or symptoms of pregnancy or STI, such as a missed or late menstrual period or abnormal discharge. Testing and treatment were provided free of charge to encourage participants to seek care at a study-related clinic. Most incident STIs were diagnosed at study-related facilities; for the small percentage of cases diagnosed elsewhere, medical records were reviewed for confirmation.

Statistical analyses

Data were evaluated for bivariate associations between the incident STIs and demographic characteristics (e.g., age, race/ethnicity, educational level, and marital status), history of STI or unplanned pregnancy or both, as well as behavioral characteristics (e.g., number of sexual partners [lifetime and past 30 days], current cigarette smoker, illicit drug use [any marijuana, cocaine, or heroin use in the past year], frequency of condom use in the past 30 days [every time, almost every time, sometimes, almost never or never]), and avoidance of partners who pressure to have sex without a condom [never, not often/sometimes, often/very often]. Information on participant history and characteristics was obtained via self-reported information collected during an interviewer-administered structure interview completed at baseline. We also included prospective reported violence. Specifically, we created a variable of any violence during follow-up from three items which were repeated at the 6, 12, 18, and 24 month follow-ups: In the past 6 months, have you been emotionally or physically abused by your partner or someone important to you? In the past 6 months, have you been hit, slapped, kicked,

or otherwise physically hurt by someone? In the past 6 months, has anyone forced you to have sex? Chi-square and Fisher exact tests were used to determine the significance of bivariate associations.

Time to STI incidence was defined as the time from the baseline interview until the first confirmed STI within the study period. For women who did not develop an STI, time to STI was defined using the last observation date (e.g., censoring time). The association between interpersonal violence and STI incidence was evaluated using a Cox proportional hazards regression model. The Cox proportional hazards model provides an estimate of relative risk while allowing for variable follow-up lengths and for adjustment for potential confounders. The average length of follow-up for participants was 1.6 years. Ninety-four percent of women contributed some follow-up time to the analysis, and 56% were observed for the entire 24 months. There were no significant differences in length of follow-up by history of physical or sexual abuse in the past year or lifetime experience of physical or emotional abuse.

In this paper, we present the crude model and two adjusted models for each of the violence variables. The first adjusted model includes only the demographic variables age, race/ethnicity, and education. The second adjusted model includes these demographic characteristics as well as STI history, number of sexual partners in the past month, substance use, and avoidance of sexual partners who pressure participants to have sex without condoms. We considered the following in identification of confounders: biological plausibility, prior published evidence, and significance level ($p < 0.05$) in bivariate comparison. The statistical analyses were conducted using SAS (version 9.1, SAS Corporation, Cary, NC). A level of $p < 0.05$ was considered statistically significant.

Results

The cohort of women was predominantly young (79% <25 years of age), diverse, and high risk (Table 1). Forty-two percent of the cohort reported their race/ethnicity as white/

TABLE 1. CHARACTERISTICS OF WOMEN WITH AND WITHOUT INCIDENT SEXUALLY TRANSMITTED INFECTIONS (STI)

	Total n = 542 n (%)	No incident STI n = 455 n (%)	Incident STI n = 87 n (%)	p value
Age, years				
<20	155 (29)	124 (27)	31 (36)	0.28
20–24	273 (50)	233 (51)	40 (46)	
>24	114 (21)	98 (22)	16 (18)	
Race/ethnicity				
White, non-Hispanic	227 (42)	207 (46)	20 (23)	<0.0001
African American, non-Hispanic	115 (21)	82 (18)	33 (38)	
Hispanic	123 (23)	101 (22)	22 (25)	
Other	76 (14)	64 (14)	12 (14)	
Education				
Less than high school	133 (25)	95 (21)	38 (44)	<0.0001
High school	200 (37)	167 (37)	33 (38)	
Some college or more	208 (38)	192 (42)	16 (18)	
History of STI	253 (47)	191 (42)	62 (72)	<0.0001
History of unplanned pregnancy	263 (49)	212 (47)	51 (59)	0.04
Sexual partners (lifetime)				
1	70 (13)	58 (13)	12 (14)	0.97
2–5	189 (35)	159 (35)	30 (34)	
≥6	282 (52)	237 (52)	45 (52)	
Sexual partners (past 30 days)				
0	73 (14)	61 (13)	12 (14)	<0.01
1	386 (71)	329 (73)	57 (66)	
2	50 (9)	44 (10)	6 (6)	
≥3	31 (6)	19 (4)	12 (14)	
Current cigarette smoker	260 (48)	218 (48)	42 (48)	0.96
Illicit drug use in past year	317 (59)	263 (59)	54 (62)	0.54
Always uses condoms	116 (21)	95 (21)	21 (24)	0.51
Avoid sex partners who pressure to have sex without condom				
Never	56 (10)	52 (11)	4 (5)	0.04
Not often/sometimes	140 (26)	110 (24)	30 (34)	
Often/very often	345 (64)	292 (64)	53 (61)	
Ever emotionally or physically abused	250 (46)	204 (45)	46 (53)	0.15
Any physical or sexual abuse in past year (baseline)	127 (24%)	96 (21%)	31 (36%)	<0.01
Type of abuse in past year (baseline) ^a				
Neither	411 (76)	355 (79)	56 (64)	0.03
Physical only	71 (13)	52 (12)	19 (22)	
Sexual only	26 (5)	21 (5)	5 (6)	
Physical and sexual	30 (6)	23 (5)	7 (8)	
Missing	4 (1)	4 (1)	0	

^aMay exceed 100% due to rounding.

non-Hispanic, 21% as African American/non-Hispanic, and 23% as Hispanic. A quarter had less than a high school education, and 37% had only a high school education. Most participants were not married; 90% were single, never married, and 5% were separated, divorced, or widowed. Almost half of the participants had a history of STI or unplanned pregnancy, 52% had 6 or more lifetime sexual partners, 48% were current cigarette smokers, and 59% reported some illicit drug use in the past years. One in five women reported they always used condoms when they had intercourse.

Women with reported histories of violence were more likely to report more lifetime sexual partners and illicit drug use than women with no history of violence. Age, history of STI and history of unintended pregnancy, partners in the last month, and current smoking were associated with ever emotional or physical abuse but not recent sexual abuse whereas race/ethnicity was only associated with lifetime report of emotional or physical abuse. Education was associated with abuse in the last year (physical or sexual) but not lifetime emotional or physical abuse.

Incident STIs were common in this cohort. Eighty-seven women (16%) had at least one STI during the 2-year observation period. Women with an incident infection differed significantly from those who did not in a number of ways. Women with incident STIs were more likely to be African American, to be of lower educational level, to have a history of STI or unplanned pregnancy, and to report more sexual partners in the last month. Women with incident STIs were less likely to avoid sexual partners who pressure to have sex without a condom. There were no significant differences between women with an incident STI compared with those without in terms of lifetime sexual partners, current cigarette smoking, illicit drug use, consistent condom use, or age.

We examined three questions related to experiences of interpersonal violence: ever emotionally or physically abused, physical abuse in the past year, and sexual abuse in the past year (Table 1). Abuse was common; 46% reported some emotional or physical abuse in their lifetimes, and almost 25%

reported physical or sexual abuse in the past year. Of the 1 in 4 women reporting recent abuse, 56% of participants reported only physical abuse, 20% reported only sexual abuse, and 24% reported both physical and sexual abuse. In the bivariate comparisons, recent abuse was more common among women with incident STI; 36% of women with an STI reported abuse in the past year compared with 21% among those without an incident STI ($p < 0.01$). Further breakdown by type of recent abuse found this difference was pronounced only among women who reported only physical abuse in the past year.

We also examined whether the time to incident STI differed by experience of interpersonal violence (Table 2). Women with a history of lifetime emotional/physical abuse had consistently faster rates of STI occurrence, but these findings were not statistically significant after adjustment for age, race/ethnicity, education, history of STI, number of sexual partners in the past month, illicit drug use, and avoidance of partners who pressured to have sex without using a condom. Recent abuse, however, was significantly associated with time to incident STI in this cohort. After adjustment for demographic and behavioral characteristics, the risk of STI was almost 70% higher among women who reported recent abuse (hazard rate ratio [HRR] 1.68, 95% CI 1.06, 2.65).

We sought to determine if type of recent abuse was associated with time to incident STI. Reporting recent physical abuse alone was consistently and significantly associated with time to STI incidence. In the crude analysis, the hazard rate for women who had experienced recent physical abuse only was twice that of women who had not (HRR 2.14, 95% CI 1.27, 3.60). After adjustment for demographic and behavioral characteristics, this finding was attenuated (HRR 1.77, 95% CI 1.03, 3.02). Recent sexual abuse and recent physical and sexual abuse were associated with increased risk of incident STI, but the associations were not statistically significant. Because women may have experienced abuse after the baseline reporting and before contracting an STI, we also examined models that adjusted for any abuse after baseline, but this did not alter the findings appreciably (data not shown).

TABLE 2. ASSOCIATION BETWEEN EXPERIENCES OF INTERPERSONAL VIOLENCE AND INCIDENT SEXUALLY TRANSMITTED INFECTIONS

	No. of new infections/person-time (days)	Crude HRR ^a (95% CI)	Model 1 ^b Adjusted HRR (95% CI)	Model 2 ^c Adjusted HRR (95% CI)
Ever physically/emotional abused by partner or someone important				
Yes	46/121,662	1.42 (0.93, 2.18)	1.66 (1.07, 2.57)	1.51 (0.96, 2.38)
No	40/150,491	–	–	–
Any physical or sexual abuse in past year				
Yes	56/212,959	2.00 (1.29, 3.10)	1.79 (1.14, 2.81)	1.68 (1.06, 2.65)
No	31/58,793	–	–	–
Type of abuse in past year				
Neither	56/212,959	–	–	–
Physical only	19/33,602	2.14 (1.27, 3.60)	1.80 (1.06, 3.07)	1.77 (1.03, 3.02)
Sexual only	5/13,130	1.43 (0.57, 3.57)	1.62 (0.63, 4.18)	1.48 (0.57, 3.88)
Physical and sexual	7/12,061	2.22 (1.01, 4.86)	1.87 (0.85, 4.15)	1.60 (0.71, 3.63)

^aHRR, hazard rate ratio; CI, confidence interval.

^bModel 1, adjusted for age, race/ethnicity, education.

^cModel 2, adjusted for age, race/ethnicity, education, history of STI, number of partners in past 30 days, substance use, and avoidance of partners who pressure to have sex without condom.

Moreover, as this cohort had been recruited for an intervention study to improve dual contraceptive method use, we also adjusted for initiation of dual method, but the results were unchanged (data not shown).

Demographic characteristics persisted as important risk factors for incident STI. Women with less than a high school education had estimates of HRRs ranging from 1.8 to 2.0 in the adjusted models. Similarly, irrespective of the abuse variable examined, black women had a 3-fold increase in incidence and Hispanic women had a 2-fold increase in incidence compared with white women. Age was not associated with STI incidence, but this is likely a result of the study's enrollment criteria, which sought to enroll older women at high risk for STIs.

Discussion

In this study, we found that women who reported any abuse or physical abuse within the past year had a significantly higher risk of incident STIs than those who did not report abuse. This held true even after adjusting for confounding variables, including age, race/ethnicity, education, history of STI, number of sexual partners in the past month, substance use, and the avoidance of partners who pressure the participant to have sex without a condom.

Our study confirms findings of previous studies reporting that women with a history of abuse have a higher incidence of STIs than women without such a history.^{19,20} Johnson and Hellerstedt¹⁹ found that pregnant women who had been victims of only sexual abuse or both physical and sexual abuse had a significantly increased risk of incident STIs. In a cross-sectional study of prenatal care patients, Martin et al.²⁰ found that a history of STIs was significantly more likely in victims of both physical and sexual abuse. However, in neither of these studies was physical abuse alone found to be significantly associated with STI prevalence or incidence.

There are a few possibilities for the differences between our results and those of prior studies on the association of STIs and types of interpersonal violence. First, in our study, there was a nonsignificant association with time to incident STI in victims of either solely sexual abuse or of both physical and sexual abuse. This might be attributed to inadequate sample size; only 5 women reported only sexual abuse, and only 7 women reported both physical and sexual abuse. Second, although we used questions to screen for partner violence adapted from the validated Abuse Assessment Screen,^{16,21} the distinction between nonsexual physical violence and nonphysical sexual violence may not be clear to participants. Furthermore, many victims of sexual violence experience physical violence either immediately before or after the act of sexual violence.²²

Strengths of our study include a large sample size compared to similar studies and objective, prospective assessment of incident STIs rather than participant self-report or retrospective review. With the exception of Johnson and Hellerstedt's retrospective cohort study,¹⁹ the majority of prior studies on STIs and interpersonal violence have relied on prevalence rather than incidence data.^{7,20,23} Beyond reaffirming the association of STIs and violence, our prospective design enabled us to explore the possibility of whether a history of physical abuse constitutes a true risk factor for incident STI.

Our study has some limitations. This was a secondary analysis based on data from a randomized trial. Because we used a preexisting dataset, we utilized the original questions pertaining to interpersonal violence in the baseline questionnaire used in Project PROTECT. These questions were derived from a validated measure used to clinically assess interpersonal violence. Previous studies on STIs and violence have used similar questions^{20,23} or even more open-ended inquiry.¹⁹ However, because the terms "physical violence" and "sexual violence" are similar, participants may not have been aware of the distinction. Moreover, statements about association with lifetime reports of abuse are limited to physical and emotional abuse, as lifetime experience of sexual abuse was not included in the baseline questionnaire. As the relationship to the perpetrator is not known, this study cannot determine if the magnitude of the associations may be different if violence was conducted by known vs. unknown perpetrators. The participants in this study were selected because of their high risk for STI, yet they were willing to participate in a 2-year clinical trial; therefore, these findings may not be generalizable to the general population or women at low risk for STIs. Finally, there were no incident diagnoses of HIV during the study period, so we were not able to directly test for an association between IPV and HIV incidence.

Conclusions

Our findings have certain implications for healthcare practice and research. We found that women with a history of physical abuse are at higher risk for predominantly curable incident STIs, and this risk likely extends to HIV as well. If possible, domestic violence shelters, social support agencies, and clinicians should appropriately refer abused women for STI/HIV screening/treatment and counsel women about effective prevention techniques. In addition, programs targeted toward STI and HIV prevention should be sensitive to the complex issues that may be common among women with histories of physical and sexual violence, such as condom use and negotiation and high sexual risk behaviors. In addition to attending to immediate safety concerns, STI and HIV prevention programs may also work to increase sexual assertiveness as one way to help women protect themselves. Future directions for research examining interpersonal violence and STIs might include determining more feasible methods of STI prevention for women in abusive relationships and using validated measures to distinguish among the different types of interpersonal violence.

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Disclosure Statement

The authors have no conflicts of interest to report.

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