

Intimate Partner Violence and HIV Risks: A Longitudinal Study of Men on Methadone

Louisa Gilbert, Nabila El-Bassel, Elwin Wu,
and Mingway Chang

ABSTRACT *Whereas research has suggested that drug-involved men are at disproportionately high risk of engaging in transmission risk behaviors for HIV and of perpetrating intimate partner violence (IPV) against women, only a few cross-sectional studies have examined the relationship between IPV and HIV/sexually transmitted infection (STI) transmission risks among heterosexual, drug-involved men. This study builds on previous cross-sectional research by using a longitudinal design to examine the temporal relationships between perpetration of IPV and different HIV/STI transmission risks among a random sample of 356 men on methadone assessed at baseline (wave 1), 6 months (wave 2), and 12 months (wave 3). The findings indicate that (1) perpetration of IPV in the past 6 months at wave 1 was associated with having more than one intimate partner, buying sex, and sexual coercion at subsequent waves and that (2) noncondom use, injecting drugs, and sexual coercion at wave 1 were associated with subsequent IPV. The temporal relationships between perpetration of IPV and HIV risks found in this study underscore the need for HIV prevention interventions targeting men on methadone to consider IPV and HIV risks as cooccurring problems.*

KEYWORDS *Intimate partner violence, HIV risk factors, Drugs users, Methadone*

INTRODUCTION

Substantial research has found that drug-involved men are at disproportionately high risk of engaging in transmission risk behaviors for HIV and other sexually transmitted infections (STIs)¹⁻⁴ as well as of perpetrating intimate partner violence (IPV) against women.⁵⁻¹⁴ Over the past decade, mounting evidence also has documented multifaceted relationships between experiencing IPV and HIV/STI transmission risks among drug-involved women.¹⁴⁻¹⁶ However, to our knowledge, only a handful of recent studies have examined the relationships between perpetration of IPV and HIV/STI transmission risks among heterosexual men and only one study has focused on drug-involved men.

This nascent research has suggested multiple relationships between male perpetration of IPV and HIV transmission risks. A cross-sectional study among 104 male inmates that examined their responses to condom requests by their female partners found that the severity of male perpetration of IPV was associated with more coercive responses to condom request messages that implied women's infidelity.¹⁷ A cross-sectional study of a random sample of 726 sexually active individuals found

Gilbert, El-Bassel, Wu, and Chang are with the Social Intervention Group, Columbia University School of Social Work, New York, NY, USA.

Correspondence: Louisa Gilbert, Social Intervention Group, Columbia University School of Social Work, New York, NY, USA. (E-mail: lg123@columbia.edu)

that perpetration of IPV was associated with having unprotected intercourse.¹⁸ Another recent cross-sectional study of a nonrandom sample of 283 sexually active, young adult men recruited from an urban community health center found that participants who reported perpetration of IPV during the past year were significantly more likely to report (1) inconsistent or no condom use, (2) forced vaginal sex without a condom, and (3) sex with multiple female partners.¹⁹ A cross-sectional study with a nonrandom sample of 273 men in methadone maintenance treatment programs (MMTPs) found that men who reported perpetrating IPV were almost 4 times more likely to have had more than one intimate partner and 2.6 times more likely to have had sex with a drug injecting sexual partner than their counterparts.²⁰ This emerging research on the relationship between perpetration of IPV and HIV/STI transmission risks among drug-involved men in heterosexual relationships remains limited in terms of cross-sectional designs, nonrandom samples, or failure to adequately control for potentially confounding variables. Longitudinal research with improved methods of control for potential confounders is needed to provide stronger evidence for direct associations between perpetration of IPV and different HIV/STI transmission risks among drug-involved men.

Research on the relationship between experiencing IPV and HIV/STI transmission risks among heterosexual women has elucidated several pathways linking IPV and HIV/STI transmission risks that may also exist among male perpetrators, including (1) engaging in unprotected sex,^{14,21–34} (2) higher rates of STIs,^{29,35–39} (3) sex with multiple sexual partners,^{28,29,40} (4) disclosure of an STI or positive HIV status,^{41,42} (5) trading sex for drugs or money,^{36,43} (6) having a risky sexual partner (e.g., one who injects drugs is HIV-positive and/or has had sex with multiple partners),^{28,29,33,36,38,43–45} (7) forced sex,^{43,46,47} and (8) injecting drug use.²⁰

This study builds on previous research linking perpetration of IPV and HIV/STI transmission risks by examining the temporal relationships between perpetration of IPV and different HIV/STI transmission risks among a random sample of men in MMTP using a longitudinal design and propensity score matching. This study examines two hypotheses. The first hypothesis (H1) is: self-reported sexual HIV/STI transmission risks at baseline (i.e., wave 1) will increase the likelihood of perpetrating physical and/or injurious IPV at 6- and 12-month follow-up assessments (i.e., waves 2 and 3) over the subsequent year. The second hypothesis (H2) is: perpetration of physical and/or injurious IPV at wave 1 will increase the likelihood of sexual HIV/STI transmission risks at subsequent waves 2 and 3 (i.e., 6- and 12-month follow-up).

MATERIALS AND METHODS

Random Sampling and Recruitment Procedures

We randomly selected 1,300 men to be screened for eligibility for this study from a total population of 2,067 men who were enrolled as patients in seven MMTP clinics in Harlem, New York City. Eligible participants included men, aged 18 or over, who were enrolled at an MMTP for at least 3 months and who reported having had a sexual relationship with a woman during the past year described as a girlfriend, spouse, regular sexual partner, or the mother of his children. MMTP counselors notified potential participants of their selection for the study and invited them to contact research assistants (RAs). Once a potential participant made contact with an RA, the RA would describe the study and give him an opportunity

to ask any questions. If the potential participant expressed interest in the study, the RA would complete informed consent and conduct a brief screening interview to determine eligibility.

Of the 1,300 randomly selected men, 25 men were excluded from screening because they did not demonstrate sufficient English-speaking proficiency to provide informed consent and three men were excluded from screening because of a severe cognitive or psychiatric impairment that interfered with their ability to provide informed consent. Of the remaining 1,272 randomly selected men, 774 men agreed to participate and completed a 15-min screening interview, 194 refused to participate in the study, and 304 missed two or more screening appointments and did not participate. Of the 774 men who were screened, 499 met eligibility criteria of whom 356 (71%) agreed to participate and completed a baseline assessment.

Data for the longitudinal study were collected between 1999 and 2003. Eligible participants were assessed with repeated measures at baseline (wave 1), at 6-month follow-up (wave 2), and at 12-month follow-up (wave 3). For all three assessments, male RAs administered face-to-face structured interviews, which averaged 1.5 h in length. Compensation entailed \$5 for participating in the screening, \$30 for participating in the face-to-face baseline interview, \$35 for the 6-month interview, and \$40 for the 12-month interview. The RAs received 24 h of training in recruitment and interviewing skills. The Institutional Review Boards of the participating MMTPs and Columbia University approved the protocol for this study.

Measurement

The repeated assessments covered self-reported sociodemographics, relationship characteristics, drug use and drug risk behaviors, sexual HIV risk behaviors, self-reported STIs, and participant reports on partner's drug-related and sexual HIV risk behaviors. Information on a maximum of two current female intimate partners was elicited from participants.

Sociodemographic and relationship characteristics included: age, race/ethnicity, education, employment status, length of stay in most recent methadone maintenance treatment, number of intimate partners in past 6 months, length of relationship with intimate partner, type of relationship, and contribution of participant and partner's to household expenses.

The Drug Use and Risk Behavior Questionnaire was developed by the investigators to provide frequency counts of binge drinking, injecting drug use, and using crack/cocaine, heroin, marijuana, and other illicit drugs in the past 6 months. Internal consistency was assessed with 800 subjects and yielded α reliability of 0.80.^{48,49} For the purpose of this study, we dichotomized use of each drug so that any use was coded as 1 and nonuse was coded as 0. Binge drinking was defined as drinking five or more alcoholic drinks within a 6-h period, which is considered a standard definition of a binge-drinking episode for men.⁵⁰

Self-reported data on sexual HIV/STI risks were measured by the Sexual Risk Behavior Questionnaire (SRBQ). The internal consistency of the SRBQ has yielded an α reliability of 0.80.⁴⁴ The SRBQ ascertains sexual behaviors within past 6 months, including (1) frequency of condom use (i.e., always, sometimes, or never) during vaginal and anal sex with intimate, casual, and paying partner(s); (2) number of sexual partners; (3) risk factors associated with partners reported by participants (i.e., partners who inject drugs, are HIV-infected, have had STIs, or who have had sex with other concurrent partners in the past 6 months); (4) self-reported STIs in past

6 months; and (5) self-reported HIV status.⁴⁴ A positive response to an HIV/STI transmission risk at wave 2 (6-month follow-up) and/or wave 3 (12-month follow-up) was coded as 1 for that outcome; a negative response to the HIV risk outcome for both waves 2 and 3 was coded as 0. With respect to condom use and condom request variables, participants indicating at waves 2 and 3 that they always used or requested condoms were coded as “always=2” whereas participants reporting they sometimes used or requested condoms were coded as “sometimes=1.” Participants who reported never using or requesting condoms at wave 2 and wave 3 were coded as “never=0.”

Perpetration of physical and injury-related IPV was assessed using the revised Conflict Tactics scales (CTS2).⁴⁹ The CTS2 contains two subscales measuring physical and injury-related IPV in the past 6 months, which provide an overall prevalence of IPV that we define as “physical and/or injury-related IPV.” We examined IPV across intimate partners at each wave. The CTS2 also has a subscale that assesses sexual coercion, which was considered as an HIV/STI risk variable because it contains items on coerced sex without condoms. Internal consistency of the CTS2 subscales ranges between 0.79 and 0.95.⁴⁹ At all waves respondents who reported perpetrating any physical and/or injury-related IPV in the prior 6 months were coded as 1 for IPV and those who did not report perpetrating any physical and/or injury-related IPV in prior 6 months were coded as 0.

Data Analysis

Of the 356 participants, who completed the baseline interview (wave 1), 287 (81%) completed the 6-month follow-up interview (wave 2) and 278 (78%), the 12-month interview (wave 3). Similarities on the baseline measures were found among those who were retained at follow-ups and dropouts, except on age, ethnicity, and injection drug use. Multiple imputation via the Multivariate Imputation by Chained Equations module in Stata8 was used to reduce the potential for bias resulting from missing data and differential attrition.^{51–54}

Propensity scores were calculated using attributes for observed confounders and treatment variables observed at wave 1 (baseline). Propensity score matching is a technique used in observational studies to select groups, which are similar on average with respect to potential confounders.^{55–59} The confounders included (1) sociodemographic variables (i.e., age, race/ethnicity, education, length of time in MMTP, and employment status), (2) relationship characteristics (i.e., type of intimate relationship(s), length of relationship, and financial dependency), and (3) substance use (i.e., participant’s use of illicit drugs and binge drinking in past 6 months, participant’s reports on intimate partner’s substance use in past 6 months). The selection of these potential confounders was based on previous research on factors associated with both IPV and sexual transmission risks among drug-involved, heterosexual men and women.^{14,20} The matching procedure was performed by “PSMATCH2” (a shareware module in Stata8).⁶⁰ The diagnostics of balance on all covariates were also conducted for adequacy of matched groups.⁶¹

After selecting a final sample of participants using propensity score matching, multiple logistic regression analyses were conducted to test each hypothesis. Causal effect sizes were estimated by odds ratios (ORs) and their associated 95% confidence intervals (CI), adjusting for the same set of confounders used in the propensity score matching. For all evaluations testing H1, we compared participants who reported perpetrating physical or injurious-related IPV in the prior 6 months at wave 1 (baseline) with men who did not perpetrate such violence on HIV risk

outcomes reported in wave 2 (6-month follow-up) and/or wave 3 (12-month follow-up). For all evaluations testing H2, the treatment variables are HIV risk factors measured at wave 1 and the outcome variable is perpetration of physical and injury-related IPV at wave 2 and/or wave 3.

RESULTS

Sociodemographic and Relationship Characteristics

Sociodemographic and relationship characteristics collected at wave 1 are presented in Table 1. The majority of participants self-identified as Latino or African American. The men’s mean age was almost 44 years old (SD=8.5) and their average level of education was 11.6 years (SD=2.3). Almost half of the sample (47%) was unemployed and about one tenth had been incarcerated in the past 6 months. Participants had been in methadone maintenance treatment for an average of 8.3 years (SD=7.4). In terms of relationship characteristics, the average length of relationship with the main intimate partner was 10.5 years (SD=9.2). More than half indicated that they were married or had a common-law marriage with their main intimate partners. Likewise, more than half were living with their partner. The mean age of their main partners was almost 40 years old (SD=8.9). The majority of partners were Latina or African American. About half of the partners were unemployed.

TABLE 1 Sociodemographic characteristics and relationship characteristics (N=356)

Sociodemographic characteristics		
Age (years)	\bar{x} =43.6	SD=8.5
Years of schooling	\bar{x} =11.6	SD=2.3
Income (dollars per month)	\bar{x} =989	SD=958
Race/Ethnicity (n, %)		
Latino	161	45%
African American	134	38%
Unemployed in the past 6 months (n, %)	169	47%
Incarcerated in the past 6 months (n, %)	39	11%
Duration of methadone treatment (years)	\bar{x} =8.3	SD=7.4
Current methadone dose (mg)	\bar{x} =84	SD=31
Relationship characteristics		
Partner’s age (years)	\bar{x} =39.5	SD=8.9
Partner’s years of schooling	\bar{x} =12.3	SD=2.7
Partner’s race/ethnicity (n, %)		
Latino	157	44%
African American	123	35%
Partner unemployed in the past 6 months (n, %)	171	48%
Partner incarcerated in the past 6 months (n, %)	16	4%
Relationship type with partner (n, %)		
Married (legally)	111	31%
Married (Common-law)	101	28%
Living with partner (n, %)	196	55%
Length of relationship (years)	\bar{x} =10.5	SD=9.2
% contributed to partner’s household expenses	\bar{x} =39%	SD=33%

Substance Abuse-related Characteristics

In the 6 months before wave 1 (baseline), about half of the participants (50%) reported heroin use, 37% reported crack/cocaine use, 38% marijuana use, 72% reported any illicit drug use, and 26% reported binge drinking. At wave 1 (baseline), 42% of the participants reported that their intimate partners used an illicit drug in the prior 6 months, 22% reported partner use of crack/cocaine, 18% had a partner who used heroin, and 29% reported their partners engaged in binge drinking.

Prevalence of IPV

Prevalence rates of perpetrating physical and/or injurious IPV during the prior 6 months as reported at each wave of the study are presented in Table 2. The prevalence of perpetrating physical and/or injurious IPV was 28% for wave 1 (baseline), 34% for wave 2 (6-month follow-up), and 31% for wave 3 (12-month follow-up). About half (47%) of the sample reported perpetrating physical and/or injurious IPV during the follow-up period covering waves 2 and 3.

HIV/STI Risk

At wave 1 (baseline), more than a third of the participants reported consistent condom use during vaginal sex with their intimate partners in the past 6 months. Five percent self-reported having had an STI in the past 6 months and 15% reported testing positive for HIV. About one quarter indicated that they had more than one intimate partner and 8% reported buying sex for money or drugs. Less than one quarter of the participants

TABLE 2 Prevalence of IPV, condom use behaviors, and HIV/STI risks at three time points

	Baseline (%)	6 months (%)	12 months (%)
Physical and injurious IPV	28	34	31
Condom use during vaginal sex			
Always	35	50	50
Sometimes	16	9	10
Never	49	41	40
Any STI	5	12	9
HIV status			
Positive	15	19	19
Negative	75	71	72
Unknown	10	10	9
Having >1 intimate partner	24	26	22
Buying sex	8	16	11
Injected drugs	22	29	27
Partner HIV status			
Positive	7	9	10
Negative	88	80	82
Unknown	5	11	8
Partner having >1 partner	6	13	11
Partner injected drugs	8	7	5
100% protected vaginal sex with other nonmain partners ^a	88	88	86
Any sexual coercion	17	25	18

^aFor “100% protected vaginal sex with other nonmain partners,” those who did not have any outside partner were coded as 100% protected.

injected drugs in the past 6 months. In addition to these risks, 7% of the men reported that their intimate partners were HIV-positive, 6% reported that their partners had an outside partner, and 8% indicated that their partners injected drugs in the past 6 months. Prevalence rates of HIV risks were consistent over time.

Hypotheses Testing

H1: Perpetration of IPV Increases the Likelihood of Subsequent HIV/STI Risk The findings presented in Table 3 are the adjusted ORs for reporting HIV/STI risks at wave 2 (6-month follow-up) and/or wave 3 (12-month follow-up) associated with perpetrating physical and/or injurious IPV in the prior 6 months at wave 1 (baseline). Compared to men who do not report physical and/or injurious IPV, men who report perpetrating physical and/or injurious IPV in the prior 6 months at wave 1 (baseline) were significantly more likely to indicate that they have had more than one intimate partner (OR=2.9, CI=1.2, 7.1) and more likely to buy sex for money or drugs (OR=3.3, CI=1.1, 10.4) at subsequent waves (6 and 12-month follow-up). Perpetrators of IPV at wave 1 (baseline) were also significantly more likely than nonperpetrators to report sexual coercion at subsequent waves (OR=2.9, CI=1.2, 6.6). In addition, perpetrators of IPV at wave 1 were marginally more likely to report not using condoms consistently with other nonmain partners at subsequent waves (OR=0.4, CI=0.1, 1.1). No significant associations were found between perpetration of IPV at wave 1 (baseline) and subsequent self-reported STIs, injection drug use, frequency of condom use, requests for condom use, and subsequent partner-related risk factors (i.e., injecting drugs, having more than one partner).

H2: HIV/STI Risks Increase the Likelihood of Perpetration of IPV Table 4 contains adjusted ORs for perpetrating IPV at subsequent waves associated with reporting HIV/STI risks in the prior 6 months at wave 1 (baseline). Compared to men who reported never using condoms in the past 6 months at wave 1, men who sometimes used condoms in the past 6 months were significantly more likely to report perpetrating physical and/or injurious IPV at subsequent waves (6- and 12-month follow-up) (OR=0.3, CI=0.1, 0.8). Inconsistent condom use at wave 1 (baseline) was marginally associated with subsequent perpetration of IPV (OR=0.5, CI=0.3, 1.1). Men who reported injecting drugs in the past 6 months at baseline were significantly more likely than noninjectors to indicate perpetrating IPV at subsequent waves (OR=3.7, CI=1.1, 11.9). Men who indicated any sexual coercion against their partners at baseline were also significantly more likely than their counterparts to report perpetrating physical or injurious IPV at subsequent waves (OR=2.6, CI=1.2, 5.4). In addition, having a self-reported STI in the past 6 months at wave 1 (baseline) was marginally associated with perpetration of IPV at subsequent waves at the 90% confidence level (OR=5.6, CI=0.98, 31.6). No support was found for subsequent perpetration of IPV as a consequence of having a risky partner, having had sex with multiple or commercial partners, or partner-related risk factors assessed at wave 1 (baseline).

DISCUSSION

To our knowledge, this is the first longitudinal investigation that examines temporal relationships between perpetrating IPV and HIV/STI transmission risks among a random sample of drug-involved men in heterosexual, intimate relationships. The methodology of propensity score matching in combination with multiple logistic

TABLE 3 Estimates of the temporal relationship between perpetration of IPV at baseline and subsequent HIV risk indicators at follow-up (H1)

HIV risk indicators at follow-up	Perpetration of physical/injurious IPV at baseline	
	N	OR (95% CI) ^a
Always condom use during vaginal sex (vs. at least one or more unprotected act)	165	1.1 (0.4, 3.0)
Sometimes condom use during vaginal sex (vs. never)	88–96	1.4 (0.4, 4.8)
Any STI (vs. no)	165	2.4 (0.6, 10.5)
HIV positive (vs. negative/unknown)	165	–
Having > 1 intimate partner (vs. no)	165	2.9 (1.2, 7.1)**
Buying sex (vs. no)	165	3.3 (1.1, 10.4)**
Injected drugs (vs. no)	165	1.4 (0.5, 4.0)
Partner HIV-positive (vs. negative/unknown)	165	–
Partner having >1 partner (vs. no)	165	2.7 (0.7, 9.9)
Partner injected drugs (vs. no)	165	–
100% protected vaginal sex with other nonmain partners (vs. any unprotected) ^b	165	0.4 (0.1, 1.1)*
Any sexual coercion (vs. no)	165	2.9 (1.2, 6.6)**

* $p < 0.1$ ** $p < 0.05$

^aThe confounders for propensity score matching are participant's characteristics (age, ethnicity, education, unemployment, length on methadone), relationship with partner (length of relationship, type of relationship, contribution to household expense), participant's substance use (binge drinking and illicit drug use), and partner's substance use (binge drinking and illicit drug use). Baseline measurement of the outcome was included in the logistic regression analysis.

^bFor "100% protected vaginal sex with other nonmain partners," those who did not have any outside partner were coded as 100% protected.

TABLE 4 Estimates of the temporal relationship between HIV risk indicators at baseline and subsequent perpetration of IPV at follow up (H2) after propensity score matching: adjusted ORs and 95% CI

HIV risk indicators at baseline	Perpetration of physical/injurious IPV at follow-up	
	N	OR (95% CI) ^a
Always condom use during vaginal sex (vs. at least one or more unprotected act)	201	0.5 (0.3, 1.1)*
Sometimes condom use during vaginal sex (vs. never)	92	0.3 (0.1, 0.8)**
Any STI (vs. no)	34	5.6 (0.98, 31.6)*
HIV positive (vs. negative/unknown)	98	0.6 (0.2, 1.8)
Having > 1 intimate partner (vs. no)	144	1.5 (0.6, 3.8)
Buying sex (vs. no)	52	—
Injected drugs (vs. no)	129	3.7 (1.1, 11.9)**
Partner HIV positive (vs. negative/unknown)	50	1.5 (0.2, 13.1)
Partner having >1 partner (vs. no)	36	—
Partner injected drugs (vs. no)	52	1.5 (0.1, 26.0)
100% protected vaginal sex with other nonmain partners (vs. any unprotected) ^b	349	2.1 (0.5, 8.6)
Any sexual coercion (vs. no)	110	2.6 (1.2, 5.4)**

* $p < 0.1$

** $p < 0.05$

^aThe confounders for propensity score matching are participant's characteristics (age, ethnicity, education, unemployment, length on methadone), relationship with partner (length of relationship, type of relationship, contribution to household expense), participant's substance use (binge drinking and illicit drug use), and partner's substance use (binge drinking and illicit drug use). Baseline measurement of the outcome was included in the logistic regression analysis.

^bFor “100% protected vaginal sex with other nonmain partners,” those who did not have any outside partner were coded as 100% protected.

regression in this longitudinal study allows for a more rigorous method of accounting for potentially confounding variables and inferring causality. These methodological advances improve on previous cross-sectional research, which has examined relationships between male perpetration of IPV and HIV transmission risks. Collectively, the study findings suggest multiple, temporal relationships between perpetrating IPV and several HIV/STI risk factors, which mirror relationships between these cooccurring problems found in studies among drug-involved women.

The first hypothesis that perpetration of IPV increases the likelihood of presenting subsequent HIV/STI transmission risks was supported for some HIV risks. The temporal relationship between IPV and engaging in outside relationships with other intimate or sex exchanging partners is consistent with previous cross-sectional studies, which have found a significant relationship between these two variables among heterosexual men as perpetrators^{19,20,62} and among heterosexual women as victims of IPV.^{28-30,40,45,63} These findings may suggest that the relationship instability associated with IPV may increase the likelihood that men will engage in outside relationships as an exit strategy or as another form of retaliation, which may also be considered as a form of psychological IPV. Further research is needed to examine whether perpetration of IPV among drug-involved men predicts subsequent changes in partner status (e.g., shifting primary intimate partners, engaging in concurrent relationships with different types of sexual partners, and initiating sex with casual or commercial partners) that may, in turn, result in changes in other HIV risk-related behaviors, like inconsistent condom use.

Moreover, the study findings supported temporal relationships between perpetration of physical or injurious IPV and sexual coercion, suggesting that the pathways linking perpetration of physical or injurious IPV and sexual coercion are bidirectional. Although this finding is not surprising as sexual coercion is considered a domain of IPV, it does have HIV/STI risk implications. Sexual coercion has been identified as a risk factor for HIV/STIs as it has been found to be associated with unprotected sex and rough sex resulting in vaginal lacerations that may increase the likelihood of HIV/STI transmission.⁶⁴⁻⁶⁶

In addition, the data supported the second hypothesis: an increased likelihood of subsequent perpetration of IPV was significantly associated with wave 1 reports of recent injection drug use and noncondom use. The temporal relationship found between injection drug use and perpetration of IPV is consistent with previous literature.²⁰ Several qualitative studies suggest that the practice of injecting drugs and sharing needles between intimate partners is often pervaded with gender-based inequalities and IPV.^{67,68} The relationship between perpetration of IPV and inconsistent or no condom use has been supported by previous research.^{19,20} Failure to use condoms in intimate relationships, especially when other risk factors are present, such as having an STI or outside partners, may increase the likelihood of relationship conflict and IPV. The marginal association found between self-reported STIs and subsequent perpetration of IPV may be related to the impact of the disclosure of an STI, or alternatively, contracting STIs may be related to sexual affairs outside the intimate relationship, which may trigger IPV. Here again, future research to identify the precise sequence of multiple HIV/STI risks that lead to the perpetration of IPV may further elucidate the causal mechanisms linking these two cooccurring problems.

Limitations

The nonresponse rate limits the generalizability of findings as we do not have data on whether randomly selected men who did not participate in the screening

interview may have differed from respondents in terms of the IPV, HIV risk, and background variables. This study also relies on self-reported data of sensitive behaviors that are subject to a social desirability bias, which may have influenced study findings. For example, social desirability bias may have inhibited participants from disclosing recent perpetration of IPV and other socially undesirable HIV risk behaviors.

Implications for Intervention

Despite these limitations this study has several implications for designing effective HIV prevention interventions for this population. The HIV/STI transmission risks linked with perpetration of IPV among this sample of men suggest the need for HIV prevention strategies to take into account broader relationship safety issues. To date, no HIV prevention interventions have been developed and tested for drug-involved men, who are at risk of perpetrating IPV. Over the past two decades MMTPs have played an instrumental role in reducing HIV among patients.⁶⁹ MMTPs may serve as an optimal setting to launch an HIV prevention intervention, which addresses broader relationship safety issues associated with IPV and HIV/STI transmission risks among men and their intimate partners.

ACKNOWLEDGMENTS

We acknowledge the contributions of the staff of the Methadone Maintenance Treatment Program at the Beth Israel Medical Center, New York, for their help in conducting this study. The study was supported by the National Institute on Drug Abuse grant Ga12335 awarded to Dr. Nabila El-Bassel.

REFERENCES

1. Chiasson MA, Stoneburner RL, Lifson AR, et al. Risk factors for human immunodeficiency virus type 1 (HIV-1) infection in patients at a sexually transmitted disease clinic in New York City. *Am J Epidemiol.* 1990;131(2):208–220.
2. Edlin BR, Irwin KL, Ludwig DD, et al. High-risk sex behavior among young street-recruited crack cocaine smokers in three American cities: An interim report. *J Psychoact Drugs.* 1992;24:363–371.
3. Edlin BR, Irwin KL, Faruque S, et al. Intersecting epidemics: Crack cocaine use and HIV infection in inner-city young adults. *N Engl J Med.* 1994;21:1422–1427.
4. El-Bassel N, Schilling RF, Irwin KL, et al. Sex trading and psychological distress among women recruited from the streets of Harlem. *Am J Public Health.* 1997;87(1):66–70.
5. O’Leary A, Wingood GM. Interventions for Sexually Active Heterosexual Women. In: Peterson JL, DiClemente RJ, eds. *Handbook of HIV Prevention.* New York: Plenum Publishing Corp; 2000:179–197.
6. Gilbert L, El-Bassel N, Schilling R, Wada T, Bennet B. Partner violence and sexual HIV risk behaviors among women in methadone treatment. *AIDS Behav.* 2000;4(3):261–269.
7. Abbot J, Johnson R, Koziol-McLain J, Lowenstein S. Domestic violence against women: Incidence and prevalence in emergency department populations. *J Am Med Assoc.* 1995;273:1763–1767.
8. Miller BA, Downs WR, Testa M. Interrelationships between victimization experiences and women’s alcohol use. *J Stud Alcohol.* 1993;11:109–117.
9. Miller BA. The interrelationships between alcohol and drugs and family violence. *NIDA Res Monogr.* 1990;103:177–207.
10. Fagan JA, Wexler S. Crime at home and in the streets. *Violence Vict.* 1987;2(1):5–23.

11. Hotaling GT, Sugarman DB. An analysis of risk markers in husband to wife violence: The current state of knowledge. *Violence Vict.* 1986;1:101–124.
12. Leonard EK, Bromet EJ, Parkinson DK, Day NL, Ryan CM. Patterns of alcohol use and physically aggressive behavior. *J Stud Alcohol.* 1985;46:279–282.
13. Byles JA. Violence, alcohol problems and other problems in disintegrating families. *J Stud Alcohol.* 1978;39:551–553.
14. El-Bassel N, Gilbert L, Wu E, Go H, Hill J. HIV and intimate partner violence among women on methadone. *Soc Sci Med.* 2005;61(1):171–183.
15. Gilbert L, El-Bassel N, Rajah V, Folen A, Frye V. Linking drug related activities with experiences of partner violence: A focus group study of women in methadone treatment. *Violence Vict.* 2001;16(5):517–536.
16. Gielen AC, McDonnel K, Burke JG, O'Campo P. Women's lives after an HIV positive diagnosis: Disclosure and violence. *Matern Child Health J.* 2000;4(2):111–120.
17. Neighbors CJ, O'Leary A. Responses of male inmates to primary partner requests for condom use: Effects of message content and domestic violence history. *AIDS Educ Prev.* 2003;15(1):93–108.
18. Cecil H, Pinkerton SD, Bogart LM. Perceived benefits and barriers associated with the female condom among African American adults. *J Health Psychol.* 1999;4(2):165–175.
19. Raj A, Santana C, La Marche A, Amaro H. Perpetration of intimate partner violence associated with sexual risk behaviors among young adult men. *Am J Public Health.* 2006;96(10):1873.
20. El-Bassel N, Fontdevila J, Gilbert L, Voisin D, Richman B, Pitchell P. HIV risks of men in methadone maintenance treatment programs who abuse their intimate partners: A forgotten issue. *J Subst Abuse.* 2001;13:1–15.
21. Wingood GM, DiClemente RJ. The effects of an abusive primary partner on the condom use and sexual negotiation practices of African-American women. *Am J Public Health.* 1997;87(6):1016–1018.
22. Amaro H. Love, sex and power: Considering women's realities in HIV prevention. *Am Psychol.* 1995;50:437–447.
23. Fernandez MI. In: O'Leary A, Jemmott LS, eds. *Latinas and AIDS: Challenges to HIV prevention efforts. AIDS prevention and mental health.* New York: Plenum; 1995:159–174.
24. Cunningham RM, Stiffman AR, Dore P, Earls F. The association of physical and sexual abuse with HIV risk behaviors in adolescence and young adulthood: Implications for public health. *Child Abuse Negl.* 1994;18(3):233–245.
25. Wyatt GE. Child sexual abuse and its effects on sexual functioning. *Annu Rev Sex Res.* 1991;2:249–266.
26. Amaro H, Fried LE, Cabral H, Zuckerman B. Violence during pregnancy and substance abuse. *Am J Public Health.* 1990;80(5):575–579.
27. Worth D. Sexual decision-making and AIDS: Why condom promotion among vulnerable women is likely to fail. *Stud Fam Plann.* 1989;20(6):297–307.
28. Gilbert L, El-Bassel N, Rajah V, et al. The converging epidemics of mood-altering-drug use, HIV, HCV, and partner violence: A conundrum for methadone maintenance treatment. *Mt Sinai J Med.* 2000;67(5–6):452–464.
29. Wu E, El-Bassel N, Witte SS, Gilbert L, Chang M. Intimate partner violence and HIV risk among urban minority women in primary health care settings. *AIDS Behav.* 2003;7(3):291–301.
30. Tucker JS, Wenzel SL, Elliott MN, Marshall GN, Williamson S. Interpersonal violence, substance use, HIV-related behavior and cognitions: A prospective study of impoverished women in Los Angeles County. *AIDS Behav.* 2004;8(4):463–474.
31. Hamburger ME, Moore J, Koenig LJ, et al. Persistence of inconsistent condom use: Relation to abuse history and HIV serostatus. *AIDS Behav.* 2004;8(3):333–344.
32. Brown V, Melchior L, Panter A, Slaughter R, Huba G. Women's steps of change and entry into drug abuse treatment: A multidimensional stages of change model. *J Subst Abuse Treat.* 2000;18(3):231–240.

33. Gielen AC, McDonnell KA, O'Campo PJ. Intimate partner violence, HIV status, and sexual risk reduction. *AIDS Behav.* 2002;6(2):107–116.
34. Saul J, Moore J, Murphy ST, Miller LC. Relationship violence and women's reactions to male- and female-controlled HIV prevention methods. *AIDS Behav.* 2004;8(2):207–214.
35. Gilbert L, El-Bassel N, Schilling RF, Catan V, Wada T. Partner abuse and sexual risk behavior among women on methadone. *Violence Vict.* 1998;13(4):1–17.
36. El-Bassel N, Gilbert L, Schilling RF, Wada T. Drug abuse and partner violence among women in methadone treatment. *J Fam Violence.* 2000;15(3):209–225.
37. Rodriguez MA, Szkupinski Quiroga S, Bauer HM. Breaking the silence: Battered women's perspective on medical care. *Arch Fam Med.* 1996;5:153–158.
38. El-Bassel N, Gilbert L, Krishnan S, et al. Partner violence and sexual HIV-risk behaviors among women in an inner-city emergency department. *Violence Vict.* 1998;13(4):377–393.
39. Hogben M, Gange SJ, Watts DH, Robison E, Young M, Richardson J. The effect of sexual and physical violence on risky sexual behavior and STDs among a cohort of HIV seropositive women. *AIDS Behav.* 2001;5:353–361.
40. Rich JD, Dickinson BP, Macalino G, et al. Prevalence and Incidence of HIV Among Incarcerated and Reincarcerated Women in Rhode Island. *J Acquir Immune Defic Syndr.* 1999;22(2):161.
41. Rothenberg KH, Paskey SJ. The risk of domestic violence and women with HIV infection: Implications for partner notification, public policy and the law. *Am J Public Health.* 1995;85(11):1569–1575.
42. North RL, Rothenberg KH. Partner notification and the threat of domestic violence against women with HIV infection. *N Engl J Med.* 1993;329(16):1194–1196.
43. Beadnell B, Baker SA, Morrison DM, Knox K. HIV/STD risk factors for women with violent male partners. *Sex Roles.* 2000;42:661–689.
44. El-Bassel N, Ivanoff A, Schilling RF, Gilbert L, Borne D, Chen D. Preventing HIV/AIDS in drug-abusing incarcerated women through skills-building and social support enhancement: Preliminary outcomes. *Soc Work Res.* 1995;19:131–141.
45. Raj A, Silverman JG, Amaro H. Abused women report greater male partner risk and gender-based risk for HIV; findings from a community-based study with Hispanic women. *AIDS Care.* 2004;16(4):519–529.
46. Go VF, Sethulakshmi CJ, Bentley ME, et al. When HIV-prevention messages and gender norms clash: The impact of domestic violence on women's HIV risk in slums of Chennai, India. *AIDS Behav.* 2003;7(3):263–272.
47. Wingood GM, DiClemente RJ. Partner influences and gender-related factors associated with noncondom use among young adult African American women. *Am J Community Psychol.* 1998;26(1):29–51.
48. El-Bassel N, Ivanoff A, Schilling RF, Gilbert L, Safyer S. Correlates of problem drinking among drug using incarcerated women. *Addict Behav.* 1995;20:359–369.
49. Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised Conflict Tactics scales (CTS2): Development & preliminary psychometric data. *J Fam Issues.* 1996;17:283–316.
50. Matano RA, Koopman C, Wanat SF, Whitsell SD, Borggrefe A, Westrup D. Assessment of binge drinking of alcohol in highly educated employees. *Addict Behav.* 2003;28(7):1299–1310.
51. Rubin DB. *Multiple Imputation for Nonresponse in Surveys.* New York: Wiley Publications; 1987.
52. Schafer JL. *Analysis of Incomplete Multivariate Data.* London: Chapman & Hall; 1997.
53. Royston P. Multiple imputation of missing values. *Stata J.* 2004;4(3):227–241.
54. van Buren S, Boshuizen HC, Knook DL. Multiple imputation of missing blood pressure covariates in survival analysis. *Stat Med.* 1999;18:681–694.
55. Connors A, Speroff T, Dawson N, et al. The effectiveness of right heart catheterization in the initial care of critically ill patients. Support investigators. *JAMA.* 1996;276(11):889–897.

56. Dehejia R, Wahba S. Causal effects in non-experimental studies: Re-evaluating the evaluation of training programs. *JAMA*. 1999;94:1053–1062.
57. Rosenbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. *Biometrika*. 1983;70:41–55.
58. Rosenbaum PR, Rubin DB. Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. *Am Stat*. 1985;39:33–38.
59. Stenestrand U, Wallentin L. Early statin treatment following acute myocardial infarction and one-year survival. *JAMA*. 2001;285(4):430–436.
60. Leuven E, Sianesi B. *PSMATCH2: Stata Module to Perform Full Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing*. Boston, MA: Boston College Department of Economics; 2003.
61. Berger LM, Hill J, Waldfogel J. Maternity leave, early maternal employment and child health and development in the US. *Econ J*. 2005;115(F29–F47).
62. Dunkle KL, Jewkes RK, Nduna M, et al. Perpetration of partner violence and HIV risk behavior among young men in rural Eastern Cape, South Africa. *AIDS*. 2006;20(16):2107–2114.
63. Gaeta TJ, LaPolla C, Melendez E. AIDS in the elderly: New York City vital statistics. *J Emerg Med*. 1996;14(1):19–23.
64. Maman S, Campbell J, Sweat M, Gielen A. The intersections of HIV and violence: Directions for future research and interventions. *Soc Sci Med*. 2000;50:459–478.
65. Glaser JB, Schachter J, Benes S, Cummings M, Frances CA, McCormack WM. Sexually transmitted diseases in postpubertal female rape victims. *J Infect Dis*. 1991;164:726–730.
66. Jenny C, Hooton T, Bowers A, et al. Sexually transmitted diseases in victims of rape. *N Engl J Med*. 1990;322(11):713–716.
67. Amaro H, Hardy-Fanta C. Gender relations in addiction and recovery. *J Psychoact Drugs*. 1995;27(4):325–337.
68. Etorre E. *Women and Substance Use*. London: Macmillan; 1992.
69. Metzger DS, Navaline H, Woody GE. In: Peterson JL, DiClemente RJ, eds. *The Role of Drug Abuse Treatment in the Prevention of HIV Infection. Handbook of HIV Prevention*. New York: Plenum Publishing Corp.; 2000:145–157.