

## Unprotected Sexual Behavior Among Heterosexual HIV-Positive Injection Drug Using Men: Associations by Partner Type and Partner Serostatus

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**ABSTRACT** *Few studies have examined sexual risk behaviors of HIV-positive, heterosexual, injection drug using (IDU) men. We investigated such behaviors and associations with risk among sexually active, HIV-positive IDU men who reported only female sex partners in the 3 months prior to baseline interview. We examined associations separately for four non-exclusive groups of men by crossing partner type (main or casual) and partner serostatus (HIV-positive or HIV-negative/unknown). Of 732 male participants, 469 (64%) were sexually active with only female partners. Of these 469 men, 155 (33%) reported sex with HIV-positive main partners, 127 (27%) with HIV-negative or unknown serostatus main partners, 145 (31%) with HIV-positive casual partners, and 192 (41%) with HIV-negative/unknown serostatus casual partners. Significant multivariate associations for unprotected sex with HIV-negative or unknown serostatus main partners were less self-efficacy to use condoms, weaker partner norms supporting condoms, and more negative condom beliefs. Similar correlates were found for unprotected sex with HIV-positive main and casual partners. In addition, alcohol or drug use during sex was a significant correlate of unprotected sex with HIV-positive main partners, while depression was significant for HIV-positive casual partners. For unprotected sex with HIV-negative/unknown status casual partners, self-efficacy for condom use, sex trade, and education were significant multivariate correlates. A combination of broad and tailored intervention strategies based on the relationship pattern of men's lives may provide the most benefit for reducing unprotected sex with female partners.*

**KEYWORDS** *Heterosexual men, HIV-positive, Injection drug users, Sexual risk.*

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Since the advent of highly active antiretroviral therapy, increasing scientific attention and HIV prevention resources have been focused on HIV-positive persons.<sup>1-4</sup> Injection drug users (IDUs) have been an important part of the HIV epidemic since the beginning, constituting 24% of AIDS cases diagnosed through 2004.<sup>5</sup> While

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rates of HIV transmission among IDUs have fallen due to the success of a combination of HIV prevention strategies,<sup>6</sup> evidence suggests that sexual risk is an increasing route of transmission.<sup>7,8</sup> Reducing sexual risk may be a particularly important public health goal among HIV-positive, heterosexual men because HIV is more easily transmitted from men to women.<sup>9</sup> Also, because men wear male condoms and usually control their use, women sometimes find it difficult to insist on condoms with male partners. In addition, women may have trouble insisting on condoms because they may rely on their male partner's access to drugs, food, shelter, or other tangible resources.<sup>10</sup> Finally, HIV-positive male IDUs may assume that some of their female partners are HIV-positive, so they may be unwilling to use condoms with these partners.<sup>10</sup> For all of these reasons, understanding the motivations for protected and unprotected sexual behaviors by HIV-positive IDU men with their female partners is crucial.

A few studies report on the sexual behavior of HIV-positive men, and many of these focus on men who have sex with men (MSM).<sup>11</sup> In general, HIV-positive persons are more likely to engage in unprotected sex with HIV-positive partners than uninfected partners but not more likely to have unprotected sex with primary partners than non-primary.<sup>11</sup> It may be that HIV-positive persons are more likely to have unprotected sex with a seroconcordant partner regardless of whether that person is a main or casual partner, but that with HIV-negative or unknown serostatus partners, unprotected sex is more likely with casual than with main partners.<sup>11</sup> Studies conducted over the past decade with HIV-positive IDU men have consistently shown that, following an HIV-positive test result, many men do reduce their injection and sexual risk behaviors, although 25 to 50% continue to engage in high-risk behaviors.<sup>12–15</sup> Studies among HIV-positive IDU men found that more advanced HIV illness was associated with decreased sexual risk behavior<sup>16</sup> and that among HIV-positive IDU men and women, lack of social support, avoidant coping after an HIV-positive test, and low HIV/AIDS knowledge were associated with continued sexual and injection risk behaviors.<sup>17</sup> Previous studies with IDUs, regardless of serostatus, have shown that it is more difficult to change the sexual risk behaviors with main or primary partners compared with casual sex partners.<sup>18–20</sup>

In the present analysis we describe the sexual risk behavior of HIV-positive IDU men with four types of female partners: 1) HIV-positive main partners, 2) HIV-negative or unknown serostatus main, 3) HIV-positive casual, and 4) HIV-negative or unknown serostatus casual. Then we examine how particular individual, partner, and social characteristics are related to the men's sexual risk with each of these partner types. These exploratory analyses were conducted to help develop HIV prevention interventions for HIV-positive IDUs.

## **MATERIALS AND METHODS**

We report baseline data from Intervention for Seropositive Injectors—Research and Evaluation (INSPIRE), a randomized controlled trial of a ten-session HIV prevention intervention designed for HIV-positive IDUs. The study was conducted in community and clinical settings in four cities in the United States (Baltimore, Miami, New York, San Francisco), and data were collected from August 2001 through March 2005.

### **Sample and Procedures**

Potential participants were recruited for brief screening through street-based recruiting and from medical care settings, methadone clinics, and AIDS service

organizations and were eligible if they were at least 18 years old, confirmed to be HIV positive by oral fluid specimen test (OraSure, OraSure Technologies, Inc., Bethlehem, PA, USA), and reported recent sex with an opposite sex partner (past 3 months) and injection drug use (past 12 months). After screening 4,263 people, 1,499 were found to be eligible, and 1,161 people attended baseline (77.4% of those screening eligible). At baseline, participants were administered an audio-computer assisted self-interview (regarding sexual and drug using behaviors, health care, and adherence to medications as well as correlates of these behaviors) and provided an oral fluid sample and a blood specimen for CD4 count and viral load testing. The methodology of the full randomized controlled trial has been reported elsewhere.<sup>21</sup>

Of the 1,161 enrolled participants, 732 (63%) were men. Among these men, 49 (7%) reported having no sex partners (due to deception or the lag between screening and baseline), 469 (64%) reported having exclusively female partners, 118 (16%) reported having both male and female partners, and 90 (12%) reported having exclusively male partners in the past 3 months. Because few studies have focused on HIV-positive, heterosexual male IDUs, the present paper focuses on the 469 men who had exclusively female main or casual sexual partners. A main partner was defined as a girlfriend, spouse, or significant other. Casual partners were defined as a friend, acquaintance, or a stranger, including commercial sex partners. Of these 469 men, 155 (33%) reported having sex with HIV-positive main partners, 127 (27%) reported sex with HIV-negative or unknown serostatus main partners, 145 (31%) reported sex with HIV-positive casual partners, and 192 (41%) reported sex with HIV-negative/unknown serostatus casual partners. These groups are not mutually exclusive as some men had partners in multiple categories.

### **Dependent Variables**

We developed sexual risk variables for each of the four non-independent groups of men. Participants were asked about the frequency of their sexual behavior, their use of condoms, and the serostatus of their partners (known HIV-positive, known HIV-negative, and unknown serostatus). We were not able to independently confirm partner serostatus, but tried to minimize guessing by asking “has [your partner] told you that he or she is HIV positive or HIV negative? If your partner has not told you their HIV status, please select ‘unsure.’” For the four dependent variables, we examined vaginal/anal sex in the past 3 months with different types of partners (main or casual) by serostatus (HIV-positive or HIV-negative/unknown serostatus). The latter two groups were combined because both groups are potentially susceptible to HIV. Each dependent variable was dichotomized into “protected” (100% condom use with this partner type) and “unprotected” (less than 100% condom use). This dichotomy was used because only consistent condom use is associated with reduced HIV transmission or acquisition.<sup>22</sup>

### **Independent Variables**

We examined variables at three levels—individual, partner, and social—for their association with unprotected sex with the various types of partners.

*Individual-level variables* We measured a number of socio-demographic variables (age, race, education, income, years since HIV diagnosis) as well as incarceration in the past 6 months, engaging in transmission injection behavior in the past 3 months (lending needle or sharing cotton, cooker, or rinse water with any HIV-negative or unknown serostatus injection partner), exchanging (as buyer or seller) sex for

money or drugs in the past 3 months. We also examined use of alcohol or other drugs before or during sex in the past 3 months (five-point scale from ‘never’ to ‘every time’). For the current analyses, substance use before or during sex was dichotomized into higher frequency (‘most of the time’ and ‘every time’) and lower frequency. Depressive symptoms experienced in the prior week were measured using the depression sub-scale of the Brief Symptoms Inventory (seven items, score range 1–5, higher scores indicating greater depression, Cronbach’s alpha = 0.88).<sup>23</sup>

Self efficacy for safe sex was assessed by a scale inquiring about a participant’s confidence to use condoms during different situations with each of his sex partners [nine items, score range 1 (absolutely sure I cannot) to 5 (absolutely sure I can)]. Among men with multiple partners, scale scores for main partner(s) and for casual partner(s) were positively and highly correlated. Thus, the means for each partner type and serostatus were used when men had more than one partner in a category (alphas = 0.94–0.95). Self efficacy for disclosing HIV status to a sex partner was assessed using a six-item scale that asked about participants’ confidence to disclose their HIV status to any sex partner in various situations. Scoring was the same as for the previous self-efficacy scale (alpha = 0.91).

Negative condom beliefs (beliefs that condoms would reduce sexual pleasure) were assessed by a scale adapted from the “hedonistic outcome expectancy” scale developed for a study on HIV-positive MSM (four items, score range 1–5, higher scores indicating more negative beliefs, alpha = 0.88).<sup>24</sup> Participants’ knowledge about HIV, STD, and hepatitis was measured using 18 true–false questions. Percentage of correct answers was computed for each participant. Beliefs about personal responsibility were measured by a scale that was adapted from a scale developed for MSM.<sup>25</sup> The adapted scale inquired about the perceived responsibility of the participant and of other HIV-positive people to limit the spread of HIV during situations involving sex and injection drug use (seven items, range 1–5, higher scores indicated greater beliefs in responsibility, alpha = 0.83).

*Partner-level variables* Partner norms were measured in reference to the specific main/casual sex partner the participant identified. The construct, sometimes called “perceived normative pressure”,<sup>26</sup> was assessed using two questions with a range of five responses each: 1) whether participant thought the main partner believed that a condom should be used for vaginal sex (normative belief) and 2) whether the participant felt it was important to comply with that expectation (motivation to comply).<sup>27</sup> The normative belief score (–2 to +2) was multiplied by the motivation score (1 to 5) to create the final score ranging from –10 to +10 (higher scores indicating stronger partner norm supporting condom use).<sup>28</sup> Among men with multiple partners, scores for main partner(s) were correlated as were scores among casual partner(s). Thus, the mean for each partner type was used for men having more than one partner per type.

Physical violence against and from the partner was measured in reference to a specific main sex partner and was assessed using an adapted version of the Conflict Tactics Scale.<sup>29</sup> This scale asked whether or not, in the prior 12 months, the main partner had exhibited various threatening or violent behaviors (eight items) or whether the participant had threatened his main partner (eight items). The number of “yes” responses was summed for each subscale.

*Social-level variables* Social norms supporting condom use for vaginal sex was measured similarly to the partner norm variable. This construct used “most people

who are important to me” as the reference group. A higher score indicates stronger social norms supporting condom use. Social support was measured using five items adapted from Barerra’s<sup>30</sup> method for assessing social support in community settings (range 1–5, higher scores indicated greater social support,  $\alpha = 0.87$ ).

### Statistical Analysis

Demographics and sexual risk behaviors were used to describe the sample by partner type and serostatus. Associations between independent variables and the outcomes were assessed using chi-squared tests of homogeneity for categorical variables and analysis of variance (ANOVA) for continuous variables. Then, to assess whether observed relationships were the result of confounding, stepwise model selection procedures were used to build multivariate logistic regression models, with predictors significant at  $p < 0.1$  added to the models. This level of significance was used because of the exploratory nature of these analyses and the potential covariation between variables. The models were fitted stepwise by first considering individual-level variables,

**TABLE 1. Baseline demographic characteristics and sexual behaviors of HIV-positive IDU men with female partners by partner type and serostatus: INSPIRE study, 2001–2004**

	Men with HIV + main partners ( <i>n</i> = 155)	Men with HIV-? main partners ( <i>n</i> = 127)	Men with HIV + casual partners ( <i>n</i> = 145)	Men with HIV-? casual partners ( <i>n</i> = 192)
Age mean (SD)	43.4 (6.0)	44.1 (6.5)	43.9 (6.7)	44.6 (6.6)
Race/Ethnicity % ( <i>n</i> )				
White African	3.3 (5)	14.5 (18)	6.4 (9)	5.3 (10)
American	66.9 (101)	62.1 (77)	67.4 (95)	75.3 (143)
Hispanic	23.2 (35)	15.3 (19)	22.0 (31)	13.7 (26)
Other	6.6 (10)	8.1 (10)	4.3 (6)	5.8 (11)
Education % ( <i>n</i> )				
Less than high school	44.5 (69)	30.7 (39)	48.3 (70)	41.1 (79)
Annual income % ( <i>n</i> )				
Less than \$5,000	51.3 (78)	45.0 (54)	56.0 (79)	51.6 (95)
Incarcerated in past 6 months % yes ( <i>n</i> )	33.3 (42)	32.0 (33)	35.3 (42)	36.1 (60)
Sexual orientation % ( <i>n</i> )				
Heterosexual	90.2 (138)	92.1 (116)	93.7 (134)	92.2 (177)
Bisexual	4.6 (7)	4.0 (5)	2.8 (4)	4.2 (8)
Unsure/none	5.2 (8)	4.0 (5)	3.5 (5)	3.6 (7)
Years since HIV diagnosis mean (SD)	9.4 (5.2)	9.9 (5.0)	9.4 (4.9)	9.3 (5.2)
Years injecting mean (SD)	24.6 (9.1)	25.3 (8.8)	24.4 (9.7)	24.0 (9.0)
Any unprotected sex with this partner type and serostatus % yes ( <i>n</i> )	58.2 (89)	31.7 (39)	50.0 (71)	35.4 (67)
Number of partners in past 3 months				
Mean (SD)	4.6 (13.2)	2.4 (3.4)	6.7 (14.4)	6.8 (13.3)
Median (range)	1.0 (1–111)	1.0 (1–24)	3.0 (1–111)	3.0 (1–111)

Within each variable, total number of observations may not coincide with column total due to missing data.

and then partner-level and finally social-level variables. The best model fit was assessed using the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC).<sup>31</sup> The statistical package used for all analyses was SAS 9.1 (Cary, NC).

**TABLE 2. Bivariate associations between independent variables and unprotected vaginal and/or anal sex with main partners by serostatus: INSPIRE study, 2001–2004**

	Main partners					
	HIV+			HIV-/?		
	All sex protected ( <i>n</i> = 64)	Any unprotected sex ( <i>n</i> = 89)	<i>p</i> value	All sex protected ( <i>n</i> = 84)	Any unprotected sex ( <i>n</i> = 39)	<i>p</i> value
<b>Individual-level correlates</b>						
Age mean (SD)	44.4 (6.2)	42.6 (5.6)	0.07	44.2 (6.6)	43.3 (6.3)	0.45
Incarcerated in past 6 months % yes	25.9	39.4	0.11	27.1	45.2	0.08
Always used alcohol or drug during sex prior 3 months % yes	32.8	51.7	0.02	32.1	59.0	0.005
Lent used needles or shared equipment with injection partners % yes	32.1	55.7	0.008	40.0	59.4	0.07
Depression mean (SD)	1.8 (0.7)	1.9 (0.7)	0.59	1.8 (0.8)	2.2 (0.8)	0.006
Self-efficacy for condom use mean (SD)	4.2 (0.8)	3.3 (1.0)	<0.001	4.4 (0.7)	3.0 (1.0)	<0.001
Self-efficacy for disclosing HIV status to a sex partner mean (SD)	3.9 (0.7)	3.6 (0.9)	0.07	4.0 (0.9)	3.7 (1.0)	0.23
Negative condom beliefs mean (SD)	2.9 (1.0)	3.3 (1.0)	0.02	2.6 (0.9)	3.4 (0.9)	<0.001
Knowledge mean (SD)	0.81 (0.1)	0.76 (0.2)	0.04	0.83 (0.1)	0.76 (0.2)	0.04
Personal responsibility for limiting spread of HIV mean (SD)	4.4 (0.6)	4.2 (0.7)	0.05	4.4 (0.6)	4.1 (0.7)	0.01
<b>Partner-level correlates</b>						
Partner norm supporting condom use mean (SD)	5.9 (3.9)	1.6 (4.4)	<0.001	6.4 (3.3)	-0.4 (4.5)	<0.001
Conflict with main partner mean (SD)	0.8 (1.4)	1.3 (1.8)	0.11	1.0 (1.5)	1.7 (2.2)	0.03
<b>Social-level correlates</b>						
Peer norm supporting condom use mean (SD)	6.2 (3.6)	3.5 (3.8)	<0.001	5.8 (3.5)	2.5 (3.9)	<0.001
Social support mean (SD)	4.3 (0.9)	4.1 (0.8)	0.31	4.3 (0.7)	3.8 (1.0)	0.001

## RESULTS

Table 1 describes the characteristics of the four non-mutually exclusive sub-samples of men stratified by the reported characteristics of their female partners. The men were in their mid-40s, primarily African American, poor and poorly educated with significant incarceration history. In addition, men were primarily self-identified as

**TABLE 3. Bivariate associations between independent variables and unprotected vaginal and/or anal sex with casual partners by serostatus: INSPIRE study, 2001–2004**

	Casual partners					
	HIV+			HIV-/?		
	All sex protected ( <i>n</i> = 64)	Any unprotected sex ( <i>n</i> = 89)	<i>p</i> value	All sex protected ( <i>n</i> = 84)	Any unprotected sex ( <i>n</i> = 39)	<i>p</i> value
Individual-level correlates						
Education % of less than high school	45.1	50.7	0.50	32.0	58.2	<0.001
Exchanged money/drugs for sex % yes	50.7	52.1	0.87	52.5	73.1	0.006
Lent used needles or shared equipment with injection partners % yes	33.9	41.9	0.37	38.9	59.3	0.014
Depression mean (SD)	1.8 (0.7)	2.1 (0.9)	0.015	2.0 (0.9)	2.0 (0.8)	0.76
Self-efficacy for condom use mean (SD)	4.2 (0.8)	3.4 (0.9)	<0.001	4.2 (0.7)	3.7 (0.9)	<0.001
Self-efficacy for disclosing HIV status to a sex partner mean (SD)	3.8 (0.8)	3.7 (0.9)	0.40	3.6 (0.9)	3.1 (0.9)	<0.001
Negative condom beliefs mean (SD)	2.6 (1.0)	3.3 (1.0)	<0.001	2.8 (0.9)	3.1 (1.1)	0.07
Personal responsibility for limiting spread of HIV mean (SD)	4.3 (0.7)	4.2 (0.7)	0.52	4.3 (0.7)	4.1 (0.8)	0.01
Partner-level correlates						
Partner norm supporting condom use mean (SD)	5.4 (3.6)	1.4 (4.4)	<0.001	4.6 (3.7)	2.5 (3.9)	0.001
Social-level correlates						
Peer norm supporting condom use mean (SD)	5.3 (3.6)	3.0 (4.1)	<0.001	5.2 (3.3)	4.3 (3.6)	0.08
Social support mean (SD)	3.8 (0.9)	3.9 (0.9)	0.40	3.9 (0.9)	3.5 (0.9)	0.01

heterosexual, had been injecting for over half of their lives, and had been HIV positive for almost a decade. Regarding sexual risk, more than half of the sample with HIV-positive partners (58% with main and 50% with casual) reported having unprotected vaginal/anal sex with these partners in the past 3 months. The rates for sexual risk behaviors with HIV-negative or unknown serostatus partners were 32% with main partners and 35% with casual partners. Approximately 55% of men reported one female partner in the past 3 months. Among men with main partners, 33% reported also having one or more casual partners. The mean number of partners for the different groups ranged from 2.4 to 6.8, with the median number of partners being one for those men reporting a main partner and three for men with casual partners (regardless of serostatus in both cases).

### Bivariate Analyses

Bivariate associations between the independent variables and unprotected sex ( $p < 0.1$ ) with main partners by serostatus are presented in Table 2 and with casual partners by serostatus in Table 3. With main partners, regardless of serostatus, unprotected sex was associated with alcohol or drug use during sex, injection risk, lower self-efficacy to use condoms, negative beliefs about condoms, less knowledge, greater responsibility, and weaker partner and peer norms supporting condoms. Younger age and lower self-efficacy for HIV disclosure were associated with unprotected sex with HIV-positive main partners. Incarceration, depression, conflict with main partner, and lower social support were associated with unprotected sex with HIV-negative/unknown status main partners.

With casual partners, regardless of serostatus, unprotected sex was associated with lower self-efficacy to use condoms, negative beliefs about condoms, and weaker partner and peer norms supporting condoms. Depression was associated with unprotected sex with HIV-positive casual partners. Lower education, sex

**TABLE 4. Multivariate analysis of factors associated with unprotected vaginal and/or anal sex between HIV-Positive IDU men and their female sexual partners by relationship type and partner serostatus: INSPIRE study, 2001–2004**

	OR (95% CI)	<i>p</i> value
Sex with HIV+ main partner(s)		
Self-efficacy for safer sex	0.45 (0.26–0.76)	0.003
Partner norm supporting condom use	0.85 (0.77–0.94)	0.002
Always used alcohol or drug during sex prior 3 months	2.20 (1.02–4.78)	0.046
Sex with HIV-? main partner(s)		
Self-efficacy for safer sex	0.39 (0.19–0.79)	0.009
Partner norm supporting condom use	0.73 (0.60–0.89)	0.001
Negative condom beliefs	2.38 (1.27–4.47)	0.007
Sex with HIV+ casual partner(s)		
Self-efficacy for safer sex	0.55 (0.29–1.01)	0.053
Partner norm supporting condom use	0.85 (0.75–0.96)	0.009
Negative condom beliefs	1.66 (1.11–2.50)	0.015
Depression	1.85 (1.08–3.16)	0.025
Sex with HIV-? casual partner(s)		
Self-efficacy for safer sex	0.42 (0.26–0.67)	<0.001
Traded sex for money or drugs in prior 3 months	2.76 (1.32–5.76)	0.007
Education (less than high school)	2.17 (1.09–4.34)	0.028

exchanging, injection risk, lower self-efficacy for HIV status disclosure, greater responsibility, and lower social support were associated with unprotected sex with HIV-negative/unknown status casual partners.

### **Multivariate Analyses**

For multivariate analyses, greater self-efficacy to use condoms reduced the odds of reporting unprotected sex with all partner type/serostatus combinations except for HIV-positive casual partners (trend) (Table 4). Partner norms supporting condoms significantly reduced the odds of reporting unprotected sex for all combinations except for HIV-negative/unknown status casual partners. Alcohol or drug use during sex significantly increased the odds of reporting unprotected sex with HIV-positive main partners, while negative condom belief significantly increased the odds of reporting unprotected sex with HIV-negative/unknown status main partners.

For unprotected sex with HIV-positive casual partners, negative condom beliefs and depression were additional significant multivariate correlates. For unprotected sex with HIV-negative/unknown status casual partners, engaging in sex exchange and less education increased the odds of engaging in unprotected sex with these types of partners.

### **DISCUSSION**

A third of HIV-positive IDU men reported unprotected sex with HIV-negative and unknown serostatus main and casual partners, and over 50% of men engaged in unprotected sex with HIV-positive partners. Clearly there are many opportunities for the sexual transmission of HIV and other STDs from male IDUs to their female sexual partners and for the acquisition of STDs or superinfection by HIV-positive men. Consistent with prior research,<sup>11</sup> the variation in condom use by partner serostatus indicates that men's knowledge of their female partner's serostatus is important and that women's disclosures of their HIV-negative serostatus to HIV-positive men is associated with increased condom use for both main and casual partners. Thus, programs that focus on serostatus disclosure could be beneficial for reducing risk between HIV-positive and HIV-negative persons, particularly in contexts where disclosure is safe (e.g., absence of interpersonal violence). This also indicates, however, the significant risk HIV-positive men have for contracting other diseases that can accelerate HIV disease or make it easier to transmit HIV to uninfected partners.

Interestingly, when examining the patterns of findings, the models are relatively similar for three of the four types of partners. The outlier is the model for unprotected sex with HIV-negative and unknown status casual partners. The unprotected sexual liaisons between HIV-positive men and their uninfected or unknown serostatus casual female partners may particularly fuel the HIV epidemic. IDU men engaging in these relationships have a high number of partners, and if the men come in contact with the public health system (for example, through STD surveillance), they may be less likely to be able to identify their female partners so that they can take advantage of public health resources. In addition, the fact that engaging in sex exchange and lower education were related to sexual risk with HIV-negative or unknown status casual partners speaks to the challenges of promoting protection in the context of the drug–sex economy, where less educated, less skilled members of society are more likely to find themselves.<sup>10</sup> HIV-positive IDU men may

assume that their exchange partners are HIV positive<sup>32</sup> or not care about protecting them because they devalue them.<sup>10</sup> Similarly, those men who are exchanging drugs or money for sex may not be asked to use protection in these encounters or may have power that puts them in the position to not use condoms. The drug–sex economy is a challenge to address with traditional HIV prevention interventions—it calls for broader structural solutions that address poverty, power differentials, and education in addition to trying to invoke self-protection and altruism/partner protection.

Despite the challenges in addressing unprotected sex with uninfected casual partners, it is important to note that 65% of the men with these types of partners reported protected sex. This should encourage interventionists despite some of the structural challenges. In addition, across all four models, greater self-efficacy was significantly related to protected sex. While this finding is not new, it extends the importance of self-efficacy to HIV-positive men with female partners. This finding indicates that a cornerstone of programs for HIV-positive IDU men with any type of female partner should be to increase self-efficacy through activities such as modeling, hands on practice, role plays, and discussions. Because self-efficacy is conceptually specific by partner type or situation,<sup>33</sup> the context of men's lives should be explored, either individually or in group, to help improve self-efficacy for safer sex in those specific situations where it is individually most challenging.

We also saw that in three of the models, men's unprotected sex was associated with partner norms supporting condom use. Partner norms are made up of 1) beliefs that the partner want to use condoms and 2) how important it is for the man to comply with his partner's beliefs. In interventions for men, it would be feasible and desirable to focus on both of these components, particularly on the second component. Assuming that the woman has that desire to use a condom, increasing the concern a man might have for complying with his partner's desires about condom use is important. Interventions with at-risk women could focus on getting them to be more supportive of having their male partner use a condom and getting them to communicate this preference to their male partners so that men are clear that their female partners do want to use condoms. These two components of partner norms appear to tap into the power dynamics that are often present among male and female IDUs.<sup>10</sup> To the extent the women are fearful or feel unable to assert their desires for protection and to the extent that men feel empowered to ignore these desires, unprotected encounters are more likely. To fully understand this dynamic for any particular couple, it might be important to intervene at the level of the couple. Finally, negative condom beliefs were related to unprotected sex in two of the models, and two mental health variables (frequency of drinking alcohol or using drugs before or during sex and depression) were each significant in one model with HIV-positive partners. These findings indicate the importance of evaluating condom beliefs, substance use in the context of sex, and depression in HIV-positive IDU men because of their potential relationship to unprotected sex.

The pattern of findings across the four models indicates that an intervention for HIV-positive men should have a number of core components (those relevant regardless of partner type) and additional components that might be used if relevant to the participant(s). This suggests the need to have the flexibility to tailor the intervention, which can be accomplished in an individual setting or in a group setting where subgroups are possible. It also is important to acknowledge that perfect tailoring should not be the goal. A client who does not have a casual partner today may have one in the future, so he could benefit from modules that our data

indicate may be less relevant for him. In other words, our data should not be construed as offering a specific list of ingredients for men with specific types of partners. Instead, it should be used to sensitize interventionists to the different factors that may make risk reduction more challenging for some men based on the characteristics of their partners.

Several study limitations should be noted. First, these data are from a convenience sample of primarily poor, African American, IDU men recruited from four urban areas who all had exclusively female sex partners. Thus, generalizations to other IDUs should be made cautiously. However, using a multi-site sample with multiple recruitment venues strengthens potential generalizability. Second, these data are all self-reported, potentially leading to stigmatized behaviors such as sexual risk being underreported. To diminish this concern, we used computerized data collection methods, which have been shown to enhance reporting of sensitive risk behaviors among IDU samples,<sup>34</sup> particularly for sexual risk behaviors.<sup>35</sup> In any case, we had a significant minority of men reporting unprotected sex. Third, because these data were collected in the context of an intervention trial, we had only limited measures available. Finally the analysis was cross-sectional so causation could not be established. Strengths of this study were the use of psychometric scales that performed well with the present sample and the ability to focus on sexual encounters by partner type and serostatus.

As HIV medications continue to enhance the quality of HIV-positive men's lives, the need intensifies to identify effective and realistic prevention strategies. General interventions that also include targeted strategies based on the relationship pattern of men's lives may improve our current prevention strategies. Constructs such as self-efficacy for safer sex, partner norms, and condom beliefs should be part of most intervention strategies for HIV-positive men. In a group setting, different types of partnerships can be explored, and men can learn about all pairings, whether or not they are currently relevant for them, as well as learning about treating mental health and substance abuse. Relationship factors are also important, and working with couples or separately with the female partners is another intervention strategy. For men with more anonymous couplings (casual partners of unknown serostatus), social factors such as sex trade must be addressed. In sum, prevention efforts with HIV-positive IDU men need to consider personal, partner, and social factors in order to reduce sexual risk behavior with female partners.

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