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Multiplex crack smoking and sexual networks: Associations between network members' incarceration and HIV risks among high-risk MSM

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Abstract

Objectives—This study examined HIV risks in the multiplex crack-smoking and sexual networks of incarcerated drug-using men who have sex with men (MSM) and their associates. We estimated the associations between the network members' incarceration, self-reported HIV infection, and trading sex for money.

Methods—Our analytic sample consisted of 508 crack-smoking or sexual partnerships of 273 high-risk MSM. Network members were specified by (1) crack smoking and sexual behavior or (2) crack smoking only.

Results—Longer incarceration of the crack-smoking and sexual network members was associated with self-reported HIV infection ($AOR = 1.61$, $p < 0.05$), which extended up to one's partners' partners' partners ($AOR = 1.63$, $p < 0.05$). Similar results were found for trading sex ($AOR = 2.77$, $p < 0.05$).

Conclusions—The findings of the study call for the development of a system-level HIV intervention among former incarcerated MSM and their associates.

Keywords

Social network analysis; criminal justice involvement; network proximity; HIV STI/ infection; HIV transmission networks; three degrees of influence

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Incarceration rates in the United States are the highest in the world, largely due to drug-related offenses. Between 1980 and 2010, incarceration for drug-related offenses increased tenfold, to 143 per 100,000 population (Travis et al., 2014). An estimated one in seven people with HIV pass through a correctional facility (Centers for Disease Control and Prevention [CDC], 2012), and the large numbers of individuals who enter the criminal justice system have an impact on the health of prisoners and the public health of communities in general (Drucker, 2012, 2014). Increased rates of incarceration in state prisons and county jails are strongly associated with increased rates of sexually transmitted infections (STIs), including human immunodeficiency virus (HIV) (Khan et al., 2011b; Thomas & Torrone, 2006). Incarcerated individuals are eight to ten times more likely to be HIV infected (Adimora et al., 2005; Freudenberg, 2001) and more likely to engage in behaviors that increase their risk of contracting HIV, including illicit drug use and commercial sex work, than those who have not been incarcerated (CDC, 2012).

The public health impact of incarceration has been observed in the networks of individuals with criminal justice system involvement. From a network perspective, incarceration is a type of forced migration (Thomas & Torrone, 2006) and increases the potential that an individual will be exposed to high-risk drug trade and drug-use networks (Freudenberg, 2001). Incarceration also directly influences sexual networks by disrupting primary relationships during incarceration and by promoting high-risk partnering, such as multiple and concurrent partners or partnerships that involve trading sex for money or drugs (Adimora & Schoenbach, 2005; Khan et al., 2008, 2009, 2011a; Maru et al., 2007).

Sexual partnering that involves high risk is more common among individuals in short-term incarceration perhaps due to sexual partner changes when migrating in and out of the criminal justice system (Khan et al., 2008). Incarceration of a sex partner increases the risk of HIV transmission when the incarcerated partner becomes part of new sexual networks within a setting with a high prevalence of risk and HIV infection (Adimora & Schoenbach, 2005). When an inmate partner returns to the community, the partnerships that he formed in prison bridge high-risk inmate networks to lower risk networks in the community. In this way, rapid turnover rates in correctional settings promote disease transmission in the community.

Drugs and drug use also are part of the social context of the incarcerated population prior to incarceration and when they return to the community. Formerly incarcerated individuals often use crack cocaine as a social drug (Senteio et al., 2010), and crack is often easily available in the community into which incarcerated individuals return. Crack use is associated with greater involvement in criminal activity (Inciardi & Pottieger, 1994; Kinlock et al., 2003) and, notably, greater likelihood of longer incarceration (Bland et al., 2012).

Smoking crack is also an independent risk factor for HIV seroconversion (DeBeck et al., 2009), having concurrent drug and sex partners (Tobin et al., 2011), having multiple sex partners, trading sex for money or drugs, and having unprotected sex among MSM (Campsmith et al., 2000; Newman et al., 2004; Tobin et al., 2011). The sexual networks of crack-using MSM comprise more HIV-positive sex partners than do those of non-crack-using MSM (Tobin et al., 2011). Network members' crack use also is associated with

multiple sex partners and having casual sex partners among injection drug users (Latkin et al., 1996), suggesting peer influence on sexual risk behavior.

Despite the health risks of incarceration, few network studies have examined how the overlapping relational conditions (types of relationships) under network members' incarceration are associated with HIV infection/sexual risk behavior or how far overlapping associations (indirectly) extend. Further, although existing network studies have established the effect of incarceration on changing sexual networks and the associated HIV risk or infection, the majority of studies target heterosexual populations (Khan et al., 2008, 2009, 2011a, 2011b).

The current study takes a social network approach to examining the diffusion of HIV risk in terms of the risk network members' incarceration history and targeting the high-risk MSM in the formerly incarcerated population of drug-using sex workers. Briefly, a social network approach posits that relationships among people will influence an individual's behavior more than will his or her individual attributes, attitudes, beliefs, and behaviors (Valente, 2010). In HIV/STI network research, a risk network is defined as a pattern of risk-potential relationships among a group of people who are connected through having sex and/or injecting drugs together (Friedman & Aral, 2001), a channel which then facilitates the spread of the HIV/STD infection. Few existing network studies, however, have regarded the composition of the risk networks as relational conditions under which overlapped risk-prone relationships are associated with HIV risk.

The current study defines "risk networks" that involve former inmates as types of risk-prone relationships based on crack-smoking and sexual relationships. Network members' incarceration may be differentially associated with individuals' HIV risk and behavior, depending on their individual relational conditions (e.g., overlapped crack-smoking and sexual networks or crack-smoking networks non-overlapped with sexual networks). The concept of "network multiplexity" (Krohn et al., 1988) indicates that networks that connect individuals through more than one relationship develop greater behavioral similarity (Fujimoto & Valente, 2015; Krohn, 1986; Krohn et al., 1988), as they contain multiple bases for interaction (Skvoretz & Agneessens, 2007). Based on these concepts, our first and second hypotheses are:

Hypothesis 1: Risk of exposure to a network member who has been incarcerated and is HIV infected is greater in an overlapped crack and sex network than in a non-overlapped network.

Hypothesis 2: Risk of exposure to a network member who has been incarcerated and involved in sex work is greater in an overlapped crack and sex network than in a non-overlapped network.

The "three degrees of influence rule" (Christakis & Fowler, 2009), a social network theory, posits that network effects reach up to three degrees of separation (one's friends' friends' friends) in various health behavior domains, such as obesity, substance use, and depression (Christakis & Fowler, 2007, 2008, 2009; Fujimoto & Valente, 2012). In this study, we also explored how far associations ripple through in terms of the relational distance of risk

exposure to members' incarceration. The hypotheses were tested for connected members and indirectly connected members.

Methods

Recruitment and study design

The study from which the data were derived was conducted between May 2003 and February 2004 in Houston, Texas. The purpose of the study was to investigate the social, drug-use, and sexual networks of drug-using male sex workers in Houston. Drug-using male sex workers were recruited using targeted sampling and participant referral, described elsewhere (Williams et al., 2005, 2006). A focal participant (seed) was eligible for the study if he was a self-identified male at least 17 years old, had exchanged sex for money with another man in the last seven days, and had smoked crack cocaine or injected an illicit substance in the past 48 hours. Participants were asked to name their social, sexual, and drug-use contacts in the last 48 hours who were at least 17 years old. The focal participant was asked to recruit the contacts, with greater preference given to drug-using or sexual contacts. We repeated the process when secondary or tertiary contacts participated in the study.

Study procedures and data collection instruments were approved by the Committee for the Protection of Human Subjects at the University of Texas Health Science Center at Houston. We obtained written informed consent from all participants, including those who were 17 years of age. Participants who were 17 at the time of the interview were, as approved by the IRB, emancipated adults under state law.

Data

We collected data using the Sexual Network Questionnaire. The questionnaire was designed to collect self-reported data on respondents' socio-demographic characteristics and histories of HIV/STDs, drug use, and sexual behaviors as well as on the drug use and sexual behaviors of their sexual contacts (Williams et al., 2001). Our total analytic sample was restricted to 273 MSM (excluding females) with 508 dyads whose nominated partners could be linked to their survey ID, and, thus, their survey information was accessible.

Variable measures

Outcome variables—We measured two individual-level outcome variables of respondents' self-reports of "HIV infection" (yes, no, unknown) and "trading sex" (ever or never traded sex for money).

Incarceration-related variables—We measured three incarceration-related variables: "age at the first-time arrest" (continuous), "number of lifetime arrests" (continuous), and "total months of lifetime incarceration in jail, prison, or juvenile lockup" (continuous). Lifetime arrests and lifetime incarceration were distinct measures (Friedman et al., 2011). We used duration of incarceration, not timing of incarceration (how long ago incarceration occurred), as duration of incarceration was more important to predicting risk-taking sexual behavior (Khan et al., 2008).

Control variables—The following variables were used as control variables in our regression models: socio-demographic characteristics, including “age” (continuous), “race/ethnicity” (African American, Hispanic, or White), “homelessness” (yes or no), “self-identified as gay” (gay or non-gay), and “years of education” (continuous). We measured risk variables as the square root of the number of sex partners for the last 30 days (continuous) and “ever injected drugs” (yes or no).

Network measures

Risk networks—We operationalized risk networks based on two types of relationship measures: ever smoked crack with partner (crack) and ever had sex with partner (sex). Then, we created two different types of risk networks by desegregating the risk network based on crack overlapped with sex from the one based on the crack relationships only. Matrix expressions for risk networks are available in the online supplement.

Network proximity—We measured network proximity by computing relational distance from a respondent to partners: one’s direct partners (1 distance), up to one’s partners’ partners (up to 2 distances), and up to one’s partners’ partners’ partners (up to 3 distances). Mathematical expressions for network proximity measure are available in the online supplement.

Risk network exposure—We measured risk network exposure in terms of a partner’s incarceration-related variables of (i) frequency of lifetime arrest and (ii) total months of lifetime incarceration. We used a decomposed network exposure model (Fujimoto, 2012; Fujimoto & Valente, 2013) to compute the level of risk exposure with varying network proximity separately for crack overlapped with sex and for crack only, for a total of 12 risk network exposure measures. The first six risk exposures concern the average lifetime arrests of one’s direct partners (1 distance), up to one’s partners’ partners (up to 2 distances), and up to one’s partners’ partners’ partners (up to 3 distances), respectively, who are connected through crack and sexual relationships. The additional six risk exposures concern the average incarceration-months of one’s direct partners (1 distance), up to one’s partners’ partners (up to 2 distances), and up to one’s partners’ partners’ partners (up to 3 distances), respectively, who are connected through just the crack relationships only. These risk network exposure measures are our independent variables. Mathematical expressions for decomposed exposure model are available in the online supplement.

Involvement in risk networks—We created a dummy variable (yes or no) to indicate the involvement of a crack or a sex relationship as determined by having at least one crack or one sexual relationship with a contact. We then specified this dummy variable as a control variable.

Statistical analysis

We examined two distinctly separate logistic regression models for each outcome variable, self-reported HIV infection and trading sex, using robust variance estimates. For each of these regression models, we fitted three separate regression models: the model with independent variables of risk network exposures for the crack and sexual partnerships and

risk network exposures for crack-only partnerships. We fitted these separately for each of the three levels of network proximity (i.e., 1 distance, up to 2 distances, and up to 3 distances). Mathematical expressions for these statistical models are available in the online supplement. We imputed any missing values for at least one of the covariates (required for approximately 11% of our sample) using switching regression, an iterative multivariable regression technique of multiple imputations by chained equations (Royston, 2004) using Stata 13.

Results

Visualization and risk networks

We constructed a visual representation for the structural patterns of the three forms of: (a) risk network composed of combined crack or sexual relationships (to visualize one's involvement in risk networks), (b) risk network composed of combined crack and sexual relationships, and (c) risk network composed of crack-only relationships (Figure 1). A node represents an individual MSM with HIV status and length of incarcerations. The graphs were constructed using the *igraph* package in R (Csardi & Nepusz, 2006).

Descriptive statistics

Table 1 shows the descriptive statistics for our analytic sample. On average, respondents reported 32 sex partners in the last 30 days, with 97% having had at least one sex partner in the last 30 days.

As for network characteristics, the mean number of partners who smoked crack cocaine together was 1.73 ($SD = 1.65$; $Min = 0$, $Max = 12$; $Median = 1$), 0.94 ($SD = 1.07$; $Min = 0$, $Max = 5$; $Median = 1$) had sex, and 0.79 ($SD = 0.94$; $Min = 0$, $Max = 5$; $Median = 1$) smoked crack and had sex. Of the 273 MSM, 239 (88%) were in the risk network connected through crack *or* sexual relationships. There were 33 distinct components in this network, with the largest component's consisting of 83 MSM. Slightly more than half (143, 52%) of the 273 MSM were in risk networks connected through combined crack *and* sexual relationships. There were 42 distinct components in this network, with the largest component's consisting of nine MSM. In the risk network of crack-only relationships, 173 (63%) MSM were connected. There were 39 distinct components in the crack-only network, with the largest component's consisting of 48 MSM.

Regression analysis

Table 2 presents the adjusted odds ratios (*AOR*) for socio-demographic, risk-behavioral, and incarceration-related effects in the logistic regression model, using risk exposure computed at network proximity of direct partners (1 distance).

Table 3 presents the adjusted odds ratios for risk network exposure in the logistic regression models.

Self-reports of HIV infection

Table 2 shows that, of the socio-demographic, risk-behavior, incarceration-, and risk-network involvement covariates, only self-identified as gay was significantly associated with

self-reported HIV infection ($AOR = 9.28$, $p < 0.001$, $CI = 4.07, 21.15$ for “1 distance”). Table 3 shows that risk network exposure to crack and-sexual partners with longer incarceration months was significantly associated with self-reported HIV infection. These partners included one’s direct partners ($AOR = 1.61$, $p < 0.05$, $CI = 1.07, 2.43$ for “1 distance”), up to one’s partners’ partners ($AOR = 1.64$, $p < 0.05$, $CI = 1.02, 2.64$ for “up to 2 distances”), and up to one’s partners’ partners’ partners ($AOR = 1.63$, $p < 0.05$, $CI = 1.03, 2.58$ for “up to 3 distances”). Lower 95% CIs for the risk exposure to indirect partners were close to 1, indicating a marginally significant effect. No associations were found in the crack-only risk network.

The results support our first hypothesis regarding the association between the network members’ length of incarceration and self-reported HIV infection. Partners’ arrest history, risk exposures to crack and sexual partners or crack-only partners with more frequent lifetime arrests were not associated with self-reported HIV infection for any level of relational distances.

Trading sex

Table 2 shows that the number of sex partners was significantly associated with trading sex ($AOR = 2.36$, $p < 0.001$, $CI = 1.66, 3.34$ for “1 distance”). Incarceration length also associated with trading sex ($AOR = 1.90$, $p < 0.05$, $CI = 1.04, 3.47$ for “1 distance”).

Table 3 shows that risk network exposure to crack and sexual partners with longer incarceration was significantly associated with one’s experience in trading sex. These partners included up to one’s partners’ partners ($AOR = 2.61$, $p < 0.01$, $CI = 1.39, 4.92$ for “up to 2 distances”) and up to one’s partners’ partners’ partners ($AOR = 2.77$, $p < 0.05$, $CI = 1.43, 5.36$ for “up to 3 distances”), but this association was not significant in the case of one’s direct partners only (“1 distance”). The tendencies were not supported in the case of risk-network exposures to crack-only partners with longer incarceration, supporting our second hypothesis regarding the association between the network members’ length of incarceration and one’s experience in trading sex. As for partners’ arrest history, the risk exposures to crack-only partners with more frequent lifetime arrests were associated with trading sex, but only for partners up to 2 distances. The association for partners at 3 distances was marginal, suggesting a chance finding.

Discussion

This study used a network perspective to investigate the social context of risk networks among the high-risk MSM population and HIV risk in the community. Presumably, a more serious criminal connection (i.e., longer history of drug use and previous convictions) indicates that the individual is living in a social context where other illegal activities, such as trading sex, are common and that the disease epidemic is at the community level. Our study demonstrated that an individual’s greater exposure to network members with longer incarceration periods matters both for one’s self-reported HIV infection and one’s experience in trading sex, which ripples through up to one’s partner’s partners’ partners who are connected only through overlapped crack-smoking and sexual relationships. Notably, one’s own incarceration history was not associated with self-reported HIV infection.

The relationships between illicit drug use and sexual behavior are complex (Ross & Williams, 2001). Further, sexual partners are often drug-using partners (Sherman & Latkin, 2001), and perhaps the overlap of sexual and drug relations contributes to the risk of HIV (Tobin et al., 2011). Our results suggest that a sexual partnership that involves crack cocaine use could be formed among the formally incarcerated high-risk MSM and, thus, enlarge the sexual network among HIV positive people. Such an incarceration-involved risk network may provide individuals with an opportunity to negotiate the exchange of sex for money by word of mouth, as our results indicate that not only one's incarceration but also a greater exposure to network members with longer incarceration were associated with trading sex for money.

Our study has some limitations in terms of its not addressing other factors, such as type of sexual contact, healthcare/treatment access, or use of preventive measures. These may contribute to increasing or reducing risk of HIV acquisition or related risk behavior within risk networks. In addition, our dataset is cross-sectional, and, thus, the interpretation of our results has limitations in terms of our understanding of the causality of network influence on HIV infection and risk behavior.

Another limitation is that the data that were collected from 2003 to 2004. Considering the expansion of sex work venues to social media over the last decade, the social networking of the incarcerated population may have changed. However, given that street-based sex work is driven by the economic need to obtain drugs or shelter (Newman et al., 2004), we do not expect street-based sex workers to have consistent access to social media. The age of the data also raises a limitation, as the course of the HIV epidemic has changed as newer medication regimens, including prophylaxis have become available. It is highly unlikely, however, that circumstances have changed for street-based sex workers. Sex workers who use drugs subsist at the level of economic survival. They have limited access to medical care, treatment, or medications. In addition, crack smoking persists over long periods of time (Falck et al., 2007) as do street-based drug use and the culture surrounding use. Consequently, we expect that data more recently collected from drug users would provide similar results. Nevertheless, our results should be interpreted with these social, economic, and political changes surrounding sex work in mind.

Conclusions

The findings of our study suggest that appropriate network-based intervention efforts have the potential to reduce the disproportionate number of HIV-infected individuals in the community of crack-using MSM who migrate in and out of the criminal justice system. For instance, social network strategies for HIV testing, prevention, and engagement in care offered by the CDC (Kimbrough et al., 2009; McCree et al., 2013) could be extended to those who have just been released from jail or prison as a means to reach the network members who are vulnerable to HIV infection in the community and who are connected through both drug and sex relationships. Our results indicate that such efforts should be extended to wider risk networks, not limited to an incarcerated individual's direct partners, and should be focused on MSM who are HIV positive and have been incarcerated for longer periods or who are trading sex for money.

Further, correctional facilities can play a part in providing appropriate health promotion and prevention services while individuals are in prison (Ross, 2013). For example, some prisons in Texas provide drug treatment in cooperation with the Texas Central Unit prison. Such prevention programs would be more beneficial if they followed up when individuals return to the community. Some released individuals could even lead prevention programs with their network members in the community. In relation to Affordable Care Act, it is important that correlational systems coordinate with Medicaid or with county- or state-level healthcare systems to assist incarcerated individuals in enrolling in Medicaid upon release (Travis et al., 2014). With Medicaid, it is more likely that individuals will be linked to the healthcare system and will be able to maintain the care that they may have received during incarceration.

Some argue that the criminalization of drug use has caused an increase in incarceration that has led to the HIV epidemic in prison (Drucker, 2013; Maru et al., 2007). Our study findings suggest the important role that incarceration plays in forming crack-using and sexual networks and its associations with HIV infection and the trading sex. Perhaps HIV risk-involving networks formed by incarcerated high-risk MSM populations would be greatly decreased through a reform of drug policies in the United States. From a public health perspective, the most effective preventive strategies may include some legislative changes (Maru et al., 2007). We hope that our study provides additional insight and some data for public health discussion about tackling the HIV and drug-use problems associated with prison systems nationally.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Risk networks composed of crack-smoking and sexual relationships among high-risk MSM.

(A) Risk network connected through crack-or-sexual relationships

(B) Risk network connected through combined crack-and-sexual relationships

(C) Risk network connected through crack-only relationship

Table 1

Descriptive statistics for our study covariates and network measures: Percentage or mean with *n*, standard deviation, and minimum and maximum value in parentheses (*N* = 273)

Percentages (<i>n</i>) or Mean (<i>SD</i> ; <i>Min</i> , <i>Max</i>)			
<i>Outcome variables:</i>			
Self-reported HIV status			
Positive		22% (<i>n</i> = 60)	
Negative		63% (<i>n</i> = 171)	
Sex trade			
Ever traded sex for money		75% (<i>n</i> = 206)	
Never traded sex for money		25% (<i>n</i> = 67)	
<i>Socio-demographic variables:</i>			
Age		34.0 (9.7; 18, 73)	
White		47% (<i>n</i> = 129)	
African American		45% (<i>n</i> = 122)	
Hispanic		8% (<i>n</i> = 22)	
Homeless		48% (<i>n</i> = 132)	
Self-identified gay		35% (<i>n</i> = 96)	
Years of education		11.4 (2.3; 4, 19)	
<i>Risk behavioral variables:</i>			
Sex partners in the last 30 days		31.7 (40.7; 0, 150)	
Ever injected drugs		52% (<i>n</i> = 143)	
<i>Incarceration-related variables:</i>			
Age at the first-time arrest		18.7 (6.5; 10, 52)	
Total number of lifetime arrests		12.2 (15.3; 0, 90)	
Total months of incarceration		54.0 (58.3; 0, 300)	
Involvement in risk network		87.6% (<i>n</i> = 239)	
<i>Risk network exposure to partners:</i>	1 distance	<i>Network proximity</i> Up to 2 distances	Up to 3 distances
(i) Lifetime arrest			
a) Crack-smoking and sex partners	7.0 (11.4; 0, 50)	6.9 (9.6; 0, 50)	6.6 (9.0; 0, 50)
b) Crack-smoking-only partners	8.4 (14.4; 0, 90)	9.0 (11.1; 0, 50)	9.3 (10.3; 0, 47.5)
(ii) Incarceration months			
a) Crack-smoking and sex partners	31.8 (50.9; 0, 204)	29.9 (43.4; 0, 228)	29.5 (41.5; 0, 204)
b) Crack-smoking-only partners	31.0 (49.2; 0, 300)	38.2 (42.7; 0, 300)	38.5 (41.2; 0, 300)

Note: There are 15% unknown/missing cases for "HIV status" and 16% missing cases for "Ever injected drug" for our outcome variables. There are 5% missing cases for "Age at the first-time arrest" and 6% for "Total months of lifetime incarceration." The limit of "Sex partners in the last 30 days" was set to 150. The minimum of "Age at the first-time arrest" was set to 10 years old.

Table 2

Results of socio-demographics and incarceration-related effects: Adjusted odds ratios for logistic regression analyses with standard errors and lower and upper 95% CIs in parentheses

	Adjusted Odds Ratio (AOR)	
	Self-reported HIV infection (N = 231)	Sex trade (N = 257)
<i>Socio-demographic variables:</i>		
Age	1.03 (0.03; 0.98, 1.08)	0.96 (0.02; 0.92, 1.01)
African American	1.82 (0.84; 0.74, 4.49)	0.72 (0.35; 0.27, 1.89)
Hispanic	0.77 (0.52; 0.20, 2.88)	1.12 (0.94; 0.22, 5.78)
Homeless	0.56 (0.24; 0.24, 1.31)	1.77 (0.74; 0.78, 4.03)
Self-identified gay	9.28 *** (3.90; 4.07, 21.15)	1.46 (0.80; 0.50, 4.29)
Years of education	0.98 (0.09; 0.82, 1.17)	0.97 (0.10; 0.80, 1.82)
<i>Risk behavioral variables:</i>		
Sex partners in the last 30 days	1.02 (0.07; 0.89, 1.18)	2.36 *** (0.42; 1.66, 3.34)
Ever injected drugs	1.39 (0.61; 0.59, 3.28)	2.02 (1.00; 0.77, 5.31)
<i>Incarceration-related variables:</i>		
Age at the first-time arrest	1.00 (0.04; 0.93, 1.07)	1.00 (0.04; 0.93, 1.07)
Total number of lifetime arrests	0.96 (0.18; 0.66, 1.39)	1.04 (0.23; 0.68, 1.60)
Total months of incarceration	1.22 (0.26; 0.80, 1.86)	1.90 * (0.58; 1.04, 3.47)
Involvement in risk network	1.44 (1.16; 0.30, 7.02)	1.95 (1.30; 0.53, 7.18)

Note:

Results for covariates are based on the model, with risk network exposure based on 1 distance. "White" was set as a reference category for race/ethnicity. Unknown/missing cases of outcome variables were excluded.

*
 $p < 0.05$;

**
 $p < 0.01$;

 $p < 0.001$, two-tailed test.

Table 3

Results of risk network exposure effects: Adjusted odds ratios for logistic regression analyses with standard errors and lower and upper 95% CIs in parentheses

	Adjusted Odds Ratio (AOR)	
	Self-reported HIV infection	Sex trade
<i>Risk network exposure to:</i>		
<i>Crack-smoking and sex partners</i>		
(i) Lifetime arrest		
1 distance	1.04 (0.21; 0.71, 1.53)	1.16 (0.33; 0.67, 2.01)
Up to 2 distances	1.02 (0.22; 0.68, 1.55)	1.04 (0.31; 0.58, 1.87)
Up to 3 distances	1.01 (0.22; 0.66, 1.55)	0.97 (0.31; 0.52, 1.80)
(ii) Incarceration months		
1 distance	1.61 * (0.34; 1.07, 2.43)	1.48 (0.37; 0.91, 2.42)
Up to 2 distances	1.64 * (0.40; 1.02, 2.64)	2.61 ** (0.84; 1.39, 4.92)
Up to 3 distances	1.63 * (0.38; 1.03, 2.58)	2.77 ** (0.93; 1.43, 5.36)
<i>Crack-smoking-only partners</i>		
(i) Lifetime arrest		
1 distance	0.80 (0.18; 0.51, 1.25)	1.18 (0.22; 0.82, 1.71)
Up to 2 distances	0.85 (0.20; 0.54, 1.35)	2.02 * (0.69; 1.04, 3.93)
Up to 3 distances	0.90 (0.20; 0.58, 1.59)	1.77 † (0.59; 0.93, 3.39)
(ii) Incarceration months		
1 distance	0.95 (0.23; 0.59, 1.53)	0.83 (0.21; 0.51, 1.36)
Up to 2 distances	0.90 (0.17; 0.61, 1.31)	0.80 (0.23; 0.46, 1.40)
Up to 3 distances	0.90 (0.17; 0.62, 1.31)	0.88 (0.28; 0.47, 1.65)

Note:

Results for covariates are based on the model with risk network exposure based on 1 distance. Unknown/missing cases of outcome variables were excluded.

† $p < 0.1$;

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$, two-tailed test.