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Receptive Syringe Sharing Behaviors and High-Risk Sexual Behaviors in Dual Risk Relationship
among Persons Who Inject Drugs in 20 Cities in the United States, 2015

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Master of Public Administration

University of Pittsburgh

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Faculty Thesis Advisor: Patrick Sullivan, PhD, DVM

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Abstract

Receptive Syringe Sharing Behaviors and High-Risk Sexual Behaviors in Dual Risk Relationship among Persons Who Inject Drugs in 20 Cities in the United States, 2015

By Xinyi Li

Background: Persons who inject drugs (PWID) engaging in both high-risk injecting behaviors and high-risk sexual behaviors with the same partner (“dual risk relationship”) may face a higher risk of infection with HIV. Current research efforts mostly focus on estimating the risk for HIV infection among PWID who engage in high-risk injection and/or sexual behaviors with different partners in the past 12 months (1). The risk of infection with HIV among PWID and their partners engaging in dual risk relationship has not been fully understood.

Objective: Investigate the characteristics of last sharing injecting partners and assess the association between dual risk relationship with both high risk injecting and sexual behaviors.

Methods: PWID aged ≥ 18 years in 20 US cities were recruited by using respondent-driving sampling in the National HIV Behavioral Surveillance in 2015. Descriptive analyses were conducted to investigate last sharing injecting partner’s characteristic and bivariate analyses were conducted to examine the associations between demographic, behavioral, and last sharing injecting partner variables and status as dual risk relationship.

Results: Condomless sex at last sex, number of sex partners in the past 12 months, and number of injecting partners at last sharing event showed significant associations with dual risk relationship. PWID who had condomless sex at last sex were more likely to report engaging in dual risk relationship (aPR = 2.39, 95% CI 2.06 – 2.77). PWID with more sex partners in the past 12 months (aPR = 0.72, 95% CI 0.66 – 0.78) or more injecting partners at the last sharing event (aPR = 0.73, 95% CI 0.67 – 0.80) were less likely to reported having dual risk relationship. Last sharing partner who were female, white, and young age (18-29 yrs) were more likely to report engaging in dual risk relationship.

Conclusion: Condomless sex at last sex is positively associated with dual risk relationship. Number of sex partners in the past 12 months and number of injecting partners at last sharing event are negatively associated with dual risk relationship. Prevention strategies should be designed to target PWID engaging in dual risk relationship.

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INTRODUCTION

In the United States, people who inject drugs (PWID) accounted for 22% of people living with diagnosed HIV/AIDS (PLWHA) and 9% of the new US HIV diagnoses in 2017 (2).

Condomless sex and sharing injecting equipment are the two most common ways to transmit HIV in the United States (3). PWID may also concurrently engage in high-risk sexual and injecting behaviors (“dual risk behaviors”) (4), which increases their risks for acquiring HIV (5, 6). By engaging in dual risk behaviors, not only are PWID themselves at an increased risk, but their sex and injecting partners are also placed at a high risk of HIV infection (7). In a study by Unger et al., the authors explored the importance of the types of partnerships that PWID engage in and it showed that PWID were more likely to share needles with certain partners, including their sex partners (8). Other studies focusing on syringe sharing also showed that many injecting relationships were not random, and that receptive syringe sharing (RSS) behaviors were more likely to happen between PWID and their sex partners (9). PWID who engage in both high-risk injecting behaviors and high-risk sexual behaviors with the same partner (“dual risk relationship”) may face a higher risk of infection with HIV (10). Current research efforts mostly focus on estimating the risk for HIV infection among PWID who engage in high-risk injection and/or sexual behaviors with different partners in the past 12 months (1). The risk of HIV infection among PWID engaging in dual risk relationship has not been fully understood.

Dual risk relationship puts both PWID and their partners at a higher risk of HIV infection; however, current studies mainly focus on the demographic characteristics and behavior of only the PWID, and not their injecting and/or sexual partners (1, 6, 7, 11, 12). Information on partners of PWID is lacking because researchers focus on only half of the risk dyad. In order to fully understand the dynamics of the entire dyad, further research is needed to focus on the characteristic of partners who engage in dual risk relationship. In this study, we will address this question.

Further understanding of types of high-risk behaviors associated with the dual risk relationship is also needed. In the previous studies, researchers found that behaviors such as condomless sex, number of sex partners, number of injecting partners, types of drugs were associated with a higher frequency of RSS behaviors (1, 13). Demographic factors such as gender, marital status, homeless status, and incarceration status were also associated with dual risk behaviors (14-16). In the current study, we investigate types of high-risk behaviors associated with dual risk relationship and factors that may influence dual risk relationship. We used data from the U.S. Centers for Disease Control and Prevention (CDC) National HIV Behavioral Surveillance (NHBS) to study the associations between high-risk behaviors and dual risk relationship (17). The analysis is restricted to NHBS respondents who tested HIV-negative at the time of interview and who engaged in RSS behavior in the past 12 months (17).

METHODS

Sampling

Data for this analysis was collected in 2015 during the fourth cycle of National HIV Behavioral Surveillance (NHBS) among PWID (17). For this cycle, data collection was conducted in 20 major U.S. metropolitan statistical areas (MSA) in 2015 and participants were limited to PWID that used injection drugs that had not prescribed during the past 12 months (18). Participants were recruited by using the respondent-driving sampling (RDS) method (18, 19). The eligibility criteria to participate in the study were whether the participants had injected drug in the past 12 months, was at or above the aged of 18 years at the time of enrollment, resided in the participating MSA, and could answer the questionnaire in English or Spanish (20). The study started by recruiting a small number of contacts in each city, referred to as “seeds”, who were from the target population and could help to recruit other respondents (18, 21). Eligible seeds would receive coupons and would be asked to recruit participants by giving them coupons as well (20, 21). Participants who received the coupons would go to the study sites in the participating MSA and completed an interview (20, 21). Interviewers would collect information on behavioral risks for HIV infection, HIV testing result and HIV services uptake via a portable computer (21). HIV testing was performed in the sites for all consenting participants (21). Participants who completed the interview were asked to recruit up to 5 other participants and if they agreed, they would receive additional coupons to give to the new participant they recruited (20, 21). Recruitment would end when either the sample size was reached or when the study period ended (20, 21).

Measures

PWID who were HIV negative and had RSS behavior in the past 12 months are the target population of this study. HIV serostatus was determined by the results of the rapid HIV test done

at the recruitment. The RSS behavior was determined by any report of shared needle in the past 12 months (receptive). Dual risk relationship is the outcome of the interest in the main analyses. During the interview, participants reported RSS behaviors were directed to a series questions of last sharing injecting partners. We also hoped to better understand the relationship types between PWID themselves and their last sharing injecting partner. This information was derived from the survey question: “Which of the following best describes your relationship to this person? Would you say this person was a:” and the options were included: “sex partner, such as your spouse, boyfriend/girlfriend, or other person you have sex with”, “relative”, “friend or someone you knew well who was not a sex partner”, “needle or drug dealer”, “stranger or someone you did not know well”, and “other” (22). Based on the dual risk relationship definition, the responses were dichotomized into “sexual partner” and “non-sexual partner”.

The high-risk behaviors included and examined in the analyses were injection frequency in the past 12 months, the most commonly injected drugs, the number of injecting partners at last sharing event, the number of sex partners in the past 12 months, and whether during their last sex act they used a condom. These behaviors were assessed as potential exposures and analyzed for associations with dual risk relationship.

Other demographic variables were included in the study to estimate their effect on the potential associations between high-risk behaviors and dual risk relationship. These variables included participants’ gender, age, race, marital status, education level, poverty status, incarceration history in the past 12 months, and homeless status in the past 12 months. Among these variables, participants who reported “never incarcerated” and “incarcerated, not within past 12 months” were categorized as “not incarcerated in the past 12 months”. Participants who reported “incarcerated within past 12 months” were categorized as “incarcerated in the past 12 months”. Participants who reported “never homeless in past 12 months”, “has been homeless, but not currently”, and “has been homeless, but unknown if currently” were categorized as “not

homeless in the past 12 months”, and participants who reported “currently homeless” were categorized as “homeless in the past 12 months”. Other than these demographic variables, participants who reported having last sharing injecting partner were also asked to answer their last sharing injecting partner’s characteristics, including last partner’s gender, age, and race. These variables were also included in the study. Age difference between participants and their last sharing partner were calculated by using participant’s age and their partner’s age. Age difference within -5 to 5 years was categorized as “same age”, age difference > 5 years was categorized as “older”, and age difference < -5 years was categorized as “younger”. Awareness of last sharing injecting partner’s HIV status and partner’s HIV status were included in the study as well because they are believed to affect the dual risk relationship (23).

Data Analysis

Descriptive analyses were conducted to describe the demographic characteristics and behavioral variables of PWID who were HIV-negative at baseline testing and the demographic characteristics of the PWID participants’ last sharing injecting partner and the relationship type. These analyses were stratified by gender. Frequencies and percentages were reported for the full sample and the for those who reported RSS.

Bivariate analyses via log-linked Poisson regression with robust standard error were conducted to investigate the associations between demographic characteristics, behavioral variables, the last sharing injecting partner variables and dual risk relationship status as outcome (21). Analyses accounted for RDS sampling methodology and general dependence among observations linked to one another in recruitment networks by clustering on recruitment chain and adjusting for city and self-reported network size (19, 21, 24, 25). Adjusted prevalence ratios (aPR) and 95% confidence intervals (CIs) were calculated and reported. Three behavioral variables with a p-value < 0.1 were regarded as statistically significant and considered for inclusion in the analyses of behaviors associated with dual risk relationship. Certain demographic

and last sharing partner variables with a p-value < 0.1 were regarded to have statistically significant associations with dual risk relationship. In order to examine whether these variables would potentially confound the associations between behavioral variables and dual risk relationship, demographic and last sharing partner variables with a p-value < 0.1 were included in the bivariate analyses with behavioral variables. Similar bivariate analyses were conducted between demographic and last sharing partner variables and each behavioral variable. Demographic and last sharing partner variables with a p-value < 0.05 were regarded as significantly associated with this behavioral variable and were the potential confounders between this behavioral variable and dual risk relationship. Each behavioral variable has a unique set of potential confounders to be considered. Potential confounders were included in the Poisson regression models between behavioral variables and dual risk relationship.

Three Poisson regression models were established to assess the associations between three behavioral variables and dual risk relationship, respectively. The unique set of potential confounders for each behavioral variable was included in each regression model and examined to see if they need to be controlled in the model. Backward elimination and confounding assessment with a 10% cut off were used in conjunction to identify confounding variables that have a significant impact on the association and would need to be retained in the final regression models. Backward elimination started from the potential confounder with the biggest p-value, and if removing this potential confounder out of the model did not cause 10% change of the estimate, this potential confounder would not be considered have a confounding effect on the association between the behavioral variable and dual risk relationship and would be eliminated from the model. If removing the potential confounder caused 10% or more change of the estimate, this variable showed a significant effect on the association between the behavioral variable and dual risk relationship and would be controlled in the model. Adjusted prevalence ratios (aPR) and 95% confidence intervals (CIs) are calculated and reported. All analyses were conducted using SAS 9.4.

RESULTS

Participants Characteristics

Of the total 9677 PWID who were HIV negative, most of the participants were male (72%), not married nor cohabiting (87%), above poverty line (77%), homeless in the past 12 months (64%), had healthcare insurance (73%), and had been incarcerated in the past 12 months (63%). About 66% of them had condomless sex at last sex, 62% had < 3 sex partners in the past 12 months, 85% injected drugs once or more than once a day, 62% injected opioids most frequently, and 45% had one sharing injecting partners with any injection equipment at last sharing event. In addition, 34% of PWID (n=3303) who were HIV negative reported RSS in the past 12 months (Table 1).

Last Sharing Partner's Characteristics

Among the 2287 male participants who reported RSS, 57% of their last sharing injecting partners were male, 55% were white, and about 50% of the participants were at the same age range as their last sharing injecting partner. In addition, 41% of the male respondents were aware of their last sharing injecting partner's HIV status and among aware male participants, 39% of their last sharing injecting partners were reported to be HIV negative. More than half (55%) of the male participants had friends as last sharing injecting partners while 33% had sex partners as their last sharing injecting partners. Among the 1003 female participants who reported RSS, the majority (80%) of their last sharing injecting partners were male, 54% of their last sharing injecting partners were white, 44% of their last sharing injecting partners were 40 years or older, and 51% were at the same age range as their last sharing injecting partners. More than half (54%) of female participants were aware of their last sharing injecting partners' HIV status, and among those aware female participants, 53% of their partners' HIV status was reported to be negative.

Additionally, 59% of female participants shared needles with their sex partners and 31% of them shared needles with their friends (Table 2).

Bivariate Analyses: Dual risk relationship and Associated Demographic and Behavioral Factors

In the bivariate analyses, the following variables were considered to be significantly associated with dual risk relationship at the level of statistical significance of p -value < 0.05 : gender, age, race, marital status, education, homeless, incarceration, last sharing partner gender, last sharing partner age, last sharing partner race, aware of last partners HIV status, partner's HIV status, condomless sex at last sex, number of sex partners, and number of sharing injecting partners (Table 3).

In the final dataset, female PWID were 72% more likely to engage in the dual risk relationship compared to male PWID, PWID who were married or cohabiting were 83% more likely to engage in dual risk relationship versus other marital status. Compared to black participants, white participants were 26% more likely to engage in dual risk relationship. Also, PWID with a college degree reported 25% more likely to engage in dual risk relationship compared to PWID with less than high school education. If PWID's last sharing injecting partner was female, they were 118% more likely to engage in dual risk relationship compared to PWID with a male partner; and if PWID's last sharing injecting partner was white, they were 40% more likely to engage in dual risk relationship compared to last sharing injecting partner was black. PWID who were aware of last partner's HIV status and PWID whose last sex was condomless sex were 80% more likely and 140% more likely to report dual risk relationship. On the other hand, PWID who aged 40 or older were 20% less likely to report dual risk relationship compared to those aged 18-29 years old. If PWID were homeless in the past 12 months, they were 12% less likely to report dual risk relationship. If PWID were incarcerated in the past 12 months, they were 8% less likely to report dual risk relationship. Age also affects the dual risk engagement rate. PWID whose last sharing injecting partner aged 40 or older, they were 28% less likely to engage

in dual risk relationship compared to those with the sharing partner aged 18-29 years old (Table 3).

Regression Models: Association Between Behavioral Factors and Dual risk relationship

Several factors were significantly associated (p-value <0.05) with dual risk relationship: condomless sex at last sex, number of sex partners in the past 12 months, and number of injecting partners at last sharing event (Table 4). As mentioned, bivariate analyses were conducted between these three significant behavioral variables, with demographic variables and last sharing partner's variables resulting in significant associations (p-value <0.05) with dual risk relationship. Variables showed a p-value <0.05 with both behavioral variable and dual risk relationship were considered to be potential confounders for the association between this behavioral variable and dual risk relationship. Eventually, three sets of potential confounders were identified and included in each of the Poisson regression models between each behavioral factor and dual risk relationship. Partner's HIV status showed significant associations with condomless sex at last sex; but given that this variable was a subset from PWID who were aware of last sharing partner's HIV status, it was not included in the regression model to avoid bias. The first set of potential confounders showed a significant association with condomless sex at last sex and dual risk relationship were gender, age, marital status, incarcerated status, last sharing injecting partner's gender, last sharing injecting partner's age, and awareness of last partner's HIV status. Without controlling for these covariates in the model, the association between condomless sex at last sex and dual risk relationship remained significant at p-value < 0.05. PWID who had condomless sex at last sex were 139% more likely to engage in dual risk relationship than those had not. The second set of potential confounders showed a significant association with number of sex partners and dual risk relationship were age, marital status, homeless status, incarcerated status, last sharing partner's age, last sharing partner's race, and awareness of last partner's HIV status. After eliminating all the potential confounders from the model, the association between

number of sex partners in the past 12 months and dual risk relationship remains significant (p-value < 0.05). PWID who had three more sex partners in the past 12 months were 28% less likely to engage in dual risk relationship compared to those with less sex partners. The third set of potential confounders showed a significant association with number of sharing injecting partners and dual risk relationship were age, race, marital status, education, homeless status, incarcerated status, last sharing partner's race, and awareness of last partner's HIV status. After conducting backward elimination and confounding assessment, the potential confounders did not affect the significance of the association between number of sharing injecting partners and dual risk relationship and it remained significant. PWID who had two or more injecting partners were 27% less likely to engage in dual risk relationship. The results indicated that three behavioral factors were significantly associated with dual risk relationship and these associations were not confounded by other variables we included in the models.

DISCUSSION

A quarter of the male participants reported that their last sharing injecting partner was their sex partner, which means they engaged in dual risk relationship. More than half of the female participants reported the same behavior. Among all non-sexual partner options, more than half of the male participants reported that their last sharing injecting partners was their friend, and only a quarter of female participants reported their last sharing injecting partner was a friend. This not only showed that PWID had preference to share needles with certain groups, but it also revealed that the difference in preference between male and female PWID.

Around 80% of the female participants reported sharing needles with male, while female participants were 72% more likely to engage in dual risk relationship compared to male. Female last sharing partners were 100% more likely to engage in dual risk relationship. This indicated that females were more likely to have sex and share syringes with the same male partner. This result could be due to multiple reasons. Women tend to rely on men to obtain the needles and drugs (7, 26), resulting in our observation of more women engaging in dual risk relationships with the same male partner. They also felt safer to be injected by someone they trusted instead of self-injecting (7, 26). To tackle this issue, increasing the access to syringe exchange programs (SSP) could help women to obtain clean needles, but would not solve the entire problem. The power imbalance, social inequity, trust and commitment for a romantic relationship also affect women's decision on engaging in dual risk relationship when they have access to clean needles (6, 7). In addition to increasing the access to SSP, providing pre-exposure prophylaxis (PrEP) and trainings on negotiation could be another strategy to reduce the HIV infection among women who engage in dual risk relationship.

Another finding was that young PWID aged between 18-29 years old were more likely to engage in dual risk relationship. Young PWID participants and young injection-sharing partners both reported a higher prevalence of engaging in dual risk relationship compared to PWID aged

40 years or older. This result is not surprising because previous studies stated that young PWID were more likely to engage in high-risk sexual behaviors and syringe sharing compared to older PWID (27-31). In a study by Broz et al., the authors found out that younger PWID were more likely to report RSS and a last sex partner who ever injected drugs, and there was a significant overlap in sex- and injection-related behaviors among young PWID (32). Another study conducted by Bailey et al. also found that young PWID were more likely to have RSS behaviors if injected with a sex partner (23). Several reasons may explain the high engagement in dual risk relationships among young PWID. Young PWID generally have a lower perception of HIV risk and poor knowledge of safe injecting and sexual practices (21, 33-35). In addition, peer norms, homeless, lower social-economic status, and lack of access to clean syringes contribute to a higher engagement of RSS behaviors among young PWID (23, 28, 36-38). Given the above reasons, though young PWID has a lower HIV prevalence compared to older PWID, their engagement in dual risk relationships put them on a vulnerable position of HIV infection. To tackle this issue, increasing the access to clean syringes through SSP and pharmacies could prevent young PWID from engaging in dual risk behaviors. Pharmacies are usually in place in most neighborhoods and open for longer hours, it is an important way for young PWID to access clean syringes (14). Other than increase the access to clean syringes, a combination of intervention that includes biomedical and behavioral interventions as well as interventions that can address structural factors should be designed to target young PWID (39). These approaches include peer-driven approaches, PrEP, HIV testing, harm reduction campaigns, and community empowerment (29, 40).

Based on the results, last sex was condomless sex, number of sex partners in the past 12 months, and number of sharing injecting partners at last sharing event have significant associations with dual risk relationship. The injection frequency in the past 12 months and most common injection drugs do not show an association with engagement in dual risk relationship.

Our results showing that PWID who had condomless sex at last sex were more likely to report engaging in dual risk relationship reveals that PWID who engage in this relationship are facing higher HIV risk brought by RSS and condomless sex. Given that female PWID may not have enough negotiation power compared to their partners (6, 7), increasing accessibility to PrEP could lower the risk of HIV infection via high risk sexual behaviors (41-43).

PWID with lower number of sex partners and sharing injecting partners were more likely to engage in dual risk relationship, which could indicate that PWID who were in dual risk relationship were less likely to have sex with multiple people or sharing needles with a third person outside of the dual risk relationship. Although we do not know the types of sexual relationships (i.e. main partner vs. casual partner) or the types of injecting relationships, these results reveal a possibility that PWID in stable relationships were more likely to engage in dual risk relationship. Couple-based interventions could be a possible approach to target this population.

Marital status and awareness of partner's HIV status play an important role in dual risk relationship despite not affecting the significance of associations between high-risk behaviors and dual risk relationship. For PWID who reported currently married or cohabiting, they were 83% more likely to engage in dual risk relationship than those who were not. This result helps to support the idea that PWID in stable relationships were more likely to engaging in dual risk relationship. For PWID who were aware of last sharing partner's HIV status, they were 80% more likely to report engaging in dual risk relationship compared to who were not aware. We mentioned that PWID tend to share syringes with people they trust and people they perceive as a lower risk of infecting HIV(23), which is in line with our analysis results showing that marital status and awareness of sharing partner's HIV status are driving factors to dual risk relationship.

Given the characteristics of last sharing partners and high-risk behaviors for PWID who reported to engage in dual risk relationship, there is a need to develop intervention programs that

target PWID who engage in dual risk relationship. PWID who are female and younger age should be prior targets for the intervention programs. A combination of intervention strategies is essential, including PrEP, couple-based interventions, negotiation training, and access to clean syringes via SSP or pharmacies. Further study should be conducted to gain a better understanding of dual risk relationship so that social network-based intervention strategies would be designed and implemented.

LIMITATIONS

The study is subject to several limitations. First, it is self-reported data and subject to social desirability bias and recall bias. The causality of dual risk relationship and high-risk behaviors cannot be interpreted because of the cross-sectional design of the study. The information about dual risk relationship was based on the questions of last sharing partner. The questionnaire only addressed the relationship types with last sharing partners but did not capture any additional information for relationships types with other previous partners. It is possible that dual risk relationship existed among PWID and their previous partners, but we do not know the information. Other potential factors that could affect the associations examined in the study were not included, for example, types of sex partners, access to SSP, transaction sex, etc. If we could include types of sexual relationships, types of injecting relationships, and transaction sex history, we will be able to better understand dual risk relationship. In addition, as the data was collected in 20 U.S. MSAs, the results could not be generalized to the entire PWID population in the United States.

CONCLUSION

PWID whose last sharing partners were female, younger age (18-29 years) and white were more likely to engage in dual risk relationship. Bivariate analyses results show significant associations between both high-risk sexual behaviors and high-risk injecting behaviors and dual risk relationship. PWID who reported having three or more sex partners in the past 12 months and PWID who reported having two or more injecting partners at last sharing event were less likely to engage in dual risk relationship. PWID who reported last sex was condomless sex were more likely to engage in dual risk relationship. Interventions should take dual risk relationship into account and should be designed to target the PWID with dual risk relationship and their dual risk partners.

TABLES

Table 1. Demographic characteristics and sexual behavior of persons who inject drugs (PWID) who tested negative for HIV, NHBS IDU4, 2015

	HIV Negative PWID	
	N	%
Gender		
Male	6954	71.9
Female	2685	27.8
Transgender	36	0.4
Age(yrs)		
18-24 years	578	6.0
25-29 years	1150	11.9
30-39 years	2317	23.9
40-49 years	2159	22.3
50 years or older	3473	35.9
Race		
Black	3137	32.4
Hispanic	2162	22.3
White	3838	39.7
Other	540	5.6
Marital Status		
Currently married or cohabiting	1287	13.3
Other	8389	86.7
Education Level		
Less than high school	2879	29.8
High school diploma or equivalent	3993	41.3
Some college or technical degree	2418	25.0
College degree or more	386	4.0
Below Poverty Line (2015)		
No	2172	22.4
Yes	7430	76.8
Homeless, past 12 months		
No	3439	35.5
Yes	6238	64.5
Health Insurance Status		
Not insured	2603	26.9
Insured	7036	72.7

Table 1 (continued)

Incarcerated Status, 12 mon		
No	6053	62.6
Yes	3618	37.4
Last Sex: Condomless Sex		
No	3155	32.6
Yes	6417	66.3
>=3 Sex Partners, 12 mon		
No	5961	61.6
Yes	3407	35.2
Injection Frequency		
Less often than once a day	1445	14.9
Once or more than once a day	8220	84.9
Most Common Injection Drugs		
Opioids	6029	62.3
Stimulants	893	9.2
Speedball (heroin and cocaine together)	523	5.4
Multiple	2208	22.8
Shared Syringe (Receptive)		
No	6368	65.8
Yes	3303	34.1
Number of Sharing Injecting Partners at Last Sharing Event ^a		
1	4309	44.5
2-4	1692	17.5
>4	225	2.3

^aNumber of sharing injecting partners with any injecting equipment

Table 2. Characteristics of the last sharing injecting partner for male and female PWID who tested negative for HIV, NHBS IDU4, 2015

	Respondent Gender			
	Male		Female	
	n	%	n	%
Last partner gender				
Male	1300	56.8	798	79.6
Female	973	42.5	198	19.7
Last partner age(yrs)				
18-29 years	663	29.0	242	24.1
30-39 years	779	34.1	306	30.5
40 years or older	816	35.7	437	43.6
Age difference between participants & last sharing partner				
Same age	1145	50.1	512	51.1
Younger	338	14.8	300	29.9
Older	776	33.9	174	17.4
Last partner race				
Black	464	20.3	255	25.4
Hispanic	502	22.0	178	17.8
White	1254	54.8	537	53.5
Other	55	2.4	26	2.6
Aware of last partner's HIV status				
No	1345	58.8	461	46.0
Yes	937	41.0	538	53.6
HIV status of last partner, if aware				
HIV negative	896	39.2	527	52.5
HIV positive	40	1.8	11	1.1
Type of relationship with the last sharing injecting partner				
Sex partner	749	32.8	590	58.8
Relative	105	4.6	37	3.7
Friend	1252	54.7	313	31.2
Needle or drug dealer	31	1.4	19	1.9
Stranger	101	4.4	27	2.7
Other	42	1.8	13	1.3

Table 3. Demographic characteristic, last sharing partner characteristic, and sexual behaviors among PWID who tested negative for HIV and reported sharing needles in the past 12 months, by type of the relationship with the last sharing injecting partner, NHBS IDU4, 2015

	Dual risk relationship		Bivariate Analysis	
	n	%	PR (95% CI)	P-value
Gender				
Male	749	32.9	ref	
Female	590	59.1	1.72 (1.60 - 1.85)	<.0001
Transgender	8	61.5	1.76 (1.17 - 2.65)	0.0067
Age(yrs)				
18-29 years	402	45.9	ref	
30-39 years	416	43.1	0.98 (0.88 - 1.09)	0.7072
40 years or older	529	36.5	0.83 (0.75 - 0.92)	0.0002
Race				
Black	243	37.2	ref	
Hispanic	216	28.4	0.92 (0.77 - 1.09)	0.3247
White	797	47.5	1.26 (1.10 - 1.43)	0.0006
Other	91	45.5	1.18 (0.96 - 1.44)	0.1151
Marital Status				
Currently married or cohabiting	300	67.4	1.83 (1.66 - 2.02)	<.0001
Other	1047	36.8	ref	
Education Level				
Less than high school	357	36.2	ref	
High school diploma or equivalent	567	41.2	1.10 (0.99 - 1.22)	0.0848
Some college or technical degree	371	45.4	1.17 (1.06 - 1.30)	0.0016
College degree or more	52	46.4	1.25 (1.02 - 1.53)	0.0296
Homeless				
No	350	44.5	ref	
Yes	997	39.8	0.89 (0.80 - 0.99)	0.0273
Incarcerated Status				
No	748	41.5	ref	
Yes	599	40.3	0.92 (0.86 - 0.99)	0.0232
Last partner gender				
Male	590	28.0	ref	
Female	756	64.3	2.18 (1.96 - 2.42)	<.0001
Last partner age(yrs)				
18-29 years	449	49.3	ref	
30-39 years	461	42.3	0.89 (0.81 - 0.98)	0.0224
40 years or older	433	34.5	0.72 (0.65 - 0.79)	<.0001

Table 3 (*Continued*)

Last partner race				
Black	247	34.0	ref	
Hispanic	188	27.5	0.95 (0.81 - 1.11)	0.5149
White	868	48.4	1.40 (1.25 - 1.56)	<.0001
Other	43	53.1	1.58 (1.31 - 1.91)	<.0001
Aware of last partner's HIV status				
No	533	29.4	ref	
Yes	814	55.0	1.80 (1.62 - 1.99)	<.0001
Partner's HIV Status, if aware				
HIV negative	533	29.4		
HIV positive	803	56.3	ref	
	11	21.2	0.41 (0.24 - 0.69)	0.0009
Last Sex: Condomless Sex				
No	17	53.1		
Yes	140	19.6	ref	
	1190	46.8	2.39 (2.06 - 2.77)	<.0001
Number of Sex Partners - Past 12 Months				
0	14	56.0		
1~2	43	13.3	0.27 (0.20 - 0.36)	<.0001
	715	52.3	ref	
>=3	575	36.5	0.72 (0.66 - 0.78)	<.0001
Number of Sharing Injecting Partners at Last Sharing Event ^a				
1	992	45.5	ref	
>=2	353	32.0	0.73 (0.67 - 0.80)	<.0001

^aNumber of sharing injecting partners with any injecting equipment

Table 4. Associations of High-Risk Injecting and Sexual Behaviors with Dual risk relationship among PWID who tested negative for HIV and reported sharing needles in the past 12 months, NHBS IDU4, 2015

	Dual risk relationship		
	%	aPR (95% CI)	P-value
Last sex was condomless sex			
Yes	46.8	2.39 (2.06 – 2.77)	<.0001
No	19.6	Ref	
Number of sex partners, 12m			
1~2	44.8	Ref	
≥ 3	36.5	0.72 (0.66 – 0.78)	<.0001
Number of injecting partners at last sharing event ^a			
1	45.5	Ref	
≥ 2	32.0	0.73 (0.67 – 0.80)	<.0001

^aNumber of sharing injecting partners with any injecting equipment

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