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Unprotected sex in heterosexual partnerships of injecting drug users in St Petersburg, Russia

V. Anna Gyarmathy[1,2], **Nan Li**[2], **Karin E. Tobin**[2], **Irving F. Hoffman**[3], **Nikolai Sokolov**[4], **Julia Levchenko**[4], **Julia Batluk**[4], **Andrei A. Kozlov**[4], **Andrei P. Kozlov**[4], and **Carl A. Latkin**[2]

[1] European Monitoring Centre for Drugs and Drug Addiction, Lisbon, Portugal

[2] Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

[3] University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

[4] Biomedical Center, St. Petersburg State University, St. Petersburg, Russia Running head: Heterosexual IDU partnerships in Russia

Abstract

We examined the association of individual demographic and behavioral attributes, partnership (dyad) and social network characteristics with unprotected sex in the heterosexual dyads of IDUs in St Petersburg, Russia. Of the individual-level characteristics female gender and younger age; and of the dyad-level characteristics sharing injecting equipment, social exposure to the sex partner ("hanging out with" or seeing each other daily), and both partners self-reporting being HIV infected were associated with unprotected sex. Although self-reported HIV discordant couples were less likely to engage in unprotected sex, it was reported in over half of self-reported HIV discordant relationships. This study highlights the intertwining of sexual risk and injecting risk, and the importance of sero-sorting based on perceived HIV status among IDU sexual partnerships in St Petersburg, Russia. A combination of social network and dyad interventions may be appropriate for this population of IDUs, especially for IDUs who are both injecting and sex partners, supported by free and confidential rapid HIV testing and counseling services to provide a comprehensive response to the wide-spread HIV epidemic among IDUs in St Petersburg.

Keywords

Injecting drug users; Risk networks; Sexual risk; HIV infection risk; Dyad analysis; Russia

INTRODUCTION

St Petersburg is the second largest city in Russia, with a population of 4.7 million people – 3.2% of the total population [1]. Drug use, especially injecting drug use, is very common in the city: the estimated number of drug users, most of whom are young male injectors, is 30,000–80,000 in St Petersburg [2]. Drug related, blood-borne viral infections among injecting drug users (IDUs) in the city are very common, with as high as half being infected with HIV and almost all with hepatitis C virus (HCV) [3,4]. While the HIV epidemic in St Petersburg has been concentrated among IDUs with unsafe injecting as the main source of infection [5], there is evidence that sexual transmission (especially heterosexual

Corresponding author: V. Anna Gyarmathy, European Monitoring Centre for Drugs and Drug Addiction, Cais do Sodré, 1249-289, Lisbon, Portugal; anna.gyarmathy@emcdda.europa.eu, Tel: +351-21-121-0286, Fax: +351-21-358-4441.

transmission from IDUs to their sex partners) plays an increasing role in HIV transmission [2,6,7].

Sexual transmission (either through primary sex partners or through sex work) may act as a bridge between IDUs and the non-IDU, general population [2,6–9]. While unsafe injecting can be greatly reduced with increased availability of sterile injecting equipment and prevention interventions, unsafe sex among IDUs has been difficult to prevent [10–13]. As a result, in certain IDU populations where the prevalence of HIV was dramatically reduced with the reduction of unsafe injecting, HIV now spreads predominantly via sexual transmission [14].

Studies among IDUs (and also other populations at risk for HIV) have shown the importance of risk networks, especially of risk behavioral partnerships (risk dyads) [15–17]. Understanding the role of risk partnerships is especially important in connection with sexual behavior, because most of the time sexual acts occur within dyads [18]. In this context, unprotected sex may be influenced on three levels: on the individual level by characteristics such as gender, age, and drug user characteristics [6,7,12]; on the social network level by characteristics such as social network density [19]; but, most importantly, on the partnership (dyad) level by characteristics related to the relationship dyad, such as trust, dependence on resources, social support, engaging in injecting risk together, and HIV discordant status [18–20]; The aim of this analysis was to assess the association of individual attributes, dyad characteristics and social network characteristics with unprotected sex in the heterosexual partnerships (dyads) of IDUs in St Petersburg, Russia, as part of a social network intervention to prevent HIV among IDUs. We hypothesize that there is a combined risk of unsafe sex and unsafe injecting, and that, in addition to other partnership characteristics, perceived HIV discordant status within the partnership plays a key role in the decision to engage in protected sex.

METHODS

Setting and participants

Between December 2004 and April 2008, IDUs were recruited into a social network intervention study in St. Petersburg, Russia. The study, a randomized controlled network-oriented peer-educator intervention, aimed to prevent HIV infection among IDUs and members of their HIV risk network [3,19]. Street outreach and chain referral methods were used to recruit participants into the study [21,22]. Areas of recruitment locations where drug users were likely to be found were identified through ethnographic methods. These areas were relatively evenly distributed around the city of St Petersburg. Street outreach involved study staff engaging people in these locations who seemed to be either injecting drug users or associated with drug users. Chain referral involved giving all participants coupons to bring back other injecting drug users to be screened for study eligibility. Those who were age 18 years or older who reported drug injecting in the past 30 days were eligible to participate. Altogether 661 eligible participants were interviewed at baseline – one half (52%) were recruited through outreach, and the other half through chain referral. Data on recruitment success were not collected or were not possible for those who were invited to participate by participants already enrolled in the study. After providing a written informed consent, participants completed an interviewer-assisted questionnaire survey. After the survey, they received pre-test counseling and gave blood to be tested for HIV infection. We used two consecutive enzyme immunological assays (EIA) (Vironostika HIV Uni-Form II *plus O*, Biomerieux, NL) for HIV antibody screening, confirmed by Western Blot (New LAV Blot I, BioRad, France). Participant incentives were food items worth about USD 10. The Institutional Review Boards of the Johns Hopkins Bloomberg School of Public Health,

Baltimore, MD, USA and the St. Petersburg University, St. Petersburg, Russia approved the study.

Measures and variables

Individual level characteristics were gender (female and male), age (under 30 vs. 30 and above), marital status (single vs. non-single), injecting heroin (daily vs. non-daily) or a stimulant (any vs. none) in the past three months, and self-report of HIV infection (never tested, self-reported HIV negative, self-reported HIV positive). We chose to assess the relationship of self-reported infection, and not of laboratory-confirmed HIV infection, to unprotected sex because we were interested in how perception was related to behavior and not how behavior was related to infection.

This study involves individual perceptions and reports of social network and dyad levels of analyses, and data were collected from the participating index IDU. The social network was delineated by asking participants to name those people who provided physical assistance, material aid, health advice, drugs, and whom they used drugs with or had sex with in the past 6 months (nominated personal network). In addition, participants also reported whether each of these nominated network members knew one another (network density). Social network- and dyad-level variables were created based on this personal network data. *Social network level variables* assessed the size and density of the injector and non-injector network (a density of zero vs. greater than zero, meaning two or more non-injector or injector network members knew each other).

Dyad level variables were as follows. A *heterosexual partnership* was defined as a dyad where the IDU participant reported that the network member was of a different gender and that they had sex together in the past 6 months. *Unprotected sex*, the dependent dyad-level variable in this analysis, assessed whether, during the past 6 months, the study participant engaged in a sexual act without the use of a condom. We assessed the following five relationship types within dyads: trust, dependence on resources, injecting risk partnership, social support, and social exposure [19]. *Trust* was assessed by assigning the network member a score greater than 5 on a scale of 1 (no trust) to 10 (trust with my life). Dependence on resources (five variables), injecting risk partnership (three variables), social support (two variables), and social exposure (two variables) binary measures were created the following way. The *dependence on resources* measure assessed whether the participant reported: 1. giving financial support to, or 2. giving drugs to, or 3. getting drugs from, or 4. living in the same apartment as the network member, or 5. having the network member pay for rent or groceries. The *injecting risk partnership* measure assessed whether the participant engaged in: 1. receptive needle sharing (participant received used syringes or needles from the network member), 2. distributive syringe sharing (participant gave used syringes or needles to the network member), or 3. sharing cookers within the dyad. The *social support* measure assessed emotional and informational support, i.e., whether the participant and network member discussed: 1. personal matters or 2. health-related matters. *Social exposure* measured whether the participant and the network member: 1. saw each other every day or 2. were “hanging out” (coming together to have fun and relax). In addition, we assessed self-reported HIV dissimilarity. *Self-reported HIV discordant status* was coded as: 1. concordant presumptive negative (neither the participant nor the sex partner were reported being infected), 2. presumptive discordant (either the participant or the sex partner was reported being infected while the other was not reported being infected), and 3. concordant presumptive positive. Note: whether the network member was HIV infected was reported by the participant based on his/her knowledge, and HIV negativity in this paper is defined as not being reported HIV infected (presumptive negative).

Statistical analysis

Participants were allowed to report up to 20 network members. Of the 661 eligible participants, 28 (4%) reported only same-sex dyads and 98 (15%) reported no heterosexual partnerships – 535 (81%) reported altogether 687 heterosexual partnerships, which this analysis is based on. Participants reported a mean of 1.5 (SD=1.8) aggregate main and casual sex partners and a mean of 1.3 (SD=0.7) nominated sex partners – thus, if all nominated partners were reported among the aggregate partners, then 87% of main or casual partners were reported as nominated partners. Those who reported heterosexual partnerships were not significantly different regarding age, gender, any stimulant or daily heroin injecting from those who did not report heterosexual partnerships.

The unit of analysis was the dyad (heterosexual partnership). Univariate analyses were conducted to identify variables for multivariate analyses. Contingency tables describe univariate distribution, and corresponding univariate generalized estimating equations (GEE) z-statistics p-values assess associations. GEE was used to account for sampling dependence and the correlation among nominated network members resulting from the clustering of network members within individual participants [23]. Variables with at least marginal univariate associations ($p<0.20$) were entered in multivariate GEE regression analysis. Multivariate GEE models with backwards elimination were used to identify significant associations with the dependent variable. Univariate odds ratios (OR) and multivariate adjusted odds ratios (aOR), and their respective 95% confidence intervals (95%CI) are reported.

RESULTS

Participant characteristics

Of the 535 participants, 61% were age 30 or above; 35% were female, 54% had at least a high school education, 41% were single and 49% lived with their parents. Two people reported being homeless. Altogether 42% reported making 8000 Rubles (about USD 300) or less per month; 15% reported working full time, 25% part time, and 60% reported being unemployed. Never being tested for HIV was reported by 37%; 44% reported being HIV negative and 19% reported being HIV infected. HIV seroprevalence (based on the blood test after the survey) was 38%. Most participants were daily heroin injectors (57%); and 28% said they injected stimulants in the past 3 months. Participants reported a mean of 1.3 (maximum=6, median=1, SD=0.7) heterosexual partnerships.

Univariate and multivariate analysis

Of the 687 heterosexual dyads, 74% reported engaging in unprotected sex (Table 1). In the *univariate* analysis, female gender, older age and non-single marital status (individual-level variables relating to the participant); and trust, dependence on resources, injecting equipment sharing, being part of the support network, and social exposure (dyad-level variables relating to the partnership) were significantly associated with having unprotected sex. In addition, compared to HIV negative concordant couples, HIV discordant couples were less likely, while HIV concordant positive couples were more likely to have unprotected sex. In the *multivariate* models, female gender, older age (individual variables); and injecting equipment sharing, social exposure, and self-reported HIV concordance/discordance (dyad-level variables) were associated with unprotected sex. None of the social network level variables were associated with unprotected sex.

DISCUSSION

In this study we investigated the association of individual attributes, social network characteristics and dyad characteristics with unprotected sex in the heterosexual partnerships (dyads) of IDUs in St Petersburg, Russia. Our main findings were that females, those who were younger, and those who engaged in injecting risk were more likely to also engage in sex risk; and that self-reported HIV concordant positivity had the strongest association with, and self-reported HIV discordance had the lowest odds of practicing unprotected sex. Still, unprotected sex was reported in over half of self-reported HIV discordant relationships. In addition, no social network-lever variables were associated with unprotected sex.

HIV concordance/discordance, the strongest correlate in this analysis, has been found to be associated not only with injecting risk behavior, but also with sexual risk behavior in various at-risk populations [19,20,24–26]. In an analysis of this Russian IDU study population assessing injecting risk in injecting dyads, we also found that dyads that self-reported being HIV discordant were less likely, and those that self-reported HIV positive concordant were more likely to engage in the sharing of injecting equipment (receptive and distributive syringe sharing and sharing cookers) [19]. Thus, it appears that this Russian IDU population is aware of both the injecting and sexual routes of HIV infection, and is likely to engage in risk behaviors based on their perception of the HIV status of themselves and of their risk partners. However, it is of great concern that unprotected sex was still reported in over half of self-reported HIV discordant relationships. Given the high prevalence of HIV in among IDUs in St Petersburg, interventions that focus on or may achieve reducing injecting risk may not be enough to reduce HIV incidence, since the majority of HIV discordant couples engage in unprotected sexual intercourse. This highlights the need in this IDU population of putting an emphasis on sexual risk that is equal to the emphasis on injecting risk. Although HIV concordance/discordance seems to be a major factor in the decision-making about whether to engage in unprotected sex, there may be a major gap between IDUs' perception of HIV status and their actual HIV status, as about half of those who were infected with HIV were unaware of being infected. This highlights the need to increase both the availability of and access to not only free and confidential HIV testing services, but also rapid testing methods that would provide IDUs with their test results at the point of care [27]. HIV rapid tests are now as reliable as conventional antibody testing methods, with 98%–100% sensitivity and 86%–100% specificity, and are appropriate and advisable for populations that are hard to reach, such as injecting drug users [28], and they enable most (sometimes all) clients to receive their results in a timely fashion [29].

The connection between sexual risk and injecting risk has been found in many studies among various IDU populations [11,18,30]. While trust between sex partners who inject together has been pinpointed as a potential reason for this combined risk [30,31], in this study trust between sex partners was not significant in the multivariate analysis. The reason for this may be that among this population of IDUs, other, more "practical" factors, such as self-reported HIV concordance/discordance and social exposure to the sex partner, are more important. Furthermore, in this high-HIV-prevalence Russian IDU population, sex partners who share injecting equipment may have a "sense of fatalism" about engaging in two HIV risk behaviors, and share injecting equipment because "they have unprotected sex anyway", or have sex because "they share equipment anyway" [18]. This may be particularly true among young and female IDUs [30].

Russia is a gender-conscious society, with gender inequalities not only in the societal sphere, but also considering health indicators, including lower average life expectancy, higher prevalence of drug and alcohol dependence among men and higher prevalence of STDs among women [32]. Gender was also found to be an important factor and a moderator of

risk behaviors among IDUs in Russia [9]. In an analysis of this Russian IDU study population assessing injecting risk in injecting dyads, we found that male-male injecting dyads were more likely to engage in injecting risk behaviors than either gender discordant or female-female injecting dyads, even after controlling for sexual partnership. Thus, the association of female gender with unprotected sex in this study is noteworthy, because these two studies suggest a differential risk profile for males and females among IDUs in St Petersburg: males may be more prone to injecting risk, while females may be more prone to sex risk. HIV prevention programs in St Petersburg may consider incorporating gender-specific approaches to emphasize sex risk among females and injecting risk among males.

Some non-significant results are noteworthy. For example, similar to the heterosexual dyads of IDUs in New York, there was no association between social network characteristics and unprotected sex within the dyad [18]. This may suggest lack of network influence on microsocial-level behavior. Research to test effectiveness of interventions that target couples and dyads as compared to network-level interventions in addressing sexual risk among IDUs in St Petersburg are needed, especially given the alarmingly high levels of unprotected sex in self-reported HIV discordant couples. Alternatively, our findings may suggest a need for network interventions to target increasing peer norms supportive of and open discussions regarding sexual risk reduction.

Limitations of this analysis include that dyad analysis assesses only nominated (i.e., strong) network ties, and network ties with, for example, casual, anonymous or exchange partners (exchanging sex for money or goods or favors) who were not nominated during the interview (i.e., weak ties) are not assessed [18,19,33]. However, most risk behaviors take place in these relationships with strong network ties, that is, within partnerships that participants were likely to nominate during our study [34]. Regarding exchange partners, in a post-hoc analysis of this study, we found that 9.3% (n=47) reported selling sex with a mean of 15.5 partners (median=1, SD=52.6, minimum=1, maximum=270). Serosorting can only occur if one is aware of one's own and one's partner's HIV status, and such casual or commercial sex acts are at particularly high risk of not having HIV discordance, a feature of serostatus, hence this finding may not apply to this important setting, and our recommendations regarding dyad interventions may not apply in commercial sex settings. In addition, structural factors (such as condom availability) or other aspects of dyadic relationships may also influence unprotected sex, and we assessed only selected aspects. Another limitation of the analysis is that we did not address sex risk among same sex male (MSM) couples. There were only a small number of male participants who had same-sex male partners, and thus an analysis among such a small sample would not have yielded meaningful results. Lastly, as the sample was not a random sample, it may not be representative of all IDUs in St Petersburg or in Russia. However, because the sample was relatively evenly distributed around the city, it is likely that it is a fair representation of at least the "reachable" IDU population in St Petersburg.

This study highlights the intertwining of sexual risk and injecting risk, and the importance of sero-sorting based on perceived HIV status among IDU sexual partnerships in St Petersburg, Russia. A combination of social network and dyad interventions may be appropriate for this population of IDUs, with network interventions focusing primarily on injecting risk and dyad interventions focusing primarily on sex risk – a hypothesis that needs to be tested in real-world intervention settings. These interventions should be supported by free and confidential rapid HIV testing and counseling services to provide a comprehensive response to the widespread HIV epidemic among IDUs in St Petersburg.

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References

1. Wikipedia. St Petersburg: [accessed: December 14, 2009]. 2009 http://en.wikipedia.org/wiki/St_petersburg
2. Aral SO, St Lawrence JS, Dyatlov R, Kozlov A. Commercial sex work, drug use, and sexually transmitted infections in St. Petersburg, Russia. Soc Sci Med 2005;60(10):2181–90. [PubMed: 15748667]
3. Gyarmathy VA, Li N, Tobin KE, et al. Correlates of unsafe equipment sharing among injecting drug users in St. Petersburg, Russia. Eur Addict Res 2009;15(3):163–70. [PubMed: 19506377]
4. Niccolai LM, Toussova OV, Verevochkin SV, Barbour R, Heimer R, Kozlov AP. High HIV Prevalence, Suboptimal HIV Testing, and Low Knowledge of HIV-Positive Serostatus Among Injection Drug Users in St. Petersburg, Russia. AIDS Behav. 2008
5. Kruse GR, Barbour R, Heimer R, et al. Drug choice, spatial distribution, HIV risk, and HIV prevalence among injection drug users in St. Petersburg, Russia. Harm Reduct J 2009;6:22. [PubMed: 19646255]
6. Niccolai LM, Shcherbakova IS, Toussova OV, Kozlov AP, Heimer R. The potential for bridging of HIV transmission in the Russian Federation: sex risk behaviors and HIV prevalence among drug users (DUs) and their non-DU sex partners. J Urban Health 2009;86 (Suppl 1):131–43. [PubMed: 19507037]
7. Toussova O, Shcherbakova I, Volkova G, Niccolai L, Heimer R, Kozlov A. Potential bridges of heterosexual HIV transmission from drug users to the general population in St. Petersburg, Russia: is it easy to be a young female? J Urban Health 2009;86 (Suppl 1):121–30. [PubMed: 19533368]
8. Benotsch EG, Somlai AM, Pinkerton SD, et al. Drug use and sexual risk behaviours among female Russian IDUs who exchange sex for money or drugs. Int J STD AIDS 2004;15(5):343–7. [PubMed: 15117506]
9. Gore-Felton C, Somlai AM, Benotsch EG, Kelly JA, Ostrovski D, Kozlov A. The influence of gender on factors associated with HIV transmission risk among young Russian injection drug users. Am J Drug Alcohol Abuse 2003;29(4):881–94. [PubMed: 14713145]
10. Latkin CA, Donnell D, Metzger D, et al. The efficacy of a network intervention to reduce HIV risk behaviors among drug users and risk partners in Chiang Mai, Thailand and Philadelphia, USA. Soc Sci Med 2009;68(4):740–8. [PubMed: 19070413]
11. Evans JL, Hahn JA, Page-Shafer K, et al. Gender differences in sexual and injection risk behavior among active young injection drug users in San Francisco (the UFO Study). J Urban Health 2003;80(1):137–46. [PubMed: 12612103]
12. Booth RE, Kwiatkowski CF, Chitwood DD. Sex related HIV risk behaviors: differential risks among injection drug users, crack smokers, and injection drug users who smoke crack. Drug Alcohol Depend 2000;58(3):219–26. [PubMed: 10759032]
13. Friedman SR, Flom PL, Kottiri BJ, et al. Consistent condom use among drug-using youth in a high HIV-risk neighbourhood. AIDS Care 2002;14(4):493–507. [PubMed: 12204152]
14. Des Jarlais DC, Arasteh K, McKnight C, Hagan H, Perlman D, Friedman SR. Using hepatitis C virus and herpes simplex virus-2 to track HIV among injecting drug users in New York City. Drug Alcohol Depend 2009;101(1–2):88–91. [PubMed: 19108958]
15. De P, Cox J, Boivin JF, Platt RW, Jolly AM. The importance of social networks in their association to drug equipment sharing among injection drug users: a review. Addiction 2007;102(11):1730–9. [PubMed: 17935581]
16. Neaigus A, Friedman SR, Curtis R, et al. The relevance of drug injectors' social networks and risk networks for understanding and preventing HIV infection. Soc Sci Med 1994;38(1):67–78. [PubMed: 8146717]

17. Amirkhanian YA, Kelly JA, Kirsanova AV, et al. HIV risk behaviour patterns, predictors, and sexually transmitted disease prevalence in the social networks of young men who have sex with men in St Petersburg, Russia. Int J STD AIDS 2006;17(1):50–6. [PubMed: 16409680]
18. Gyarmathy VA, Neaigus A. The relationship of sexual dyad and personal network characteristics and individual attributes to unprotected sex among young injecting drug users. AIDS Behav 2009;13(2):196–206. [PubMed: 17690975]
19. Gyarmathy VA, Li N, Tobin KE, et al. Injecting equipment sharing in Russian drug injecting dyads. AIDS Behav 2010;14(1):141–51. [PubMed: 19214731]
20. Des Jarlais DC, Perlis T, Arasteh K, et al. "Informed altruism" and "partner restriction" in the reduction of HIV infection in injecting drug users entering detoxification treatment in New York City, 1990–2001. J Acquir Immune Defic Syndr 2004;35(2):158–66. [PubMed: 14722449]
21. Friedman, SR.; Curtis, R.; Neaigus, A.; Jose, B.; Des Jarlais, DC. Social networks, drug injectors' lives, and HIV. New York: Plenum; 1999.
22. Sherman SG, Latkin CA. Drug users' involvement in the drug economy: implications for harm reduction and HIV prevention programs. J Urban Health 2002;79(2):266–77. [PubMed: 12023502]
23. Liang KY, Zeger SL. Longitudinal data analysis using generalized linear models. Biometrika 1986;73:13–22.
24. Desenclos JC, Papaevangelou G, Ancelle-Park R. Knowledge of HIV serostatus and preventive behaviour among European injecting drug users. The European Community Study Group on HIV in Injecting Drug Users. AIDS 1993;7(10):1371–7. [PubMed: 8267911]
25. Schlumberger MG, Desenclos JC, Papaevangelou G, Richardson SC, Ancelle-Park R. Knowledge of HIV serostatus and preventive behaviour among European injecting drug users: second study. European Community Study Group on HIV in Injecting Drug Users. Eur J Epidemiol 1999;15(3): 207–15. [PubMed: 10395049]
26. Osmond DH, Pollack LM, Paul JP, Catania JA. Changes in prevalence of HIV infection and sexual risk behavior in men who have sex with men in San Francisco: 1997 2002. Am J Public Health 2007;97(9):1677–83. [PubMed: 17463390]
27. Franco-Paredes C, Tellez I, del Rio C. Rapid HIV testing: a review of the literature and implications for the clinician. Curr HIV/AIDS Rep 2006;3(4):169–75. [PubMed: 17032576]
28. Sturenburg E, Junker R. Point-of-care testing in microbiology: the advantages and disadvantages of immunochromatographic test strips. Dtsch Arztebl Int 2009;106(4):48–54. [PubMed: 19564967]
29. Roberts KJ, Grusky O, Swanson AN. Outcomes of blood and oral fluid rapid HIV testing: a literature review, 2000–2006. AIDS Patient Care STDS 2007;21(9):621–37. [PubMed: 17919089]
30. Unger JB, Kipke MD, De Rosa CJ, Hyde J, Ritt-Olson A, Montgomery S. Needle-sharing among young IV drug users and their social network members: The influence of the injection partner's characteristics on HIV risk behavior. Addict Behav 2006;31(9):1607–18. [PubMed: 16459023]
31. Gyarmathy VA, Neaigus A, Ujhelyi E, Szabó T, Rácz J. Strong HIV and hepatitis disclosure norms and frequent risk behaviors among Hungarian drug injectors. Drug Alcohol Dependence 2006;82(Suppl 1):S65–9.
32. Somach, SD.; Kochkina, E.; Shlyk, E. DevTech Systems, Inc; 2004. Gender Assessment for USAID, Russia -USAID Contract #: GEW-I-01-02-00019-00. www.devtechsys.com/publications/gender/assesments/Final%20Report,%20Russia.pdf
33. Granovetter M. The strength of weak ties: A network theory revisited. Sociological Theory 1983;1:201–33.
34. Valente TW, Vlahov D. Selective risk taking among needle exchange participants: implications for supplemental interventions. Am J Public Health 2001;91(3):406–11. [PubMed: 11236405]

Table 1

Univariate and multivariate correlates of having unprotected sex within heterosexual dyads of IDUs in St Petersburg, Russia.

Characteristic	Used condom every time N (%)	Any unprotected sex N (%)	Univariate OR (95%CI)	Multivariate aOR (95%CI)
Total	176 (25.6%)	511 (74.4%)		
Individual characteristics				
Female gender				
no	128 (28.4)	322 (71.6)	(reference)	(reference)
yes	48 (20.3)	189 (79.7)	1.9 (1.2, 2.9)*	1.6 (1.0, 2.5)*
Age - 30 or above				
no	83 (30.4)	190 (69.6)	(reference)	(reference)
yes	93 (22.5)	321 (77.5)	1.4 (0.9, 2.1)*	1.5 (1.0, 2.3)*
Marital status single				
no	90 (23.2)	298 (76.8)	(reference)	
yes	86 (28.8)	213 (71.2)	0.6 (0.4, 0.9)*	
Daily heroin injector				
no	71 (25.2)	211 (74.8)	(reference)	
yes	105 (25.9)	300 (74.1)	1.0 (0.7, 1.5)	
Any stimulant injector				
no	124 (26.0)	353 (74.0)	(reference)	
yes	52 (24.8)	158 (75.2)	1.1 (0.7, 1.7)	
Social network-level characteristics				
Number of IDU network members	3.6 (2.0)	3.4 (1.8)	1.0 (0.9, 1.1)	
Two or more IDU network members know each other				
no	26 (23.9)	83 (76.1)	(reference)	
yes	150 (26.0)	428 (74.0)	0.8 (0.5, 1.4)	
Number of non-IDU network members	2.6 (2.3)	2.5 (2.4)	1.0 (0.9, 1.1)	
Two or more non- IDU network members know each other				
no	87 (24.4)	269 (75.6)	(reference)	
yes	89 (26.9)	242 (73.1)	0.9 (0.6, 1.3)	
Dyad-level characteristics				
Trust their IDU network member				
no	85 (34.0)	165 (66.0)	(reference)	
yes	91 (20.8)	346 (79.2)	2.0 (1.3, 2.9)*	
Dependence on resources				
no	67 (38.5)	107 (61.5)	(reference)	
yes	109 (21.2)	404 (78.8)	2.2 (1.5, 3.4)*	
Shared any injecting equipment				
no	123 (32.8)	252 (67.2)	(reference)	(reference)
yes	53 (17.0)	259 (83.0)	2.3 (1.5, 3.6)*	1.8 (1.2, 2.8)*

Characteristic	Used condom every time N (%)	Any unprotected sex N (%)	Univariate OR (95%CI)	Multivariate aOR (95%CI)
Member of support network				
no	122 (32.7)	251 (67.3)	(reference)	
yes	54 (17.2)	260 (82.8)	2.2 (1.5, 3.2)*	
Social exposure				
no	93 (38.0)	152 (62.0)	(reference)	(reference)
yes	83 (18.8)	359 (81.2)	2.6 (1.8, 3.7)*	2.2 (1.4, 3.3)*
Self-reported HIV dissimilarity				
Concordant negative	130 (24.1)	409 (75.9)	(reference)	(reference)
Discordant	42 (45.2)	51 (54.8)	0.4 (0.2, 0.7)*	0.4 (0.2, 0.6)*
Concordant positive	4 (7.3)	51 (92.7)	4.4 (1.3, 14)*	3.1 (1.1, 9.1)*

Note:

* $p < 0.05$