

# Correlates of unprotected sexual intercourse among women who inject drugs or who have sexual partners who inject drugs in St Petersburg, Russia

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## ABSTRACT

**Objectives** To assess risk for unintended pregnancy, this study describes the correlates of unprotected sexual intercourse (UPSI) among women who inject illicit drugs or who have sexual partners who inject drugs in St Petersburg, Russia.

**Methods** Data from a cross-sectional survey and biological test results collected between 2005 and 2008 from 202 Russian women (143 drug injectors and 59 non-drug injectors) were analysed. Multivariate regression was used to investigate the correlates of UPSI occurring at the women's last sexual act. Independent variables included socio-demographics, age at sexual debut, first sexual encounter perceived as involuntary, number of pregnancies and number of children for which the participant is the primary caretaker, heavy sporadic drinking (i.e. consuming more than five drinks in 2 hours at least twice a month), at-risk drinking per the Alcohol Use Disorder Identification Test (AUDIT-C) score, and sexually transmitted infections (HIV-1, syphilis serology, *Chlamydia trachomatis* and *Neisseria gonorrhoeae*).

**Results** Sixty-seven percent of women reported UPSI at last intercourse. UPSI was independently associated with heavy sporadic drinking [odds ratio (OR) 2.8, 95% CI 1.2–6.6] and having been pregnant (OR 2.25, 95% CI 1.1–4.6).

**Conclusions** Despite the high risk for HIV acquisition or transmission and unintended pregnancy, condom use among the study population is low. Programmes to investigate and improve contraceptive use, including condom use, among this vulnerable group of women are needed. Such programmes may require

## KEY MESSAGE POINTS

- ▶ Despite the high risk for HIV transmission and unintended pregnancy, the prevalence of condom use was low among participants, independent of women's HIV status.
- ▶ Programmes to investigate and improve contraceptive use, including condoms, among this vulnerable group of women are needed and might benefit from addressing alcohol misuse.
- ▶ Studies that investigate reproductive health issues, including early sexual behaviour and substance use patterns, are needed among Russian women at high risk for HIV.

identifying and targeting female reproductive health concerns and problem drinking, particularly heavy sporadic drinking, rather than conventional measures of alcohol misuse.

## INTRODUCTION

Russia has one of the highest HIV incidence rates in Eastern Europe and Asia.<sup>1</sup> Although the HIV epidemic in Russia is concentrated among injection drug users (IDUs), data from the Russian Ministry of Health show an increase in the rate of sexually acquired HIV infections among women<sup>2 3</sup> and a growing number of children born to HIV-infected mothers.<sup>4</sup> The HIV infection levels measured among

pregnant women rose from less than 0.01% in 1998 to 0.11% in 2003.<sup>5</sup> For these reasons, studies that investigate reproductive health issues among Russian women who inject drugs or who are sexual partners of men who inject drugs may provide useful HIV prevention information.

Because induced abortion was the most common means of preventing births during the Soviet period,<sup>6</sup> Russia has one of the highest abortion rates in the world today.<sup>7</sup> Although abortions can be recommended and performed for medical reasons, most abortions in Russia occur due to unintended pregnancy.<sup>7</sup> Among the general female population in large urban areas, the self-reported prevalence of abortion approximates 50%.<sup>8</sup> Among more vulnerable populations, such as female IDUs, the abortion prevalence may reach 67%.<sup>9</sup> Efforts to decrease unwanted pregnancies between 1991 and 1997<sup>10 11</sup> apparently led to a reduction in the number of abortions and better attitudes toward contraceptive methods in Russia.<sup>12 13</sup> However, results from a longitudinal monitoring survey between 1994 and 2003 revealed that effective contraceptive use had not increased among sexually active Russian women.<sup>14</sup>

The refusal to use contraceptives and the resulting risk for unintended pregnancy has several negative consequences for women. Unintended pregnancy is associated with higher rates of negative maternal behaviours [e.g. failure to resolve sexually transmitted infections (STIs) prior to pregnancy, substance use during pregnancy, and a lower number of prenatal care visits], and a greater risk for the abandonment of infants and abortion.<sup>4 15–18</sup> In Russia, where rates of alcohol consumption are among the highest in the world,<sup>19</sup> alcohol misuse may compound women's reproductive health-related problems. Alcohol misuse is more likely to occur during an unintended pregnancy, as are alcohol-related negative birth outcomes including birth defects<sup>20 21</sup> and a range of developmental disabilities and fetal alcohol spectrum disorders.<sup>22</sup> Among non-pregnant women, misuse of alcohol has been associated with unplanned intercourse,<sup>23</sup> unprotected sexual intercourse (UPSI), lack of contraceptive use,<sup>18 24</sup> and with being diagnosed with an STI,<sup>23</sup> and may compound women's risks for unintended pregnancies, abortions, reproductive health problems and HIV transmission. Thus, the investigation of the association of alcohol use to women's reproductive health issues may provide useful public health information.

Other factors that may contribute to women's patterns of contraceptive use, such as early sexual behaviour, have not been extensively investigated in Russia. For example, in a US study,<sup>25</sup> adolescents who initiated sex at a younger age were more likely to be frequent polysubstance users and to not have used condoms during their last episode of intercourse. Other studies have linked childhood sexual trauma to

adult sexual risk-taking and adult substance abuse.<sup>26–28</sup> Substance use such as illicit drug injection, methamphetamine use and problem drinking may also contribute to unsafe sex.<sup>29–31</sup> Therefore studies of women's reproductive health risks may benefit from controlling for patterns of substance use and for early sexual behaviours and trauma. Such studies may provide helpful information for the development of interventions to increase contraceptive use, including condom use among vulnerable women.

Despite these findings, no study has yet investigated the relationship between lack of contraceptive use and the factors related to the reproductive health and early sexual behaviours of women who are at elevated risk for HIV and unintended pregnancy in Russia. We conducted an initial study to investigate the correlates of unsafe sex, including early sexual behaviour, reproductive health characteristics and patterns of alcohol use among women who inject drugs or who have sexual partners who inject drugs in St Petersburg, Russia.

## METHODS

### Study population and recruitment into the SATHCAP study

This analysis uses data from a study conducted in St Petersburg, Russia, which was part of a large multi-site project, the Sexual Acquisition and Transmission of HIV-Cooperative Agreement Program (SATHCAP).<sup>32</sup> The goal of SATHCAP was to recruit individuals who inject drugs, and their sexual partners, and collect data on the factors that may influence the transmission of HIV from high-prevalence core populations (such as IDUs) to the greater general populations of which they are part.

The SATHCAP study protocol was approved by the Institutional Review Boards of Yale University, the Biomedical Center in St Petersburg, and RAND Corporation. Participants were recruited between November 2005 and December 2008 using a modified form of respondent-driven sampling (RDS).<sup>32 33</sup> RDS is a chain-referral sampling methodology that uses structured incentives and coupon disbursement for peer referrals. Conventional RDS methods were modified<sup>32</sup> in this study to recruit IDUs and their sex partners. Enrolled IDUs were given coupons to distribute to their peers and to their sex partners. After receiving coupons, potential participants contacted the study site to schedule an appointment for eligibility screening and enrolment. Newly enrolled IDUs were in turn offered coupons to recruit their sexual partners and additional injection drug-using peers. Participation was anonymous. No locator information was collected but a number of bio-measures including forearm length and wrist circumference were collected to prevent repeat participation (duplicates).<sup>34 35</sup>

After providing written informed consent, participants completed structured interviews and were given pre-test counselling before biological specimens were

collected for the testing of STIs, including HIV. Participants received incentives equivalent to US\$10, which included mobile phone cards or personal care items; all received subway tokens, condoms and HIV prevention information. Participants were instructed when to return to the site to receive their laboratory test results and post-test counselling. Participants were referred for other medical services as needed.

#### Interview data collection

Interviews lasting 90–120 minutes were conducted using computer-assisted survey interviewing technology on laptop computers. Information was collected on socio-demographics, health status and HIV-associated sexual and injection risk behaviours. Socio-demographic data included age, sex, education and employment. Participants were asked if they had ever been tested for HIV. If a participant had been previously tested for HIV, he or she was asked for the result of the HIV test from a list of five options: refuse to answer, did not know, did not get results, HIV-negative and HIV-positive.

Participants were asked if they injected illicit drugs in the last 6 months. They were asked the three first questions of the Alcohol Use Disorder Identification Test (AUDIT-C): the number of days in the last month during which alcohol was consumed, average number of drinks at each drinking event, and number of days in the last month during which they got drunk or consumed five or more drinks within 2 hours. Heavy sporadic drinking was defined as being drunk or having five or more drinks within 2 hours at least twice a month. At-risk drinking corresponded to a score greater than two on the AUDIT-C questions as determined in previous studies among women.<sup>36 37</sup>

Information on sexual behaviours included the number of male and/or female sex partners in the 6 months prior to the interview. Participants were asked whether they had unprotected vaginal or anal sexual intercourse (UPSI) at the last sexual encounter with up to five recent sexual partners within the prior 6 months. For each reported partnership, the participants were asked whether they knew the HIV sero-status of their sexual partners. Self-reported sexual and reproductive characteristics included age at first sexual intercourse, whether participants perceived their first sex to have been involuntary, current pregnancy status, the number of children for whom the participant is the primary caretaker, and number of previous pregnancies.

#### STI detection assays

Blood and urine specimens were obtained from all participants. Sera were tested for both HIV type-1 (HIV-1) and syphilis. HIV-1 testing involved two HIV-1 antibodies enzyme immunological assays (EIAs) (Vironostika HIV-1, Uni-Form-II plus-0; Biomerieux, The Netherlands and Genscreen HIV-1/2; BioRad, France). Positive HIV-1 EIA tests were confirmed by

Western Blot (WB) (HIV-1 WB Type-1; Biorad, France). Specimens that were positive by WB were considered HIV-positive. Serum samples were screened for syphilis with rapid plasma reagin test (RPR) (Macro-Vue RPR-Card Tests; Becton Dickinson, USA) and *Treponema pallidum* particle agglutination assay (TPPA) (Serodia-TPPA; Fujirebio, Japan). Specimens were seropositive for syphilis if TPPA alone or if both TPPA and RPR tests were reactive. Urine specimens were tested for nucleic acid from *Chlamydia trachomatis* and *Neisseriae gonorrhoeae* using polymerase chain reaction (PCR) (Amplicor CT/NG; Roche, USA).

#### Data analysis

Because equilibrium in RDS was not satisfactorily achieved, the presented results do not include standard RDS weighing algorithms. Standard descriptive statistics were used to describe the sample. Bivariate associations between UPSI and independent variables, such as socio-demographics, substance use, sexual and reproductive characteristics and HIV/STIs, were examined. Variables associated with UPSI at  $p < 0.20$  were entered into multivariate logistic regression models. Backward stepwise elimination was used to produce adjusted ORs for those variables independently associated with UPSI at  $p$  values  $\leq 0.05$ . All data were analysed using SPSS Version 17 (IBM Corporation, USA).

## RESULTS

### General characteristics and substance use patterns of subjects

In all, 1023 IDUs, men who had sex with men and their sexual partners were recruited into the completed SATHCAP study in St Petersburg. After excluding all males (772), two transgendered individuals (2), those who reported zero male sex partners (71), those who did not report their number of sex partners in the prior 6 months (34), and those who did not answer questions about their sexual partnerships (78), 202 participants were included in the analysis (note that some participants belonged to more than one of these categories). This included 143 (71%) women who reported injection drug use in the prior 6 months and 59 (29%) women who did not. The ages of all participants included in this analysis were in the range 18–46 years (Table 1), with a median of 26 years [interquartile range (IQR)=22–31]. Most participants had completed secondary education and were employed. Furthermore, 25% of the women engaged in heavy sporadic drinking and 65% received an at-risk drinking score.

### Sexual and reproductive characteristics and STI test results

The median age for the first sexual act was 16 (IQR=14–17, min 11–max 23), 13% perceived their first sexual encounter to have been involuntary, and

**Table 1** Characteristics of sexually active female participants in the SATHCAP study (N=202)

Characteristic	All participants (N=202)		Inject drugs (n=143)		Do not inject drugs (n=59)	
Demographics						
Age (median years, IQR)	26	22–31	26	22–30	25	22–29
Post-secondary education	111/202	55%	68/143	48%	43/59	73%
Unemployed	72/200	36%	61/141	43%	11/59	19%
Substance use						
Heavy sporadic drinking*	48/190	25%	35/137	26%	13/53	25%
At-risk drinking per AUDIT-C	124/192	65%	81/137	59%	43/55	78%
Women's sexual behaviour history and reproductive characteristics						
Age at first sex (median years, IQR)	16	14–17	15	14–17	16	15–18
First sex perceived as involuntary	27/202	13%	18/143	13%	9/59	15%
First sex involuntary and <age 16	19/201	9%	13/143	9%	6/59	10%
Had >1 sex partner in last 6 months	91/202	45%	58/143	41%	33/59	56%
Had a sex trade partner in last 6 months	19/189	10%	17/134	13%	2/55	4%
Reported a positive HIV status	37/201	18%	31/142	22%	6/59	10%
Sexual partner at last sex was HIV-positive	32/189	17%	27/134	20%	5/55	9%
Had UPSI at last sexual act	125/188	67%	85/131	65%	40/57	70%
Number of children for which participant is primary care taker						
0	123/191	64%	86/136	63%	37/55	67%
1	51/191	27%	37/136	27%	14/55	26%
2	15/191	8%	11/136	8%	4/55	7%
3	2/191	1%	2/136	2%	0/55	0%
Number of times pregnant						
0	52/199	26%	29/140	21%	23/59	39%
1	48/199	24%	39/140	28%	9/59	15%
2	40/199	20%	28/140	20%	12/59	20%
3	36/199	18%	29/140	21%	7/59	12%
4+	23/199	12%	15/140	11%	8/59	14%
Detected urogenital pathogens and infections						
HIV-1	79/202	39%	69/143	48%	10/59	16%
Had at least one STI†	47/202	23%	36/143	25%	11/59	19%

\*Drunk or had five or more drinks in 2 hours at least twice a month.

†*Chlamydia trachomatis*, *Neisseria gonorrhoeae* or positive syphilis serology.

IQR, interquartile range; SATHCAP, Sexual Acquisition and Transmission of HIV-Cooperative Agreement Program; STI, sexually transmitted infection; UPSI, unprotected sexual intercourse.

9% reported that their sexual debut was involuntary and occurred when they were younger than age 16 years (Table 1). Nearly half of all women had more than one sex partner in the last 6 months and 10% had a sex trade partner (a partner with whom they exchanged money, goods or drugs for sex). Nearly two-thirds reported having had UPSI at their last sexual intercourse, 18% self-reported having a positive HIV status (though 39% were found to be positive at HIV testing) and 17% reported that the sexual partner with whom they last had sex was HIV-positive. Overall, 11% and 10% of participants tested positive for HIV, or reported being positive for HIV, respectively, and also reported having had a sexual partner who was HIV-positive.

While 64% of all participants had no children, 74% reported having been pregnant. Further, while 1% of participants reported at least three children, 30% had been pregnant three or more times. Laboratory test results revealed an HIV prevalence of 39% (48% among injectors and 16% among non-injectors) and 23% tested positive for chlamydia, gonorrhoea or syphilis serology.

#### Correlates of UPSI as marker for pregnancy risk

In the bivariate analysis among all participants (Table 2), UPSI at the last sexual act was significantly associated with heavy sporadic drinking and with having been pregnant. In the multiple logistic regression model, heavy sporadic drinking (OR 2.8, 95% CI



**Table 2** Correlates of unprotected sexual intercourse at last sexual act among female SATHCAP participants who inject drugs or who have sexual partners who inject drugs

Characteristic	Among all women (N=202)	
	uOR	aOR
Demographics		
Age 25+ years	0.72 (0.39–1.31)	
Post-secondary education	0.81 (0.44–1.50)	
Unemployed	1.41 (0.74–2.70)	
Substance use		
Injection drug use in last 6 months	0.78 (0.40–1.54)	
Heavy sporadic drinking†	2.68 (1.15–6.22)*	2.80 (1.18–6.60)*
At-risk drinking per AUDIT-C	1.45 (0.77–2.76)	
Women's sexual behaviour and reproductive characteristics		
First sex below age 16 years	1.47 (0.80–2.71)	
First sex perceived as involuntary	2.34 (0.84–6.54)	
First sex below age 16 years and involuntary	2.73 (0.76–9.80)	
Had more than one sex partner in last 6 months	1.15 (0.63–2.12)	
Reported a positive HIV status	1.27 (0.57–2.86)	
Had a sex trade partner in last 6 months	0.46 (0.17–1.23)	
Sexual partner at last sex was HIV-positive	0.83 (0.38–1.84)	
Has children	1.49 (0.77–2.88)	
Has been pregnant	1.99 (1.02–3.91)*	2.25 (1.11–4.58)*
Detected urogenital pathogens and infections		
HIV-1	1.33 (0.71–2.49)	
Had at least one STI‡	1.15 (0.56–2.37)	

\* $p < 0.05$ .

†Drunk or had five or more drinks in 2 hours at least twice a month.

‡*Chlamydia trachomatis*, *Neisseria gonorrhoeae* or positive syphilis serology.

aOR, adjusted odds ratio; SATHCAP, Sexual Acquisition and Transmission of HIV-Cooperative Agreement Program; STI, sexually transmitted infection, uOR, unadjusted odds ratio.

1.2–6.6) and having been pregnant (OR 2.2, 95% CI 1.1–4.6) remained independently associated with UPSI at the last sexual act.

## DISCUSSION

This is the first study to explore the relationships between women's risk for HIV and unintended pregnancy taking into consideration early sexual risk behaviours, parity and substance use patterns of women who are at high risk for HIV infection in St Petersburg, Russia. Nearly two-thirds of all participants reported UPSI at their last sexual intercourse. UPSI may be considered a strong indicator for pregnancy risk among this population. Although this study did not collect data on contraceptive behaviour other than condom use, a previous study of the contraceptive use patterns of 80 sexually active female IDUs

from St Petersburg revealed that condoms were the only effective contraceptive method used by women.<sup>9</sup> The findings suggest that women who inject drugs or who have sex with partners who inject drugs are at elevated risk for HIV acquisition and transmission and unintended pregnancy. Although the prevalence of risk behaviour was lower than the 88% prevalence of UPSI found among narcology patients in Russia,<sup>38</sup> it is still high especially when considering that 39% of participants received a positive HIV test result in this study.

UPSI was independently associated with sporadic heavy drinking. The results contrast with a previous study among narcology patients in Russia that failed to detect an association between UPSI and binge drinking.<sup>38</sup> However, our result is consistent with studies conducted outside Russia that show drinking to be associated with a greater chance of engaging in sexual risks, such as unplanned intercourse and UPSI.<sup>18–39–40</sup> These results indicate that programmes to increase condom use among women at high risk for HIV need to address problem drinking, particularly heavy sporadic drinking. The results showing no independent association between UPSI and risky drinking per AUDIT-C criteria suggest that interventions may need to identify and target population-specific drinking patterns rather than conventional measures of problem drinking in order to achieve changes in sexual risk behaviours. Moreover, given that a previous study of female STI clinic patients in St Petersburg found an association between alcohol misuse and self-reported abortion,<sup>17</sup> this finding suggests that studies to investigate the links between alcohol and contraceptive use patterns among this vulnerable group of women are needed.

UPSI at one's last sexual act was associated with having been pregnant. This is consistent with a previous study in Russia that found lower odds of contraceptive use among women who had given birth.<sup>8</sup> The lack of condom use could be due to the use of other forms of contraceptive methods among the women who had been pregnant. However, a previous study among sexually active female drug injectors in St Petersburg showed that none of the participants used hormonal pills or intrauterine devices,<sup>9</sup> which could also be the case in this study. The risk for unintended pregnancy can have marked negative consequences given that 18% of women reported being HIV-positive (and 39% actually tested positive) and 10% ( $n=11/116$ ) of those who tested negative for HIV reported that their partner at last sexual act was living with HIV. Thus, studies that investigate the contraceptive use patterns of this group of women are urgently needed.

The fact that a third of the participants reported three or more pregnancies, despite only 1% of women having three or more children, supports the possibility that the high number of pregnancies are a

proxy for the number of induced abortions among participants. This is quite feasible given that abortion prevalence can be 50% or higher among Russian women.<sup>14 41</sup> However, there are other explanations for the discrepancy between the number of children and the number of pregnancies. Russia has high rates of abandonment of infants by HIV-positive women or women who did not intend to become pregnant;<sup>4 42</sup> in addition, women who inject drugs may lose child custody<sup>43</sup> and may be more prone to pregnancies that result in miscarriages, stillbirths or infant mortality.<sup>44</sup> These possibilities are important public health concerns and need further scientific investigation.

Knowing one's HIV status to be positive, engaging in sex trade, or knowing that the sexual partner with whom one last had sex with had a positive HIV status were not associated with a greater likelihood of using condoms. While consistent and correct use of male condoms can provide effective protection against HIV and other STIs, they are associated with relatively high pregnancy rates compared to other contraceptive methods.<sup>45</sup> In one study, the average failure rate for the male condom was estimated to be 15%.<sup>46</sup> These results further confirm the great need for more efforts to increase condom use and dual contraceptive use among these women.

Approximately 13% of participants reported involuntary first sex and in approximately two-thirds of these cases this occurred before the age of 16 years. This number may approximate the 10% prevalence of forced sexual intercourse reported by female adolescents in the USA.<sup>47</sup> However, additional questions about sexual coercion, abuse or assault were not asked in this study. Intimate partner violence and sexual violence in adulthood have been linked to risky sexual behaviour, and can restrict women's abilities to use contraception, including condoms.<sup>48</sup> Additional studies will need to confirm the prevalence of sexual trauma and early sexual risk behaviours and their associated risk factors among this group of women.

#### Limitations of study

A primary limitation with this study is the small sample size, which restricted the analyses that could be conducted, as well as the power to identify small but significant relationships that may exist. There is a need for larger studies to confirm these results. Risk behaviours may have been under-reported because of social desirability or other types of bias. Due to the cross-sectional nature of the data, causal relationships could not be established. Participants recruited into this study were drug injectors and non-injectors who reported at least one sexual partner who was an IDU; thus the results may not apply to individuals who never had a sexual partner who injected drugs. In addition, we did not ask participants about contraceptive use patterns or pregnancy desires, which limits the conclusions that can be drawn from our findings. Finally, the non-

representative recruitment method may limit the generalisability of the results. However, the study provides a unique opportunity for the identification of reproductive health problems that may also place women at risk for HIV and unintended pregnancy.

#### CONCLUSIONS

Despite the high risk for HIV acquisition or transmission and unintended pregnancies, condom use among the study population is low. Heavy sporadic drinking and a history of pregnancies were associated with UPSI among this vulnerable group of women. Programmes to address alcohol misuse and women's reproductive health concerns, including the contraceptive decision-making of women who use injection drugs or have IDU sexual partners in St Petersburg, Russia, are needed.

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