Correlates of life-time history of purchasing sex services by men in Saint Petersburg and Leningrad Oblast, Russian Federation

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CORRELATES OF LIFE-TIME HISTORY OF PURCHASING SEX SERVICES BY MEN
IN SAINT PETERSBURG AND LENINGRAD OBLAST,
RUSSIAN FEDERATION

by

Polina Girchenko

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Abstract

**Background.** Commercial sex workers (CSW) in the Russian Federation are at high risk of HIV infection and transmission as a result of unsafe sexual and injecting behaviors. Their clients might be at increased risk of acquiring HIV; however, little is known about the population of men purchasing sex services. This study aims to investigate factors associated with a history of purchasing sex services by men in Saint Petersburg and Leningrad Oblast, the Russian Federation.

**Methods.** Data were collected as part of a cross-sectional study offering free anonymous rapid HIV-testing in Saint Petersburg and Leningrad Oblast in 2014; in total, 3,565 men aged 18 years and older provided information about their behaviors associated with risk of acquiring HIV during face-to-face interviews.

**Results.** Prevalence of CSW use in our study was 23.9%. Multivariable analyses using log-binomial regression were stratified by self-reported HIV-testing during the 12 months preceding the study interview. In both strata older age, multiple sex partners, and a history of sex with an injection drug user (IDU) were associated with an elevated prevalence ratio (PR) for history of purchasing sex services, though the strength of the association differed by strata. Among men who reported recent HIV testing, condom use (PR=1.22, 90% CI 1.0, 1.48) was associated with a history of purchasing sex services, and among men who did not report recent HIV testing having a consistent sex partner was associated with purchasing sex services (PR=1.23, 90% CI 1.1, 1.37).
Discussion. The high prevalence of CSW services use and associations found in this study raise serious concerns about potential for sexual HIV transmission and should be investigated more closely.
1. Literature Review and Background

1.1. HIV-prevalence in Russian Federation

The HIV epidemic in Russian Federation continues to remain one of the fastest growing HIV epidemics worldwide (Niccolai, Verevochkin et al. 2011, Dukhovlinova, Masharsky et al. 2014). According to the official statistics published at the website of the Federal AIDS Center of Russian Federation, at the end of 2013, HIV prevalence in Russian Federation was 468.8 per 100,000 of population. Those officially registered with HIV-infection are patients who were non-anonymously tested at the state medical facility, tested positive on the enzyme-linked immunosorbent assay (ELISA) test and confirmed by the Western Blot. It is suggested that official data seriously underestimate the real HIV prevalence in Russian Federation (Mathers, Degenhardt et al. 2008, Pokrovskiy 2014). At the end of 2013, 668,032 residents of Russian Federation were officially registered with HIV-infection, whereas the estimated number of people living with HIV/AIDS in Russia was 1,363,330 (Pokrovskaya, Popova et al. 2014). Based on this estimation it might be suggested about 50% of HIV-cases in Russian Federation remain undiagnosed or unregistered.

1.2. Populations at risk for HIV-infection in Russian Federation

Since its beginning the HIV epidemic in Russian Federation was driven primarily by injection drug users (IDUs) (Volik, Karmanova et al. 2012). However, during recent years, the spread of HIV-infection is shifting towards sexual transmission (Aral, St Lawrence et al. 2005, Goliysova 2011, Fedorova, Skochilov et al. 2013). According to the official statistics published on the website of the Federal AIDS Center of Russian Federation, 42% of 79,728 people diagnosed with HIV in
2013 in Russian Federation were infected through heterosexual sex. Nevertheless, IDUs continue to comprise one of the groups most affected by HIV in Russian Federation (Niccolai, Verevochkin et al. 2011). Previous research has found that injection drug use is a risk factor for sexual HIV transmission: female IDUs contribute to the sexual spread of HIV through widespread practices of exchanging sexual services for drugs or money (Wechsberg, Krupitsky et al. 2012).

1.3. Commercial sex workers as a risk group for acquisition and transmission of HIV-infection

With regard to sexual HIV transmission, commercial sex workers (CSW) represent the population highly vulnerable to HIV (King, Maman et al. 2013, Carobene, Bolcic et al. 2014). The rates of sexually transmitted infections among commercial sex workers are significantly higher than in the general population (Aral, St Lawrence et al. 2005, Abdala, Kershaw et al. 2011, Zhou, Li et al. 2013), which increases their susceptibility to HIV acquisition and transmission (Kleppe, Holmen et al. 2014, Masson, Mlisana et al. 2014). Previous research demonstrates that commercial sex work is strongly associated with substance use and violence (Benotsch, Somlai et al. 2004, Malta, Magnanini et al. 2010, Abdala, Kershaw et al. 2011, Yorick, Skipalska et al. 2012, Abdala, Hansen et al. 2013, Zohrabyan, Johnston et al. 2013), which interferes with CSWs’ decisions about safer sex. It has been found that female CSWs inconsistently use condoms when having sex with their clients (Hong, Poon et al. 2011, Decker, Yam et al. 2013). Factors described above lead to high rates of HIV-infection among CSWs including female CSWs (Malta, Magnanini et al. 2010, Zohrabyan, Johnston et al. 2013).
The public health implication of the inconsistent use of condoms among CSWs is that they are less likely to use condoms with their casual or constant intimate partners (Decker, Yam et al. 2013, Parriault, Basurko et al. 2014), which additionally increases CSWs’ risk of acquiring and transmitting HIV-infection.

1.4. Commercial sex work in Russia

The phenomenon of commercial sex work in Russian Federation is under investigated. Little is known about the number of people providing sex services and the structure of sex work in Russian Federation both in terms of gender and location; female sex workers offering services in public places, such as streets, railroad stations, and truck stops are more visible and thus more available for participation in the research (Aral, St Lawrence et al. 2003). Sex work conducted in closed settings, such as massage salons, bathhouses, night clubs, is hidden and challenging to study. Further, almost no data exist about male sex workers. For this reason, it should be noted that the vast majority of the information about CSWs collected in Russian Federation concern female street sex workers.

In Russian Federation, sex workers are largely affected by the epidemic of injection drug use (Yorick, Skipalska et al. 2012). One study in Russian Federation found that sex work and injection drug use are highly correlated, which places commercial sex workers in the position of double risk for HIV acquisition and transmission (Wechsberg, Krupitsky et al. 2012). Another study conducted in Saint Petersburg found that 99.3% of female street-based sex workers had a life-time experience of injecting drugs and 98.6% were current IDUs (Ramanathan, Nagarajan et al. 2014). Data on HIV-prevalence among injection drug users indicate that it ranges from 37% (Des Jarlais, Feelemyer et al. 2012) to 64% (Long, Brandeau et al. 2006). Most researchers agree
that HIV-prevalence among IDUs in Russia exceeds 40% (Dukhovlinova, Masharsky et al. 2014). It might be suggested that due to the double risk of acquiring HIV (Wechsberg, Krupitsky et al. 2012), HIV-prevalence among female CSWs would be even higher.

There are limited data available on HIV-prevalence among CSWs in Russia; a study conducted in three Russian cities - Kazan, Krasnoyarsk, and Tomsk - found that HIV prevalence among female CSW was 3.9% (Decker, Wirtz et al. 2014). Another study conducted among female CSW in Moscow found HIV-prevalence in this population to be 4.8%, while 31.3% of female CSWs were infected with at least one sexually transmitted infection (STI), suggesting a high prevalence of unsafe sex (Decker, Wirtz et al. 2012). Data for the studies described above were collected in 2007-2008 and 2005 respectively; as such, data on HIV prevalence among female CSWs are outdated. Nevertheless, these studies provide evidence that even 8-10 years ago HIV rates among female CSWs were significantly higher than in the general population of sexually active women in Russian Federation.

1.5. Clients of commercial sex workers as a population at increased risk of HIV infection

Considering the above, people who use CSW services are themselves at increased risk of HIV infection, and represent “bridges” of HIV transmission from the vulnerable CWS population to the general population (Xu, Wang et al. 2008, Huang, Wang et al. 2011, Niccolai, Odinokova et al. 2012). One study conducted in Russian Federation found that at most 61% of sexual contacts between female CSWs and their male clients involved consistent condom use (Niccolai, Odinokova et al. 2012). There is also evidence that sexual contact between female CSWs and their male clients often involves alcohol or drug use by clients (Landers, Closson et al. 2014) and
by female CSWs, (Odinokova, Rusakova et al. 2014) which impairs judgment and hampers decisions about adequate condom use (Toussova, Shcherbakova et al. 2009).

Condom use reported by men who use the services of female CSWs differs by the country where this issue was investigated, and ranges from 77.3% (Mulieri, Santi et al. 2014) to 95% (Belza, de la Fuente et al. 2008). Condom use by male clients of female CSWs in Western European countries is higher than in Russian Federation, which is possibly the consequence of the lack of HIV prevention efforts in Russian Federation. Nevertheless, no studies reported 100% condom use during sexual intercourse between female CSW and their male clients, with the majority of studies finding inconsistent condom use by male clients (Galvan, Ortiz et al. 2009, Ramanathan, Nagarajan et al. 2014).

Concurrently, studies have reported that the prevalence of HIV-infection among male clients of female CSW has been steadily increasing during the past 10 years (Huang, Maman et al. 2012). Results of studies conducted among male clients of female CSW found that the prevalence of STIs including HIV-infection among male clients of female CSWs was significantly higher than in general population (Shaw, Deering et al. 2011, McLaughlin, Chow et al. 2013). It was also found that positive HIV-status among men using female CSWs’ services was not associated with the frequency of use of these services: men who reported one-time usage of female CSW services were at equal risk of acquiring HIV-infection as frequent users of female CSW services (Shaw, Deering et al. 2011). This result implies that even one-time use of CSW services considerably increases risk of acquiring HIV-infection.

Male clients of CSWs are often also involved in sexual relationship with partners from lower risk groups. Previous research demonstrates that men who pay for sex are likely to have both
commercial and non-commercial sex partners, which increases their chances to transit HIV-infection into the general population and places them in the position of intermediate link between high and low risk groups (Ward, Mercer et al. 2005, Subramanian, Gupte et al. 2008, Niccolai, Odinokova et al. 2012). In studies conducted in Russian Federation, it was found that 43% to 61% of male clients of CSW were engaged in a stable relationship (Subramanian, Gupte et al. 2008, Niccolai, Odinokova et al. 2012, Mulieri, Santi et al. 2014). In addition, the study conducted in Russia found that consistent condom use by female CSWs’ clients when having sex with their non-commercial partners did not exceed 43% (Niccolai, Odinokova et al. 2012).

Therefore, male clients of female CSW are at increased risk of acquiring HIV-infection and act as a “bridge” of HIV-infection to lower risk populations (Niccolai, Odinokova et al. 2012). However, the majority of the studies investigating the effect of sex work on public health, including the role of sexual transmission of HIV-infection, continue to focus on commercial sex workers (Ompad, Bell et al. 2013). The vast majority of public health interventions aimed at prevention of HIV-infection spread among CSWs target CSWs and not their clients (Hong, Poon et al. 2011).

1.6. Influence of the policies regulating sex work on public health

In countries where sex work is criminalized, both the populations of CSWs and the men who pay for sex are hidden (Krusi, Pacey et al. 2014). In Russian Federation, according to Article 6.11 of the Code of Laws on Administrative Violations of Russian Federation, “engagement in prostitution is penalized with a fine sized 1,000 to 2,500 roubles” and as such, sex work is criminalized. The situation in Russian Federation is complicated by the repressive policies towards IDUs, lack of harm reduction programs and bun of substitution therapy, all of which
prevent implementation of public health measures aimed at stopping the HIV-epidemic among IDUs (Kazatchkine 2014) including female CSWs (Lunze, Raj et al. 2014).

In the countries where sex work is legal, estimates of the population of men purchasing sex services might be more accurate. Still, buying sexual services is often stigmatized (Shannon and Montaner 2012), which potentially might lead to underestimation of sex workers’ clients population size.

Therefore, it is challenging to estimate the size of the population of male clients of CSWs. Nevertheless, evidence exists that in some countries, that the lifetime prevalence of usage of commercial sex workers’ services among men exceeds 25% (Belza, de la Fuente et al. 2008, Galvan, Ortiz et al. 2009, Huang, Maman et al. 2012). Thus, men who pay for sexual services might potentially represent the biggest group at increased risk for acquiring and transmitting HIV-infection.

Addressing the HIV epidemic among CSWs and their clients is further complicated by moral and legal implications, which negatively affect the public health efforts aimed at primary, secondary and tertiary HIV prevention in these vulnerable populations (Shannon and Montaner 2012). It has been suggested that criminalization of sex work is responsible for 33-46% of cases of HIV-infection (Shannon, Strathdee et al. 2015). Previous research has found that the negative public health implications of sex work criminalization, such as the impossibility of conducting systematic public health interventions aimed at prevention of the HIV-spread (Cameron and Godwin 2014), affects buyers of CSW services (Krusi, Pacey et al. 2014). Moreover, the implementation of enforcement based approaches to sex work and sex workers has been associated with increased violence and decreased ability to negotiate condom use (Cameron and
Godwin 2014). Additionally, public health programs addressing the HIV-epidemic as it relates to sex work often are often in conflict with the legal system (Shannon and Montaner 2012, Shannon, Strathdee et al. 2015).

In many countries including Russian Federation, male clients of commercial sex workers are not recognized as a separate group at risk of acquiring and transmitting HIV-infection (Huang, Maman et al. 2012). In Russian Federation no prevention and intervention programs designed specifically for male clients of commercial sex workers exist, and there are a limited number of programs targeting female sex workers. No official public health strategies to prevent spread of HIV-infection among female CSWs and their clients exist, and the separate efforts of different non-governmental organizations are segmented and disconnected.

1.7. Factors associated with life-time history of purchasing sexual services

Age

In the literature, age, analyzed as either continuous (Barnard, McKeeganey et al. 1993), categorized into quartiles (Ompad, Bell et al. 2013) or other categorizations (Jewkes, Morrell et al. 2012, Reilly, Wang et al. 2012), was considered as a predictor of life-time experience of purchasing sexual services. In all studies, older age was found to be significantly associated with life-time experience of purchasing sexual services (Ompad, Bell et al. 2013).

Education

Education has been investigated as a potential factor associated with usage of CSW services, however, it was not found to be a statistically significant correlate of a history of purchasing sex services in two previous studies (Jewkes, Morrell et al. 2012, Ompad, Bell et al. 2013).
Statistically significant associations between level of education and life-time experience of purchasing sex services found by previous studies are contradictory: one study found higher level of education to be associated with being a sex worker client (Ompad, Bell et al. 2013), while another study found this association to be inverse (Pitts, Smith et al. 2004). These differences may be related to differences in the populations examined. Nevertheless, education was found to be associated with life-time experience of being a client of a sex worker.

**Life-time number of sex partners**

Increased number of life-time sex partners was found to be associated with history of purchasing sex (Schei and Stigum 2010, Ompad, Bell et al. 2013). The research suggests that the association between the number of sex partners and life-time experience of purchasing sex services displays a dose-response pattern. An explanation suggested by researchers is that the increased number of sex partners might be due to sexual compulsivity, which, in turn, leads to usage of CSW services (Ompad, Bell et al. 2013).

**Marriage/cohabitation**

Having a constant partner was also found to have contradictory associations with life-time experience of using services of CSWs: in one study it had a protective effect, while in another it was shown to be a risk factor. (Jewkes, Morrell et al. 2012, Ompad, Bell et al. 2013). Barnard, McKeeganey et al. combined marriage and cohabitation into one category (Barnard, McKeeganey et al. 1993), whereas others used separate categories for marriage and cohabitation (Reilly, Wang et al. 2012, Ompad, Bell et al. 2013). One study found cohabitation, being single, divorced or widowed increased the probability of purchasing sex services from commercial providers compared to being married (Jewkes, Morrell et al. 2012). Despite the differing results of
previous studies, marriage/cohabitation/having a constant sexual partner was found to be associated with the using the services of CSWs.

**Testing for HIV**

Previous research found that purchasing sex services was associated with having HIV-tests during the 12 months preceding the study (Day, Ward et al. 1993, Ompad, Bell et al. 2013).

**Condom use**

Condom use defined as categorized frequency of condom use (Ford, Wirawan et al. 1995, Lu, Tang et al. 2014) or condom use during last sex episode (Zhang, Li et al. 2014) was shown to be positively associated with the history of paying for sexual services in previous studies (Ford, Wirawan et al. 1995, Lu, Tang et al. 2014, Zhang, Li et al. 2014).

**Substance use**

Very few studies investigated the role of the history of injection drug use by the clients of sex workers. Limited research on this subject did not find an association between injection drug use and life-time experience of purchasing sex service (Reilly, Wang et al. 2012).

**STIs and HIV-status**

HIV-status and/or STIs are the most commonly investigated factors associated with being clients of CSWs. Previous research showed strong evidence that STIs and positive HIV-status are significantly associated with being a client of sex worker (Ford, Wirawan et al. 1995, Aral, St Lawrence et al. 2005, Xu, Wang et al. 2008, Hong, Poon et al. 2011, McLaughlin, Chow et al. 2013, Zhang, Li et al. 2014).
1.8. Goal and objectives of the study

The main goal of the present study is to identify factors associated with the self-reported lifetime experience of using services of commercial sex workers among men in Saint Petersburg and Leningrad Oblast, Russian Federation.

The main objectives of this study are:

- To compare the prevalence of risky behaviors for acquiring and transmitting HIV among men with and without history of being a CSW client
- To identify factors associated with usage of CSW services among men with and without recent history of testing for HIV-infection
- To provide avenues for future research.
2. Journal Article

2.1. Background

The HIV epidemic in Russian Federation is one of the fastest growing HIV epidemics worldwide (Niccolai, Verevochkin et al. 2011, Dukhovlinova, Masharsky et al. 2014). Since the beginning of the HIV epidemic in Russian Federation, it was driven primarily by injection drug users (IDUs)(Volik, Karmanova et al. 2012), but during recent years a major route of HIV transmission has been sexual transmission (Aral, St Lawrence et al. 2005, Goliusova 2011, Fedorova, Skochilov et al. 2013). According to the official statistics published on the website of the Federal AIDS Center of Russian Federation, 42% of 79,728 people diagnosed with HIV in 2013 in Russian Federation were infected through heterosexual sex.

With regard to sexual HIV transmission, commercial sex workers (CSW) represent the population highly vulnerable to HIV infection (King and Maman 2013, Carobene, Bolcic et al. 2014). In addition, sex workers in Russian Federation are at elevated risk of injection drug use (Yorick, Skipalska et al. 2012), which places them at higher risk because of multiple possible routes for HIV acquisition and transmission (Decker, Wirtz et al. 2012, Wechsberg, Krupitsky et al. 2012, Ramanathan, Nagarajan et al. 2014).

Consequently, men who use CSW services are at increased risk of HIV infection, and represent potential “bridges” of HIV transmission from the vulnerable population of sex workers to the general population (Xu, Wang et al. 2008, Huang, Wang et al. 2011, Niccolai, Odinokova et al. 2012). Previous research demonstrates that men who pay for sex are likely to have both commercial and non-commercial sex partners, which increase their chances to transmit HIV-
infection to the general population, and places them in the position of intermediate link between high and low risk groups (Ward, Mercer et al. 2005, Subramanian, Gupte et al. 2008, Niccolai, Odinokova et al. 2012). Still, the majority of the studies investigating the impact of sex work on public health, including the role of sexual transmission of HIV-infection, focus on CSWs (Ompad, Bell et al. 2013). In many countries including Russian Federation, male clients of CSWs are not recognized as a separate group at risk of acquiring and transmitting HIV-infection by public health officials (Huang, Maman et al. 2012).

Little is known about male clients of CSWs in Russian Federation, including the prevalence of purchasing sex services, social and demographic characteristics, and associations between using CSW services and other behaviors increasing or decreasing risk of HIV-infection. The present study’s goal is to examine factors associated with self-reported lifetime experience of using services of commercial sex workers among males in Saint Petersburg and Leningrad Oblast, Russian Federation.

2.2. Methods

2.2.1. Study setting

Saint Petersburg is the second largest city in Russia (population 5.1 million), and Leningrad oblast (population 1.7 million) is the region surrounding Saint Petersburg (Saint Petersburg Census data, 2014). Data for the present study were collected in the public places of Saint Petersburg and Leningrad oblast, such as subway stations, railroad stations, city squares, malls, and other high population density areas, during January - December 2014 by the Foundation “Humanitarian Action” and with administrative support of the State Health Institution of
Leningrad Oblast “Centre for HIV and Infectious Disease Prevention and Control.” The behavioral survey was conducted as part of a rapid testing program for HIV-infection implemented by a mobile testing unit of “Humanitarian Action” and “Centre for HIV and Infectious Disease Prevention and Control.”

2.2.2. Study procedures

All individuals who volunteered to take a rapid test for HIV were offered an opportunity to complete a brief behavioral survey. Individuals who chose to participate signed a written informed consent form. Data on participants’ demographics and risky behaviors were collected during a face-to-face structured interview. Participation in the survey was completely anonymous; no personal information including names, phone numbers, e-mails, or exact dates of births were collected. Each participant was assigned an individual depersonalized code as a study identifier. Data on socio-demographic status and self-reported risky behaviors were entered on a paper-based form along with the unique individual code. Data were double entered into an Excel database. Since the survey and rapid HIV testing were conducted by different organizations, data about HIV-status of survey participants are not included in the present study.

2.2.3. Study population

The study population consisted of people who volunteered to participate in the survey. Exclusion criteria were age younger than 18 years, visible intoxication or other conditions which would potentially affect the ability to participate, and visible mental disorders.

For the purposes of the current analysis, the sample was restricted to men only. In total, 3,682 men were eligible to participate, and 3,565 men aged 18-92 gave informed consent and completed the behavioral survey.
2.2.4. Statistical methods

Descriptive statistics were calculated for all variables: means and medians for continuous variables and frequencies and percentages for categorical variables. To compare socio-demographic and behavioral characteristics of the study population to history of purchasing sex services, bivariable analyses were conducted, which included t-tests for continuous variables and $\chi^2$ square tests for categorical variables.

Previous research found prevalence ratios (PR) to be an appropriate measure of association for cross-sectional studies in which the binary outcomes were common (Lee, Tan et al. 2009). Thus, multivariable log-binomial regression, which has been shown to calculate the PR accurately (Coutinho, Scazufca et al. 2008), was used to measure the associations of interest.

The outcome variable was defined as self-reported life-time experience of purchasing sexual services from CSWs. The list of potential covariates included variables found to be significantly associated with the outcome of interest in previous research, such as age (Barnard, McKeganey et al. 1993, Jewkes, Morrell et al. 2012, Ompad, Bell et al. 2013) categorized into tertiles (29 years and younger (reference group), 30-36 years, 36 years and older); having a consistent sexual partner (Barnard, McKeganey et al. 1993, Jewkes, Morrell et al. 2012, Reilly, Wang et al. 2012, Ompad, Bell et al. 2013) (yes/no); number of sexual partners during last 12 months (Ompad, Bell et al. 2013) categorized as zero or one (reference group), 2-3, and more than 4; condom use (Day, Ward et al. 1993, Zhang, Li et al. 2014) during last sex episode; and a history of injection drug use (Reilly, Wang et al. 2012). Education was not found to be associated with purchasing sex services by the majority of previous studies. However, as education was studied as a potential correlate by other researchers (Jewkes, Morrell et al. 2012, Ompad, Bell et al. 2013), it
was included in this analysis using categories of less than high school, high school (reference group), some college and post college education. In addition, as previous studies found sex work in Russia to be associated with injection drug use (Yorick, Skipalska et al. 2012, Ramanathan, Nagarajan et al. 2014, Girchenko, Ompad et al. 2015), self-reported history of having sex with an IDU categorized as yes/no was included in the list of potential covariates. All covariates except for education and having a consistent sex partner were associated with the outcome in bivariable analyses.

Previous research has found that having taken an HIV-test during the past 12 months was associated with the history of purchasing sex services (Day, Ward et al. 1993, Ramanathan, Nagarajan et al. 2014). However, based on Directed Acyclic Diagram (DAG) analysis, we determined that it was not appropriate to include HIV-testing as a covariate, since it is clearly a consequence of using services of CSWs. Recent testing for HIV might potentially indicate an increased awareness about risk of acquiring HIV. It was hypothesized that for men who did take an HIV test during last 12 months, the correlates of purchasing sex services might be different as compared to men who were not tested recently. Thus, to account for these potential differences in men tested and not tested for HIV during last 12 months, a stratified analysis was performed. Unadjusted associations between characteristics of the study population and recent testing for HIV were analyzed using $\chi^2$ square tests.

To obtain a parsimonious model, only variables that were significantly associated with the outcome were included in the final models. The purpose of the analysis was exploratory since no other studies were available in Russian Federation; for this reason it was decided to use a level of significance of 0.1.
For the two final models (among men with and without HIV testing in the past 12 months), goodness-of-fit testing was performed using Deviance and Hosmer and Lemeshow tests. Data were analyzed using SAS 9.3 software (SAS Institute Inc., Cary, NC, USA).

2.3. Results

2.3.1. Univariate and bivariable analyses

In total, 23.9% of the study population reported ever purchasing sex services (Table 1), and only 15.0% of men participating in the study reported HIV testing during the 12 months preceding the study (Table 2).

Results of bivariable analyses classified by experience of using services of CSWs and HIV-testing are presented in Tables 1 and 2. Men who reported ever purchasing sexual services were older (mean ages 34.5 and 33.4 years, \( p=0.008 \)), more likely to have had multiple sex partners, to have a history of injection drug use, to have had sexual contact with an IDU, and to have had a sex partner of same sex. They were also more likely to use condoms and to be tested for HIV-infection.

Men with and without a history of purchasing sex services did not differ in terms of education or having a consistent sexual partner, or with regard to experience of selling sex.

Table 2 presents the covariates by HIV testing status. There were statistically significantly differences between those tested and not tested for HIV for all characteristics except history of selling sexual services. Men who reported taking an HIV test during the past 12 months were younger (mean ages 33.2 and 33.8 years, \( p<0.0001 \)), had higher level of education, were less
likely to have a constant sex partner, were more likely to have history of injection drug use and sex with IDU, and were more likely to report experience of homosexual sex. Men who were tested for HIV during the past 12 months were also more likely to report condom use during last sexual intercourse, have multiple sexual partners and have history of using services of CSWs.

2.3.2. Multivariable analyses

The results of the regression models predicting use of CSW services differed for men who reported and those who did not report testing for HIV during the last 12 months; thus stratification by HIV-testing is justified, and the results are reported separately.

Model 1 (Table 3) demonstrates that, among men not tested for HIV in the past 12 months, the PR of CSW services use for age categories 30 to 36 years and 37 years and older was 1.87 and 1.68 respectively, when compared to men 29 years of age and younger. In the same model a history of sexual relationship with IDUs was associated with an increase in prevalence of purchasing CSW services (PR = 1.27). Having multiple sex partners during the past 12 months had the strongest association with purchasing sex services: the PR was 2.62 among men who had 2-3 sexual partners during the last 12 months, and 2.74 among men who had 4 or more sexual partners compared to having 0-1 sex partners during the last 12 months. Having a consistent sex partner was found to be associated with an increased prevalence of purchasing CSW services (PR=1.23).

Model 2 also found age to be an important risk factor among men tested for HIV in the past 12 months: in age groups 30 to 36 years and 37 years and older the PR of purchasing CSW services was 1.57 and 1.49 respectively, when compared to men 29 years of age and younger. Similarly to the model constructed for men who were not tested for HIV during the past 12 months,
experience of sex with IDU was found to be significantly associated with purchasing sexual services (PR=1.73). In contrast with Model 1, having 2-3 sexual partners during the last 12 months was not associated with purchasing CSW services, while having 4 or more sexual partners during the past 12 months was significantly associated with the outcome (PR =2.02). In Model 2 having a consistent sex partner was not significantly associated with history of paying for sex, while condom use during last sexual intercourse was found to be marginally statistically significant.

In both models age was strongly associated with the outcome, in particular for the age category 30-36 years. The effect of age was stronger among men who had not been recently tested for HIV. Multiple sex partners were also significantly associated with the purchasing of sex services, though for men who did not report recent HIV testing this association was stronger. For men who reported testing for HIV during the last 12 months the association between history of sex with IDU and history of purchasing CSW services was stronger than for men who did not report recent testing for HIV.

### 2.4. Discussion

This study is of an exploratory nature; its goal was not to test a specific hypothesis, but to examine different predictors of purchasing sex services by men in Saint Petersburg and Leningrad Oblast. Thus, the study results highlight several potentially problematic issues related to buying sex services, and provide avenues for further exploration in future research. The high
prevalence (23.9%) of using CSW services found in this study is striking and requires serious consideration.

The overall prevalence of not using condoms during last sexual contact was 64% of the total study population. From a public health point of view, this is a dangerously high proportion. Among those who reported not using condoms, 36.2% reported having a consistent sex partner and no other sexual contacts, making this a lower risk group for HIV transmission. The other 64.8% reported not using condoms and had one or more additional risk factors for HIV transmission, such as multiple sex partners, casual sex partners, or reported usage of CSW services. Of specific concern was the finding that only 42.1% of the men with a history of CSW services use reported using a condom during their last sexual episode. Thus, the level of protective measures taken by men at increased risk of HIV infection is unacceptably low.

Another serious public health finding is the overall high prevalence of injection drug use in the study population. This finding might have resulted from the recruitment procedures, which potentially might have over-sampled populations at high risk for HIV, or might truly indicate a high prevalence of injection drug use among men in Saint Petersburg and Leningrad Oblast. According to the Russian Codex of Administrative Offenses against Law, Article 6, Clause 6.9, “Usage of narcotic substances without medical prescription is the subject of penalty in the amount of 4,000 to 5,000 roubles or administrative arrest up to 15 days”. Because drug use is illegal, the population of people injecting drugs is hidden; thus, prevalence of injection drug use in the general population is approximated from the number of people officially registered as injection drug users, and is presumably seriously underestimated (Heimer and White 2010). As a result the real prevalence of injection drug use in the general population is unknown. The results
of our study provide some additional evidence that the prevalence of injection drug use in Saint Petersburg and Leningrad Oblast might be underestimated.

Given the high prevalence of HIV-related risky behaviors in the study population, past testing for HIV is alarmingly low: only 14.9% of the study population reported HIV testing during the past 12 months. Among men with a history of CSW services use, the proportion of recent HIV-testing is higher compared to men without a history of paying for sex, but is still only 19.1%. This finding might indicate a slightly increased awareness about HIV infection among men using services of CSWs.

Testing for HIV might serve as a proxy for awareness about the risk of acquiring HIV. Men who reported recent testing for HIV might be referred to as having “high awareness” about the risk of HIV infection, and men who didn’t report recent HIV test uptake might be described as having “low awareness”. In our study the “high awareness” group includes only 14.9% of the study population. In fact, in the “high awareness” group, history of being a CSW client was positively associated with condom use, whereas it was unassociated in the “low awareness” group.

In our study age was found to be an important correlate of life-time use of CSW services, which agrees with the results of other studies. One of the possible explanations for this association is that changes in relationship status, such as divorce, separation or widowhood resulting in a loss of sex partner, might lead to resolving the problem of sexual satisfaction by using commercial sex services (Ompad, Bell et al. 2013). Another possible explanation for the association between older age and history of using CSW services is that older age is associated with increased income, making purchasing sex services financially more affordable (Ompad, Bell et al. 2013).
Prevalence of purchasing sex services was the highest among men 30-36 years of age both among men who sought and did not seek HIV-testing during the past 12 months. One possible explanation for this is that for men this age group is characterized by high sexual activity and stable financial situation.

Education was not found to be a significant predictor of purchasing sex services; this finding agrees with the results of previous research (South and Trent 2010, Jewkes, Morrell et al. 2012, Ompad, Bell et al. 2013). However, higher education was found to be positively associated with recent testing for HIV.

Another important finding of our study was the strong association between a history of sex with IDUs and using a CSW’s services. Previous research has demonstrated that in Russia sex work is associated with the epidemic of injection drug use. This places these individuals in a position of double risk for acquiring HIV (Wechsberg, Krupitsky et al. 2012, Ramanathan, Nagarajan et al. 2014). The results of our previous study provide some support for the synergism of sex work and injection drug use leading to high rates of HIV-infection among CSWs (Girchenko, Ompad et al. 2015). In this context, the high prevalence of usage of CSW services by sexually active men of Saint Petersburg and Leningrad oblast combined with the inadequately low levels of condom use reported by these men is a serious public health concern.

The finding that among those men who did not seek testing for HIV during the past 12 months a consistent sex partner was associated with a higher prevalence of the purchasing of sex services suggests that among men with “low awareness” about risk of HIV a stable sexual relationship might not be imply monogamy. This statement is supported by the fact that 32.8% of all men in this study who reported having a consistent sex partner also reported having had multiple
partners. Moreover, having a consistent sexual relationship creates a sense of security for both partners and may decrease an already low level of condom use. In our study, men who reported having a consistent sex partner were considerably less likely to use condoms. However, without timely and regular HIV testing, the HIV status of one or both partners in the couple remains unknown. Thus, the sense of security developed in the steady relationship might be false.

As stated earlier, the recruitment of subjects for this study may have targeted populations who considered themselves at risk of acquiring HIV, as anonymous rapid HIV testing was the main attraction for the study participants. Since there are no prior studies that have estimated the prevalence of risky behaviors for HIV in the general population in Saint Petersburg and Leningrad Oblast, the sample frame of men at risk for HIV-infection is difficult to determine. Since the recruitment to the study was happening in diverse locations without targeting any specific population, it is possible that our study sample reflects the population of sexually active men from general population, although as noted above the offer of free rapid HIV testing may have resulted in a sample at higher risk for HIV.

This study’s findings raise some serious public health issues, including high prevalence of CSW services use, injection drug use, and having multiple sex partners combined with low prevalence of condom use and testing for HIV infection. These risk factors, as well as the associations found in the study, need further exploration and confirmation. However, these data also indicate a need for an immediate public health response including comprehensive HIV prevention programs for sexually active men.
2.4.1. Strengths

A major strength of this study is the large sample size and the geographical, social and demographic diversity of the study’s target population. This was achieved through recruitment in different places, such as malls, railroad stations, and high population density residential areas, allowing the opportunity for participation of different social groups of men.

The method of recruitment, which potentially targeted populations at risk for HIV-infection, resulted in the recruitment of a high proportion of men with a self-reported history of purchasing sexual services. In total, 852 men reported to have a history of sex with CSWs, which to our knowledge is the largest sample of CSW clients among all studies conducted in Russian Federation. Due to the diversity of the study population and the large sample size, associations found in this study are likely to be reliable; however, future studies should confirm these associations and their generalizability in other study populations.

2.4.2. Limitations

The cross-sectional study design does not allow for assessment of temporality and causality; it is impossible to ascertain if predictors preceded the outcome or vice versa. Nevertheless, for the reasons of exploration and generation of new hypotheses and research questions, the cross-sectional study design was appropriately convenient.

Our study population may not reflect the general population of men in Saint Petersburg and Leningrad oblast, as it potentially may reflect the population of men at higher risk for HIV in Saint Petersburg and Leningrad Oblast.
Although the main reason for participation in this study was the incentive of being anonymously tested for HIV infection, the results of the HIV tests were not available for this analysis.

Questions about the different risk factors for acquiring HIV covered different time periods, including lifetime history, the past 12 months, or most recent sexual episode, and we did not have information on all period of interest for certain exposures. In addition, the question about having a consistent sex partner was vaguely worded, and it is unclear what study participants meant when they reported or did not report having a consistent sex partner (e.g., marriage, co-habitation, or regular sex partner). Thus, interpretation of this variable is difficult.

Potential response bias might have been introduced by the sensitivity of the issues being investigated. Potentially risky behaviors including history of purchasing sex services might be underreported, and protective and socially acceptable behaviors might be over reported.

2.5. Conclusions

The findings of this study demonstrate the need for an immediate public health response to decrease rates of HIV transmission, particularly among those at high risk. The high prevalence of CSW services use among the men in our study, though not necessarily reflecting the prevalence of paying for sex among the general population of men in Saint Petersburg and Leningrad oblast, is concerning. Clients of sex workers should be acknowledged as a group at high risk for acquisition and transmission of HIV-infection requiring specially tailored HIV prevention and intervention strategies.

Secondly, the high prevalence of risky behaviors found in our study, such as multiple sex partners and injection drug use, indicates a need for additional research aimed at estimation of prevalence of these types of behaviors in the general population. Low levels of protective
behaviors, such as condom use and testing for HIV indicate insufficient awareness about risk of HIV infection and opportunities for prevention.

Overall, this study indicates a need for urgent public health measures aimed at decreasing risky behaviors and the risk of HIV transmission among men who are clients of CSWs, including promoting condom use and regular testing for HIV in both the general population and among men who are clients of CSW’s.
3. Epidemiologic Considerations

3.1. Data source

The present study underscores the existence of significant gaps in knowledge of the real prevalence of risky behaviors which may lead to acquiring and transmitting HIV-infection among men in Saint Petersburg and Leningrad Oblast. The high prevalence of CSW services use observed in our study is alarming and indicates a priority area for public health interventions; however, there are no previous data to compare this prevalence to.

Study subjects were recruited among men who volunteered for rapid HIV-testing. Participants were then requested to answer a few questions of short face-to-face interview during which they reported any HIV-related risky behaviors. It is hypothesized that this method of recruitment would target a population at increased risk for HIV-infection, compared to the general population, as people who considered themselves at risk of acquiring HIV would be more likely to volunteer for anonymous rapid testing for HIV. However, since recruitment for the study took place in public places of Saint Petersburg and Leningrad Oblast, no specific at-risk population was targeted.

Since there are no prior studies estimating the prevalence of risky behaviors in the general population in Saint Petersburg and Leningrad Oblast, the sample frame of men at risk for HIV-infection cannot be estimated. As most of our study participants were at the age of high sexual activity and as the distribution of levels of education reflected those in the general population of men in Saint Petersburg and Leningrad Oblast, it is possible that our study sample truly reflects the sub-population of sexually active men. If this assumption is true, our findings suggest that the
prevalence of risky behaviors for HIV transmission among sexually active men in Saint Petersburg and Leningrad Oblast might be higher than previously thought.

3.2. Constructing the measures

Since this study is of an exploratory nature and is aimed at providing avenues for future research, the results should be interpreted cautiously and used primarily to guide future research. Study instrument was designed for the purpose of exploration and needs further validation. Questions about the different kinds of risks for acquiring HIV covered different time periods, and data were not available on all time periods of interest. History of purchasing and providing sexual services, as well as history of homosexual sex refer to life-time period, questions about number of sex partners and consistent sex partner refer to the past 12 months, and the question on condom use refers to the last sexual episode. Thus, questions asking about a history of purchasing sex services and practicing commercial sex work as well as about having homosexual sex experiences, captured even one lifetime experience and did not provide any information about frequency and recentness of these experiences.

In contrast, questions about a history of using drugs and having an IDU as a sex partner covered both past and present experiences, and also reflected frequency of these behaviors. However, since all other questions were related either to life-time experience or a definite time-period, it was decided to dichotomize a history of using drugs and having IDU as a sex partner, so that variables used in the analyses would reflect having any kind of such experiences versus not having these experiences at all.

Another measurement issue was that question about having a consistent sex partner was vaguely formulated: it is unclear what study participants meant when they reported having or not having
a consistent sex partner (e.g., marriage, co-habitation, or regular sex partner). Thus, interpretation of this variable was limited and more information would be useful in future studies.

For future studies it will be necessary to address these issues in the construction of the measurements and to double check that all questions reflect comparable time periods and measure frequencies of the behaviors of interest.

3.3. Discussion

The prevalence of CSW services use observed in our study agrees with findings from studies conducted in other countries. In our study almost 25% of the study participants reported purchasing sexual services. Previous research found similarly high prevalence of a life-time history of purchasing sexual services in other countries among sexually active men, including Spain and China (Belza, de la Fuente et al. 2008, Galvan, Ortiz et al. 2009, Huang, Maman et al. 2012). Similar to our study, generalizability of the findings from other countries is questionable, because sampling strategies used to recruit study subjects did not allow for representativeness.

In Russian Federation sex work is criminalized: according to Article 6.11 of the Code of Laws on Administrative Violations of Russian Federation “engagement in prostitution is penalized with a fine sized 1,000 to 2,500 roubles”. However, only sex workers themselves are subject to administrative sanctions for sex work, whereas clients of sex workers are not acknowledged as law violators. In addition, Russian legislative framework stipulates administrative sanctions for using drugs: in accordance with the Article 20.20 of the Code of Laws on Administrative Violations of Russian Federation “drug use without medical prescription is penalized with the fine sized 4,000 to 5,000 roubles or administrative arrest up to 155 days”. Moreover, according
to Russian Federation Federal Law № 3 “About narcotic and psychotropic substances”, Article 31, Clause 6, dated 1 August 1998, states that narcotic substances including methadone cannot be used to treat drug addiction. Thus, drug substitution therapy is prohibited in Russia.

In these conditions, sex workers, the vast majority of whom are also affected by the epidemic of drug use (Wechsberg, Krupitsky et al. 2012, Ramanathan, Nagarajan et al. 2014), have to hide their activities to avoid any attention from any public officials, including medical attention. Thus, CSWs face barriers to adequate and timely HIV testing and treatment, which may contribute to higher rates of HIV transmission in this population (King and Maman 2013, King, Maman et al. 2013).

Contradictions between law enforcement policies and the goals of public health make difficult the development and implementation of systematic government funded prevention and intervention programs targeting CSWs. Conflicts between legislation and the necessity of measures to control the epidemic of HIV in vulnerable populations have been a concern throughout the history of the HIV epidemic in Russian Federation, and legal issues continue to predominate over public health goals. Meanwhile, the phenomena of commercial sex work in Russian Federation continues to be uninvestigated. CSWs who work in closed settings under the cover of bathhouses and massage salons are operating under conditions of secretiveness, which does not allow for the collection of any systematic information about risky practices and levels of HIV-infection. Street based sex workers are more accessible for studies. It is estimated that the level of HIV-infection among street-based CSWs in Saint Petersburg exceeds 40% and might be as high as 63% (Long, Brandeau et al. 2006, Girchenko, Ompad et al. 2015). Yet, due to the conflict between the legislative framework and public health interests, the problem of extremely high levels of HIV and other socially significant infections among CSWs, as well as possible
transmission to the general population via users of CSW services, continue to remain unaddressed.

In this context the relatively high prevalence of use of CSW services by sexually active men of Saint Petersburg and Leningrad oblast raise some public health concerns. Combined with the low levels of condom use (42.1%) reported by men with a history of purchasing sex services, our data suggest that the risk of HIV acquisition might be higher in this population.

In addition, this study found a strong association between history of sex with IDUs and being a CSW client. Previous research demonstrated that in Russia sex workers are at high risk for injection drug use (Wechsberg, Krupitsky et al. 2012, Ramanathan, Nagarajan et al. 2014). The results of our study support this statement and provide additional evidence about high rates of HIV-infection among CSWs and, consequently, increased risk of acquiring HIV among men using their services.

This study also found a high prevalence of injection drug use in the study population: 35.2% of the study population reported ever injecting drugs, and 12.3% were active IDUs. This may be a result of the study design, which potentially attracted populations at high risk for HIV, or it might indicate an overall high prevalence of injection drug use in the general population of sexually active men in Saint Petersburg and Leningrad Oblast. As discussed above, according to the Russian Codex of Administrative Offenses against Law, Article 6, Clause 6.9, “Usage of narcotic substances without medical prescription is the subject of penalty in the amount of 4,000 to 5,000 roubles or administrative arrest up to 15 days”. Because drug use is illegal and prosecuted, the population of people injecting drugs is hidden. As a result, the prevalence of drug use in the general population is estimated from the number of people officially registered as
injection drug users, and presumably is seriously underestimated (Heimer and White 2010). The results of our study provide some additional evidence that injection drug use in Saint Petersburg and Leningrad Oblast might be underestimated.

Given the high prevalence of risky behaviors in the study population, the level the testing for HIV is alarmingly low: only 15% of the study population reported having had an HIV test during the last 12 months. Although the proportion who reported recent HIV testing was higher among men with a history of CSW services compared to men without a history of paying for sex, the proportion is still low at 19.1%. This might indicate an increased awareness about HIV infection among men using services of CSWs. Overall, our results indicate a need for additional HIV prevention efforts in Russia, including targeted and evidence-based HIV awareness campaigns by mass media and intensive public health efforts to prevent HIV infection from the State Department of Health and Social Welfare.

Of the men who did not seek testing for HIV during the last 12 months and who had a consistent sex partner, 21.4% also reported a history of purchasing sex services. In addition, 26% of men who reported having a consistent sex partner also reported having multiple sex partners during the past 12 months. These findings suggest that among sexually active men in Saint Petersburg and Leningrad oblast, stable sexual relationship might not be associated with monogamy. Having a consistent sexual relationship might create a sense of security for both partners and decrease already low levels of condom use. However, without timely and regular HIV testing, the HIV status of one or both partners remains unknown, potentially creating a false sense of security.

The findings of this study demonstrate the need for an immediate public health response. The high prevalence of CSWs services use among the men in our study population, though not
necessarily reflecting the prevalence of paying for sex among the general population of men in Saint Petersburg and Leningrad oblast, is disconcerting. Clients of sex workers should be acknowledged as a group at high risk for acquisition and transmission of HIV-infection requiring specially tailored HIV prevention and intervention activities.

In addition, the high prevalence of risky behaviors found in our study, such as multiple sex partners and injection drug use, should provide a basis for more exploration and additional research. Low levels of protective behaviors, such as condom use and testing for HIV, indicate insufficient awareness about risk of HIV infection and a need for increased education and public health interventions.

Overall, this study highlights the need for more intensive HIV prevention efforts and public health measures aimed at controlling the epidemic of HIV among CSWs. It also indicates an urgent need for programs promoting safer sexual behaviors, such as sustained condom use and regular testing for HIV in the general population, as well as programs specifically targeting men who are clients of CSW.
References


workers in two cities in the Republic of Moldova: the role of injection drug use and sexual risk."


# Tables

## Table 1. Characteristics of the study population by experience of purchasing sex services (N=3565)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No history of purchasing sex services&lt;sup&gt;1&lt;/sup&gt;</th>
<th>History of purchasing sex services&lt;sup&gt;1&lt;/sup&gt;</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2713 (76.1%)</td>
<td>852 (23.9%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>Age category</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 years and younger</td>
<td>1039 (38.3%)</td>
<td>216 (25.0%)</td>
<td></td>
</tr>
<tr>
<td>30-36 years</td>
<td>777 (28.7%)</td>
<td>368 (43.8%)</td>
<td></td>
</tr>
<tr>
<td>37 years and older</td>
<td>896 (33.0%)</td>
<td>268 (31.2%)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td>0.653</td>
</tr>
<tr>
<td>Unfinished high school</td>
<td>26 (3.0%)</td>
<td>88 (2.5%)</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>187 (22.0%)</td>
<td>543 (15.2%)</td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>410 (48.1%)</td>
<td>1351 (49.9%)</td>
<td></td>
</tr>
<tr>
<td>Post college education</td>
<td>229 (26.9%)</td>
<td>730 (26.9%)</td>
<td></td>
</tr>
<tr>
<td><strong>Consistent sex partner</strong></td>
<td>1684 (62.2%)</td>
<td>544 (63.9%)</td>
<td>0.373</td>
</tr>
<tr>
<td><strong>History of injection drug use</strong></td>
<td>903 (33.3%)</td>
<td>352 (41.3%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>History of sex with injection drug user</strong></td>
<td>288 (10.6%)</td>
<td>210 (24.7%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>History of sex work</strong></td>
<td>14 (0.5%)</td>
<td>4 (0.5%)</td>
<td>0.867</td>
</tr>
<tr>
<td><strong>History of homosexual sex</strong></td>
<td>57 (2.1%)</td>
<td>36 (4.2%)</td>
<td>0.0007</td>
</tr>
<tr>
<td><strong>Condom use during last sexual intercourse</strong></td>
<td>925 (34.1%)</td>
<td>359 (42.1%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>Number of sex partners during last 12 months</strong></td>
<td></td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>1 and fewer</td>
<td>1800 (66.3%)</td>
<td>311 (36.6%)</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>144 (5.3%)</td>
<td>69 (8.1%)</td>
<td></td>
</tr>
<tr>
<td>4 and more</td>
<td>769 (28.4%)</td>
<td>472 (55.4%)</td>
<td></td>
</tr>
<tr>
<td><strong>Tested for HIV during last 12 months</strong></td>
<td>372 (13.7%)</td>
<td>162 (19.1%)</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

<sup>1</sup> All values presented as n (%)
Table 2. Characteristics of the study population by HIV-testing during the last 12 months (N=3565)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No HIV-test during last 12 months(^2)</th>
<th>Tested for HIV during last 12 months(^2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3031 (85.0%)</td>
<td>534 (15.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Age category</strong></td>
<td></td>
<td></td>
<td>0.0025</td>
</tr>
<tr>
<td>29 years and younger</td>
<td>1077 (35.5%)</td>
<td>178 (33.3%)</td>
<td></td>
</tr>
<tr>
<td>30-36 years</td>
<td>940 (31.0%)</td>
<td>205 (38.4%)</td>
<td></td>
</tr>
<tr>
<td>37 years and older</td>
<td>1013 (33.4%)</td>
<td>151 (28.3%)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td>0.0006</td>
</tr>
<tr>
<td>Unfinished high school</td>
<td>100 (3.3%)</td>
<td>14 (2.6%)</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>648 (21.4%)</td>
<td>82 (15.4%)</td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>1456 (48.1%)</td>
<td>305 (57.1%)</td>
<td></td>
</tr>
<tr>
<td>Post college education</td>
<td>826 (27.2%)</td>
<td>133 (24.9%)</td>
<td></td>
</tr>
<tr>
<td><strong>Consistent sex partner</strong></td>
<td>1952 (64.5%)</td>
<td>276 (51.9%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>History of injection drug use</strong></td>
<td>990 (32.7%)</td>
<td>265 (49.6%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td><strong>History of sex with injection drug user</strong></td>
<td>401 (13.2%)</td>
<td>97 (18.2%)</td>
<td>&lt;0.0024</td>
</tr>
<tr>
<td><strong>History of sex work</strong></td>
<td>16 (0.5%)</td>
<td>2 (0.4%)</td>
<td>0.645</td>
</tr>
<tr>
<td><strong>History of buying sex services</strong></td>
<td>690 (22.8%)</td>
<td>162 (30.3%)</td>
<td>0.0002</td>
</tr>
<tr>
<td><strong>History of homosexual sex</strong></td>
<td>71 (2.3%)</td>
<td>22 (4.1%)</td>
<td>0.018</td>
</tr>
<tr>
<td><strong>Condom use during last sexual intercourse</strong></td>
<td>1068 (35.2%)</td>
<td>216 (40.4%)</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Number of sex partners during last 12 months</strong></td>
<td>1834 (60.5%)</td>
<td>277 (51.9%)</td>
<td>0.0008</td>
</tr>
<tr>
<td>1 and fewer</td>
<td>178 (5.9%)</td>
<td>35 (6.6%)</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>1019 (33.6%)</td>
<td>222 (41.5%)</td>
<td></td>
</tr>
</tbody>
</table>

\(^2\) All values presented as n (%)
Table 3. Prevalence ratios (PR) and 90% confidence intervals (CI) of purchasing sex services by men in Saint Petersburg and Leningrad Oblast controlling for all correlates in the model, stratified by self-reported testing for HIV in the past 12 months

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adjusted PR (90% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1: Not tested for HIV (N=3029)</strong></td>
<td></td>
</tr>
<tr>
<td>Age category</td>
<td></td>
</tr>
<tr>
<td>29 years and younger</td>
<td>Ref</td>
</tr>
<tr>
<td>30-36 years</td>
<td>1.87 (1.63, 2.14)</td>
</tr>
<tr>
<td>37 years and older</td>
<td>1.68 (1.45, 1.95)</td>
</tr>
<tr>
<td>History of sex with injection drug user</td>
<td></td>
</tr>
<tr>
<td>Consistent sex partner</td>
<td></td>
</tr>
<tr>
<td>Number of sex partners during last 12 months</td>
<td></td>
</tr>
<tr>
<td>0-1</td>
<td>Ref</td>
</tr>
<tr>
<td>2-3</td>
<td>2.62 (2.17, 3.10)</td>
</tr>
<tr>
<td>4 and more</td>
<td>2.74 (2.43, 3.10)</td>
</tr>
<tr>
<td><strong>Model 2: Tested for HIV (N=532)</strong></td>
<td></td>
</tr>
<tr>
<td>Age category</td>
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</tr>
<tr>
<td>29 years and younger</td>
<td>Ref</td>
</tr>
<tr>
<td>30-36 years</td>
<td>1.57 (1.22, 2.02)</td>
</tr>
<tr>
<td>37 years and older</td>
<td>1.49 (1.14, 1.94)</td>
</tr>
<tr>
<td>History of sex with injection drug user</td>
<td></td>
</tr>
<tr>
<td>Condom use during last sexual intercourse</td>
<td></td>
</tr>
<tr>
<td>Number of sex partners during last 12 months</td>
<td></td>
</tr>
<tr>
<td>0-1</td>
<td>Ref</td>
</tr>
<tr>
<td>2-3</td>
<td>1.03 (0.58, 1.84)</td>
</tr>
<tr>
<td>4 and more</td>
<td>2.02 (1.60, 2.55)</td>
</tr>
</tbody>
</table>