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Predictors of HIV risk behaviors among a national sample of Russian men who have sex with men

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Abstract

Russia has one of the fastest growing HIV epidemics in the world and is at the point of transitioning from injection drug use to sexual transmissions. We sought to identify factors associated with unprotected sex among men who have sex with men (MSM) in Russia, separately for Moscow, St. Petersburg and the rest of the country. Multivariable data from a national cross-sectional study (n=5035) demonstrate that significant correlates of unprotected anal intercourse (UAI) with a non-steady partner across all areas were visiting sex-related venues (AOR range 1.35-1.96) and access to condoms (AOR range 0.37-0.52). In Moscow and St. Petersburg, being HIV-positive was correlated with UAI (AOR 2.13 and 2.69). The dynamics of the HIV epidemic among MSM in Russia appear to be both similar, and different, across various areas and factors associated with unprotected sex should be seen as part of an environment of exogenous factors impacting MSM's sexual behaviors.

Resumen

El crecimiento de la epidemia del VIH en Rusia es uno de los más rápidos en el mundo y se encuentra en un estado de transición entre las drogas inyectables a las transmisiones sexuales. Buscamos identificar los factores asociados con la práctica del sexo sin protección entre hombres que tienen sexo con hombres (HSH, MSM en inglés) en Rusia, separando a Moscú, San Petersburgo y el resto del país. Los análisis multivariados de una encuesta nacional (n=5035) demuestran que las correlaciones significativas entre el sexo anal sin protección con pareja no estable en todas las áreas del país fueron la visita a lugares relacionadas con el sexo (rango del ORA 1,35 – 1,96) y el acceso a los condones (rango del ORA 0,37 – 0,52). En Moscú y San Petersburgo, el tener un diagnóstico de VIH positivo se correlacionó con el sexo anal sin protección (ORA 2,13 y 2,69). La dinámica de la epidemia del VIH entre HSH en Rusia parece ser similar, y diferente, entre varias áreas y los factores asociados con la práctica del sexo sin protección deberían ser visto como parte de un ambiente de factores exógenos que impactan los comportamientos sexuales entre HSH.

Introduction

The Russian Federation has one of the fastest growing HIV epidemics in the world, accounting for nearly 70% of the known infections in Eastern Europe and Central Asia [1]. In 2013, the number of new cases increased by 10.1% [2]. Russia is one of only nine countries globally in which the burden of HIV is increasing. The official prevalence rate of HIV in January 2014 totaled 479.0 per 100,000 while the incidence rate was 54.3 per 100,000 [2]. According to UNAIDS estimates, close to one million people live with HIV [1].

To date, the major transmission route for HIV in Russia has been among injection drug users [3], but current surveillance data suggest that transmission routes are changing towards more sexual transmission [4-8]. According to recent data presented by Wirtz and colleagues [9], today's key populations at risk for HIV infections in Russia are sex workers, people who inject drugs, and men who have sex with men (MSM). Further, epidemiological research using viral sequencing among people who inject drugs and MSM suggests these are two independent epidemics in Russia, with little overlap between the two highest at-risk populations [10]. This implies different risk trajectories and, in turn, that different HIV prevention strategies are required for these highest risk groups.

While there is a lack of official reports on HIV among MSM in Russia, a regional analysis estimates the HIV prevalence among MSM in Russia at 3.5%. Similarly, it estimates the MSM population in Russia to 1.3-3.4 million men, making this population the largest HIV risk group in the country [11]. Despite this, research among gay, bisexual and other MSM in Russia has been relatively limited. What research has been done suggests that factors associated with sexual risk behaviors among MSM in St. Petersburg include weak behavior change intentions and self-efficacy [12, 13], poor safer sex attitudes, low knowledge about HIV transmission risk, peer

norms that don't support safer sex, and being in a steady relationship [13]. A more recent qualitative study among immigrant MSM in Moscow found that risks included selling sex, high numbers of sex partners, and inconsistent condom use [14]. Additionally, among MSM in Moscow, being HIV-positive and having 2-4 steady male sex partners in the last year were associated with infection with Human Papillomavirus [9], and ever injecting drugs and never having tested for HIV were associated with HIV infections. In the latter study, which recruited men from both Moscow and St. Petersburg, the majority of the HIV-positive study participants reported ongoing high-risk behaviors [15], a finding that was supported by Wirtz and colleagues [16]. Prevalence of sexually transmitted infections (STIs), which can be expected to occur with unsafe sex practices, has been found to range between 10.5%-31.7% among various groups of MSM in Russia [12, 13, 15].

Not only is there a general scarcity of research on HIV-related issues among MSM in Russia, but research has been limited to MSM in Moscow and St. Petersburg, and samples recruited from gay-identified venues and through non-governmental organizations (NGOs) or snowball methods (see [9, 12-17]). Generalizability is therefore limited and it is uncertain whether factors associated with sexual risk for HIV/STI transmission are the same in different metropolitan areas and the rest of Russia. In Russia, there are twelve cities of more than one million inhabitants. However, Moscow and St. Petersburg are the only metropolitan, and decidedly largest, cities with around 12 and 5 million inhabitants respectively, while the other cities have 1.0-1.5 million residents. Further, given the greater risk for HIV and STI transmissions, and of an expansion of the HIV epidemic from having sex with non-main partners rather than with main partners [18, 19], it is important to examine correlates of unsafe sex in relation to non-main sexual partnerships. Thus, the objective of this study was to identify factors associated with unprotected sex with non-steady male partners among MSM in Russia –

separately for Moscow, St. Petersburg and the rest of Russia – with the overarching aim to guide tailored interventions to prevent further spread of HIV in Russia.

Methods

The analysis presented here is derived from a large cross-sectional study, the European MSM Internet Survey (EMIS), which was undertaken in 38 European countries during the summer of 2010. The primary aims of that parent study were to identify commonly unmet prevention needs across diverse groups of MSM and to identify subgroups of MSM who have poorly met prevention needs. Details about the methodology for EMIS are available elsewhere [20]. The present research is based on the dataset of respondents who stated that they resided in Russia.

Study population and sampling methods

Eligible participants were men who were legally of age to have consensual sex with men in their country of residence (age 16 in Russia), who were attracted to other men and/or men who have sex with men, and who declared they had read and understood the aim of the study.

The national collaborating partner in Russia that effectuated recruitment was PSI Russia. This is an NGO that works to support healthier lives for sexual minority populations. Participant recruitment was done through advertisements on online dating sites and health organizations' websites, and printed invitation cards and posters. Recruitment started in June 2010 and lasted until August 2010. A study website, where potential participants could select among 25 language options, presented the study. The survey provider stored all incoming data on secure and encrypted data servers, and collected no data that could be used to identify computers (and hence participants). While this ensured respondents anonymity, we were unable to protect against multiple responses from the same person. However, bias due to multiple responses is highly

unlikely because there was no recompense for participation, respondents were asked to complete the survey only once, and the survey had to be completed in one sitting. The survey consisted of about 280 questions, but its tailored filtering – that depended on the respondent's answer to previous questions – meant that a smaller number of questions applied to the individual respondent. The average time to completion was about 20 minutes. Further details regarding the methods are available elsewhere [20].

Measures

As noted above, HIV is becoming a major health problem in Russia and many question in this area remain unanswered. Our focus for this study was determined through two deliberations: identification of research gaps based on published literature and structured discussions with Russian public health officials, activists, representatives of various NGOs, and individual MSM. Accordingly, in an attempt to examine multiple areas of potential predictors amenable to direct prevention initiatives with respect to unprotected anal intercourse (UAI) with non-steady male partners (criterion variable), factors examined in this research covered three main domains: sociodemographics, health behaviors, and situational/societal factors. The survey question used to distinguish between those who did and did not engage in UAI was 'How many non-steady male partners have you had anal intercourse without a condom with in the last 12 months?' with a pull-down answer menu of numbers from 0 through 10, 11-20, 21-30, 31-40, 41-50 and more than 50. The survey explained non-steady male partner as "men you have sex with once only, and men you have sex with more than once but who you don't think of as a steady partner (including one-night stands, anonymous and casual partners, regular sex buddies)." We dichotomized the criterion variable as is convention (see e.g. [12]): had UAI with 1+ non-steady partners versus no UAI with a non-steady partner.

There were five general sociodemographic descriptives of respondents, including the respondent's age (continuous variable) and HIV status (HIV-positive, HIV-negative, unsure HIV-status). "Are you happy with your sex life" was answered yes/no. Respondents could select one or multiple listed reasons for why they were not happy with their sex life. We asked whether they sometimes felt lonely and we assessed gay social involvement by asking whether respondents in the last 12 months had visited various gay social venues (bar, organization, etc.).

With regard to the second domain, we included four variables that described the respondents' sexual- and health profile: being diagnosed with a bacterial STIs, using various 'party' drugs traditionally associated with unprotected sex among MSM (ecstasy, amphetamines, crystal methamphetamine, GHB, ketamine), visiting sex-related venues (gay sex club, backroom of a bar, cruising location), and engaging in transactional sex (paying for sex or being paid for sex). These were dichotomous variables and time of recall was 12 months. Finally, we included situational/societal factors that may impact the sexual behavior of MSM. The question "When was the last time you saw or heard any information about HIV or STIs specifically for men who have sex with men" was dichotomized (from eight point Likert scale options, ranging from 'never' to 'more than 5 years ago') as those who had been exposed to HIV/STI information in the past year and those who had not (more than 1 year ago or never). Availability of condoms was dichotomized (from eight point Likert scale options, ranging from 'never' to 'more than 5 years ago') as those who affirmed or disconfirmed that in the last 12 months they had wanted a condom but did not have one.

Analyses

In accordance with our study objective, to identify potential predictors of UAI with non-steady partners – separately for Moscow, St. Petersburg and the rest of Russia – we performed

multivariable logistic regression analyses using SPSS 23.0. First, descriptive statistics for all variables were obtained. The association between engaging in UAI with a non-steady partner – the dichotomous sexual risk behavior – and the independent variables was first estimated with odds ratios (OR) in univariate analyses. We did this both for the entire sample and stratified by region (Moscow, St. Petersburg, rest of Russia). Next, we used multivariable logistic regression analyses, again for the entire sample and stratified by region, to obtain the adjusted odds ratios (AOR). In the model for the full sample, we included location as a covariate. We checked that the models had no evidence of multicollinearity and obtained the Hosmer-Lemeshow goodness-of-fit χ^2 statistic for each model. Lastly, we conducted tests of effect modification by region for the variables that differed across regions. For the first variable, HIV serostatus, we used age as the covariate. For the other variables (engaging in transactional sex, using party drugs, diagnosed with bacterial STI, receiving HIV/STI information) we used HIV serostatus and age as covariates.

Results

By the end the 12 weeks recruitment period, 5035 eligible respondents who lived in Russia had submitted answers. The respondents were primarily recruited through four gay dating sites: Qguys.ru (34.5%), Gay.ru (15.2%), PlanetRomeo.com (10.1%) and Xs.gay.ru (8.8%).

Sample characteristics

Sample characteristics are shown in Table I. The mean age of the total sample was 30.9 and the majority self-identified as gay (68%) or bisexual (17%). About three quarters lived in a large city of over a half million inhabitants (78.1%) and reported having higher education (72.4%). Nine out of ten were employed, full- or part-time, or studying (92%). Half reported they

had one steady partner (48.2%), 6.3% of the respondents self-reported that they were HIV-positive, but a quarter were unsure (25.7%).

Respondents who resided in the city or region of Moscow made up 36.5% of the total sample and respondents in St. Petersburg made up 13.9%. The remaining sample was distributed across the other 82 areas, with no area making up more than 2.8% of the sample. The respondents' sociodemographic characteristics were similar across the three regions Moscow, St. Petersburg, and rest of Russia, but a slightly higher proportion of men in Moscow and St. Petersburg identified as gay and a slightly higher proportion of men in Moscow reported they were HIV-positive. As seen in Table II, about 30% reported engaging in UAI with a non-steady partner in the past year, with almost no difference across regions in this regard. In contrast, the table shows that there were region-specific differences in the proportions reporting UAI according to risk factors. In particular, a higher proportion of men who resided in Moscow and who reported UAI with a non-steady partner (compared to both men in St. Petersburg and men in the rest of Russia) were also HIV-positive, happy with their sex life, and diagnosed with a bacterial STIs in the past year.

Predictors of engaging in UAI with a non-steady partner

The univariate analyses of 11 predictor variables and the criterion variable, UAI with a non-steady partner, showed that only one association failed to reach statistical significance at the p<0.01 level: received HIV/STI information (Table III). Among the other variables, six were significantly associated with UAI across all regions (sometimes feel lonely, visited gay social venues, visited sex-related venues, used party drugs, engaged in transactional sex, availability of condoms) and the remaining four variables were significantly associated with UAI in only some areas. All ORs are shown in Table III.

The results of the multivariable logistic regression analyses for the full sample, and stratified by the three geographic areas, are shown in Table IV. As seen by the Hosmer-Lemeshow goodness-of-fit Chi-square statistic, in all models, the data fit the model well. Considering all regions, there were two variables that remained significantly associated with UAI with non-steady partners in the context of the other independent variables: visited sex-related venues (AOR range 1.35-1.96) and availability of condoms (AOR range 0.37-0.52). In contrast, visited gay social venues failed to reach significance in all regions (p-value range 0.133-0.940). In the model for Moscow, five variables (in addition to visited sex-related venues and availability of condoms) remained significantly associated with the criterion variable in the context of the other independent variables: being HIV-positive (AOR=2.13), sometimes feel lonely (AOR=1.36), used party drugs (AOR=1.56), diagnosed with bacterial STI (AOR=1.80), and engaged in transactional sex (AOR=1.45). Among men residing in the city or region of St. Petersburg, there were two variables that were significantly associated with UAI (in addition to visited sex-related venues and availability of condoms): being HIV-positive (AOR=2.69) and happy with one's sex life (AOR=0.58). Among respondents residing in other (non-metropolitan) areas of Russia, the multivariable logistic regression model showed that, in addition to visited sex-related venues and availability of condoms, three variables were significantly associated with UAI: age (AOR=1.02), happy with one's sex life (AOR=0.65), and received HIV/STI information (AOR=0.68). Lastly, in the analysis for the full sample, with region included as a covariate, all but three of the predictor variables remained significantly associated with UAI with non-steady partners in the context of the other independent variables: being HIV-positive (AOR=1.87), happy with one's sex life (AOR=0.70), sometimes feel lonely (AOR=1.25), visited sex-related venues (AOR=1.53), used party drugs (AOR=1.40), diagnosed with bacterial STI

(AOR=1.49), engaged in transactional sex (AOR=1.34), and availability of condoms (AOR=0.44).

The final part of the analysis tested effect modification by region. The results showed that there was a significant interaction between region and HIV serostatus (p=.015), transactional sex (p=.000), using party drugs (p=.024), and being diagnosed with an STI (p=.020). The test for interaction between region and receiving HIV/STI information failed to reach statistical significance (p=.991).

Discussion

In this national study, we sought to identify factors associated with unprotected sex with non-steady partners in several geographic areas of Russia, having as an overarching aim to guide tailored HIV prevention interventions among MSM. There were two common independent risk factors across all areas of Russia: lack of availability of condoms and visiting sex-related venues. First, across all areas of Russia, the significant association between UAI and availability of condoms suggests that MSM, when they are caught up in the moment, situation or mood, don't have a condom at hand, and it could suggest limitations in the commercial availability of condoms for MSM in Russia. In fact, the Russian Federation is unusual in that availability of quality condoms has been reported as both limited [21] and expensive [22]. In the fall of 2015, the Industry and Trade Ministry proposed restrictions on condom imports. Although government officials recognized that the cheaper, less popular condom options were not on par with foreign brands, officials such as the head of a federal center for combating AIDS argued that "no direct link" existed between HIV infection rates and the availability of imported condoms [23]. Certainly, many factors impact the use of condoms. In their qualitative study among U.S. MSM, Ostergren, Rosser, and Horvath [24] recently identified contextual factors and a preference for

not using condoms as the top two reasons why MSM didn't use condoms during anal sex.

Nonetheless, availability of acceptable condoms is an exogenous and necessary first contextual

factor to the use of condoms. This point should be considered within Russia's restrained political

climate for gay people. Notably, laws have restricted expressions of same-sex attraction

(legislation imposes substantial fines on people accused of engaging in "propaganda of non-

traditional sexual relations amongst minors"), registration of gay civil rights organizations,

international funding for NGOs -- such as LGBT (lesbian, gay, bisexual, transgender) groups --

and there is a worsening social climate for sexual minority populations [25].

The second common correlate of unprotected sex across both metropolitan areas and

smaller areas of Russia was self-reporting visiting sex-related venues, such as gay sex clubs,

backrooms of bars, and cruising locations. While we know of no other studies that have examined

this issue among Russian MSM, research from both Europe and the U.S. has reported that MSM

who visit sex-related environments are more likely to engage in multiple forms of risky sexual

behaviors, including unprotected anal sex [26, 27]. Likely, the social environment where MSM

meet their sex partners impacts the availability- and decision to use a condom. Yet, it should be

noted that a recent literature review of the link between visiting sex-on-premises venues and

person-level sexual risk appears to be due to an overall disposition towards unprotected sex [28].

Another factor associated with unprotected anal sex with non-steady partners across all

areas of Russia, except Moscow, was not being happy with one's sex life. Men's reasons for not

being happy with their sex life were similar across the three sociogeographical contexts, however,

with the most common reasons being a wish for a steady relationship, wanting more sex with

primary partner(s), and having problems in relationship with primary partner(s). This may

indicate that happiness with one's sex life is a proxy for relationship- or mental health concerns.

Although research on sexual happiness among MSM is scarce, similar findings are reported by

researchers such Peplau, Cochrane, and Mays [29], who found a link between general well-being and sexual satisfaction in MSM. That MSM in Moscow were happier with their sex life, relative to men in other areas, may also be related to the higher proportion of respondents in Moscow who identified as gay. This likely creates greater opportunities for romantic- and sexual partnering. In a qualitative study of MSM who resided in Moscow but originated from other regions, participants did report feeling greater sexual freedoms in Moscow [14]. Related, and of significant concern, is that our multivariable analyses showed that MSM in Moscow who engaged in transactional sex and used party drugs were about 1.5 times more likely to engage in UAI (the interaction analyses showed a differential effect of transactional sex and using party drugs on unprotected sex depending on region). Considering all risk factors, it appears MSM in Moscow, relative to the rest of Russia, may have a higher 'risk' profile. The social norms within Moscow MSM networks may be characterized by accepting unsafe sex, attending sex-related venues, using illicit drugs, trading sex, and may work synergistically with MSM's feelings of loneliness, thus exacerbating the risk of engaging in condomless anal sex with non-steady partners. Other studies among MSM in Moscow report similar findings [9, 14].

The results also demonstrated that HIV-positive MSM in Moscow and St. Petersburg were more than twice as likely as HIV-negative MSM to report engaging in UAI with a non-steady partner. This was in contrast to MSM who resided in other, non-metropolitan areas (the interaction analysis showed a differential effect of HIV-seropositivity on unprotected sex depending on region). This finding substantiates Baral and colleagues' [15] findings among MSM in Moscow and St. Petersburg that the majority of HIV-positive MSM reported ongoing high-risk sexual behaviors. As acknowledged also by others [30], the majority of HIV-positive MSM take precautions with their sex partners, but a sizeable percentage engage in sexual behaviors that place their partners at risk for HIV infection and themselves at risk for other STIs,

also when the unprotected sex is with another HIV-positive person. In fact, we found that among MSM in Moscow, being diagnosed with an STI in the past year was associated with UAI with a non-steady partner. Undeniably, engaging in UAI may result in both STIs and HIV acquisition, and a decrease in transmission behaviors such as UAI following an HIV diagnosis is important for controlling the epidemic, particularly in settings with low anti-retroviral therapy coverage. Cohort studies indicate risk reduction among recently-diagnosed MSM, with UAI rebounding after less than a year [31]. Related, we note that in our study, 6.3% of MSM self-reported that they were HIV-positive. The rates varied from 9.7% in Moscow to 5.6% in St. Petersburg to 4.0% in the rest of Russia, with about twice as many HIV-positive men engaging in UAI than not engaging in UAI with a non-steady partner. As mentioned, official reports on HIV among MSM in Russia are lacking, but a regional report estimates the HIV prevalence among MSM in Russia at 3.5% [11]. Other recent studies of MSM have estimated HIV prevalence at 5.3%-5.5% in St. Petersburg [12, 15] and 6.0%-15.6% in Moscow [15, 16]. Thus, our rates are similar to those of previous studies and suggest HIV prevalence among MSM varies across Russia, with the highest rate among MSM in Moscow. Regrettably, while some preventative and low-threshold HIV programs have been initiated (see e.g. [32]), Pre-exposure Prophylaxis is virtually non-existent and treatment as prevention restricted. It is estimated that anti-retroviral therapy coverage is less than 20% of the total HIV-positive population in Russia [6] and there is evidence of alarming barriers to care from the perspectives of both patients and care providers, particularly discrimination and stigma, which are highlighted among both groups [33].

Our findings carry practical implications for the development and refinement of HIV prevention programming in Russia. Taken as a whole, our results suggest that MSM in Russia constitute a population who is highly vulnerable to sexually-transmitted HIV infection, but HIV/STI risk factors to some extent vary across localities. Therefore, not only must HIV

prevention strategies be scaled up, particularly among HIV-positive MSM in metropolitan areas, they should also be contextually tailored to optimize intervention success. The data from this study underscore the importance of HIV prevention for the high-risk subsets of MSM in Moscow who use party drugs and engage in transactional sex. Across the country, sexual health education and prevention services within sex-related venues are indicated and efforts to increase access to free- or low-cost quality condoms may help curb the spread of HIV. The authors of a recent meta-analysis of condom distribution interventions recommended making condoms more universally available, accessible, and acceptable in locations reaching high-risk individuals, because the results showed that scaling-up condom distribution is efficacious for HIV risk behaviors and STIs [34]. However, successfully addressing the expanding HIV epidemic in Russia will require a comprehensive approach that builds on a more solid understanding of the contextually relevant HIV/STI risk factors than that provided in the present study. More research is needed to better understand the nature of different risk trajectories and the situational contexts driving the HIV epidemic among MSM in Russia.

Several strengths of the study should be noted, including the large sample size and use of multivariable analyses. However, our sample was largely obtained through gay-oriented websites. Due to the use of a convenience sample, there is potential for selection bias. We are unable to generalize the findings to MSM who might not visit gay-oriented websites. In Russia, MSM who have access to the Internet typically also have health insurance, steady work, regular income, and a generally higher sociodemographic background. There is some evidence that Internet samples tend to have higher education and be more urban, younger, and single [35]. It is a limitation that the survey did not distinguish between receptive and penetrative UAI with non-steady partners. As in any large dataset, there were some missing answers because respondents could skip questions, but this was a minor issue and we did not re-classify those with missing answers.

Further, the causality of reported associations cannot be determined because the survey was cross-sectional, and the results may have been affected by social desirability and recall bias. Yet, as one of the first, this study generated valuable insight about cultural factors affecting HIV risk situations among MSM in Russia. A better understanding of these risks can inform future prevention programs.

Conclusions

The HIV epidemic among MSM in Russia is rapidly moving and largely understudied. Its dynamics appear to be both similar – and different – across various areas. HIV prevention interventions designed to work with MSM are needed and strategies should differ from one sociogeographical area to the other, reflecting the unique contextual factors driving the epidemic. Behavioral and social science research with MSM such as ours can contribute to the development of prevention programming capable of reducing the HIV crisis now confronting the country.

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Table I Description of the sample (n=5035)

	Moscow	St. Petersburg	Rest of Russia	Total
	n=1836	n=699	n=2500	N=5035
	N (%)	N (%)	N (%)	N (%)
Age (median, range)	30 (16-68)	30 (17-65)	29 (14-70)	30 (14-70)
Size of place of residence [a]				
≥ 1 million inhabitants	1587 (89.7)	659 (98.7)	974 (40.5)	3220 (66.5)
500,000-999,999 inhabitants	22 (1.2)	9 (1.3)	531 (22.1)	561 (11.6)
100,000-499,999 inhabitants	94 (5.3)		605 (25.2)	700 (14.5)
10,000-99,999 inhabitants	52 (2.9)		247 (10.2)	259 (6.1)
≤10,000 inhabitants	14 (0.8)		48 (2.0)	62 (1.3)
Education [b]				
High (ISCED 5-6)	1396 (76.4)	495 (71.3)	1737 (69.8)	3628 (72.4)
Moderate (ISCED 3-4)	398 (21.8)	184 (26.5)	662 (26.6)	1244 (24.8)
Low (ISCED (1-2)	33 (1.8)	15 (2.2)	91 (3.6)	139 (2.8)
Occupation				
Employed full-or part time	1561 (85.4)	590 (85.3)	1985 (79.9)	4136 (82.7)
Unemployed	78 (4.3)	23 (3.3)	121 (4.9)	222 (4.4)
Student	135 (7.4)	60 (8.7)	271 (10.9)	466 (9.3)
Retired/Long-term sick-leave	2 (0.1)	5 (0.7)	39 (1.5)	57 (1.1)
Other	41 (2.2)	14 (2.0)	70 (2.8)	125 (2.5)
Sexual orientation				
Gay or homosexual	1321 (72.1)	488 (69.9)	1604 (64.4)	3413 (68.0)
Bisexual	242 (13.2)	117 (16.8)	493 (19.8)	852 (17.0)
Straight or heterosexual	11 (0.6)	2 (0.3)	15 (0.6)	28 (0.6)
Any other term/Don't use term	260 (14.2)	91 (13.0)	379 (15.2)	727 (14.4)
Relationship status				
Single	782 (42.6)	299 (42.9)	1111 (44.5)	2192 (43.6)
Steady relationship with 1 partner	907 (49.5)	348 (50.0)	1206 (48.4)	2423 (48.2)
Steady relationship with >1 partner	145(7.9)	50 (7.1)	178 (7.1)	408 (8.1)
HIV status [c]				
Unsure	328 (17.9)	187 (26.8)	770 (31.0)	1285 (25.7)
HIV-negative	1324 (72.3)	471 (67.6)	1612 (65.0)	3407 (68.0)
HIV-positive	178 (9.7)	39 (5.6)	99 (4.0)	316 (6.3)

Legend: [a] Some men were unaware that Moscow and St. Petersburg have ≥ 1 million inhabitants. [b] Low education= ISCED (International Standardised Classification of Educational Degrees) 1 and 2, Mid edu= ISCED 3 and 4, High edu=ISCED 5 and 6. [c] Unsure HIV-status= I have never received an HIV test result. HIV-negative= My last HIV test was negative. HIV-positive= I have tested positive for HIV. Totals do not always add up to N due to missing values.

Table II Descriptives of UAI with a non-steady partner overall, by region, and for all variables (values in percent)

Variables	Moscow		St. Petersburg		Rest of Russia		Total	
	UAI	no UAI	UAI	no UAI	UAI	no UAI	UAI	no UAI
HIV serostatus (positive)	18.3	9.2	11.6	6.1	7.4	5.1	12.3	6.9
Happy with sex life	50.1	53.7	43.2	53.1	44.5	48.8	46.4	59.2
Sometimes feel lonely	73.3	65.3	74.7	66.7	76.5	70.0	75.1	67.8
Visited gay social venues	73.3	65.8	80.5	70.8	54.5	45.6	64.9	56.5
Visited sex-related venues	63.7	48.5	67.2	48.8	51.7	33.3	58.2	41.0
Used 'party' drugs	17.0	9.5	16.9	7.9	5.4	3.5	11.2	6.3
Diagnosed with bacterial STI	14.9	6.5	13.6	6.7	8.7	6.5	11.6	6.5
Engaged in transactional sex	24.3	15.5	25.1	15.2	18.9	10.2	21.7	12.9
Availability of condoms	64.1	82.0	60.3	82.4	65.3	84.7	64.2	83.3
Received HIV/STI information	72.7	68.7	75.4	69.4	61.4	64.5	67.4	66.7
Overall (UAI with non-primary partner)	28.8		27.9		29.3		28.9	

Legend: UAI= Unprotected anal intercourse. HIV serostatus is HIV positive vs HIV negative or unknown. All behaviors are dichotomous variables and time of recall is 12 months.

Table III Univariable logistic regression model of having engaged in UAI with non-steady partners in the past 12 months

Variables	Moscow OR (95% CI)	P	St. Petersburg OR (95% CI)	p	Rest of Russia OR (95% CI)	p	Total OR (95% CI)	p
HIV serostatus (positive)	2.22 (1.61-3.05)	<.001*	2.01 (1.04-3.94)	.037*	1.47 (0.97-2.24)	.070	1.89 (1.49-2.39)	<.001*
Age	0.10 (0.98-1.00)	.159	0.99 (0.97-1.01)	.415	1.02 (1.01-1.03)	.001*	1.00 (0.99-1.01)	.224
Happy with sex life	0.87 (0.71-1.07)	.175	0.67 (0.48-0.95)	.023*	0.84 (0.70-1.00)	.056	0.83 (0.73-0.93)	.002*
Sometimes feel lonely	1.46 (1.17-1.83)	.001*	1.48 (1.02-2.14)	.041*	1.40 (1.15-1.71)	.001*	1.44 (1.25-1.65)	<.001*
Visited gay social venues	1.43 (1.14-1.79)	.002*	1.71 (1.14-2.55)	.009*	1.43 (1.20-1.70)	<.001*	1.42 (1.25-1.61)	<.001*
Visited sex-related venues	1.87 (1.52-2.30)	<.001*	2.19 (1.55-3.10)	<.001*	2.14 (1.80-2.55)	<.001*	2.00 (1.77-2.27)	<.001*
Used 'party' drugs	1.96 (1.46-2.63)	<.001*	2.39 (1.45-3.92)	.001*	1.54 (1.02-2.33)	.038*	1.86 (1.51-2.30)	<.001*
Diagnosed with bacterial STI	2.52 (1.82-3.49)	<.001*	2.19 (1.27-3.78)	.005*	1.36 (0.98-1.87)	.062	1.87 (1.52-2.31)	<.001*
Engaged in transactional sex	1.75 (1.36-2.26)	<.001*	1.87 (1.27-2.82)	.003*	2.06 (1.60-2.64)	<.001*	1.87 (1.59-2.20)	<.001*
Availability of condoms	0.39 (0.31-0.49)	<.001*	0.33 (0.23-0.47)	<.001*	0.34 (0.28-0.42)	<.001*	0.39 (0.31-0.41)	<.001*
Received HIV/STI info	1.21 (0.97-1.52)	.091	1.35 (0.93-1.97)	.120	0.88 (0.73-1.05)	.147	1.03 (0.91-1.18)	.644

Legend: *= p-value smaller than 0.05. UAI= Unprotected anal intercourse. Info= information. HIV serostatus is HIV positive vs HIV negative or unknown. Age is a continuous variable. All behaviors are dichotomous variables and time of recall is 12 months.

Table IV Multivariable logistic regression model of having engaged in UAI with non-steady partners in the past 12 months

Variables	Moscow		St. Petersburg		Rest of Russia		Total	
Hosmer and Lemeshow χ^2	2.60, p=.957		13.74, p=.090		7.51, p=.483		5.712, p=.679	
	AOR (95% CI)	P	AOR (95% CI)	p	AOR (95% CI)	p	AOR (95% CI)	p
HIV serostatus (positive)	2.13 (1.49-3.05)	<.001*	2.69 (1.23-5.89)	.013*	1.49 (0.95-2.33)	.086	1.87 (1.44-2.43)	<.001*
Age	0.99 (0.98-1.00)	.276	0.98 (0.96-1.02)	.319	1.02 (1.00-1.03)	.042*	1.00 (0.99-1.01)	.851
Happy with sex life	0.79 (0.62-1.02)	.072	0.58 (0.37-0.92)	.020*	0.65 (0.51-0.83)	.001*	0.70 (0.60-0.82)	<.001*
Sometimes feel lonely	1.36 (1.03-1.78)	.028*	1.27 (0.77-2.12)	.354	1.15 (0.88-1.51)	.306	1.25 (1.05-1.49)	.014*
Visited gay social venues	0.79 (0.59-1.07)	.133	1.02 (0.57-1.84)	.940	0.99 (0.77-1.28)	.937	0.89 (0.74-1.07)	.205
Visited sex-related venues	1.35 (1.02-1.77)	.035*	1.96 (1.21-3.17)	.006*	1.64 (1.28-2.11)	<.001*	1.53 (1.29-1.81)	<.001*
Used 'party' drugs	1.56 (1.10-2.22)	.013*	1.76 (0.90-3.44)	.097	0.83 (0.47-1.47)	.526	1.40 (1.07-1.82)	.014*
Diagnosed with bacterial STI	1.80 (1.24-2.61)	.002*	1.74 (0.90-3.34)	.099	1.12 (0.76-1.65)	.564	1.49 (1.17-1.91)	.001*
Engaged in transactional sex	1.45 (1.07-1.96)	.018*	1.33 (0.77-2.28)	.305	1.27 (0.92-1.75)	.154	1.34 (1.10-1.65)	.004*
Availability of condoms	0.52 (0.40-0.69)	<.001*	0.37 (0.23-0.60)	<.001*	0.38 (0.30-0.51)	<.001*	0.44 (0.37-0.53)	<.001*
Received HIV/STI information	1.17 (0.89-1.54)	.274	1.24 (0.75-2.04)	.399	0.68 (0.53-0.86)	.001*	0.90 (0.76-1.07)	.229
Covariate: Region							0.86 (0.76-0.96)	.008

Legend: *= p-value smaller than 0.05. UAI= Unprotected anal intercourse. HIV serostatus is HIV positive vs HIV negative or unknown. Age is a continuous variable. All behaviors are dichotomous and time of recall is 12 months.