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Alcohol use and associated sexual and substance use behaviors among men who have sex with men in Moscow, Russia

AL Wirtz[1,2], **CE Zelaya**[2], **C Latkin**[3], **R Stall**[4], **A Peryshkina**[5], **N Galai**[2], **V Mogilnyi**[5], **P Dzhigun**[5], **I Kostetskaya**[5], and **C Beyrer**[2]

[1]Department of Emergency Medicine, Johns Hopkins Medical Institute, Baltimore, MD

[2]Center for Public Health and Human Rights, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

[3]Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

[4]Dept. of Behavioral and Community Health Sciences Graduate School of Public Health University of Pittsburgh, PA

[5]AIDS Infoshare, Moscow, Russian Federation

Abstract

Introduction—Alcohol use is a public health problem in the Russian Federation. This study explored relationships between alcohol use and behavioral risks for HIV transmission among men who have sex with men (MSM) in Moscow, Russia.

Methods—Alcohol Use Disorder Identification Test scores for 1,367 MSM participating in a cross-sectional survey and HIV testing were categorized to: “abstinence/low use”, “hazardous use”, “harmful use/dependency”. Multiple logistic regression models compared dependent variables for sexual and drug use behaviors across alcohol use strata.

Results—Hazardous and harmful/dependent alcohol use were significantly associated with high-risk sexual behaviors and drug use. Harmful use/dependency was associated with an increased odds of having more than five male sex partners (last 12 months; AOR:1.69; 95%CI:1.25–2.27), inconsistent condom use during anal intercourse (AOR:2.19; 95%CI:1.61–2.96) and, among those using recreational drugs, injection drug use (last month; AOR:4.38: 95%CI:1.13–17.07) compared to abstinent/low-level users. Harmful/dependent use was marginally associated with HIV infection (AOR:1.48; 95 CI:0.97–2.25).

Discussion—HIV prevention efforts for MSM in Moscow may benefit from addressing problem alcohol use to mitigate high-risk behaviors.

Keywords

Men who have sex with men; alcohol use; HIV; Russian Federation; sexual behavior; violence

Introduction

The Russian Federation is amongst the leading countries for per capita alcohol use.(1) Alcohol use, particularly consumption of vodka and beer, is common with almost 30% of the adult male population estimated to have alcohol use disorders and 17% alcohol dependency.(2) Alcohol is one of the leading risk factors for morbidity and mortality in the country, and particularly affects cardiovascular disease, intentional and unintentional injuries, and cirrhosis of the liver.(3) Resultantly, alcohol consumption has been implicated with premature mortality in the Russian population.(4, 5) Alcohol-associated mortality is particularly of concern among men, for whom the average life expectancy is estimated at 65 years, lower than counterparts from the United Kingdom with an expectancy of 79 years.(6, 7) Most recently, a prospective study from 1999–2008 of 151,000 adults in three cities in the Russian Federation produced age-specific 20-year absolute death risk associated with alcohol use. Risk of death was reported in the range of 16–35% for men aged 35–54 years, depending on the number of half-pint vodka bottles consumed per week.(8) While the Russian government enacted a long-term strategy in 2006 to reduce alcohol-related harms through the regulation of ethyl alcohol, ecologic analyses have described only moderate reductions in alcohol related mortality with reductions in spirit consumption partially compensated by increases in beer and wine.(9, 10) To-date consumption remains at substantially high levels in Russia.(2, 8, 10)

Beyond the direct effects on health in the Russian Federation, alcohol use affects sexual risks and is of particular concern where sexual behaviors contribute substantially to HIV transmission. Research from the general adult population in Russia has described the interactive relationships between alcohol use and sexual behavior.(11) These have included heavy use as a demonstration of masculinity; as a means of coping with life stressors; directly used during sexual encounters; and use in alcohol serving venues, which serve as a location for social interactions and sexual encounters.(11) A cross-sectional survey in St. Petersburg has found increased associations between at-risk drinking (defined using the AUDIT-C screen) and having non-main sexual partners (AOR 2.5, 95% CI 1.4–4.4) as well as with unprotected sex with casual partners (AOR 3.2, 95% CI 1.3–8.1).(12) Similarly, an observational study from St. Petersburg, Russia found that almost half of the study population of adults living with HIV had a lifetime diagnosis of alcohol abuse or dependence, which was significantly associated with increased sexual risk behaviors and marginally associated with higher drug-risk behaviors.(13)

Few studies in the Russian Federation have described the prevalence of alcohol use among men who have sex with men (MSM); those that have done so predominantly focus on use among male sex workers.(14–16) In St. Petersburg and Moscow, for example, alcohol serving venues were found to be common locations for male sex workers to meet male partners and clients, while 70% of male sex workers reported consuming alcohol with clients.(14, 15) Qualitative descriptions have highlighted alcohol use as a source of courage and relaxation, but also portray increased vulnerability to violence by clients or other individuals during alcohol consumption in the context of sex work.(14, 16) Much like heterosexual populations, alcohol use may have complex etiologies and behavioral relationships for MSM; serving as a means of socialization, meeting sexual partners, coping

with psychosocial problems, and is associated with high risk sexual behaviors. Some authors have described alcohol use as a component of syndemics among MSM, or mutually reinforcing epidemics that negatively impact health.(17) In the United States, almost 40% of MSM are estimated to have at least one episode of clinical depression in their lifetime,(18) and other research from the U.S. and Europe have documented substantial experiences of stigma and depression among MSM, especially among MSM living with HIV.(19) Alcohol use may be an individual response to coping with stigma and depression in which alcohol use is a mechanism to increase pleasure seeking and individual sense of invulnerability. Detrimentally, such use also impairs decision-making and negotiation.(20) Consequently, alcohol use among MSM has been linked to unprotected anal intercourse (UAI) with primary and non-primary partners, unknown HIV serostatus, sexual relationships with serodiscordant partners or partners of unknown serostatus, as well as associated with HIV infection.(20)

The majority of research describing the prevalence of alcohol use and other substance use among MSM originates in North American and Western European setting.(21) In a country with high levels of alcohol consumption, but substantially less known about behavioral risks among MSM, we sought to understand potential linkages between alcohol use and behavioral risk for HIV transmission for this population. Specifically, we aimed to assess the relationship between alcohol use and sexual and substance use behaviors that could lead to exposure to HIV infection among MSM living in Moscow, Russia. Understanding these alcohol-related linkages is particularly important for informing HIV prevention programs.

Methods

Data for this analysis comes from a cross sectional study to identify socio-behavioral characteristics and correlates of HIV of HIV and STI infection among MSM living in Moscow, Russia. The study was implemented between October 2010 and April 2013. This was a collaborative research activity jointly conducted by Johns Hopkins University and a local, non-governmental organization, AIDS Infoshare. Principal study activities included completion of a structured survey instrument and biological assessment of HIV and syphilis.

Study setting and participants

Eligibility requirements for participation included: born male, aged 18 years or older, fluent in Russian, residing or working in Moscow metropolitan area, reported anal sex with another man in the last 12 months, had no prior participation in this study, possessed a valid study recruitment coupon, and provided informed verbal consent to participate. HIV and syphilis testing were optional and participants were asked for separate consent for testing procedures; thus, some individuals participated in the survey but did not have HIV or syphilis testing data. Study activities were conducted two days per week in private rooms of a non-governmental clinic that is centrally located and which has a reputation of being non-stigmatizing to key populations. This clinic had been the site of previous research among MSM and male sex workers that was conducted by the research team.(15) Recruitment activities, behavioral surveys, and interviews were implemented by AIDS Infoshare staff, while all biologic testing and counseling was conducted by trained clinic physicians and

staff. All staff members were trained in confidentiality, human subjects protection, and survey research methods. A substantial formative research phase (N=121) was implemented prior to survey research to inform the development of recruitment methods and scripts, coupon design, incentives, and survey items, as well as to understand the specific social and health contexts for MSM subgroups.(16)

Recruitment

The 1,367 participants for the current analyses were recruited by respondent-driven sampling (RDS). RDS recruitment, a chain recruitment method, is often used to reach hidden or populations such as MSM, sex workers and people who use drugs.(22) RDS methods have been described in detail elsewhere.(23, 24) Recruitment began with three purposively selected 'seeds' who were each provided with four study-specific coupons with which to recruit peer MSM from their social network into the study. Subsequent initiation of additional seeds was staggered over the duration of the study, taking into consideration potential propagation failure of some seeds and eventual die-out of the chains. In total, six productive seeds initiated recruitment of the study sample over the course of the study. Seeds were recruited from the pool of MSM who were involved in local HIV prevention programs, which include some that provide harm reduction services, or who had participated in prior formative research.(16) Seeds were selected to represent a range of characteristics, including age, education, employment, substance use, and sexual identity. Individuals who were recruited by seeds were assessed for eligibility and, if eligible, consented and enrolled in the study. At completion of study activities, on the same day, participants were then provided with three study coupons for further recruitment of peers, thus beginning a new wave of recruitment. This process continued until the target sample size was reached, which resulted in an ultimate enrolment of 31 waves of participants over the course of the study.

To protect the privacy of participants, study coupons included the study name, telephone contact information, and individual coupon identification number, but did not include any information related to homosexuality or HIV and did not include the clinic address. Participants were reimbursed 1,000 rubles (approximately $40USD) for participation in the study and 500 rubles ($20USD) for recruitment of each peer into the study. RDS participants were asked to return 2–4 weeks later to collect payment for peer recruitment. Netdraw software (Analytic Technologies) was used to monitor RDS recruitment over the course of the study through linkages between coupon identification numbers of seeds/recruiters and the recruited.(25)

Survey Measures

The structured survey was developed based on formative research,(16) cognitive testing,(26) and pilot testing methods. Survey measures included socio-demographic characteristics; sexual identity; sexual practices and partner types; alcohol and other substance use; intimate partner violence (IPV) victimization, and mental health symptoms. Recall periods for survey questions included calculated temporal anchors within the question. All survey items were developed in English, translated into Russian language, back-translated to ensure accuracy, and pilot tested prior to use. Trained interviewers administered surveys in Russian language

and entered data into an online protected data collection system. Time for survey completion ranged from 60 to 90 minutes.

Key variables for this analysis included sexual and other behavioral risks for HIV transmission and alcohol consumption. Measures of sexual identity and sexual practices were adapted from the US CDC's National Health Behavior Survey.(27) Sexual practice measures were restricted to the last 12 months and included prior anal/oral/vaginal sex with men and women; number(s) of sexual partners and partner characteristics; concurrent relationships, defined as "two sexual partnerships at the same time or two ongoing sexual partnerships (male and/or female genders)"; group sex; sex in public spaces; and transactional sex (both purchased or sold). Additional questions were included to measure other drug use (injecting and non-injecting) within the last 12 months. The Alcohol Use Disorders Identification Test (AUDIT) a validated scale in Russia was included in the survey for identification of alcohol use in the last 12 months (Cronbach's α=0.80).(28) All participants were asked personal network size questions traditionally used for RDS weighted estimates, specifically the number of MSM the participant knows and number of MSM the participant has seen in the last six months.(22, 29)

Biologic testing

Following completion of the behavioral survey, participants who had provided consent to HIV and syphilis testing proceeded to biologic testing conducted by trained physicians. Finger-prick blood samples were collected for the Oraquick Rapid HIV 1/2 test (OraSure Technologies, Bethlehem, PA, USA). HIV rapid screening tests were completed according to manufacturer's instructions and results were available within 15 minutes. The staff physician (TB) provided pre- and post-test HIV counseling and followed all blood-safety precautions protocols outlined in the Manual of Belyaeva and Pokrovsky published by the Federal AIDS Center of the Russian Federation.(30) Participants were also given the option to receive or opt-out of receiving their HIV screening test results. Individuals with positive results were asked to provide an additional sample of blood to be sent for confirmatory testing at the local reference laboratory (Lages Laboratory, Moscow).

Clinic staff collected additional serum samples for syphilis testing with the Lues Rapid Plasma Reaction (RPR) (Nearmedic Plus, Moscow, Russia). Syphilis rapid tests were conducted in sequential order and the second RPGA test was conducted only if the first test was positive. A positive first syphilis rapid test (Lues RPR) was followed by a positive Lues RPGA result to define a positive syphilis diagnosis. Participants with a positive RPR but a negative confirmatory RPGA test were determined to have a negative syphilis diagnosis. Of the 1,376 participants, 1,173 consented to HIV and syphilis testing. An additional six participants had incomplete syphilis data resulting in an effective sample of 1,167 participants with syphilis data. Reasons for declined consent for testing included: lack of time, fear/discomfort with blood or needles, and/or had already been tested previously.

Human subjects protection

The study was conducted in partnership with a local non-governmental organization, AIDS Infoshare, and approved by both the Ethics Committee of the State Medical University, IP

Pavlov, St. Petersburg, Russia and the Johns Hopkins Bloomberg School of Public Health Institutional Review Board, Baltimore, Maryland.

Data analysis

The primary independent variable of interest was alcohol use, measured by the AUDIT score. At preliminary analysis, over 50% of the sample had scores above the cutoff of 8 that is traditionally used during screening and research to determine hazardous use. AUDIT scores were instead stratified into three groups: a score <8 representing abstinence or low use, 8-15 “hazardous use”, >=16 “harmful use” including those with potential alcohol dependency (score of 20 or higher) according to WHO categories.(31) Descriptive analyses were conducted to present distributions of socio-demographic characteristics, sexual behaviors, and substance use among the total population and across alcohol use strata. Separate analyses were conducted to calculate RDS-weighted prevalence estimates among the total population using the Volz-Heckathorn (RDS-II) estimation method that can produce population level estimates with bootstrapping algorithms used to produce 95% confidence intervals.(32) The relatively little difference between RDS-weighted proportion and crude sample estimates as well as relatively low homophily across variables of interest led to the decision to present the unweighted (or crude) estimates instead of the RDS-weighted estimates, though these estimates are included in the Appendix. Chi-square tests were used to evaluate statistical significance in bivariate analysis of unweighted estimates. Unweighted estimates were used for logistic regression analysis, given lack of consensus on use of RDS weights in multiple logistic regression.(33) Multiple logistic regression was used to produce adjusted odds ratios to compare the magnitudes of association between the three strata of alcohol use with select dependent variables. This resulted in several models to investigate the magnitude of association between levels of alcohol use and dependent variables that represent behavioral risks of HIV transmission. Dependent variables included: number of male sex partners, number of male one night stands, inconsistent condom use during anal sex and vaginal sex, selling and purchasing sex, engagement in group sex, and recreational and injecting drug use. These models adjusted for demographic variables that were potential confounders and were also significantly associated with alcohol use ($p<0.05$), including age (continuous), employment, ethnicity, number of dependents (continuous), and sexual identity. Abstinence/low alcohol use served as the reference category and a second analysis was conducted to compare alcohol dependence to the reference of hazardous drinking. Survey data and HIV test results were analyzed using the statistical software STATA version 12 (Stata Corporation, College Station, USA).

Results

A total of 1,376 MSM recruited by RDS were enrolled in the study. The median age of the sample was 30 years (IQR: 24–36 years) and over 80% were of Russian ethnicity. Less than 20% of the sample had been or were currently married to a woman at the time of the study. Over half of the participants reported drinking on a weekly basis or more frequently. Twenty percent of participants reported seven or more beverages during a single drinking occasion. Over 30% reported ever being injured or injuring someone as a result of drinking in the last 12 months. Item responses for the AUDIT scale are included in Appendix 1.

Stratified by AUDIT score, 47.3% (n=651) were determined to be abstainers/low-level drinkers, 32.4% (n=446) hazardous drinkers, 20.3% (n=279) harmful/dependent drinkers. Higher proportions of participants with hazardous use (47.8%; n=210) or harmful/dependent use (49.5%; n=134) self-identified as bisexual compared to those with low levels of alcohol use (36.7%; n=234; p<0.001). Self-reported lifetime history of jail or prison was also higher among participants with hazardous alcohol use (6.8%; n=30) or harmful/dependent use (14.0%; n=38), compared to abstainers/low-level users (2.3%; n=15; p<0.001). Table 1 displays participant demographic characteristics stratified by AUDIT category. Appendix table 2 presents the RDS-weighted demographic estimates for the total population.

Participants engaging in hazardous use and harmful/dependent use were different from low-level alcohol users on a number of sexual risk variables. Overall, this appeared to be a dose-response relationship between alcohol use and sexual risk with relationships consistently in the same direction. Harmful/dependent users tended to report initiation of sexual intercourse at younger ages (aged 18 years or younger; 63.5%; n=174) compared to hazardous users (58.6%; n=260) and abstainers/low alcohol users (55.3%; n=353; p=0.01). The number of male sex partners in the last twelve months was high and varied, with 43.9% (n=286; p<0.001) of abstainers/low-level alcohol users reporting five or more male sex partners in the last 12 months, 49.3% (n=220) among hazardous users, and 55.9% (n=156) of harmful/dependent drinkers. The number of male one night stands (or, single sex contacts) and number of boyfriends in the last 12 months were also significantly higher among those in the hazardous and harmful/dependent alcohol use strata. Consistent condom use during anal sex was lower for heavy users, with slightly more than half of hazardous and harmful/dependent users reporting always or almost always using condoms, compared to 70% consistent use among low-level users (p<0.001). Similar patterns were observed among the 478 participants who reported having a female partner in the last 12 month, demonstrating increased numbers of female partners and inconsistent condom use during vaginal sex among those with increased levels of alcohol use. Sex in public spaces and group sex were also significantly higher among hazardous alcohol users and harmful/dependent users. Almost 29.9% and 28.8% of harmful/dependent users reported selling sex or purchasing sex in the last month, respectively, while less frequent engagement in sex work activities were reported by those with hazardous use (22.7% and 22.4%) and low-level use (13.5% and 11.2%, p<0.001). Recreational drug use and injection drug use was also more common among harmful/dependent and hazardous users. Among the 30% who reported recreational drug use, commonly used drugs included marijuana and poppers, while cocaine and methamphetamines were reported among hazardous and harmful alcohol users (data not displayed). The overall HIV prevalence of the sample was 15.2% and ranged from a low of 13.9% (n=77) among low alcohol users, 14.3% (n=46) among hazardous alcohol users, to 19.6% (n=46; p=0.11) among harmful/dependent users. Table 2 presents the distributions of sexual and substance use behaviors. Appendix table 3 displays the RDS-weighted distributions of sexual and substance use behaviors for the total population.

Table 3 presents the multivariate logistic regression results of the associations between alcohol use strata and dependent variables related to sexual and substance use behaviors. The adjusted odds ratios (AOR) compare these outcomes to hazardous alcohol and harmful/dependent use to low-level alcohol use, while also adjusting for age (continuous), ethnicity,

employment status, number of dependents (continuous), and sexual identity. A second analysis compares alcohol dependence to the reference of hazardous drinking and significant results are denoted on the table. All tested sexual behavior outcomes were significantly higher for hazardous drinkers and harmful/dependent drinkers compared to abstinence/low alcohol use. Specifically, the adjusted odds of inconsistent condom use during anal sex were 2.2 times higher for harmful/dependent users (AOR: 2.19; 95%CI: 1.61–2.96) and 1.8 times higher for hazardous drinkers (AOR: 1.77; 95%CI: 1.36–2.30), compared to low-level drinkers. The adjusted odds of selling or purchasing sex were 2.6 times (AOR: 2.60; 95%CI: 1.79–3.76) and 3.2 times higher (AOR: 3.15; 95%CI: 2.16–4.58), respectively, among harmful/dependent users relative to low-level drinkers. Hazardous drinkers had increased adjusted odds of selling (AOR: 1.71; 95%CI: 1.22 – 2.39) or buying sex (AOR: 2.35; 95%CI: 1.67–3.31), compared to low-level drinkers Hazardous alcohol users (AOR: 1.70; 95%CI: 1.28–2.25) and harmful/dependent users (AOR: 2.26; 95%CI: 1.64–3.12) had increased adjusted odds of recreational drug use, compared to abstainers/low-level users. In a similar trend, the adjusted odds of injection in the last month were four times higher for harmful/dependent users (AOR: 4.38; 95%CI: 1.13–17.07) compared to abstainers/low-level drinkers. Hazardous use was not significantly associated with injection drug use, despite a high magnitude of association (AOR: 3.00; 95%CI: 0.78– 11.55). Harmful/dependent use, compared to low-level users was only marginally associated ($p<0.10$) with HIV infection, after adjusting for ethnicity and employment status (AOR: 1.49; 95%CI: 0.97–2.28).

Discussion

In Moscow, the majority of this sample of MSM was classified as engaging in hazardous or harmful levels of alcohol use. These levels of use were highly associated with a number of sexual and injecting behaviors that increase risk for HIV transmission or acquisition. Specifically, heavy alcohol use was associated with higher levels of recent inconsistent condom use with both male and female partners, increased numbers of partners and one-night stands, engagement in sex work and purchase of sex, as well as group sex and sex in public spaces. Beyond sexual risk, heavy alcohol use was associated with other substance use and heightened levels of injection drug use among harmful or dependent users, signifying potential transmission or acquisition risks through both sexual and injecting pathways. Consistently, though only marginally significant, harmful or dependent use was associated with increased odds of HIV infection among participants. This study utilized global measures of alcohol use, which provide non-causal associations with sexual behaviors as they do not capture alcohol use during sexual contact. Situational alcohol use, which capture the use of alcohol during high risk sexual activity or the proportion of sex acts that include alcohol use, and event analyses, which capture alcohol use at key sexual events (e.g. first intercourse, last intercourse with a casual partner), provide more focused analysis of the role of alcohol in high-risk sexual behaviors.(34) Nonetheless, the patterns of high-risk sexual behaviors and substance use suggest that subgroups with hazardous or harmful/dependent alcohol use have generally higher risk behavioral profiles and may be a high priority for HIV prevention and other comprehensive services. While these findings are consistent with others from North America and Europe, they are first data for MSM from the Russian Federation, where alcohol use is a major public health concern.(20, 35, 36) These

findings have implications for MSM in terms of comprehensive HIV prevention for MSM, including those living with HIV.

Over half of the population was identified with at least hazardous levels of alcohol use, which is consistent with estimates from the general adult male population.(2) These levels may be explained in part by cultural acceptance and consumption of alcohol in which alcohol is present at most social gatherings and readily accessible at street kiosks and in other public spaces.(2, 5, 8) Alcohol use and alcohol venues serve as one of the common mediums through which MSM may be able to meet other MSM for sexual or non-sexual relationships. Conversely, alcohol and substance use may serve a method to cope with issues of social and self-stigma, discrimination, and other life stressors.(37, 38) In the Russian context, both situations may be particularly relevant. While meeting in bars or other alcohol serving venues is not dissimilar from the heterosexual populations or from MSM experiences in other countries, recent laws passed to prevent the dissemination of information or 'propaganda' of homosexuality and social violence toward the homosexual population, effectively limit socialization of MSM in other open, public spaces.(39) Similarly, such social stigma may have individual effects, increasing levels of depression and internalized homophobia, and may lead to alcohol use as a coping mechanism.

Regardless of etiology, increased risk behavior with alcohol intake is an important consideration for HIV prevention. At least two cohort studies from the U.S. have identified significant associations with HIV incidence (35, 36) and with the odds of seroconversion estimated to be almost twice as high for heavy drinkers.(36) Though some case-control and cross-sectional studies have not seen such an association with HIV infection,(40, 41) which could partially be explained by differences in measurement methods, other findings of sexual risk associated with alcohol use provides insight to the mechanism through which alcohol acts to increase HIV risk. In this study in Moscow, harmful alcohol use was associated with a two-fold increase of UAI with male partners as well as unprotected vaginal intercourse, among those MSM with female partners. Other U.S.-based studies have likewise demonstrated that alcohol dependency, as determined by the CAGE screening tool, has also been associated with increased UAI among MSM.(42) Finally, situational use, or use of alcohol during sexual contacts, has been associated with increased numbers of partners, increased causal partners, and unprotected receptive anal intercourse across a number of studies.(20)

Findings should be viewed in light of study limitations. Our cross-sectional study utilized global measures of alcohol use, rather than event-level analysis, limiting ability to capture moments in which HIV transmission may occur and preventing causal association. Participants had the option to opt out of HIV testing, thus providing a smaller analytic sample and one for which missingness of data may be associated with sexual and substance use behaviors. The marginal association between alcohol use and HIV infection may be a reflection of differential refusal of HIV testing and/or may influenced by residual confounding by other demographic, socioeconomic factors, or resulting from the challenges of assessing complex sexual risk behaviors. Additionally, we do not know how testing, enrollment criteria, and financial incentives influence the sampling. It is possible that those who do not want to disclose their sexual orientation or who are less motivated by the

incentives may have been less likely to participate. We also do not know if RDS did not reach certain groups. There is a possibility that financial incentives influence participation; however, Moscow is an expensive, high-income city and financial remuneration was based on the cost of transport and informed by substantial piloting and focus groups. While the incentives are higher than most RDS studies, which are often conducted in low-income settings, there was no evidence that remuneration influenced participation. Given the stigmatizing environment for LGBT populations in Russia, it is difficult to conduct research on MSM. This is one of the few studies that have been able to recruit a large sample of MSM. Under such circumstances RDS, with its limitations, appears to be one of best ways to recruit MSM.

Findings have obvious implications for HIV prevention and targets for which interventions may serve to address alcohol-related risks, in addition to standard HIV and STI prevention and testing programs for MSM. These include, but are not limited to risk reduction counseling that addresses alcohol use and sexual behavior; provision of condoms at bars, kiosks, or other alcohol servicing venues; and individual behavior change interventions. Unfortunately, data on such interventions are limited. A recent review of combined interventions to target alcohol use and sexual risk among the general population in the Russian Federation identified only two of such interventions.(43) The first intervention, by Abdala and colleagues, tested a brief individually tailored HIV prevention counseling session based on the Information-Motivation-Behavioral Skills model among patients of an STI clinic in St. Petersburg, Russia.(44) The intervention was associated with short-term improvements in consistent condom use, and decreased numbers of unprotected sexual acts and frequency of drug use before sex, though improvements dissipated by six months. The other study, by Samet and colleagues, was the Partnership to Reduce the Epidemic Via Engagement in Narcology Treatment (PREVENT), which was a sexual risk reduction intervention based in St. Petersburg narcology centers.(45) This intervention demonstrated improvements by six months in the median number of protected sex acts (defined as the percentage of times condoms were used among the total number of anal or vaginal sexual episodes in the past three months). Such individually-tailored interventions may be improved upon by also addressing sexual risks in same-sex partnerships.

Conclusion

In the setting of an increasing national HIV epidemic, heavy alcohol use is highly associated with increased sexual risk behaviors and substance use among MSM. With increasing stigma and challenging political climates in the Russian Federation, the use of alcohol as a means to cope with stigma may be exacerbated among MSM. High-risk behaviors associated with alcohol use may have indirect effects on HIV acquisition and transmission among MSM. HIV prevention efforts from MSM in Moscow and settings where alcohol use is high may benefit from comprehensive programs that address problem alcohol use. Future research into addressing alcohol-associated sexual risks among MSM in the Russian Federation would benefit from investigating the locations, individuals, and contexts among which MSM consume alcohol and the related or resulting sexual risk behaviors. Research may also investigate methods in which MSM negotiate sexual risk reduction or have lower sexual risks even with heavy alcohol use. Given that hazardous alcohol use and dependency

in the general population appears to be almost endemic among the general population, structural interventions to increase cost and reduce accessibility may be appropriate as well as reducing MSM-targeted stigma to address depression and stress among MSM. Overall, these findings present clear implications and areas to be addressed by HIV prevention and care for the MSM population. The multiple and inter-related needs of this population must be addressed for an effective response.

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Table 1

Demographic characteristics of 1,376 MSM in Moscow, Russia stratified by AUDIT alcohol use category

	Abstinence/Low use (n=651)		Hazardous use (n=446)		Harmful/Dependent use (n=279)		Total (N=1376)		P-Value
	n	col %	n	col %	n	col %	n	col %	
Age category									0.02
<25 years	172	26.4	148	33.2	79	28.3	399	29.0	
25–29 years	144	22.1	107	24.0	70	25.1	321	23.3	
30–35 years	181	27.8	83	18.6	62	22.2	326	23.7	
>35 years	154	23.7	108	24.2	68	24.4	330	24.0	
Place of Birth									0.12
Born in Russia	543	83.4	374	83.9	247	88.5	1164	84.6	
Born outside Russia	108	16.6	72	16.1	32	11.5	212	15.4	
Ethnicity (n=1366)[¶]									0.08
Russian only	504	78.3	363	81.6	234	84.5	1101	80.6	
Russian plus other	16	2.5	16	3.6	8	2.9	40	2.9	
Other	124	19.3	66	14.8	35	12.6	225	16.5	
Current Employment Status									0.00
Full-time	395	61.2	224	50.5	125	45.0	744	54.4	
Part-time	185	28.7	158	35.6	114	41.0	457	33.4	
Student	30	4.7	21	4.7	10	3.6	61	4.5	
Other	10	1.6	10	2.3	8	2.9	28	2.0	
Unemployed	25	3.9	31	7.0	21	7.6	77	5.6	
Income (n=1365)									0.11
High	14	2.2	7	1.6	2	0.7	23	1.7	
Middle	304	47.2	196	44.1	105	37.9	605	44.3	
Low	306	47.5	227	51.1	159	57.4	692	50.7	
Poverty	20	3.1	14	3.2	11	4.0	45	3.3	
Sexual Identity (n=1347)									< 0.001
Homosexual	394	61.9	221	50.3	126	46.5	741	55.0	

	Abstinence/Low use (n=651)		Hazardous use (n=446)		Harmful/Dependent use (n=279)		Total (N=1376)		P-Value
	n	col %	n	col %	n	col %	n	col %	
Bisexual	234	36.7	210	47.8	134	49.5	578	42.9	
Other	9	1.4	8	1.8	11	4.1	28	2.1	
Ever Married To A Woman (n=1368)									0.46
Never	541	83.7	363	81.8	224	80.6	1128	82.5	
Past/Current marriage	105	16.3	81	18.2	54	19.4	240	17.5	
Number of Dependents									0.01
1	458	70.4	299	67.0	165	59.1	922	67.0	
2 to 4	172	26.4	133	29.8	98	35.1	403	29.3	
>3	21	3.2	14	3.1	16	5.7	51	3.7	
Location Where Participants Normally Go For Healthcare (n=1253)									0.54
Private only	179	30.1	111	27.7	64	24.9	354	28.3	
Public and Private/Other	76	12.8	54	13.5	29	11.3	159	12.7	
Public only	320	53.8	226	56.4	153	59.5	699	55.8	
Other only	20	3.4	10	2.5	11	4.3	41	3.3	
Lifetime History of Detention in Jail/Prison (n=1360)									< 0.001
No	629	97.7	414	93.2	234	86.0	1277	93.9	
Yes	15	2.3	30	6.8	38	14.0	83	6.1	

[*] AUDIT: Alcohol Use Disorder Identification Test; AUDIT categories based on WHO guidelines: Low use: <8; Hazardous use: 8 - 15; Harmful use or dependence: >=16;

[¶] Ethnicity 'other' category includes Azerbaijani, Armenian, Belarus, Georgian, Dagestani, Moldavian, Tadjik, Tatar, Ukrainian, Uzbek.

Table 2

Sexual and substance use behaviors, stratified AUDIT alcohol use categories among MSM living in Moscow, Russia (N=1,376)

	Abstinence/Low use (n=651)		Hazardous use (n=446)		Harmful/Dependent use (n=279)		Total (N=1376)		P-Value
Characteristic	**n**	**col %**	**n**	**col %**	**n**	**col %**	**n**	**col %**	
SEXUAL BEHAVIORS (last 12 months)									
Age of first sex (n=1356)									0.00
<=18 years	353	55.3	260	58.6	174	63.5	787	58.0	
19–25 years	263	41.2	159	35.8	80	29.2	502	37.0	
>25 years	22	3.4	25	5.6	20	7.3	67	4.9	
Number of Male Partners									< 0.001
One or less	195	30.0	89	20.0	57	20.4	341	24.8	
2 to 4	170	26.1	137	30.7	66	23.7	373	27.1	
>=5	286	43.9	220	49.3	156	55.9	662	48.1	
Number Of Male One Night Stands (n=1207)									< 0.001
One or less	279	50.7	165	40.7	98	38.9	542	44.9	
2 to 4	131	23.8	99	24.4	52	20.6	282	23.4	
5 or more	140	25.5	141	34.8	102	40.5	383	31.7	
Number Of Boyfriends (n=1282)									0.01
One or less	443	74.6	275	65.3	185	69.3	903	70.4	
2 to 4	125	21.0	107	25.4	63	23.6	295	23.0	
5 or more	26	4.4	39	9.3	19	7.1	84	6.6	
Consistent Condom Use, Anal Sex (n=1355)									< 0.001
Always/Almost always	447	70.5	254	57.1	143	51.8	844	62.3	
Half/Rarely/Never	187	29.5	191	42.9	133	48.2	511	37.7	
Number Of Female Partners (n=478, among those who have female partners)									0.09
One	50	28.1	43	24.3	21	17.1	114	23.8	
2 or more	128	71.9	134	75.7	102	82.9	364	76.2	
Consistent Condom Use, Vaginal Sex (n=439)									0.01
Always/Almost always	88	52.7	66	40.5	33	30.3	187	42.6	
Half/Rarely/Never	79	47.3	97	59.5	76	69.7	252	57.4	

	Abstinence/Low use (n=651)		Hazardous use (n=446)		Harmful/Dependent use (n=279)		Total (N=1376)		P-Value
Characteristic	**n**	**col %**	**n**	**col %**	**n**	**col %**	**n**	**col %**	
Sold Sex (n=1328)	84	13.5	100	22.7	80	29.9	264	19.9	< 0.001
Purchased Sex (n=1331)	70	11.2	99	22.4	77	28.8	246	18.5	< 0.001
Drug And/Or Alcohol Use, Prior To/During Sex (n=1329)									< 0.001
None	215	34.6	42	9.6	11	4.1	268	20.2	
Alcohol only	344	55.3	323	73.6	208	77.6	875	65.8	
Drugs only	25	4.0	6	1.4	5	1.9	36	2.7	
Both alcohol and drugs	38	6.1	68	15.5	44	16.4	150	11.3	
Sex In Public Place (n=1336)	173	27.6	190	43.1	124	46.3	487	36.5	< 0.001
Engaged In Group Sex (n=1334; ref: no)*	136	21.8	124	28.1	86	32.2	346	25.9	< 0.001
SUBSTANCE USE									
Recreational Drug Use, Last 12 Months (n=1365; ref: no)*	143	22.3	149	33.6	107	38.4	399	29.2	< 0.001
Injected Drugs, Last Month (n=398; ref: no)	3	2.1	9	6.1	10	9.3	22	5.5	0.04
INFECTIOUS DISEASE									
HIV infection (study diagnosis; n=1,173; ref: negative)	77	13.9	55	14.3	46	19.6	178	15.2	0.11
Syphilis infection (study diagnosis; n=1,167; ref: negative)	20	3.6	22	5.7	16	6.8	58	5.0	0.12

Note:

* Recreational drug use was defined as use of any drugs for recreational purposes (including poppers), for fun or to relax in the last 12 months?;

Table 3

Associations between alcohol use, sexual and substance use behaviors, and infectious disease among 1,367 MSM living in Moscow, Russia

Dependent Variable	Abstinence/Low use (n=651)	Hazardous use (n=446)				Harmful/Dependent use (n=279)			
	AOR	AOR	95%CI		p-value	AOR	95%CI		p-value
SEXUAL BEHAVIORS (last 12 months)									
Number Of Male Partners (n=1376; ref <5)*	Ref	1.30	1.01	1.67	0.04	1.69	1.25	2.27	0.00
Number Of Male One Night Stands (n=1207; ref: 0) *	Ref	1.80	1.35	2.42	< 0.001	1.74	1.23	2.45	<0.01
Inconsistent Condom Use, Anal Sex (n=1355; ref: consistent use) *	Ref	1.77	1.36	2.30	<0.01	2.19	1.61	2.96	< 0.001
Inconsistent Condom Use, Vaginal Sex (n=439; ref: consistent use)*	Ref	1.71	1.09	2.68	0.02	2.53	1.49	4.29	<0.01
Sold Sex (n=1328; ref: no)*¶	Ref	1.71	1.22	2.39	<0.01	2.60	1.79	3.76	< 0.001
Purchased Sex (n=1331; ref: no)*	Ref	2.35	1.67	3.31	< 0.001	3.15	2.16	4.58	< 0.001
Sex In Public Place (n=1336; ref: no)*	Ref	2.01	1.54	2.62	< 0.001	2.22	1.63	3.03	< 0.001
Engaged In Group Sex (n=1334; ref: no)*	Ref	1.46	1.09	1.95	0.01	1.75	1.26	2.43	<0.01
SUBSTANCE USE									
Recreational Drug Use, Last 12 Months (n=1365; ref: no)*	Ref	1.70	1.28	2.25	< 0.001	2.26	1.64	3.12	< 0.001
Injected Drugs, Last Month (n=398; ref: no)	Ref	3.00	0.78	11.55	0.11	4.38	1.13	17.07	0.03
INFECTIOUS DISEASE									
HIV infection (study diagnosis; n=1,173; ref: negative)	Ref	1.07	0.73	1.58	0.72	1.49	0.97	2.28	0.07
Syphilis infection (study diagnosis; n=1,167; ref: negative)	Ref	1.71	0.91	3.21	0.10	2.04	1.01	4.11	0.05

Logistic regression models are adjusted for individual age (continuous), ethnicity, employment status, number of dependents (continuous), sexual identity;

*Overall test of trend for audit categories significant at p<0.05;

¶Harmful or dependent alcohol use (AUDIT >=16) significantly different at p<0.05 from hazardous drinking, when compared to hazardous drinking (AUDIT: 8-15) as the reference; Ref: reference category

Appendix Table 1

Response distribution for AUDIT items among MSM in Moscow, Russia

Domains	Items (Recall: last 12 months)	n	Col %
Domain 1	**How often drink alcohol (n=1365)**		
	Never*	149	10.9
	Less than monthly	128	9.4
	Monthly	306	22.4
	Weekly	576	42.2
	Daily or almost daily	206	15.1
	How many drinks containing alcohol on a typical day when drinking (n=1197)		
	1 or 2	301	25.1
	3 or 4	400	33.4
	5 or 6	255	21.3
	7 to 9	92	7.7
	10 or more	149	12.4
	How often having six or more drinks on one occasion (n=1207)		
	Never	324	26.8
	Less than monthly	283	23.4
	Monthly	308	25.5
	Weekly	244	20.2
	Daily or almost daily	48	4.0
Domain 2	**How often found not able to stop drinking once started (n=1201)**		
	Never	877	73.0
	Less than monthly	155	12.9
	Monthly	122	10.2
	Weekly	29	2.4
	Daily or almost daily	18	1.5
	How often failed to do what is normally expected (n=1191)		
	Never	735	61.7
	Less than monthly	270	22.7
	Monthly	146	12.3
	Weekly	31	2.6
	Daily or almost daily	9	0.8
	How often needed a drink in the morning (n=1209)		
	Never	870	72.0
	Less than monthly	162	13.4
	Monthly	101	8.4
	Weekly	53	4.4
	Daily or almost daily	23	1.9

Domains	Items (Recall: last 12 months)	n	Col %
Domain 3	**How often had a feeling of guilt or remorse (n=1197)**		
	Never	713	59.6
	Less than monthly	238	19.9
	Monthly	160	13.4
	Weekly	56	4.7
	Daily or almost daily	30	2.5
	How often been unable to remember what happened (n=1202)		
	Never	784	65.2
	Less than monthly	253	21.0
	Monthly	126	10.5
	Weekly	31	2.6
	Daily or almost daily	8	0.7
	Have you or has someone else been injured as a result of your drinking (n=1214)		
	No	805	66.3
	Yes, but not in the past year	177	14.6
	Yes, during the past year	232	19.1
	Has anyone concerned about your drinking or suggested you cut down (n=1214)		
	No	817	67.3
	Yes, but not in the past year	125	10.3
	Yes, during the past year	272	22.4

Cronbach's alpha scale reliability coefficient for AUDIT: 0.8018;

*Respondents to 'Never' drink skipped remaining questions

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Appendix Table 2

RDS-weighted estimates of demographic characteristics of 1,367 MSM participants

Category	n	Crude Proportion	RDS-Weighted Proportion	95%CI		Homophily
Age category						
<25 years	399	29.0%	30.6%	26.3%	35.0%	0.160
25–29 years	321	23.3%	20.6%	16.6%	24.6%	0.063
30–35 years	326	23.7%	22.6%	18.8%	26.5%	0.133
>35 years	330	24.0%	26.2%	21.8%	30.5%	0.188
Place of Birth						
Born in Russia	1164	84.6%	80.7%	76.6%	84.9%	0.227
Born outside Russia	212	15.4%	19.3%	15.1%	23.4%	−0.023
Ethnicity (n=1366)						
Russian only	1101	80.6%	77.5%	73.3%	81.7%	0.160
Russian plus other	40	2.9%	3.2%	1.7%	4.7%	−0.034
Other	225	16.5%	19.2%	15.2%	23.3%	0.012
Current Employment Status						
Full-time	744	54.4%	50.3%	45.4%	55.1%	0.140
Part-time	457	33.4%	34.8%	30.2%	39.4%	0.031
Student	61	4.5%	7.2%	4.4%	10.1%	0.034
Other	28	2.0%	1.2%	0.6%	1.7%	−0.012
Unemployed	77	5.6%	6.5%	3.8%	9.3%	−0.017
Income (n=1365)						
High	23	1.7%	0.9%	0.1%	1.6%	0.039
Middle	605	44.3%	40.7%	35.9%	45.5%	0.181
Low	692	50.7%	54.2%	49.3%	59.2%	0.065
Poverty	45	3.3%	4.2%	2.1%	6.3%	−0.044
Sexual Identity						
Homosexual	741	55.0%	44.8%	40.0%	49.6%	0.353
Bisexual	578	42.9%	50.5%	45.7%	55.3%	0.060
Other	28	2.1%	4.7%	2.5%	6.9%	0.056

Category	n	Crude Proportion	RDS-Weighted Proportion	95%CI		Homophily
Ever Married To A Woman (n=1368)						
Never	1128	82.5%	81.1%	77.4%	84.7%	0.122
Past/current marriage	240	17.5%	18.9%	15.3%	22.6%	0.040
Number of Dependents						
1	922	67.0%	64.6%	60.1%	69.0%	0.099
2 to 4	403	29.3%	32.0%	27.7%	36.4%	−0.010
>3	51	3.7%	3.4%	1.6%	5.2%	0.061
Location Where Participants Normally Go For Healthcare (n=1253)						
Private only	354	28.3%	27.4%	22.9%	32.0%	0.058
Public and Private/Other	159	12.7%	10.2%	7.7%	12.7%	0.033
Public only	699	55.8%	59.4%	54.5%	64.2%	−0.011
Other only	41	3.3%	3.0%	1.3%	4.6%	−0.031
Lifetime History of Jail/Prison (n=1360)						
No	1277	93.9%	93.3%	90.7%	96.0%	0.101
Yes	83	6.1%	6.7%	4.0%	9.3%	0.000
Alcohol Use (AUDIT Categories)						
Abstinence/Low use (AUDIT <8)	651	47.3%	47.7%	42.9%	52.5%	0.086
Hazardous use (AUDIT 8 - 15)	446	32.4%	30.6%	26.2%	34.9%	0.021
Harmful/Dependent use (AUDIT ≥ 16)	279	20.3%	21.8%	17.7%	25.8%	0.038

*RDS estimates produced using the Volz-Heckathorn (RDS-II) estimator; 95%CI are produced using 1000 bootstrap replications around the VH estimate for each indicator; RDS estimates are not provided for individual AUDIT categories due to small n's or zero values for some response categories that prohibit estimates of the transition matrix required for the calculation

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Appendix Table 3

RDS-weighted estimates of sexual behaviors, substance use, and infectious disease outcomes of 1,367 MSM participants in Moscow, Russia

Category	n	Crude Proportion	RDS-Weighted Proportion	95%CI		Homophily
SEXUAL BEHAVIORS (last 12 months)						
Age Of First Sex (n=1356)						
<=18 years	787	58.0%	51.0%	46.1%	55.9%	0.174
19–25 years	502	37.0%	40.6%	35.9%	45.3%	−0.036
>25 years	67	4.9%	8.4%	5.6%	11.1%	0.065
Number of Male Partners						
<=1	341	24.8%	32.4%	27.9%	36.9%	−0.006
2 to 4	373	27.1%	29.4%	25.3%	33.6%	0.013
>=5	662	48.1%	38.2%	33.6%	42.8%	0.226
Number Of Male One Night Stands (n=1207)						
One or less	542	44.9%	53.6%	48.8%	58.5%	−0.120
1 to 4	282	23.4%	26.2%	21.9%	30.5%	−0.011
5 or more	383	31.7%	20.1%	16.4%	23.9%	0.215
Number Of Boyfriends (n=1282)						
One or less	903	70.4%	78.4%	74.5%	82.3%	−0.338
1 to 4	295	23.0%	18.5%	14.8%	22.2%	0.064
5 or more	84	6.6%	3.1%	1.7%	4.5%	0.133
Consistent Condom Use, Anal Sex (n=1355)						
Always/almost always	844	62.3%	61.6%	57.0%	66.3%	0.181
Half/Rarely/Never	511	37.7%	38.4%	33.7%	43.0%	0.161
Number Of Female Partners (n=478, those who have female partners)						
One	114	23.8%	27.4%	21.1%	33.7%	−0.093
2 or more	364	76.2%	72.6%	66.3%	78.9%	0.095
Consistent Condom Use, Vaginal Sex (n=439)						
Always/almost always	187	42.6%	40.1%	33.1%	47.1%	0.110
Half/Rarely/Never	252	57.4%	59.9%	52.9%	66.9%	0.011
Sold Sex (n=1328)	264	19.9%	17.3%	13.7%	20.9%	0.055

Category	n	Crude Proportion	RDS-Weighted Proportion	95%CI		Homophily
Purchased Sex (n=1331)	246	18.5%	13.3%	10.1%	16.5%	0.105
Drug And/Or Alcohol Use Prior To/During Sex (n=1329)						
None	268	20.2%	23.6%	19.2%	28.0%	−0.044
Alcohol only	875	65.8%	68.2%	63.6%	72.8%	−0.063
Drugs only	36	2.7%	1.3%	0.6%	2.0%	0.050
Both alc and drugs	150	11.3%	6.9%	4.5%	9.3%	0.078
Sex In Public Place (n=1336)	487	36.5%	30.8%	26.2%	35.4%	0.129
Engaged in Group Sex (n=1334)	346	25.9%	16.9%	13.6%	20.3%	0.118
SUBSTANCE USE						
Recreational Drug Use, Last 12 Mo. (n=1365; ref: no)	399	29.2%	24.8%	20.6%	29.1%	0.065
Injected Drugs, Last Month (n=398; ref: no)	22	5.5%	5.4%	0.7%	10.1%	−0.081
INFECTIOUS DISEASE						
HIV infection (study diagnosis; n=1,173; ref: negative)	178	15.2%	11.3%	8.2%	14.3%	0.072
Syphilis infection (study diagnosis; n=1,167; ref: negative)	58	5.0%	3.5%	1.8%	5.2%	0.043

*RDS estimates produced using the Volz-Heckathorn (RDS-II) estimator; 95%CI are produced using 1000 bootstrap replications around the VH estimate for each indicator;