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Moderate/heavy alcohol use and HCV infection among injection drug users in two Russian cities

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Abstract

Background—In Russia, injection drug use and transmission of blood-borne pathogens such as human immunodeficiency virus (HIV) and hepatitis C virus (HCV) are inextricably linked, however the burden of alcohol use remains unexplored among injection drug users (IDUs).

Methods—Individuals who were 18 years of age and older and had injected drugs in the previous 30 days were recruited in the cities of Novosibirsk and Ivanovo by respondent driven sampling. Consenting individuals were administered a quantitative survey instrument and provided blood samples for serological testing.

Results—In Novosibirsk and Ivanovo, 29% and 35% of respondents were categorized as moderate/heavy drinkers respectively. Individuals reported problems related to alcohol use that affected their physical health (23%), family (55%), and induced financial hardships (43%). In the multivariate analysis, we found that methamphetamine injection in the past 12 months was a strong and significant correlate of moderate/heavy drinking in Novosibirsk (aOR = 5.63 95% CI: [1.01–31.47]) and Ivanovo (aOR = 3.81 95% CI [2.20–6.62]). There was poor agreement between self-reported HCV status and HCV test results (kappa = –0.05 and 0.26 in Novosibirsk and Ivanovo respectively). IDUs who correctly knew their HCV seropositive status in Novosibirsk and IDUs who correctly knew their HCV seronegative status in Ivanovo were significantly more likely to be moderate/heavy drinkers.

Conclusion—Alcohol use is problematic among IDUs who are at high risk for HCV. Future interventions should target IDUs who are moderate/heavy drinkers in order to prevent liver complications resulting from HCV infection.

Keywords

Russia; Hepatitis C; Alcohol; injection drug use; methamphetamine

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1. INTRODUCTION

In Russia, alcohol use is widespread and a major contributor to the male mortality crisis (Leon et al., 2009; Tomkins et al., 2012), problems in self-reported health (Carlson, 2001) and economic strain (Jukkala et al., 2008). Sociodemographic correlates such as age, sex, education, employment, have all been found to be associated with alcohol consumption and alcohol related problems in the general population (Cook et al., 2011). Research on alcohol use has focused mainly on working age males (Leon et al., 2007; Zaridze et al., 2009) and the role of alcohol use has not been explored among injection drug users (IDUs) save for studies on alcohol abuse as a risk behavior for HIV transmission among IDUs hospitalized for HIV (Krupitsky et al., 2005), TB (Fleming et al., 2006), or addiction treatment (Krupitsky et al., 2004; Raj et al., 2009; Walley et al., 2008).

IDUs are at high risk for hepatitis C virus (HCV). In Russia the prevalence of HCV is estimated to be 80% or higher in some locations (Paintsil et al., 2009; Rhodes et al., 2005, 2006). While chronic HCV infection is an independent risk factor for cirrhosis and hepatocellular carcinoma, the synergistic effect of HCV infection and heavy alcohol consumption can hasten the progression to these disorders (Bellentani et al., 1999; Safdar and Schiff, 2004; Tagger et al., 1999). Moderate alcohol consumption has also been shown to increase progression of liver fibrosis among HCV positive individuals (Thomas et al., 2000; Westin et al., 2002; Zarski et al., 2003), however the evidence is not conclusive (Monto et al., 2006; Ostapowicz et al., 1998).

In addition to the impact of alcohol on HCV liver disease progression, there is an added burden due to drug use. Since most IDUs in Russia inject opioids, it is necessary to understand the frequency and amount of alcohol consumed because of the increased risk of respiratory failure and overdose/death when these substances are consumed together (Levine et al., 1995; White and Irvine, 1999).

To our knowledge, no study has examined alcohol use among Russian IDUs in relation to awareness of HCV status. Additionally, the effect of knowledge of one's HCV seropositivity with respect to alcohol reduction has not been reported, despite evidence in other countries that alcohol consumption is reduced after receipt of a positive HCV diagnosis and counseling from a clinician (McCusker, 2001; Sladden et al., 1998).

The aims of this study were to describe the burden of alcohol use, identify correlates of moderate/heavy drinking, measure the agreement between self-reported HCV status and HCV serotesting results, and assess the effect of knowledge of HCV infection on moderate/heavy drinking among a sample of IDUs in two Russian cities. While there are no clinical guidelines in Russia with respect to alcohol use among patients with HCV, knowing one's HCV status after receiving counseling from a clinician would be an important step in alcohol cessation, thereby reducing liver disease progression. Given the high burden of HCV among IDUs in Russia, there is an urgent need to investigate the impact of alcohol use on this population.

2. METHODS

2.1. Recruitment and data collection

Data were collected between March and August, 2010 in two Russian cities, Novosibirsk and Ivanovo. With a population of 1.5 million, Novosibirsk is the third largest city in Russia and has the second highest standard of living (Mercer Human Resource Consulting, 2007). Due to its strategic geographic location in southwestern Siberia, Novosibirsk has experienced economic growth since the fall of the Soviet Union. Ivanovo lies 300 km

northeast of Moscow, has a population of 400,000, and is the capital of the eponymous oblast [administrative region]. Known for being the center of textile manufacturing since tsarist times, Ivanovo is now one of the poorest regions in Russia (Cookson, 2002; Pravda, 2006). Rapid assessments have estimated the prevalence of injection drug use to be as high as 3% in Novosibirsk (Dehne and Kobysheva, 2000; Koshkina, 2001); IDUs in Ivanovo had been an understudied population.

IDU were recruited using respondent driven sampling (RDS), a modified version of chain referral (Heckathorn, 1997, 2002). Respondent driven sampling is often used to recruit individuals from hidden populations such as injection drug users. Given concerns about its ability to produce representative samples (Gile and Handcock, 2010; Salganik, 2012), we used RDS only as a tool for efficient recruitment of convenience samples. Briefly, RDS uses a dual incentive approach where respondents receive an incentive to participate and a second incentive to recruit their peers. Recruitment begins with “seeds” or individuals familiar to research staff who meet eligibility criteria and are given coupons to distribute to potentially eligible peers within their networks. In this study, seeds (n=11 in Ivanovo including 9 HIV-positive, n=10 in Novosibirsk including 1 HIV-positive) were recruited by local fieldworkers through known contacts or from narcology (drug treatment), harm-reduction, and AIDS advocacy service organizations. Eligibility criteria including having injected drugs during 30 days prior to survey, 18 years of age or older, and willingness and capacity to provide written informed consent. Participants meeting these criteria were enrolled and compensated for their time with a gift of food and personal hygiene products valued at 200 roubles (approximately US\$7.00). Participation was anonymous. A study code that could not be linked to any identifiable information was given to participants to allow them obtain test results. Ethical approval was obtained from the institutional review boards at St. Petersburg State University and Yale University.

Participants completed an interviewer-administered questionnaire in a private space at offices of the regional AIDS Center or harm reduction organization. The questionnaire was adopted from instruments used by the authors in past studies conducted in Russia (Niccolai et al., 2010; Tun et al., 2007) and included questions about sociodemographic variables, social support measures (Lubben et al., 2006), current and past drug use including alcohol, and sexual behavior. We included social support variables in this analysis because we had a priori knowledge that social support may be an important factor in maintaining a low level of alcohol consumption among problem drinkers (Humphreys et al., 1995; Macdonald, 1987; Rumpf et al., 2002). We hypothesized that being a member of a larger support network would be protective against moderate/heavy alcohol consumption. We used the 6-item Lubben Social Network Scale (LSNS-6; Lubben et al., 2006) which is a validated 6-item scale to assess social isolation and support with the sum of scores ranging from 0 to 30. Sample questions include “How many relatives do you see or hear from at least once a month?” and “How many relatives do you feel close to such that you could call on them for help?” The Cronbach’s alpha was greater than 0.7 for both cities, suggesting acceptable internal consistency. Scores were dichotomized at the clinical cutoff score 12 (Lubben et al., 2006).

2.2. Alcohol Measures

Information was collected on frequency and amount of alcohol consumed in the past 12 months. Categories for frequency of drinking included not at all, 1 day per month, 2–4 days per month, 2–3 days per week, 4 days per week. The latter two categories were combined for analysis because of the low percentage of participants who reported drinking more than four times per week. On the low end of the scale, responses for amount of alcohol consumed included one bottle of beer, one glass of wine, or two shots of vodka (or other liquor). The upper bound of alcohol consumption was drinking more than 6 – 9 bottles of

beer or a bottle of wine, or more than half of a bottle (0.7 L) of liquor. Moderate/heavy drinkers were defined as those who drank at least 2–3 times per week and at least 2 bottles of beer, 2–3 glass of wine, or 3–4 shots of liquor at each drinking occasion. These amounts are consistent with established measures from the CDC and USDHHS (Centers for Disease Control, 2012; Department of Health and Human Services, 1990). The composite outcome measure was dichotomized into moderate/heavy drinkers versus non-moderate/heavy drinkers. Due to potential underlying sociodemographic differences between drinkers and abstainers, this analysis was restricted to only IDUs who had ever consumed alcohol. The CAGE screening questionnaire consisting of four items (cutting down, annoyed, guilty, eye-opener) was administered, and a score of greater than or equal to two was used as an indicator of potential alcoholism.

2.3. HIV and HCV serotesting

Venous blood specimens were drawn and tested for antibodies to HIV and HCV at the regional AIDS and Infectious Disease Center using standard primary and confirmatory tests used by all Russian AIDS Centers (Shaboltas et al., 2006; Smolskaya et al., 2006). Anti-HCV screening was performed according to the manufacturer's instructions (Vector-Best, Russian Federation). All positive samples were confirmed by immunoblot.

2.4. Statistical analyses

Given the socioeconomic differences between Novosibirsk and Ivanovo, analyses were stratified by city. Socio-demographic variables were collapsed into meaningful categories or split at the median. We used the Pearson chi-square test or Fisher's exact test to analyze the association between sociodemographic categorical variables and being a moderate/heavy drinker. We identified significant correlates of moderate/heavy drinking by calculating all unadjusted odds ratios and 95% confidence intervals and p-values (if <0.1). Multivariate logistic regression models adjusted for possible confounders. All variables associated with moderate alcohol use that had p-values <0.1 were entered into the logistic regression model. Stepwise backward selection of all variables was conducted until the most parsimonious model resulted where all covariates were statistically significant (p-value <0.05). Kappa statistics measured agreement between self-reported HCV status and HCV serotesting results. All statistical analyses were performed using SAS version 9.2.

3. RESULTS

3.1. Sample characteristics

A total of 593 eligible participants were enrolled in the study, 98% of whom (n=584) had ever consumed alcohol and were included in this analysis. Socio-demographic characteristics, drug and sex risk behaviors, social support, HIV and HCV serostatus, and alcohol use are presented in Table 1. The sample in both cities was predominantly male (68% in Novosibirsk and 76% in Ivanovo). Over 60% of the respondents in both cities reported being employed, however only 23% in Novosibirsk and 30% in Ivanovo reported being formally, regularly employed. On average, IDUs in Ivanovo had been injecting drugs longer than IDUs in Novosibirsk. Almost all IDUs in both cities reported injecting heroin in the past 30 days (99% in both cities) and a higher proportion of IDUs in Ivanovo reported injecting poppy straw and methamphetamines in the past 12 months. Additionally, 33% of IDUs in Ivanovo and 7% of IDUs in Novosibirsk reported experiencing an overdose in the past 12 months. No IDUs in Ivanovo reported selling sex for money or drugs while 11% of IDUs in Novosibirsk, 10% of whom were male, reported doing so.

More than one-third of IDUs in Ivanovo were HIV-positive and 45% were HCV-positive. Nearly one-fifth of the IDUs in Ivanovo were co-infected. Four percent of IDUs in

Novosibirsk tested positive for HIV, yet 54% were HCV positive. All HIV-positive IDUs were co-infected with HCV.

3.2. Alcohol frequency and consumption

The distribution of alcohol frequency and consumption is found in Table 2. Overall, IDUs in Novosibirsk drank more frequently in the past 12 months than IDUs in Ivanovo (p-value <0.01). Using the composite measure of frequency and amount of alcohol consumed, 29% of IDUs in Novosibirsk and 35% of IDUs in Ivanovo were categorized as moderate/heavy drinkers.

3.3. Problem drinking and CAGE screening questionnaire

In both cities, more than 50% of the sample reported family conflict due to drinking (Figure 1). More than 40% of IDUs in both cities reported problems at work or school and absenteeism from job or school due to alcohol. Twenty two percent of the IDUs in Novosibirsk and 25% of IDUs in Ivanovo reported both being detained by police and experiencing health problems due to their alcohol use.

Figure 2 shows the proportion of IDUs responding “Yes” to any of the questions from the CAGE screening questionnaire. More than 30% of IDUs in Ivanovo and more than 20% in Novosibirsk responded “Yes” to at least 2 questions in the CAGE screening questionnaire (p-value = 0.003).

3.4. Correlates of moderate/heavy drinking

Significant correlates of moderate/heavy drinking in Novosibirsk included injection of methamphetamines in the past 12 months (aOR = 5.63 95% CI: [1.01–31.47]) and belonging to formal/informal associations or societies [aOR=3.75 95% CI (1.26–11.23)] (Table 3). In Ivanovo, the correlates of moderate/heavy drinking in the adjusted analysis were injection of methamphetamines in the past 12 months (aOR = 3.81 95% CI [2.20–6.62]), being single (aOR = 2.42 95% CI [1.33 – 4.36]), being male (aOR= 3.25 95% CI [1.59–6.64]), and younger than 25 years of age (aOR=2.05 95% CI [1.16–3.62]).

3.5. Knowledge of HCV status and association with alcohol use

Knowledge of correct HCV status was low in both cities. Less than half (45%) of IDUs in Novosibirsk correctly stated their HCV status (i.e. people who tested positive and stated being positive and people who tested negative and stated they were negative). Forty four percent of IDUs who believed they were HCV negative were positive. In Ivanovo, 65% of respondents correctly stated their HCV status, however 29% of respondents who believed they were HCV negative were indeed positive. The kappa statistics to assess agreement between self-reported HCV status and serotest results in Novosibirsk and Ivanovo were –0.05 and 0.26 respectively.

To examine the association of HCV status knowledge with drinking behaviors models were run for each city that were adjusted for sociodemographic covariates (age, sex, employment status, and marital status) (Table 4). In Novosibirsk, moderate/heavy drinkers who said they were positive for HCV but actually tested negative were 75% less likely [95% CI: 0.09–0.76] to be a moderate/heavy drinker compared to HCV positive IDUs who correctly knew that they were positive (referent group). IDUs who correctly knew that they were HCV negative were 16% less likely to be moderate/heavy drinkers compared to the referent group, however this finding was not statistically significant. In Ivanovo, IDUs who correctly knew that they were HCV negative were 1.38 times [95% CI 1.01–1.87] as likely to be a moderate/heavy drinker compared to IDUs who correctly knew that they were HCV positive.

4. DISCUSSION

This study is the first to describe alcohol use among IDUs in Russia who are at high risk for HCV and HIV. We found that problems related to alcohol use affected a large percentage of respondents' social, physical, and financial lives in Ivanovo and Novosibirsk, many of whom who were also infected with chronic blood-borne pathogens. More than 25% of IDUs in both cities had CAGE scores of at least two or greater, which has been shown to be highly predictive of lifetime alcohol related problems (Buchsbaum et al., 1991; Bush et al., 1987). Moreover, in this study only 12% of IDUs had not consumed alcohol in the past 12 months compared to studies published in the US and UK where 27% and 37% had not consumed alcohol in the past 12 months respectively (Campbell et al., 2006). This may suggest that IDUs in Russia drink more frequently, which is problematic given the high likelihood for HCV infection and the deleterious effects of drinking and HCV on the liver. Additionally, we found that over 25% of participants in both cities were moderate/heavy drinkers, which is consistent with findings in the US and UK that excessive drinking is common among IDUs (Campbell et al., 2006; O'Leary et al., 2012; Stein et al., 2000). Further, alcoholism was detected in over 75% of patients in methadone maintenance treatment (Teplin et al., 2007), as well as a high prevalence of alcohol abuse (Ottomanelli, 1999). However, a systematic review by Srivastava and colleagues suggested inconsistent findings regarding excessive alcohol consumption among patients in methadone maintenance treatment, which may have been attributed to heterogeneity of the studies included in the study (Srivastava et al., 2008).

We found several significant correlates of moderate/heavy drinking related to socio-demographic factors. In Ivanovo we found that being male, single, and of younger age were associated with an increased odds of being a moderate/heavy drinker. These findings are in line with previous studies that examined correlates of nationwide levels of drinking in Russia (Pomerleau et al., 2005; Stack and Bankowski, 1994; Vannoy, 1999; Zaridze et al., 2009). On the other hand, in Novosibirsk we found that unemployment status was the only marginally significant socio-demographic correlate associated with an increased likelihood of being a moderate/heavy drinker. While not significant in this adjusted analysis, unemployment status has been previously shown to be an important determinant of dangerous alcohol consumption in Russia (Cook et al., 2011; Tomkins et al., 2007).

Injection of methamphetamines in the past 12 months was a strong and significant correlate of moderate/heavy drinking in both cities. This finding is consistent with several studies in the United States on the positive association between methamphetamine use and alcohol intoxication (Furr et al., 2000; Nyamathi et al., 2008), however it has not been thoroughly investigated in Russia. Methamphetamine-like drugs are the most common type of stimulant in Russia and have been linked to behaviors that increase the likelihood of sexual transmission of HIV (Abdala et al., 2008). Methamphetamine use was more prevalent in Ivanovo than in Novosibirsk and the prevalence of HIV among IDUs in Ivanovo is much greater than in Novosibirsk, where the epidemic is in a more nascent stage (Pokrovsky et al., 2011). The strong association between moderate/heavy alcohol use and methamphetamine injection found in this study raises concerns due to both substances being independently associated with the transmission of HIV and other sexually transmitted infections (Fisher et al., 2007; Kalichman et al., 2007; Kozlov et al., 2006; Patterson et al., 2008). Since many IDUs in Russia are already infected with HCV, co-infection with HIV may greatly increase liver damage among IDUs who drink alcohol (Pol et al., 1998). According to the United Nations Office on Drugs and Crime, methamphetamine use is an important concern in Russia and the association between methamphetamine use and alcohol among IDUs in Russia should continue to be explored (United Nations Office on Drugs and Crime, 2005).

Our findings pertaining to the social support measures were contrary to our hypotheses. In Novosibirsk, members of a club or group with similar interests were almost four times more likely to be moderate/high drinkers than those who were not, which was significant in our adjusted analysis. While we did ask about membership to specific types of clubs or groups, the number of respondents who were members for each specific group was too low to draw any meaningful conclusions. While we found a statistically significant association in the univariate analysis for the social support scale only in Ivanovo, the overall trend suggested that having a smaller perceived social network had a protective effect with respect to being a moderate/heavy drinker. Although reasons for drinking were not elucidated in this study, this finding is consistent with emotion regulation theory (Cooper et al., 1995). This theory describes the processes that concern the initiation, continuance, and variation of one's response to positive and negative emotions (Grolnick et al., 1996). It is possible that in this sample, drinking could be explained by coping with negative emotions as opposed to social motives (Cooper et al., 1995). Since we did not ascertain information on the strength of these ties, future studies are warranted to examine the role of peer influence on alcohol consumption.

Overall, knowledge of HCV self-reported status and serostatus concordance was poor in both cities. By comparison, a recent study published in Luxembourg the agreement between self-reported HCV status and serotest results was $\kappa = 0.65$ (Origer and Schmit, 2012). In an Australian study, 80% of IDUs in a cohort correctly knew their HCV status (O'Keefe et al., 2012). On the other hand, the low HCV status/self-reported agreement we observed was similar to other studies in Scotland (O'Leary et al., 2012) and the United States (Akselrod et al., 2013; Hagan et al., 2006). In Novosibirsk, respondents' knowledge of their actual HCV status was worse than predicted by chance alone as reflected by the negative kappa statistic. In Novosibirsk IDUs tended to drink more if they knew that they were HCV positive. The converse was found to be true in Ivanovo where IDUs had better knowledge of their HCV status than IDUs in Novosibirsk but it was still poor. Moreover, we found that IDUs who were positive for HCV and correctly knew their status were significantly less likely to be moderate/heavy drinkers than IDUs who misreported their HCV status and those who correctly identified being HCV negative. This could be attributed to IDUs in Ivanovo being older than IDUs in Novosibirsk and having more interactions with medical professionals, which would lead to more opportunities to be tested for HCV. However, there are no published guidelines that instruct physicians to caution HCV-infected patients to eliminate or reduce their alcohol consumption and there have been no published studies examining whether clinicians in Russia routinely advise their patients with HCV to abstain from alcohol use in order to prevent liver disease progression. Unfortunately, access to health care, receipt of HCV counseling, and knowledge of the dangers of alcohol use if infected with HCV were not captured in the survey. We also did not investigate whether testing was routine or voluntary, which may also explain why the two cities differed with respect to HCV knowledge.

4.1 Limitations and strengths

Due to the cross-sectional design of the study, it is not possible to discern the causality of associations. We cannot say whether correctly knowing one's HCV diagnosis influenced the frequency and amount of alcohol consumed. Further, we do not know whether injecting methamphetamines promoted consumption of alcohol or vice versa, although one can speculate that the central nervous system depressant effects of alcohol might offset the stimulation produced by amphetamines allowing individuals to sleep (Kirkpatrick et al., 2012). Additionally, the number of IDUs who injected methamphetamines in Novosibirsk was small which resulted in a wide confidence interval in the adjusted analysis, thus some caution is warranted in interpreting this association.

Because no known sampling frame for an out-of-treatment population of people who inject drugs exists, our sampling was not random. Thus, the generalizability of the findings to all IDUs in each city may be limited since we used RDS to obtain a convenience sample of a hard to reach population. We are limited in making any inferences for the entire population due to this being a non-probability sample. Despite this, this study is the first to evaluate alcohol use among a large number of non-hospitalized IDUs in Russia and suggests avenues for future research and intervention to reduce the negative health consequences faced by the target population.

4.2 Conclusions

Overall, we found high burden of alcohol related problems and high prevalence of blood-borne diseases, especially HCV, among IDUs in two large Russian cities. Our findings highlight the need to test IDUs for HCV and inform those found to be infected of the risk for liver disease. The need is even more acute for those co-infected with HIV, since the two infections can produce more rapid and severe liver disease than HCV alone. Interventions are clearly needed to limit alcohol use among IDUs in Russia, especially those who are infected with HCV or co-infected with HIV. To date, the number of interventions targeting alcohol use reduction or cessation among HCV positive IDUs is limited, however one behavioral counseling intervention found a modest reduction in liver enzymes among HCV positive IDUs (Drumright et al., 2011). Future interventions to prevent alcohol related complications should include increased testing of HCV to promote better knowledge of HCV status, counseling on the dangers of alcohol use among HCV positive IDUs in Russia, antiviral treatment to reduce HIV viremia, and efforts to motivate and assist IDUs to reduce or eliminate alcohol consumption in order to avert the progression of liver complications, such as fibrosis, cirrhosis, and hepatocellular carcinoma.

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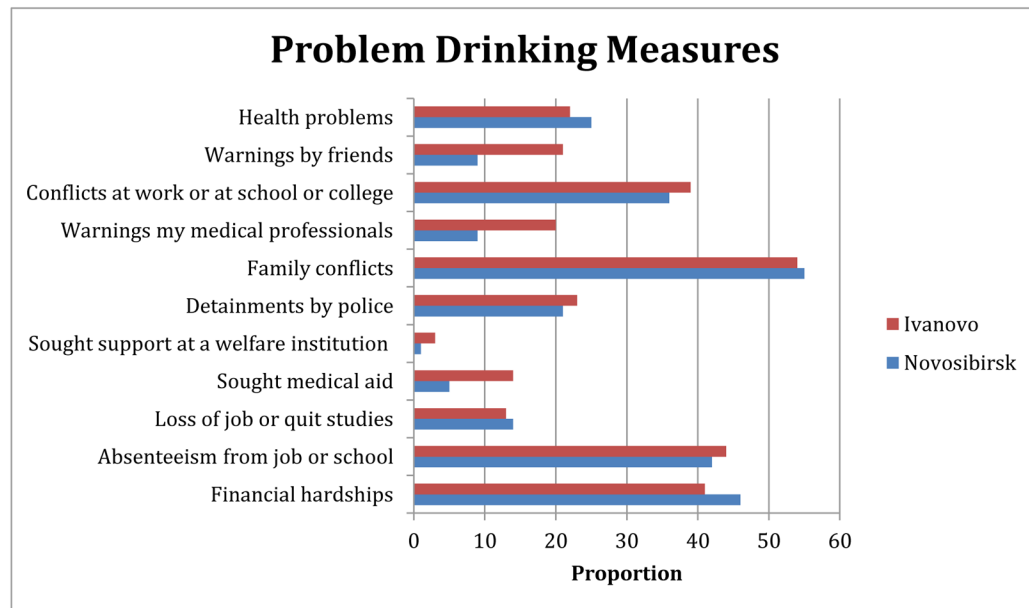


Figure 1.
Frequency of various problems associated with problem drinking

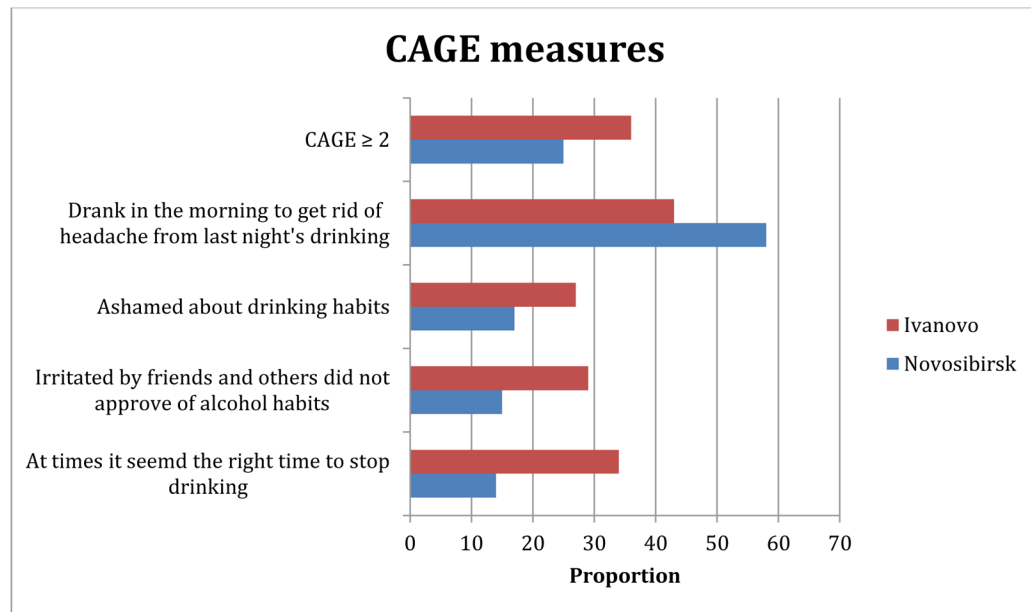


Figure 2.
Frequency of responses to CAGE questionnaire

Table 1

Characteristics of IDUs who had not abstained from alcohol use

	Novosibirsk N=285 (%)	Ivanovo N=299 (%)	p-value
SOCIODEMOGRAPHICS			
Sex			0.04
Male	194 (68)	226 (76)	
Female	91 (32)	73 (24)	
Age			
25	162 (57)	150 (50)	0.11
>25	123 (43)	148 (50)	
Education			0.01
Secondary or less	235 (83)	221 (74)	
At least University degree	48 (17)	76 (26)	
Marital status			0.41
Married or living with partner	101 (35)	115 (39)	
Single	184 (65)	182 (61)	
Currently Employed			0.09
Yes	197 (69)	187 (63)	
No	88 (31)	112 (37)	
DRUG/SEX RISK BEHAVIORS			
Duration of injecting drugs (years)			<.01
5	198 (70)	121 (41)	
>5	86 (30)	176 (59)	
Injected opium/poppy straw in past 12 months			<.01
Yes	96 (34)	199 (67)	
No	189 (66)	100 (33)	
Injected methamphetamines in past 12 months			<.01
Yes	6 (2)	96 (32)	
No	279 (98)	203 (68)	
Ever experienced overdose in past 12 months			<.01
Yes	20 (7)	98 (33)	
No	258 (93)	196 (67)	
Exchanged sex for money or drugs in past 12 months			<.01
Yes	31 (11)	0 (0)	
No	247 (89)	294 (100)	
SOCIAL SUPPORT			
Member of any formal/informal society/association based on common interests, problems, entertainment habits			0.07
Yes	14 (5)	26 (9)	
No	269 (95)	268 (91)	

	Novosibirsk N=285 (%)	Ivanovo N=299 (%)	p-value
LSNS-6 Score			0.35
12	153 (51)	149 (50)	
>12	132 (49)	150 (50)	
HIV AND HCV STATUS			
HIV			<.01
Positive	11 (4)	102 (34)	
Negative	274 (96)	197 (66)	
HCV			0.02
Positive	154 (54)	132 (44)	
Negative	131 (46)	167 (56)	
HIV/HCV co-infection			<.01
Yes	11 (4)	57 (19)	
No	274 (96)	242 (81)	

Table 2

Frequency and consumption of alcohol

	Novosibirsk N=285 (%)	Ivanovo N=299 (%)	p-value
Frequency of alcohol in past 12 months			<.01
None	12 (4)	52 (18)	
One time per month or less	34 (13)	33 (11)	
Two-four times a month	122 (45)	95 (32)	
At least two-three times a week	104 (38)	115 (39)	
Amount consumed when drinking alcohol			0.05
1 bottle of beer or 1 glass of wine, or 2 shots of liquor, or less	69 (24)	100 (34)	
1.5 – 2 bottles of beer or 2 – 3 glasses of wine, or 3 – 4 shots of liquor	103 (36)	100 (34)	
3 – 5 bottles of beer or a big bottle (0.7 L) of wine, or more than half of a bottle (0.7) of liquor	79 (28)	69 (24)	
More than 6 – 9 bottles of beer or a big bottle (0.7 L) of wine, or more than half of a bottle (0.7 L) of liquor	32 (11)	23 (8)	
Moderate/heavy drinking composite measure			0.13
Yes	78 (29)	101 (35)	
No	192 (71)	189 (65)	

Table 3

Correlates of moderate/heavy drinkers

	Novosibirsk		Ivanovo	
	Moderate/heavy drinkers (%)	Univariate OR (95% CI)	Adjusted OR (95% CI)	Moderate/heavy drinkers (%)
SOCIODEMOGRAPHICS				
Sex				
Male	52 (29)	0.97 (0.56–1.71)		87 (40)
Female	26 (29)	Ref		14 (20)
Age				
25	44 (30)	1.07 (0.63–1.82)		62 (43)
>25	34 (28)	Ref		39 (27)
Education				
Secondary or less	60 (27)	0.63 (0.33–1.20)		79 (37)
At least University degree	18 (38)	Ref		20 (27)
Marital status				
Single	47 (27)	0.76 (0.44–1.31)		76 (43)
Married or living with partner	31 (33)	Ref		25 (22)
Currently Employed				
No	30 (36)	1.64* (0.94–2.86)		34 (32)
Yes	48 (26)	Ref		67 (37)
DRUG/SEX RISK BEHAVIORS				
Duration of injecting drugs (years)				
5	47 (25)	0.58* (0.33–1.01)		47 (41)
>5	31 (37)	Ref		54 (31)
Injected opium/poppy straw in past 12 months				
Yes	30 (33)	1.38 (0.79–2.38)		72 (37)

	Novosibirsk		Ivanovo		Adjusted OR (95%CI)	Univariate OR (95%CI)	Adjusted OR (95%CI)
	Moderate/heavy drinkers (%)	Univariate OR (95%CI)	Moderate/heavy drinkers (%)	Univariate OR (95%CI)			
No	48 (27)	Ref	29 (31)	Ref			
Injected methamphetamines in past 12 months							
Yes	4 (67)	5.13* (0.92–28.63)	53 (56)	3.87*** (2.30–6.50)	5.63** (1.01–31.47)	3.81*** (2.20–6.62)	
No	74 (28)	Ref	48 (25)	Ref			
Ever experienced overdose in past 12 months							
Yes	6 (33)	1.24 (0.45–3.43)	36 (38)	1.24 (0.74–2.07)			
No	71 (29)	Ref	64 (33)				
Exchanged sex for money or drugs in past 12 months							
Yes	12 (41)	1.92 (0.87–4.24)	--	--		--	
No	63 (27)	Ref	--	--		--	
SOCIAL SUPPORT							
Member of any formal/informal society/association based on common interests, problems, entertainment habits							
Yes	8 (57)	3.58** (1.20–10.68)	12 (50)	1.97 (0.85–4.56)	3.75** (1.26–11.23)		
No	69 (27)	Ref	88 (34)	Ref			
LSNS-6 Score							
12	35 (28)	0.89 (0.52–1.50)	42 (29)	0.61** (0.37–0.98)			
>12	43 (30)	Ref	59 (40)	Ref			
HIV AND HCV STATUS							
HIV							
Positive	4 (36)	1.43 (0.41–5.03)	35 (36)	1.09 (0.65–1.81)			
Negative	74 (29)	Ref	66 (34)	Ref			

	Novosibirsk			Ivanovo		
	Moderate/heavy drinkers (%)	Univariate OR (95% CI)	Adjusted OR (95% CI)	Moderate/heavy drinkers (%)	Univariate OR (95% CI)	Adjusted OR (95% CI)
HCV serostatus						
Positive	38 (26)	0.74 (0.44–1.25)		38 (30)	0.68 (0.41–1.10)	
Negative	40 (32)	Ref		63 (39)	Ref	
HCV (self-report)						
Positive	22 (37)	1.57 (0.86–2.89)		14 (24)	0.55* (0.29–1.08)	
Negative	56 (27)	Ref		79 (36)	Ref	

* P<0.1

** P<0.05

*** P<0.01

Table 4
Bivariate analysis between moderate/heavy drinkers and HCV (serostatus/self-report)

	Moderate/heavy drinkers in Novosibirsk			Moderate/heavy drinkers in Ivanovo		
	Yes N (%)	No N (%)	aOR [†] (95% CI)	Yes N (%)	No N (%)	aOR [†] (95% CI)
HCV (-/-)	30 (33)	61 (67)	0.84 (0.60 – 1.19)	52 (38)	84 (62)	1.38 ^{*‡} (1.01 – 1.87)
HCV (-/+)	10 (31)	22 (69)	0.69 (0.38 – 1.23)	6 (33)	12 (67)	1.49 (0.77 – 2.89)
HCV (+/-)	26 (22)	91 (78)	0.25 [*] (0.09–0.76)	27 (33)	54 (67)	2.25 (0.82 – 6.2)
HCV (++)	12 (43)	16 (57)	Ref	8 (20)	32 (80)	Ref
	HCV serostatus/self-report agreement: = -0.05			HCV serostatus/self-report agreement: = 0.26		

^{*} p-value < 0.05
[†] adjusted for sex, age, employment status, and marital status
[‡] Interpretation: IDUs with HCV negative serostatus/negative self-report were 1.38 times as likely to be a moderate/heavy drinker compared to HCV positive serostatus/positive self-report
^{*} P<.05