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Alcohol Use and HIV Risk within Social Networks of MSM Sex Workers in the Dominican Republic

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Abstract

To examine how alcohol-related HIV risk behaviors within MSM sex workers' social networks (SN) may be associated with individual risk behaviors, respondent-driven and venue-based sampling were used to collect demographic, behavioral and SN characteristics among MSM sex workers in Santo Domingo and Boca Chica (N=220). The majority of participants reported problem drinking (71.0%) or alcohol use at their last sexual encounter (71.4%). Self-reported problem drinking was associated with SN characteristics (at least one member who recently got drunk aOR=7.5, no religious/spiritual adviser aOR=3.0, nonsexual network density aOR=0.9), while self-reported alcohol use at last sex was associated with individual (drug use at last sex aOR=4.4) and SN characteristics (at least one member with previous HIV/STI testing aOR=4.7). Dominican MSM sex workers reported high alcohol use, which may increase their risk for HIV. A better understanding of SN factors associated with individual risk behaviors can help guide appropriate intervention development.

Keywords

Alcohol use; Human Immunodeficiency Virus; social networks; sex work; Dominican Republic

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INTRODUCTION

HIV/AIDS in the Dominican Republic (DR) continues to be an important public health issue. Although overall HIV prevalence in the DR declined from 1.0% in 2002 to 0.8% in 2013 (1, 2), certain population groups remain disproportionately affected. The 2013 National DR Health Survey, Encuesta Demográfica y de Salud, reports that while HIV prevalence among women decreased from 0.8% in 2007 to 0.7% in 2013, HIV prevalence among men increased from 0.8% in 2007 to 0.9% in 2013 (2). Moreover, men who have sex with men (MSM) in the DR have an estimated HIV prevalence of 5% (3), with some studies reporting HIV prevalence as high as 11% (4, 5). Additionally, while only accounting for 4.5% of the DR's total population (3), MSM made up roughly a third of new HIV infections in 2010 (6).

The relatively high HIV prevalence in the DR among MSM is associated, in part, with the country's sex tourism industry (7–9). The social context created by tourism and the proliferation of alcohol venues facilitates excessive alcohol use and encourages binge drinking among tourists and local residents (7, 8). According to the World Health Organization, pure alcohol consumption increased in the DR from 1.18L per person per year in 1961 to 6.90L per person per year in 2010 (8, 10). MSM who engage in sex work with male clients (also known locally as *bugarrones* and *sanky pankies*) experience greater risk for alcohol abuse and HIV acquisition given their ongoing exposure to and involvement in the tourism economy and associated transactional sex. Furthermore, male sex workers are oftentimes burdened by financial vulnerability in addition to their participation in highly stigmatized sexual behaviors, which have been associated in prior research with decreased access to HIV prevention services and increased HIV risk behaviors such as alcohol and drug use (9, 11–16).

Systematic reviews of event-level alcohol use and sexual risk behaviors among MSM consistently demonstrate the positive association between alcohol use before or during sex and HIV risk behaviors (17, 18). One US study involving 1,712 MSM, in particular, highlights that this relationship also differs by sexual partner type, with sexual encounters involving non-primary partners being twice as likely to involve alcohol use compared to those that involved primary partners (19). Furthermore, having four or more drinks in a single drinking episode with non-primary sexual partners tripled the likelihood of engaging in unprotected anal sex (19). Studies conducted in the DR, Kenya and Vietnam among MSM sex workers, specifically, link alcohol use to risky sexual behaviors, including inconsistent condom use and unprotected anal sex (15, 20–24).

Culturally tailored interventions to address problem drinking and HIV risk reduction inadequately recognize alcohol use as a social phenomenon – an individual behavior that often occurs within a person's social network. For example, individuals who have at least one other member in their social network who is a heavy drinker significantly increases their likelihood of drinking heavily as well (25, 26). Studies in the US and Canada have found that drinking alone is often taboo and drinkers tend to cluster together in groups, with some variation in cluster membership associated with interpersonal characteristics such as income and education (27, 28).

Social epidemiological theoretical perspectives help explain the link between alcohol use and HIV risk at the social network and individual levels. Berkman and Glass (2000) suggest that social networks operate at the behavioral level through primary pathways, which include social influence and access to resources and material goods (29). Social influence is particularly important for drinking behavior and other risky behaviors since individuals often adopt behavioral norms by comparing their attitudes with those of their peers, with shared attitudes being confirmed and reinforced and aberrant ones being changed or challenged (29). This framework also suggests that access to alcohol contributes to the likelihood of participating in alcohol-related HIV risk behaviors (29). Previous research also suggests the influence of individual characteristics on problem drinking and other alcohol-related HIV risk behaviors, including age (30), sexual orientation (28, 31, 32), having children (33, 34), socioeconomic status (32, 35, 36), drug use (32), and mental health (28, 32, 37).

Despite the importance of understanding alcohol use and HIV risk in relation to social context, limited research specifically examines problem drinking and sexual risk behaviors involving alcohol in relation to social network characteristics among MSM sex workers. Additionally, previous research involving sex workers in the DR have tended to focus on the experiences of female sex workers and less so on male sex workers (38–42). The current study aims to identify important individual and social network correlates of self-reported problem drinking and alcohol use before or during last sex among MSM sex workers in the DR. We hypothesize that individuals whose social networks support excessive drinking behavior will be more likely to participate in behaviors that put them at greater risk for HIV (i.e., self-reported problem drinking, alcohol use before or during sex) compared to those who do not. Similarly, those with greater access to alcohol, either through their own income or through their social network members who may have the financial resources to provide alcohol, will be more likely to demonstrate these alcohol-related HIV risk behaviors.

METHODS

Study Participants

Recruitment took place in Santo Domingo, the capital of the DR, and Boca Chica, a popular tourism beach town just outside of the capital, from June 2015 to August 2015. Participants were eligible if they were born male and male-identified, at least 18 years of age, able to speak and understand Spanish, a resident of either Santo Domingo or Boca Chica, reported having transactional oral or anal sex with a man in the past six months, and reported receiving goods or money in exchange for sex. Respondent-driven and venue-based sampling techniques were used to reach members of this hidden and often stigmatized population, as has been done in previous research (43–45). Trained research staff administered an egocentric social network interview (SNI), an in-person survey of demographic and behavioral characteristics, and a rapid oral HIV test upon obtaining informed consent from interested participants. Formative research and input from in-country partners were used to develop and refine survey instruments to ensure effective implementation among our intended population. Each participant received a cash incentive of $RD 500 (i.e., approximately $US 10) for their time, irrespective of successful completion of all study components. A total of 233 men expressed interest in the study, of

which 228 were screened, 222 were eligible and 220 consented to participate in the study. The research received Institutional Review Board and Ethics Board approvals from the UCLA North General IRB and the Comité de Ética de la Universidad Autónoma de Santo Domingo.

Measures

Primary outcomes were self-reported problem drinking and alcohol use two hours prior to or during their last sexual encounter with either a male or female partner in the last six months. Self-reported problem drinking was defined as having six or more standard drinks in one day in the past 30 days, as has been done by the World Health Organization (46). Participants were asked a series of questions regarding their alcohol use, including ever drinking alcohol and, if so, whether they drank any alcohol in the past three months. Among those who drank any alcohol in the past three months, additional questions were asked regarding the number of days they drank alcohol in the past 30 days and how many alcoholic drinks they would have on a typical day of drinking. Raw responses from these questions were then standardized and converted into pure alcohol content and number of standard drinks consumed in a day using recommendations set forth by the International Center for Alcohol Policies (ICAP) (47). An indicator variable (Yes/No) was used to assess self-reported alcohol use two hours prior to or during the participant's last sexual encounter with either a male or female partner in the last six months, where a sexual encounter was defined as having oral, anal or vaginal sex with ejaculation with or without a condom.

Participants were also asked about their age, sexual orientation, whether they had children, socioeconomic status (e.g., maximum monthly income, whether sex work was their main source of income), and sexual HIV risk behaviors (i.e., whether they received money or some other goods in exchange for their last sexual encounter with a male or female partner in the past six months and whether they or their last sex partner had used any drugs prior to or during their sexual encounter in the past six months).

Self-reported mental health was also assessed using the 12-item Short Form Health Survey (SF-12), which is a validated measure of health status (48). It is the abbreviated form of the 36-item Short Form Health Survey (SF-36), which has been evaluated in over 30 countries (49). The Mental Component Summary (MCS-12) was computed using the algorithm described by Ware and colleagues (48). Lower scores indicate poorer functioning (48).

The social network interview (SNI) was used to assess characteristics of participants' social networks, which included social network structure (i.e., social network size – the number of individuals within each participant's social network, and social network density – the proportion of all theoretically possible ties [or connections] between individuals within a participant's social network that are actual ties). Density is often used as a proxy for social cohesion (50–52). Measures of social network composition included demographic characteristics (e.g., relation to the participant), substance use (e.g., whether a social network member got drunk with the participant in the past month and whether a social network member had used any drugs, such as marijuana, methamphetamine, heroin, cocaine, crack or ecstasy, in the past month), socioeconomic status (e.g., whether a social network member works at least part-time), and risk and protective behaviors (e.g., ever got tested for HIV or

some other STI). We operationalized social network structure through non-sexual social network size and non-sexual social network density. We operationalized social influence through the presence of at least one social network member who got drunk with the participant in the past month; used any illicit drugs in the past month; ever got tested for HIV or some other STI; is a social worker, doctor, or agency employee or volunteer; or is a religious or spiritual adviser. As a proxy for access to alcohol at both the individual and social network levels, we used socioeconomic status of the individuals and their social network members since previous research has suggested a positive relationship between alcohol use and socioeconomic status (53, 54).

Analyses

Bivariate tests of association (i.e., Chi-square, Wilcoxon-Mann-Whitney, and Fisher's exact tests) were used to identify potentially important correlates of self-reported problem drinking and alcohol use prior to or during last sex at an alpha level of 0.05. To account for multiple comparisons, an adjustment technique described by Benjamini and Hoschberg was applied. This procedure allowed us to limit the number of Type I errors (i.e., false positives) by reducing the false discovery rate (55). Multivariable logistic regressions were used to determine significant demographic and social network correlates of the primary outcomes after adjusting for covariates. To ease the interpretation of our multivariable results, the non-sexual density measure was rescaled by multiplying the original measure by 100. When more than one variable could be used to represent a certain construct within our conceptual framework for alcohol-related HIV risk behaviors, we used bivariate results between similar variables to narrow the number of variables included in our final set of analyses.

RESULTS

Descriptives

Tables 1 and 2 provide descriptive characteristics of the participants and their social networks. Nearly three-quarters of the sample met criteria for self-reported problem drinking (71.0%) and reported using alcohol two hours before or during their last sexual encounter (71.4%). The average age of participants was approximately 28 years old (SD=8.1), with the youngest participant being 18 and the oldest being 57. Most participants identified as bisexual (80.7%). Nearly half reported having children (47.0%). The average maximum monthly income in $US was about $422.46 (SD=$337.66), with half of the sample reporting that sex work was their main source of income (50.0%). The average self-reported mental health score was 52.7 (SD=9.4), with a range of 23.3 to 67.7 where lower scores indicate poorer functioning (48).

Nearly three-quarters of participants reported ever getting tested for HIV (72.2%), with more than a third of those recently tested within the last three months (37.7%). STI testing was less common (18.1%) despite high numbers of sex partners (male and female) in the past six months (M=19.4, SD=26.8). Nearly all participants reported receiving money or something else in exchange for sex with their last sex partner (male or female) (94.1%). Over a third (36.4%) reported using any drugs before or during their last sexual encounter (by either the participant himself or his sex partner at the time). Almost all participants reported that their

last sex partner was HIV-negative or that they did not know their status (99.1%), with 59.6% reporting that their last sex partner was HIV-negative and 39.6% not knowing the HIV status of their last sex partner. Among those who agreed to complete the rapid oral HIV test at the end of the study (or self-report their positive status), about 5.0% (n=10) of the sample tested positive for HIV.

On average, participants had a non-sexual network size of 4.7 individuals (SD=0.9) and non-sexual network density of 0.6 (SD=0.4) (i.e., within participants' non-sexual social networks, 60% of all possible social ties/connections had occurred). Many participants included at least one family member (61.9%), non-sexual friend (82.1%), sexual client (77.1%), or non-client sexual partner (88.1%) in their social network. Most participants also had at least one person in their social network who worked full-time or part-time (87.4%), got drunk with them in the past month (83.3%), or ever got tested for HIV or some other STI (64.7%). Less than half of participants included at least one person who was a social worker, doctor or agency employee or volunteer (41.2%); religious or spiritual adviser (36.1%); or had used any illicit drugs (i.e., marijuana, methamphetamine, heroin, cocaine, crack or ecstasy) in the past month (49.1%).

Bivariate Analyses

Tables 3 and 4 present bivariate tests between individual- and social network-level characteristics and the two alcohol-related HIV risk behaviors (i.e., self-reported problem drinking and self-reported alcohol use two hours before or during their last sexual encounter with either a male or female sex partner in the past six months). Bivariate tests indicated that none of the individual characteristics were associated with self-reported problem drinking. The social network characteristics that were significantly associated with self-reported problem drinking included having at least one social network member who was a religious or spiritual adviser, worked full-time or part-time, and got drunk with the participant in the past month. Greater percentages of those reporting problem drinking included at least one social network member who worked full-time or part-time (92.7% vs. 81.6%, $p=0.03$), got drunk with him in the past month (92.7% vs. 70.0%, $p<0.001$), and was not a religious or spiritual adviser (73.2% vs. 54.0%, $p=0.01$) compared to those who did not. The statistical significance of these bivariate associations remained even after adjusting for multiple comparisons. Additionally, non-sexual network density trended towards significance ($p<0.10$), with those who self-reported problem drinking having lower density among their non-sexual networks (i.e., less social cohesion) on average compared to those who did not (M=0.54, SD=0.45 vs. M=0.67, SD=0.42).

Self-reported alcohol use before or during last sex was significantly associated with age, having children, maximum monthly income, receiving money or something else in exchange for their last sexual encounter, reporting any drug use by either himself or his sex partner at last sex, and self-reported problem drinking. Those who used alcohol before or during their last sexual encounter were older (28.1 vs. 25.8, $p=0.008$) and had higher maximum monthly incomes ($US 443.40 vs. $US 370.11, $p=0.02$) than those who did not. Greater percentages of those who used alcohol before or during their last sexual encounter had children (53.9% vs. 30.2%, $p=0.002$), received money or something else in exchange for their last sexual

encounter (96.8% vs. 87.3%, p=0.007), reported any drug use by either the participant or his sex partner at his last sexual encounter (44.6% vs. 15.9%, p<0.001), and self-reported problem drinking (76.8% vs. 56.9%, p=0.008). Social network characteristics that were significantly associated with alcohol use before or during last sex included having at least one person in their social network who got drunk with them in the past month (89.6% vs. 67.7%, p<0.001), used any illicit drugs (i.e., marijuana, methamphetamine, heroin, cocaine, crack or ecstasy) in the past month (55.8% vs. 32.3%, p=0.002), and had ever gotten tested for HIV or any STI (70.6% vs. 50.0%, p=0.004). Greater percentages of those who used alcohol before or during their last sexual encounter had someone in their social network who exhibited these characteristics compared to those who did not. Even after adjusting for multiple comparisons, these statistically significant associations remained.

Multivariable Analyses

Table 5 presents results from the multivariable logistic regressions for both self-reported problem drinking and self-reported alcohol use at last sex. After controlling for individual- and social network-level characteristics, only social network characteristics remained significantly associated with self-reported problem drinking. With each 1%-unit increase in non-sexual network density, the odds of reporting problem drinking became 0.989 times as likely (or 0.011 times less likely) (aOR=0.99, 95% CI:0.98–0.99). Those who had at least one person in their social network who got drunk with them in the past month were seven and a half times as likely to report problem drinking as those who did not (aOR=7.5, 95% CI:2.1–26.8). Those who did not have a religious or spiritual adviser in their social network were three times as likely to report problem drinking compared to those who did (aOR=3.0, 95% CI: 1.2–7.4). Those who had children were also two and half times as likely to report problem drinking compared to those who did not (aOR=2.5, 95% CI: 0.9–7.1); however, this was only marginally significant (p<0.10).

After controlling for individual- and social network-level covariates for self-reported alcohol use before or during their last sexual encounter, only certain individual (i.e., reported any drug use by either himself or his sex partner at last sex) and certain social network characteristics (i.e., at least one social network member who had ever been tested for HIV or some other STI) remained significantly associated. Those who reported any drug use by either himself or his sex partner at last sex were more than four times as likely to report using alcohol before or during their last sexual encounter (aOR=4.4, 95% CI:1.3–14.5). Similarly, those who had at least one person in their social network who ever got tested for HIV or some other STI were more than four times as likely to report alcohol use before or during their last sexual encounter compared to those who did not (aOR=4.7, 95% CI:1.8–12.4).

DISCUSSION

This study is among the first to examine social network characteristics associated with self-reported problem drinking and self-reported alcohol use prior to or during sex among MSM who engage in sex work as part of the tourism industry in the DR. Our findings support our first hypothesis, which suggests that certain social network characteristics pertaining to

social influence may be more important than individual characteristics in explaining alcohol-related HIV risk behaviors among MSM sex workers in the DR. These findings support previous research suggesting that individuals with similar behaviors tend to cluster together in social networks (26, 56, 57) and affirm the importance of understanding alcohol drinking as a social activity. This phenomenon may be due to selection or influence; however, our cross-sectional data do not enable us to determine mechanisms by which problem drinking occurs.

We found that not having a religious or spiritual adviser within one's social network was associated with problem drinking among this population. This is especially relevant in the context of the DR where 95% of the country is Catholic (58). Intervention approaches that rely on religious groups and faith communities should be employed with caution given the history of persecution of LGBT people by the Catholic Church in the DR (59, 60). However, it may be worthwhile to engage religious and spiritual leaders in conversations about the issue of problematic alcohol use more generally. Additionally, qualitative research may be used to further understand how and why not having a religious or spiritual leader in one's network could be associated with problem drinking among this population.

We also found that participants with less social network cohesion (i.e., lower social network density) among non-sexual network members (e.g., friends, family, coworkers, acquaintances) were more likely to report problem drinking than participants with denser non-sexual networks. Based on social network theory, greater density (i.e., the extent to which members in a person's social network know one another) may be an indication of greater social cohesion and thus may be protective against harmful health behaviors (29). Alternatively, less cohesion may be indicative of social systems that are fragmented and create stress for the participant (61), which in turn may lead to alcohol use. Further exploration is needed to understand the ways in which participants' social network members are connected to each other and whether structural interventions aimed at increasing the number of connections among non-sexual network members would reduce problem drinking among Dominican MSM sex workers.

Social influence was also found to be significantly associated with self-reported alcohol use at last sex even after accounting for other factors. However, social influence in regards to sexual norms rather than drinking norms may be more important for self-reported alcohol use at last sex. That is, the findings pertaining to self-reported alcohol use before or during last sex suggest that individuals who engage in risky sexual behaviors may also have peers who practice similar behaviors and thus get tested due to their greater risk. This demonstrates the positive relationship between social influence involving sexual norms and alcohol-related HIV risk behaviors, such as self-reported alcohol use at last sex. Additionally, although it is unclear whether alcohol use before or during sex actually resulted in condomless sex among participants, previous research involving MSM sex workers have demonstrated the positive associations between alcohol use and inconsistent condom use and condomless anal sex (20, 21).

Study findings should be interpreted cautiously due to limitations in sampling and design. Because this was a cross-sectional study, it is impossible to draw causal inferences. It is

unclear whether social network characteristics influence problem drinking behavior or whether problem drinkers tend to associate with individuals who support their behaviors (i.e., these alcohol-related HIV risk behaviors may be endogenous with our social influence variables, especially those involving alcohol, illicit drug use, and sexual norms). Bullers and colleagues (2001) found that although both selection and influence affected the association between individual and network drinking patterns among adults, social selection effects were much stronger (57). Future research could circumvent this issue by adopting advanced statistical methods that control for endogenity, such as two-stage least squares regression, which would allow researchers to draw causal inferences with the use of a valid instrument for the endogenous regressor (i.e., social influence) (62). However, it may be difficult to find a valid instrument for this purpose, which would require being correlated with the endogenous regressor but uncorrelated with outcomes of interest. Additionally, due to our hard-to-reach target population, we were limited in the sampling strategies we could use. MSM sex workers who were willing to undergo an in-person interview and HIV testing may not be representative of MSM sex workers in the DR in general.

Despite these limitations, this study highlights the importance of social network characteristics associated with self-reported problem drinking and sexual risk for HIV among MSM sex workers in the tourism contexts of the DR. MSM sex workers are a hidden population that often face significant social stigma associated with MSM sexual behavior and sex work. With the help of our in-country partners, we were able to reach a substantial number of our desired target population. Our study also makes use of biomarkers for HIV status. Finally, the standardization of our alcohol measures using recommendations set forth by ICAP also allows for the comparison of estimates across various populations.

CONCLUSIONS

MSM who engage in sex work as part of the tourism economy in the DR exhibit elevated alcohol consumption, which fosters increased risk for HIV acquisition and transmission. Understanding the structure and composition of MSM sex workers' social networks and how they relate to individual risk behaviors can help inform appropriate interventions and programs to mitigate excessive consumption of alcohol commonly associated with tourism ecologies and, in turn, reduce unintended consequences such as HIV infection among men engaging in transactional sex. Future research may be needed to control for the endogeneity of social influence and its relationship with important alcohol-related HIV risk behaviors.

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Table I

Participant characteristics (N=220)

	% (n) or Mean (SD)	Range
Demographics		
Age (mean)	27.45 (8.13)	18 – 57
Sexual orientation		
Heterosexual	11.93 (26)	–
Bisexual	80.73 (176)	–
Gay/homosexual	7.34 (16)	–
Has children		
Yes	47.00 (102)	–
No	53.00 (115)	–
Socioeconomic status		
Maximum monthly income (mean, in $US)	422.46 (337.66)	32.99 – 2,199.23
Sex work is main source of income		
Yes	50.00 (110)	–
No	50.00 (110)	–
Self-reported mental health		
MCS-12 score (mean)[a]	52.67 (9.43)	23.31 – 67.68
HIV risk behaviors		
Received money, drugs or some other good(s) for last sexual encounter		
Yes	94.09 (207)	–
No	13 (5.91)	–
Reported drug use at last sexual encounter[b]		
Yes	36.36 (80)	–
No	63.64 (140)	–
Self-reported problem drinking[c]		
Yes	71.02 (125)	–
No	28.98 (51)	–
Self-reported alcohol use two hours before or during last sexual encounter		
Yes	71.36 (157)	–
No	28.64 (63)	–

[a]MCS: Mental Component Summary

[b]By the participant and/or his sex partner at the time

[c]Defined as reporting six or more standard drinks in one day in the past 30 days

Table II

Characteristics of participants' social networks (N=220)

	% (n) or Mean (SD)	Range
Social network structure		
Non-sexual network size (mean)	4.67 (0.87)	0 – 5
Density of non-sexual network (mean)	0.56 (0.44)	0 – 1
Socioeconomic status		
Has at least one social network member who works full-time or part-time	87.44 (188)	–
Social influence		
Has at least one social network member who (is a)…		
Social worker, doctor, or agency employee or volunteer	41.20 (89)	–
Religious or spiritual adviser	36.11 (78)	–
Has ever gotten tested for HIV or another STI	64.65 (139)	–
Got drunk with the participant in the past month	83.33 (180)	–
Used any illicit drugs in the past month[a]	49.07 (106)	–

[a]Includes marijuana, methamphetamine, heroin, cocaine, crack or ecstasy

AIDS Behav. Author manuscript; available in PMC 2018 November 01.

Table III

Participant characteristics associated with alcohol-related HIV risk behaviors

	Self-reported problem drinking					Self-reported alcohol use at last sex				
	% (n) or mean (SD)			Test Statistic~	P-value	% (n) or mean (SD)			Test Statistic~	P-value
	Yes (n=125)	No (n=51)	Total (n=176)			Yes (n=157)	No (n=63)	Total (n=220)		
Demographics										
Age (mean)	27.03 (8.25)	26.96 (8.06)	27.01 (8.17)	0.0801	0.9362	28.12 (8.04)	25.76 (8.17)	27.45 (8.13)	– 2.6572	**0.0079**
Sexual orientation				2.0532	0.3582				0.0059	0.1552
Heterosexual	12.10 (15)	9.80 (5)	11.43 (20)			14.01 (22)	6.56 (4)	11.93 (26)		
Bisexual	82.26 (102)	78.43 (40)	81.14 (142)			80.25 (126)	81.97 (50)	80.73 (176)		
Gay/homosexual	5.65 (7)	11.76 (6)	7.43 (13)			5.73 (9)	11.48 (7)	7.34 (16)		
Has children				2.0622	0.1510				10.1132	**0.0015**
Yes	50.00 (62)	38.00 (19)	46.55 (81)			53.90 (83)	30.16 (19)	47.00 (102)		
No	50.00 (62)	62.00 (31)	53.45 (93)			46.10 (71)	69.84 (44)	53.00 (115)		
Socioeconomic status										
Maximum monthly income (in $US)	432.30 (341.64)	449.96 (407.68)	437.40 (360.84)	0.0134	0.9893	443.40 (329.08)	370.11 (355.55)	422.46 (337.66)	– 2.3326	**0.0197**
Sex work is main source of income				0.5560	0.4559				0.5561	0.4559
Yes	55.20 (69)	49.02 (25)	53.41 (94)			51.59 (81)	46.03 (29)	50.00 (110)		
No	44.80 (56)	50.98 (26)	46.59 (82)			48.41 (76)	53.97 (34)	50.00 (110)		
Self-reported mental health										
MCS-12 score (mean)[a]	53.53 (8.50)	52.36 (9.28)	53.17 (8.74)	– 0.7806	0.4351	52.39 (9.30)	53.38 (9.80)	52.67 (9.43)	0.9211	0.3570
HIV risk behaviors										
Received money, drugs or some other good(s) for last sexual encounter				–	–				7.3189	**0.0068**

	Self-reported problem drinking					Self-reported alcohol use at last sex				
	% (n) or mean (SD)			Test Statistic~	P-value	% (n) or mean (SD)			Test Statistic~	P-value
	Yes (n=125)	No (n=51)	Total (n=176)			Yes (n=157)	No (n=63)	Total (n=220)		
Yes	–	–	–	–	–	96.82 (152)	87.30 (55)	94.09 (207)		
No	–	–	–	–	–	3.18 (5)	12.70 (8)	5.91 (13)		
Reported drug use at last sexual encounter[b]				–	–				16.0177	<**0.0001**
Yes	–	–	–	–	–	44.59 (70)	15.87 (10)	36.36 (80)		
No	–	–	–	–	–	55.41 (87)	84.13 (53)	63.64 (140)		
Self-reported problem drinking[c]				–	–				6.9959	**0.0082**
Yes	–	–	–	–	–	76.80 (96)	56.86 (29)	71.02 (125)		
No	–	–	–	–	–	23.20 (29)	43.14 (22)	28.98 (51)		

p < 0.05

~includes Chi-square tests for categorical variables, Wilcoxon-Mann-Whitley tests for continuous variables due to non-normal distributions, and Fisher's exact tests for categorical variables with cells smaller than 5 (only sexual orientation)

[a]MCS: Mental Component Summary

[b]By the participant and/or his sex partner at the time

[c]Defined as reporting six or more standard drinks in one day in the past 30 days

AIDS Behav. Author manuscript; available in PMC 2018 November 01.

Table IV

Social network characteristics associated with alcohol-related HIV risk behaviors

	Self-reported problem drinking					Self-reported alcohol use at last sex				
	% (n) or mean (SD)			Test Statistic~	P-value	% (n) or mean (SD)			Test Statistic~	P-value
	Yes (n=125)	No (n=51)	Total (n=176)			Yes (n=157)	No (n=63)	Total (n=220)		
Social network structure										
Non-sexual network size (mean)	4.64 (0.93)	4.71 (0.79)	4.66 (0.89)	0.4905	0.6237	4.67 (0.91)	4.67 (0.79)	4.67 (0.87)	−0.3334	0.7388
Density of non-sexual network (mean)	0.54 (0.45)	0.67 (0.42)	0.58 (0.45)	1.6559	0.0977	0.52 (0.45)	0.65 (0.43)	0.56 (0.44)	1.9231	0.0545
Socioeconomic status										
Has at least one social network member who works full-time or part-time (Yes)	92.68 (114)	81.63 (40)	89.53 (154)	4.5665	**0.0326**	86.93 (133)	88.71 (55)	87.44 (188)	0.1275	0.7210
Social influence										
Has at least one social network member who (is a)…										
Social worker, doctor, or agency employee or volunteer (Yes)	39.02 (48)	44.00 (22)	40.46 (70)	0.3653	0.5456	40.91 (63)	41.94 (26)	41.20 (89)	0.0192	0.8897
Religious or spiritual adviser (No)	73.17 (90)	54.00 (27)	67.63 (117)	5.9679	**0.0146**	65.58 (101)	59.68 (37)	63.89 (138)	0.6685	0.4136
Has ever gotten tested for HIV or another STI (Yes)	–	–	–	–	–	70.59 (108)	50.00 (31)	64.65 (139)	8.1834	**0.0042**
Got drunk with the participant in the past month (Yes)	92.68 (114)	70.00 (35)	86.13 (149)	15.3081	<**0.0001**	89.61 (138)	67.74 (42)	83.33 (180)	15.2204	<**0.0001**
Used any illicit drugs in the past month[a] (Yes)	52.03 (64)	42.00 (21)	49.13 (85)	1.4317	0.2315	55.84 (86)	32.26 (20)	49.07 (106)	9.8396	**0.0017**

p < 0.05

~Includes Chi-square tests for categorical variables and Wilcoxon-Mann-Whitley tests for continuous variables due to non-normal distributions

[a]Includes marijuana, methamphetamine, heroin, cocaine, crack or ecstasy

AIDS Behav. Author manuscript; available in PMC 2018 November 01.

Table V

Multivariable logistic regressions of alcohol-related HIV risk behaviors

	Self-reported problem drinking (n=151)			**Self-reported alcohol use at last sex (n=150)**		
	aOR	**95% CI**	**p-value**	**aOR**	**95% CI**	**p-value**
Individual Characteristics						
Demographics						
Age	0.970	0.913 – 1.030	0.3167	1.042	0.975 – 1.114	0.2247
Sexual orientation (ref=Bisexual)						
Heterosexual	0.720	0.202 – 2.570	0.2927	1.606	0.348 – 7.402	0.2887
Gay or homosexual	2.601	0.416 – 16.277	0.2448	0.388	0.058 – 2.579	0.2461
Has children (ref=No)	2.523	0.898 – 7.084	0.0790	0.990	0.340 – 2.883	0.9849
Socioeconomic status						
Maximum monthly income in $US	0.999	0.998 – 1.000	0.1600	0.999	0.998 – 1.001	0.3718
Sex work is main source is income (ref=No)	0.946	0.412 – 2.171	0.8950	0.807	0.334 – 1.951	0.6340
Mental health						
MCS-12 score[a]	1.027	0.979 – 1.076	0.2785	0.967	0.914 – 1.024	0.2501
HIV risk behaviors						
Received money, drugs or some other good(s) for last sexual encounter (ref=No)	–	–	–	2.556	0.326 – 20.013	0.3714
Reported any drug use at last sexual encounter[b] (ref=No)	–	–	–	4.419	1.343 – 14.543	**0.0145**
Self-reported problem drinking[c] (ref=No)	–	–	–	2.076	0.789 – 5.464	0.1390
Social Network Characteristics						
Social network structure						
Non-sexual network size	0.768	0.379 – 1.556	0.4636	1.009	0.500 – 2.034	0.9807
Non-sexual network density (re-scaled)	0.989	0.980 – 0.999	**0.0334**	0.995	0.985 – 1.006	0.3862
Socioeconomic status						
Has at least one social network member who works full-time or part-time (ref=No)	1.516	0.415 – 5.535	0.5292	0.227	0.046 – 1.123	0.0690
Social influence						
Has at least one social network member who (is a)…						
Social worker, doctor, or agency employee or volunteer (ref=No)	1.279	0.508 – 3.217	0.6017	0.930	0.350 – 2.474	0.8845

	Self-reported problem drinking (n=151)			Self-reported alcohol use at last sex (n=150)		
	aOR	**95% CI**	**p-value**	**aOR**	**95% CI**	**p-value**
Religious or spiritual adviser (ref=Yes)	3.011	1.232 – 7.357	**0.0156**	0.818	0.302 – 2.217	0.6933
Has ever gotten tested for HIV or another STI (ref=No)	–	–	–	4.670	1.752 – 12.446	**0.0021**
Got drunk with the participant in the past month (ref=No)	7.505	2.104 – 26.773	**0.0019**	3.278	0.850 – 12.644	0.0848
Used any illicit drugs in the past month[d] (ref=No)	1.374	0.552 – 3.421	0.4948	1.426	0.520 – 3.911	0.4901

p < 0.05

[a] MCS: Mental Component Summary

[b] By the participant and/or his sex partner at the time

[c] Defined as reporting six or more standard drinks in one day in the past 30 days

[d] Includes marijuana, methamphetamine, heroin, cocaine, crack or ecstasy