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Alcohol Consumption and Risky Sexual Behavior Among Persons Attending Alcohol Consumption Venues in Gaborone, Botswana

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Abstract Alcohol use is a known key risk factor associated with risky sexual behavior that contributes to HIV transmission. This cross-sectional study used time location sampling to investigate alcohol use and risky sexual behaviors that occurred after ingesting alcohol among 609 patrons of alcohol venues in Gaborone, Botswana. Alcohol Use Disorders Identification Test (AUDIT) scores were categorized as low (1–7), medium (8–15), and high (16+) for analysis. Logistic regression models stratified by gender assessed the association between alcohol use and condom use at last sex after drinking alcohol. Among females, the odds of condom use during last sex after drinking alcohol were significantly lower for high compared to low AUDIT scores (AOR=0.17, 95 % CI 0.06–0.54). Among males, factors significantly associated with condom use at last sex after alcohol use were low levels of education (primary level compared to university and above AOR=0.13; 95 % CI 0.03–0.55) and beliefs that alcohol use did not increase risky sexual behaviors (AOR=0.26; 95 % CI 0.11–0.62). HIV prevention interventions should target females and emphasize sexual risks associated with alcohol use.

Keywords HIV · Alcohol consumption · Condom use · Risky sexual behavior · Knowledge · Botswana

Introduction

Botswana has one of the highest HIV prevalence rates in the world with an estimated 23 % of adults aged 15–49 years infected by the end of 2012 (Joint United Nations Program on HIV/AIDS 2013). Alcohol use is one of the five key drivers of the high HIV infection rates in Botswana (National AIDS Coordinating Agency 2012). In order to devise prevention interventions that target alcohol use and high-risk sexual risk behaviors, it is important to understand the contribution of alcohol to HIV risk from the perspective of patrons in alcohol venues and high-risk sexual behaviors such as multiple sexual partners and inconsistent or lack of condom use.

Several studies have shown alcohol use to be associated with engaging in risky sexual behaviors and thus contributing to transmission of HIV infection (Fisher et al. 2008; Kalichman et al. 2007; Simbayi et al. 2006; Zablotska et al. 2006). A systematic review and meta-analysis of 20 studies in Africa showed a strong association between alcohol use and HIV infection, and alcohol drinkers had significantly higher odds of HIV infection relative to nondrinkers (Fisher et al. 2007). Another review of studies conducted in Sub-Saharan Africa (SSA) found gender differences in alcohol use and sexual risk, where among men, alcohol use was associated with risky sexual behaviors, but women's risks were associated with their male partners' drinking habits (Kalichman et al. 2007a). A more recent meta-analysis of 35 studies on HIV and

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alcohol use in SSA found that high levels of alcohol consumption in sexual contexts were especially associated with increased risk of HIV infection (Woolf-King et al. 2013). A population-based study in Botswana showed that among both men and women, heavy alcohol use (>21 drinker/week) was associated with unprotected sex with a nonmonogamous partner, multiple sex partners, and buying sex (among men) and selling sex (among women) (Weiser et al. 2006).

Risky environments such as alcohol consumption venues where individuals with high-risk behavior congregate are potential locations to target HIV/AIDS interventions with proven acceptability and effectiveness (Fritz et al. 2002; Kalichman et al. 2013). Little is known about rates of HIV infection and risk-taking behaviors among alcohol users and whether environmental factors in these venues modify HIV-associated risk behaviors differently for men and women patrons. Also, there is a dearth of information on whether the relationship between alcohol use and participation in high-risk sexual behaviors is the same for men and women, especially among those who frequently use alcohol consumption venues. The goal of the study was to investigate the association between hazardous and harmful levels of alcohol use and high risky sexual behavior after drinking alcohol among alcohol users and whether gender modified this association, in Gaborone, Botswana. Understanding the dynamic relationship between alcohol use and HIV risk behaviors has important implications for HIV prevention programs. The general hypothesis is that individuals regardless of gender, who report higher level of alcohol use and misuse, will be more likely to engage in high-risk sexual behavior (e.g., sex without a condom).

Methods

Sampling Frame and Setting

This study was conducted in two phases in Gaborone, Botswana. In the first stage, a desk review and in-depth interviews with stakeholders were conducted and time-location sampling (TLS) was used to map and screen venues for eligibility and the development of a sampling frame for the study. The inclusion criteria for the venues were that they were licensed and registered with the Botswana Ministry of Trade and Industry, were a place to both purchase and consume alcohol on-site (bars, nightclubs and recreational clubs), and whose owner/manager provided informed consent. As this study was supported by the government of Botswana and the Ministry of Health, the sample for this study was limited to patrons from legally operating alcohol consumption venues to prevent conflict with government regulations. Venues where noncommercial alcohol is produced and sold exist but are not licensed to operate under the new regulations affecting the production and sale of noncommercial alcohol implemented in December 2011. It is believed that some unlicensed venues continue to operate, but the pattern of drinking and proportion of alcohol users who frequently use these unlicensed establishments is not known and beyond the scope of this study.

Of the 120 legally registered and licensed potential venues screened for inclusion in phase 1, eight refused to participate. Although no detailed information on the venues that refused were collected because of the voluntary nature of the study, all of those that refused were high-end venues and they were not clustered in any one specific section of Gaborone. In the second phase, 60 met the eligibility criteria; this reduced to 53 venues during a validation exercise at the start of this phase. Of the original 60 venues in the sampling frame, four had closed down, one had relocated to an unknown location, one had changed ownership and the new owners did not want to participate, and one had burned down. Venues and venue-daytime (VDT) units for each venue were randomly selected from the sampling frame developed during phase I, to participate in the study. The data collection team assessed the environment around the entrance to the venue and noted the different approaches used by patrons to enter the venue. According to TLS, an invisible enumeration line was drawn near the entrance of each venue and individuals who crossed this "line" during the selected VDT were considered to have intent to enter the venue. These individuals were consecutively approached by data collectors for recruitment into the study.

Participants

This research study was approved by the Health Research Development Committee in Botswana, Associate Director of Science at the Centers for Disease Control and Prevention (CDC) Atlanta, and the Johns Hopkins Bloomberg School of Public Health institutional review board. This cross-sectional study recruited a total of 896 participants between October 2012 and February 2013. The patrons of alcohol venues were recruited into the study if they were 18 years of age or older, resided in Gaborone, were a patron of an alcohol consumption venue that was included in the sampling frame, had intent to purchase and drink alcohol at venue, were assessed to not be under the influence of alcohol that would impair their decision to participate in the study (based on the trained interviewer's subjective evaluation of the participant's ability to participate was impaired by alcohol use), and gave informed consent. Enrolled participants were given the option to either participate in the behavior survey or HIV testing and counseling or both.

Measures

A standardized structured questionnaire was developed in English and Setswana to estimate the prevalence of

HIV sexual risk behaviors among patrons of participating alcohol consumption venues. The structured interview assessed self-reported risk behavior for HIV transmission and collected information on demographics, patterns and amount of alcohol use using the Alcohol Use Disorders Identification Tests (AUDITs), alcohol expectancies, sexual behaviors after consuming alcohol, history of HIV testing, and knowledge of HIV infection and prevention behaviors.

HIV counseling and testing was provided to all consenting patrons, and rapid HIV testing was conducted by trained and certified lay counselors according to the Botswana HIV rapid testing algorithm; Uni-GoldTM (Trinity Biotech, Bray, Ireland) and KHBTM (Shangha Kehua Bio-engineering Co., Ltd., China) were used to test in parallel, and OraQuick (OraSure Technologies, Inc.; Bethlehem, PA) was used as a tiebreaker for discordant results. The study participated in the national quality assurance program for rapid testing, and a random 20 % of samples from participants completing an HIV rapid test were sent to the national laboratory for results validation. There was a 100 % test result agreement for both ELISA and Western blot. Interviews and serological testing were conducted in mobile HIV testing stations in close proximity to the venues.

Main Outcome Variable Participants reported condom use during last interaction after drinking alcohol, and this was used to define risky sexual behaviors after alcohol use for this study. We coded this as a binary "yes/no" response variable. Since the outcome variable is specific to sexual risk behavior after having consumed alcohol, the analysis was restricted to those who reported ever having had sex after consuming alcohol, which was 733 participants.

Major Independent Variable of Interest The primary explanatory variable for hazardous or harmful alcohol use was measured using the internationally validated WHO AUDIT (World Health Organization 2001). The test comprises of 10 questions which cover the domains of alcohol consumption, drinking behavior, and alcohol-related problems. The responses to each question have predetermined scores from 0 to 4. Scores for all questions were summed, and the total scores were categorized as low (AUDIT score <8), medium (AUDIT score 8–15), and high (AUDIT score ≥16) level of alcohol use. This was based on the recommended cutoffs for low, medium, and high level of harmful or hazardous alcohol consumption levels used in the past studies using AUDIT (Miller et al. 1992; Tumwesigye et al. 2012). The WHO AUDIT manual recommends categorizing the AUDIT scores into four risk levels (score <8, 8–15, 16–19, and >20), and this is mainly for health worker use in determining the level of intervention required (World Health Organization 2001). Several studies using AUDIT score and sexual risk for HIV in SSA have categorized the AUDIT score as binary at cutoff of ≥9 to indicate problem drinking (Kalichman et al. 2007, 2008) or a cutoff of ≥8 to denote alcohol misuse (Bing et al. 2008).

The other variables that were controlled for in the analysis were the following:

Demographic characteristics: Participants reported their age categorized into three groups for the analysis (18–24, 25–34, and ≥35 years), gender (male and female), highest level of education completed (primary and below, secondary, tertiary, and university level), religion (Christian and other), and marital status (never married, divorced, and married/cohabiting). The reference group for each variable is illustrated in Table 3.

Knowledge variables: Participants reported on their knowledge of HIV prevention methods such as abstinence, monogamy, and condom use. These knowledge variables were then combined into one knowledge of HIV prevention variable and coded as binary "full knowledge or partial/none." Furthermore, participants were also asked about their knowledge on condom use after circumcision and whether drinking alcohol and having sex can increase a person's risk for getting HIV. Both the variables were coded as "true/false" binary variables. The reference group for each variable is illustrated in Table 3.

Sexual risk behaviors: Participants reported their number of sexual partners in the past 12 months and number of sexual partners met at alcohol venues in the past 12 months, and the response was categorized as shown in Table 1. The question on concurrent partners (i.e., sexual relationships occurring at the same time) was skipped for those participants who reported having only one or no partner in the past 12 months.

HIV test history: Participants were asked if they had ever been tested for HIV and the result of their most recent HIV test. The reference group for each variable is illustrated in Table 3.

Data Analysis

Data were analyzed using STATA version 12 software (StataCorp 2011). The dataset was weighted to equalize the probability of selection among venues with different attendance patterns (busy and less busy venues) in both the univariate and multivariate analysis. In order to have a complete dataset with the eligibility criteria defined for these analyses, 287 participants were omitted from the analysis because they only did the HIV test and not behavior survey, had missing data on any one of the explanatory or outcome variables, and/

Table 1 Sociodemographic characteristics of alcohol venue patrons by level alcohol use (AUDIT score)

Level of alcohol use	Low score 1–7 (n=142)	Medium score 8–15 (n=277)	High Score 16+ (n=190)	Total (n=609)	p Value
Gender (%)					
Male	57	73.3	70.5	68.6	0.003
Female	43	26.7	29.5	31.4	
Religion (%)					0.002
Christian	81	70.4	63.2	70.6	
Other	19	29.6	36.8	29.4	
Age (years)					0.80
18–24	32.4	30.7	32.1	31.5	
25–34	51.4	52	54.7	52.7	
35 and above	16.2	17.3	13.2	15.8	
Marital status (%)					0.44
Never married	75.4	71.5	77.4	74.2	
Divorced	2.1	2.2	0.5	1.7	
Married/cohabiting relationship	22.5	26.4	22.1	24.1	
Highest education level (%)					0.31
Primary and below	8.4	3.2	4.7	4.9	
Secondary	54.3	52.3	54.7	53.5	
Tertiary	21.1	23.5	23.7	23	
University level	16.2	20.9	16.8	18.6	
Employment status (%)					0.16
Employed	72.5	65.3	62.6	66.2	
Not employed	27.5	34.7	37.4	33.8	

or reported never having sex after drinking alcohol. A comparison of those that were removed from the analysis with the remaining study participants showed no significant differences in demographics (gender, age, marital status, and education) and the outcome variable (condom use at last sex after drinking alcohol) but showed some significant differences in distribution of alcohol use and number of sexual partners in the past year suggesting that there may be some level of systematic bias. Descriptive analysis for demographic, knowledge, and behavioral characteristics by the three levels of alcohol consumption (based on total AUDIT score) were compared using nonparametric chi-squared test. Probability weights were applied to the regression analysis to adjust for the TLS allowing for the study results to be generalizable to the population of persons who attended locations in the sampling frame. Simple logistic regression of each explanatory variable with the outcome was also assessed separately using the Wald chi-squared test.

Multiple logistic regression was performed with condom use during last sex after drinking alcohol as the primary outcome; level of drinking categories as primary explanatory variable; and age, marital status, gender, education, employment, knowledge of HIV prevention, sexual history, sexual behavior/perception after alcohol use, and history of HIV testing were all controlled for. Collinearity for the logistic regression analysis was checked by performing a multiple linear regression analysis instead of logistic regression to calculate the variance inflation factors, which were all below 3.0. The risk of over fitting the model was controlled by using a ratio of 1:10 at least for the number of explanatory variables and sample size with 496 positive events (condom use).

A backward stepwise selection of predictors using the Akaike information criterion (AIC) was conducted to assess the variables that best explained the outcome and model. This reduced model was compared with the full extended model, and no significant difference was seen based on the likelihood ratio test. Previous studies have shown that gender differences exist in frequency of alcohol drinking and in patronization of alcohol venues in SSA (Kalichman et al. 2007a). Hence, a gender-specific association between level of alcohol use and condom use behavior was examined. Stratified multiple logistic regression analysis by gender was conducted.

Results

Of the 896 participants recruited, 887 participants (99 %) agreed to complete the survey. The analytical sample was first restricted to those who reported having ever had sex after alcohol consumption (733 participants) after deducting the

148 participants who either reported not having had sex after alcohol consumption or provided no response. The analytical sample was then further limited to 609 study participants (418 men and 191 women) for whom we did not have missing data on the outcome variable (6 missing responses), AUDIT variable (28 missing responses), and the combination of the remaining explanatory variables (further 90 missing responses).

When categorized by level of alcohol use, almost half of the study sample (45.5 %) was classified in the medium level, 23.3 % in the low level, and 31.2 % was classified as high-level users of alcohol. The mean total AUDIT score was 12.8 with a standard deviation of 6.6. Table 1 summarizes the sociodemographic characteristics of the study participants by level of alcohol use. About 31 % of the study participants were female, and there was a statistically significant association between gender and alcohol use (p=0.003). The majority of the population was never married which consisted of being single or dating without cohabiting (74 %), and no statistically significant association between marital status and alcohol use was evident. Religion was also significantly associated with alcohol use whereby participants who were not Christian 37 % were in the high alcohol use group compared to 63 % among Christians (p=0.002). There was no significant association between place of residence in Gaborone City (i.e., north, south, east, west, and central) and alcohol use (data not shown).

Table 2 illustrates the association between other nonsociodemographic covariates of interest and level of alcohol use. Separate analysis of this association stratified by gender showed no significant differences between men and female (data not shown). A majority of the participants (84 %) had full knowledge of the three behaviors for HIV prevention (abstinence, monogamy, and condom use); however, there was no significant association between HIV prevention knowledge and level of alcohol use. Similarly, a majority had correct knowledge that condoms should be used after being circumcised (95 %) and that a person was at higher risk of engaging in high-risk sexual behavior after alcohol consumption (91 %). Compared to participants in the low and medium drinking categories, participants in the high level of alcohol use group were significantly more likely to report having three or more sexual partners in the past year (51 vs 14 and 31 %, respectively, p value <0.001), more likely to have met four or more sexual partners at drinking venues (17 vs 2.1 and 7.6 %, respectively, p value <0.001) and more likely to be in concurrent relationships (23 vs 8.5 and 18.8 %, respectively, p value <0.001). Approximately 84 % of the participants reported having a condom at the time of the interview; however, this was not significant by level of alcohol use.

Perceptions related to sexual behavior after alcohol consumption such as desire to use condom, remembering to use condom, and ability to correctly use a condom during sex after alcohol use were all reported to worsen among the high alcohol users group (Table 2). Furthermore, about half (50 to 54 %) of the participants who refused to answer all the aforementioned questions or said they did not know the response were classified in the high-level alcohol use group (data not shown). No significant differences were seen for history of HIV testing and test results between the three levels of alcohol use groups.

Table 3 summarizes the factors associated with the odds of condom use during last sex. In the crude analysis (i.e., each independent variable is run individually in a separate model), lower odds of condom use were seen in the medium (male crude OR 0.77 [95 % CI 0.32–1.81]; female crude OR 0.55 [95 % CI 0.15–2.06]) and high (male crude OR 0.69 [95 % CI 0.28–1.71]; female crude OR 0.20 [95 % CI 0.05–0.50]) levels of alcohol use groups in comparison to the low use group stratified by gender. The crude association was significantly different between the high alcohol use and low alcohol use group among females but not males, indicating that the effect of alcohol on condom use differed by gender.

After adjusting for all the other independent variables, the odds of condom use during last sex was 83 % lower among females with high alcohol AUDIT scores compared to low AUDIT scores (A OR=0.17; 95 % CI 0.06–0.54). There was no significant association of alcohol AUDIT scores and condom use during last sex among males. No significant association was seen for knowledge of HIV prevention and condom use; however, there was a marginally significantly lower odds of condom use during last sex among married or cohabitating females compared to never married females (A OR=0.40, CI 0.16–1.00). Significantly lower odds of condom use were associated with males who had only primary level education compared to university and above (AOR=0.13; 95 % CI 0.03–0.55) and who erroneously believed that alcohol did not increase risky sexual behaviors (A OR=0.26; 95 % CI 0.11–0.62). Furthermore, about 20 % of males reported having a condom with them at the venue during the time of their interview and although not significant those reporting having a condom had higher odds of condom use during last sex after drinking alcohol (A OR=2.40; 95 % CI 0.97–5.96). No significant association with condom use at last sex after drinking alcohol was seen between sex partner variables such as the number of sexual partners in the past year and the number of sexual partners met at alcohol venues in the past year. Furthermore, although the odds of condom use were lower among those who had not had a history of prior HIV testing, they were not significantly lower for males and females.

Discussion

Our study aimed to assess sexual risk factors and the relationship between condom use at last sex and alcohol use among

Table 2 Association between levels of alcohol use and knowledge of HIV prevention, and sexual risk behavior among alcohol venue patrons

Level of alcohol use	Low score 1–7 (*n*=142) %	Medium score 8–15 (*n*=277) %	High score 16+ (*n*=190) %	Total (*n*=609) %	*p* Value
Sexual risk behavior (%)					
Number of sex partners in the past 12 months					<0.001
1 partner	59.2	49.5	36.8	47.8	
2 partners	26.8	19.1	12.6	18.9	
3 or more partners	14.1	31.4	50.5	33.3	
Number of sexual partners met at alcohol venue in the past 12 months (%)					<0.001
0 partner	67.6	49.5	31.6	48.1	
1 partner	15.5	24.2	17.4	20	
2–3 partners	14.8	18.8	34.2	22.7	
4 or more partners	2.1	7.6	16.8	9.2	
Concurrent sexual partners					<0.001
No	32.4	31.8	40	34.5	
Yes	8.5	18.8	23.2	17.7	
Not applicable	59.2	49.5	36.8	47.8	
Reported having a condom at time of interview					0.13
No	85.9	80.9	87.4	84.1	
Yes	14.1	19.1	12.6	15.9	
Sexual behavior and perception after alcohol consumption (%)					
Do you feel that you are at risk for HIV infection when you have been drinking					<0.001
No	51.4	50.2	27.4	43.3	
Yes	48.6	49.8	72.6	56.7	
When you drink alcohol, your desire to use condoms with sexual partners:					<0.001
Remains the same	64.8	58.8	35.8	53	
Improves	19	28.5	33.7	27.9	
Worsens	11.3	11.2	23.7	15.1	
Do not know/no response	4.9	1.4	6.8	3.9	
When you drink alcohol, your ability to remember to use condoms with sexual partner					<0.001
Remains the same	69.7	59.2	43.2	56.7	
Improves	21.1	26.7	30.5	26.6	
Worsens	6.3	12.6	21.1	13.8	
Do not know/no response	2.8	1.4	5.3	3	
When you drink alcohol, your ability to use condoms correctly with sexual partner					<0.001
Remains the same	76.1	63.9	42.6	60.1	
Improves	9.2	18.4	25.8	18.6	
Worsens	10.6	14.8	24.7	16.9	
Do not know/no response	4.2	2.9	6.8	4.4	
In the last 12 months, have you had sex with a person you met at a drinking venue on same night of the meeting					<0.001
No	74.6	65.3	46.3	61.6	
Yes	25.4	34.7	53.7	38.4	
Knowledge on HIV (%)					
Correct knowledge of HIV prevention: abstinence, condom use and monogamy					0.08
Full knowledge	88.7	84.1	79.5	83.7	
Partial/none	11.3	15.9	20.5	16.3	
If a man is circumcised, he does not need to use condoms					0.53
False	95.1	96.4	94.2	95.4	
True	4.9	3.6	5.8	4.6	
Drinking alcohol and having sex can increase a person's risk for getting infected					0.29
True	91.5	89.5	93.7	91.3	
False	8.5	10.5	6.3	8.7	

Table 2 (continued)

Level of alcohol use	Low score 1–7 (*n*=142) %	Medium score 8–15 (*n*=277) %	High score 16+ (*n*=190) %	Total (*n*=609) %	*p* Value
HIV test history (%)					
Have you ever been tested for HIV?					0.4
Yes	83.8	86.6	82.1	84.6	
No	16.2	13.4	17.9	15.4	
Previous HIV test result					0.83
Negative	74.6	75.5	73.2	74.5	
Positive	6.3	5.1	5.8	5.6	
Unknown	2.8	5.1	3.2	3.9	
Never been tested	16.2	14.4	17.9	15.9	
HIV test result from study					0.98
Negative	59.2	61	60.5	60.4	
Positive	12	10.1	10.5	10.7	
Did not test	28.9	28.9	28.9	28.9	

patrons of alcohol venues in Gaborone, Botswana. The key finding was that although the level of alcohol use as defined by the AUDIT score was a significant predictor of condom use at last sex for females, it was not a significant predictor for males. The association between high levels of alcohol use and condom use at last sex was highly significant for females in our study; females with a high alcohol AUDIT score had an over 80 % decreased odds of using condoms at last sex after alcohol use compared to those with low AUDIT score. The higher odds of engaging in risky sexual behavior with higher alcohol consumption is consistent with many other studies conducted in Sub-Saharan Africa that showed higher odds of incident or prevalent HIV among those reporting problem drinking and drinking in sexual contexts (Woolf-King et al. 2013). A study in Botswana showed that women with heavy alcohol consumption were associated with higher odds of unprotected sex (Weiser et al. 2006). Qualitative and quantitative studies have also shown that women who were characterized by high levels of alcohol use were more likely to sell sex for money, indicating the potential for high HIV-associated risk factors among women who have heavier alcohol consumption (Simbayi et al. 2006; Weiser et al. 2006; Woolf-King and Maisto 2011). Furthermore, a quantitative study in Botswana showed that a significant proportion of women compared to men reported their sexual partner refused to use condoms or their lack of control in sexual decision making as barriers to condom use (Weiser et al. 2006). Women who are intoxicated may have even less control and ability to exert their will regarding condom use (Weiser et al. 2006). Alcohol consumption venues are known to be places where high-risk sex encounters can take place and so may amplify HIV transmission risks (Fritz et al. 2002). This finding has implications for HIV prevention programs targeting alcohol venues, which typically target males, and highlights the need to include females in intervention activities which highlight the role of alcohol use in decreasing their ability to negotiate safer sexual encounters thereby increasing risk of HIV infection.

Although, no significant association was evident for the analysis among the men, the odds of unprotected sex during last sexual encounter under influence of alcohol was higher in the high and medium level alcohol use group relative to the low alcohol use group. Among the male participants, lower levels of education were associated with a significantly higher odd of unprotected sex during last sex after drinking alcohol compared to those with university level education. Awareness of the risk of HIV infection when having sex under the influence of alcohol was important as males who erroneously believed that alcohol did not increase risky sexual were 74 % more likely to not use condom in last sex after drinking alcohol. A large majority of the participants surveyed had accurate knowledge of HIV prevention (abstinence, condom use, and monogamy), yet high-risk behaviors such as having three or more sexual partners, concurrent sexual partners, and noncondom use during sex after drinking alcohol were reported. In addition, carrying condoms at the time of the interview was nonsignificantly associated with a higher odd of condom use among men. Thus, education of male patrons at alcohol venues on the risk factors for HIV infection along with behavior change communication strategies and access to condoms is an important HIV prevention intervention at alcohol venues.

The study also showed that patrons who reported high alcohol use had significantly higher numbers of sexual partners (three or more partners), higher numbers of sexual partners met at alcohol venues in the past year, and concurrent relationships, which are known risk factors for HIV transmission. There is a need to design prevention interventions targeting alcohol venue patrons in general. Perception of risk of HIV significantly differed between the alcohol use groups. About

Table 3 Odds of condom use during last sex after drinking alcohol by the level of alcohol use (AUDIT score), stratified by gender

	Male (*N*=418)		Female (*N*=191)	
	Weighted crude OR (95 % CI)	Weighted adjusted OR (95 % CI)	Weighted crude OR (95 % CI)	Weighted adjusted OR (95 % CI)
Alcohol use				
Low (AUDIT score <8)	Ref	Ref	Ref	Ref
Medium (AUDIT score 0–15)	0.77 (0.32–1.81)	0.64 (0.25–1.64)	0.55 (0.15–2.06)	0.60 (0.16–2.21)
High (AUDIT score ≥16)	0.69 (0.28–1.71)	0.55 (0.20–1.50)	**0.20 (0.05–0.5)**	**0.17 (0.06–0.54)**
Sociodemographic characteristics				
Education				
University and above	Ref	Ref	Ref	Ref
Primary	**0.11 (0.03–0.41)**	**0.13 (0.03–0.55)**	0.19 (0.03–1.35)	0.18 (0.02–1.68)
Secondary	0.66 (0.29–1.47)	0.60 (0.27–1.31)	0.44 (0.11–1.82)	0.60 (0.12–2.93)
Tertiary	0.91 (0.37–2.25)	0.97 (0.38–2.45)	0.25 (0.06–1.10)	0.24 (0.04–1.40)
Marital status				
Never married	Ref	Ref	Ref	Ref
Divorce	2.37 (0.26–21.80)	4.96 (0.83–29.86)	0.39 (0.04–4.14)	0.21 (0.005–9.03)
Married/cohabitating	0.74 (0.38–1.44)	0.73 (0.35–1.55)	**0.40 (0.16–1.00)**	0.29 (0.08–1.01)
Age				
18–24 years	Ref	Ref	Ref	Ref
25–34	0.78 (0.37–1.61)	0.88 (0.39–2.00)	1.38 (0.55–3.44)	2.59 (0.65–10.28)
35 and above	0.64 (0.26–1.56)	0.56 (0.20–1.50)	0.59 (0.16–2.11)	1.38 (0.22–10.29)
Religion				
Christian	Ref	Ref	Ref	Ref
Other	0.55 (0.29–1.02)	0.76 (0.38–1.52)	0.85 (0.27–2.71)	1.03 (0.33–3.20)
Employment status				
Employed	Ref	Ref	Ref	Ref
Unemployed	1.02 (0.53–1.96)	0.87 (0.41–1.84)	1.67 (0.70–3.95)	2.43 (0.71–8.25)
Knowledge and behavioral characteristics				
Drinking alcohol and having sex can increase a person's risk for getting infected				
True	Ref	Ref	Ref	Ref
False	0.40 (0.16–0.99)	**0.26 (0.11–0.62)**	1.69 (0.39–7.37)	0.84 (0.21–3.37)
Knowledge of all three HIV prevention				
Complete knowledge	Ref	Ref	Ref	Ref
Partial/none	1.04 (0.47–2.34)	1.36 (0.52–3.58)	1.11 (0.33–3.72)	1.38 (0.46–4.11)
Reported having a condom at time of interview				
No	Ref	Ref	Ref	Ref
Yes	2.14 (0.94–4.84)	2.40 (0.97–5.96)	1.87 (0.39–9.01)	1.77 (0.36–8.77)
Number of sex partners in the past 12 months				
≥3 partners	Ref	Ref	Ref	Ref
2 partners	1.45 (0.47–4.48)	1.42 (0.41–4.95)	2.52 (0.82–7.85)	2.92 (0.74–11.55)
1 partner	0.85 (0.44–1.65)	0.66 (0.28–1.53)	2.15 (0.78–5.93)	3.04 (0.77–12.04)
Number of sexual partners met at a bar, nightclub, or other alcohol venue in the past 12 months				
0 partner	Ref	Ref	Ref	Ref
1 partner	3.04 (0.96–9.64)	5.59 (2.29–13.62)	1.16 (0.40–3.30)	1.15 (0.32–4.15)
2–3 partners	0.89 (0.42–1.88)	0.84 (0.32–2.20)	1.48 (0.36–6.05)	2.39 (0.67–8.48)
≥4 partners	0.99 (0.38–2.56)	0.93 (0.26–3.31)	0.28 (0.06–1.32)	0.61 (0.09–4.28)
Ever tested for HIV				
Yes	Ref	Ref	Ref	Ref
No	0.59 (0.26–1.30)	0.69 (0.26–1.82)	0.77 (0.19–3.08)	0.62 (0.14–2.74)

The bold entries are the significant findings where the 95% confidence intervals do not contain 1.

73 % of the high alcohol use group participants perceived themselves to be at risk for HIV infection when they had been drinking and this was much lower at about 49 % in the two other alcohol use groups. More than half of the participants with high alcohol use reported having sex with a person they met at a drinking venue on the same night of the meeting, which was significantly higher than the other alcohol use groups. This shows that patrons at alcohol venues who have high levels of alcohol consumption are more likely to engage in risky sexual behaviors that can put them at greater risk for HIV infections (Kalichman et al. 2008; Simbayi et al. 2006). Studies have shown that alcohol consumption may contribute to the spread of HIV/AIDS by diminishing sexual inhibitions and interfering with one's ability to adequately assess risk (Gordon et al. 1997; MacDonald et al. 2000a, b; Maisto et al. 2004). The alcohol myopia theory (Steele and Josephs 1990) states that alcohol intoxication restricts attentional capacity resulting in people in sexual contexts after drinking not being able to process their distant risk cues (such as HIV or sexually transmitted infection (STI) risks) and be highly influenced by the most immediate cues (such as sexual arousal) in their environment (MacDonald et al. 2000). This was confirmed by our findings which showed that patrons who reported higher level of alcohol use were significantly more likely to report a worsening of their desire to use condom with sexual partners, worsening of their ability to remember to use condoms with sexual partner, and worsening of their ability to use condoms correctly with sexual partner.

The findings also suggest that role of alcohol on disinhibition may influence risky sexual behaviors. Thus, HIV prevention programs may be strengthened by including alcohol use screening interventions and treatment options for those needing assistance along with the sexual risk reduction behavior programs by integrating the two in national programs in Botswana. Botswana has a successful record of using peer educators at public and national events to encourage spontaneous testing for HIV. Adapting this strategy to reach and provide nontesters patronizing alcohol consumption venues with HIV testing and counseling services along with treatment and counseling to reduce dependency on alcohol may help decrease their risk of HIV infection. According to the report from the larger study, testing rates at alcohol consumption venues were similar to rates associated with individuals' acceptance of routine HIV testing derived for the general population (Kumoji et al. 2013). Venue-based HIV prevention interventions, including spontaneous HIV testing, proved to be feasible, accepted, and desired by patrons of venues in the sample, and the researchers were surprised to see lines of patrons outside the mobile HIV testing station at each venue (Kumoji et al. 2013).

There were several limitations to this study. The cross-sectional design of the study prevented making any causal inferences between levels of alcohol use and condom use at last sex. In addition, as "last sex" was not defined by any time period, the ability to recall condom use after alcohol consumption based on how far in the past last sex was, may be compromised. The primary outcome of condom use during last sexual act under alcohol influence was a proxy for high-risk sexual behavior, and it would have been more informative to compare the findings with condom use during sex when not under the influence of alcohol. The later information was not collected making it difficult to infer that alcohol use modifies or increases risk behavior such as condom use.

Another limitation is the restriction of this study to only legally licensed alcohol selling venues. Venues where non-commercial alcohol is produced and sold, also known as "shebeens" or informal taverns, are present in Botswana, and they usually cater to consumers of lower socioeconomic status and are not licensed to legally sell alcohol. Our study was limited to only alcohol consumers attending those venues that were registered and licensed with the Botswana Ministry of Trade and Industry. While we may have captured some people who frequently used both licensed and unlicensed venues, we may be missing information from those who only frequently used the unlicensed venues. Consequently, classification of risk may be lower than what is found in unlicensed and illegal settings.

Furthermore, the screening process in phase 1 of the selection of venues resulted in eight licensed venues refusing to participate in this study. These venues were mostly high-end venues and may be catering to certain sections of the population who were not captured in our study. These venues were only a small proportion of those screened and were spread across the various section of Gaborone, so we assume very little bias in findings for the overall city.

Although the strength of these data were that information was obtained from both men and women at alcohol venues, the gender-wise analysis for the unadjusted and adjusted regression model was among only 191 women participants of the 609. The findings from this study can be confirmed by conducting future research among a larger sample of women who frequently used alcohol venues and their associated risky sexual behaviors under influence of alcohol.

Conclusion

The findings from this study do suggest that high level of alcohol use is an important risk factor for risky behavior such as unprotected sex under the influence of alcohol, especially for women who drink at alcohol venues. In Botswana and many other countries in Southern Africa, high rates of alcohol use are common and HIV incidence rates are high. This study suggests that in general, participants who had reported higher level of alcohol use had more risky sexual behaviors. Interventions that promote the reduction of alcohol use

especially during or before sex may be effective for HIV and other STI prevention efforts. Thus, there is an urgent need to implement HIV prevention interventions targeting men and women who drink in alcohol consumption venues that focuses on reducing alcohol consumption at high levels especially in sexual contexts.

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Conflict of Interest The authors declare that they have no conflict of interest.

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