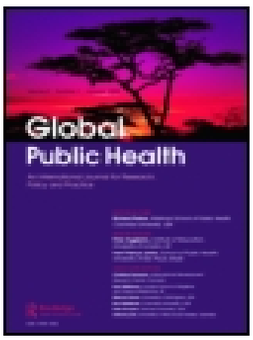

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Global Public Health

An International Journal for Research, Policy and Practice

ISSN: 1744-1692 (Print) 1744-1706 (Online) Journal homepage: http://www.tandfonline.com/loi/rgph20

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To cite this article: Scott D. Nash, Achilles Katamba, David Kaawa Mafigiri, Sam M. Mbulaiteye & Ajay K. Sethi (2015): Sex-related alcohol expectancies and high-risk sexual behaviour among drinking adults in Kampala, Uganda, Global Public Health, DOI: 10.1080/17441692.2015.1068824

To link to this article: http://dx.doi.org/10.1080/17441692.2015.1068824

Published online: 28 Aug 2015.

GLOBAL PUBLIC HEALTH, 2015
http://dx.doi.org/10.1080/17441692.2015.1068824

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Sex-related alcohol expectancies and high-risk sexual behaviour among drinking adults in Kampala, Uganda

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ABSTRACT

Alcohol consumption, a risk factor for HIV transmission in sub-Saharan Africa, is considered high in Uganda. A cross sectional study was conducted to determine whether sex-related expectations about the effects of alcohol explain the association between alcohol use and risky sexual behaviours in a population-based sample of adults in Kampala. Associations between alcohol use (current and higher risk drinking) and high-risk sexual behaviours (multiple regular partners and casual sex) were tested. In age–sex-adjusted models, having multiple regular partners was associated with current drinking (odds ratio [OR] = 2.76, 95% confidence intervals [CIs] = 1.15, 6.63) and higher risk drinking (OR = 3.35, 95% CI = 1.28, 8.71). Associations were similar but not statistically significant for having a causal sex partner. Sex-related alcohol outcome expectancy was associated with both alcohol use and high-risk sexual behaviour and attenuated relationships between multiple regular partners and both current drinking (OR = 1.94, 95% CI = 0.57, 6.73) and higher risk drinking (OR = 2.44, 95% CI = 0.68, 8.80). In this setting sexual behaviours related with alcohol consumption were explained, in part, by sex-related expectations about the effects of alcohol. These expectations could be an important component to target in HIV education campaigns.

ARTICLE HISTORY
Received 24 February 2014
Revised 6 February 2015
Accepted 26 June 2015

KEYWORDS
Alcohol-related expectancies; high-risk sexual behaviour; HIV/AIDS; Uganda

Introduction

Alcohol consumption has been identified as a risk factor for HIV transmission in sub-Saharan Africa (Chersich & Rees, 2010; Kalichman, Simbayi, Kaufman, Cain, & Jooste, 2007). Moderate to high alcohol consumption causes acute cognitive impairment that may facilitate engagement in sex, high-risk sexual behaviour, and sexual transmission of disease (Chersich & Rees, 2010; Kalichman, Simbayi, Kaufman et al., 2007).

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Alcohol consumption in Uganda is considered high; accounting for different drink types of varying alcohol content, it is estimated that adults (15 years of age and older) in the population consume 9.8 l of pure ethanol per year. Among those who did not abstain from drinking alcohol in the previous year, the annual consumption of pure ethanol is estimated to be 23.7 l (World Health Organization [WHO], 2014). The prevalence of heavy episodic drinking (drinking at least 60 g of pure alcohol on at least one occasion in the past 30 days) is 3.4% for the population and 8.3% among drinkers. In Uganda and other sub-Saharan African countries where the prevalence of HIV is high, alcohol consumption has been linked with unprotected sex (Bajunirwe, Bangsberg, & Sethi, 2013; Kalichman, Simbayi, Kaufman et al., 2007; Myer, Mathews, & Little, 2002; Weiser et al., 2006), casual sex (Fritz et al., 2002), coercive sex (King et al., 2004; Koenig et al., 2004), sex with multiple partners (Ghebremichael, Paintsil, & Larsen, 2009; Kalichman et al., 2013; Kalichman, Simbayi, Cain, & Jooste, 2007; Kalichman, Simbayi, Kaufman et al., 2007; Mnyika, Klepp, Kvåle, & Ole-Kingóri, 1997; Scott-Sheldon et al., 2012; Tumwesigye et al., 2012; Tumwesigye & Kasirye, 2005; Weiser et al., 2006), and sexually transmitted infections including HIV (Fisher, Bang, & Kapiga, 2007; Mbulaiteye et al., 2000; Vandepitte et al., 2013; Zablotska et al., 2006). Despite many countries in sub-Saharan Africa having high burdens of both alcohol use and HIV, specific interventions targeting their co-occurrence have been few, and more data on potential behavioural targets are needed (Chersich & Rees, 2010; Schneider, Chersich, Neuman, & Parry, 2012).

Although associations between alcohol consumption and the prevalence and incidence of diseases like HIV have been established, behavioural mechanisms by which sexual risk for HIV transmission is increased need further study. Expectancy outcome theory posits that a behaviour is explained by individuals having expectations of particular outcomes from performing that behaviour (Jones, Corbin, & Fromme, 2001). As explained by Jones et al. (2001), alcohol expectancies held by individuals are a result of direct and indirect past experiences with alcohol and affect the cognitive processes involved in current and future alcohol use (Jones et al., 2001). Alcohol expectancy theory has contributed to our understanding of both alcohol-use patterns and post-consumption behaviours, and has provided insight for the targeting of possible interventions (Dermen, Cooper, & Agocha, 1998; Jones et al., 2001; Leigh, 1990; White, Fleming, Catalano, & Bailey, 2009). However, given that the majority of research into alcohol expectancies has been conducted in Western populations, it is unclear whether the insights from those studies are applicable to the African setting. Several studies conducted in sub-Saharan Africa have found alcohol-related expectations to play a role in sexual behaviour in sub-Saharan Africa (Gálvez-Buccollini et al., 2008; Kalichman, Simbayi, Cain, et al., 2007; Morojele et al., 2004), however these studies focused predominantly on selective and high-risk populations. One's sexual expectations about the effects of alcohol may be an important component in the association between alcohol use, high-risk sexual behaviour, and HIV/AIDS. The aims of this study were to determine the association between patterns of alcohol use and high-risk sexual practices among a population-based sample of adults who consume alcohol and reside in urban Kampala, Uganda and to examine the effect sex-related alcohol expectances may have on these associations.

Methods

Study setting and design

Between August 2008 and April 2009 a cross-sectional survey of alcohol use and sexual behaviour was conducted among a population-based sample of adults in one (Lubaga) of five divisions of Kampala Capital City Authority, Uganda. Lubaga is a centrally located division in a heavily populated urban area of the city with a registered population of about 345,000 residents in 2007 (roughly 30% of the population of Kampala District) (Lubaga Division Three Year Development Plan, 2007–2010). A pre-study walk through in the areas surveyed revealed a high density of drinking establishments ranging from sports bars that serve bottled beer, wine, and spirits to small venues attached to or outside of homes serving locally made alcoholic beverages such as malwa (fermented millet), tonto (banana wine), and waragi (banana gin). The HIV prevalence in Kampala at the time of the survey was estimated to be 8.5% (Ministry of Health [Uganda] and ORC Macro, 2006).

Participants were selected through a two-stage, stratified cluster sampling strategy. In the first stage, zones were chosen within the 10 mostly residential parishes among the 12 in Lubaga. In the second stage, households were chosen within each zone taking into account household densities at each level. Thus, the 500 selected homes were believed to be a representative sample of the households in Lubaga Division. Interviewers were local Luganda- and English-speaking community health workers who were trained to administer the survey. Each selected house was approached by a team of one male and one female health worker. To minimise socially desirable responses, participants' gender, approximate age, and probable religion (based on characteristics such as name and clothing) were among several factors taken into account in the decision for the male or female interviewer to conduct the survey. At each home visited, study staff conducted a census to determine the eligibility of household members. Members were eligible to participate if they were a resident of the household (defined as sleeping at home the night before) and were adults (defined as aged 18 years or older). Only one eligible individual per household was selected at random (the one with the most recent birthday) by the study staff and invited to consent to the survey (Fowler, 2009). If the selected individual was not at home during the census, study staff returned at least twice to the household after which the individual was recorded as unreachable. Additionally, study staff obtained the participant's mobile phone number and used it to arrange an interview. Individuals who could not be contacted were replaced by another eligible individual closest in age and of the same sex as the originally selected individual. All participants gave written informed consent. The Internal Review Boards of Case Western Reserve University and Makerere University and the Uganda National Council for Science and Technology gave ethical approval to conduct the study.

Survey instrument

The interview was administered in English or in Luganda, the local vernacular, using a questionnaire adapted from existing standard instruments. Interviewers were proficient in both languages. The questionnaire included extensively tested questions used in the Kampala City Council residential surveys and the Uganda Demographic Health Survey. They elicited information on demographics: age, sex, marital status, religion, attained education, occupation, and monthly income (converted to 2009 US dollars [USD]); sexual relationships/

behaviours: number of spouses, number of regular partners, number of casual partners, condom usage; and alcohol use: an inventory of types of drinks consumed, and quantity and frequency of each type of alcoholic beverage consumed (commercial and traditional).

Analytic variables

High-risk sexual behaviour

Using methods similar to previous studies of alcohol use and risky sexual behaviour (Gálvez-Buccollini et al., 2008; Kalichman, Simbayi, Cain, et al., 2007; Mbulaiteye et al., 2000; Mnyika et al., 1997; Tumwesigye et al., 2012; Weiser et al., 2006) we defined a regular partner as someone whom the participant had been having sex with for about a year or more, which would include a spouse(s). We then identified individuals with two or more regular sexual partners. A causal sexual partner was defined as someone whom the participant had had sexual intercourse within the last 12 months other than a spouse or regular partner.

Risky alcohol use

Conversion to US standard drinks was conducted for all drinks reported where alcohol by volume was known including the local beverages (Namagembe et al., 2010; World Health Organization. Department of Mental Health and Substance Dependence, 2000). Once each drink was converted to US standard drinks, average daily ethanol consumption could be calculated based on the 12 g of ethanol per drink, the frequency of consumption of each alcoholic beverage, and the average number of drinks per occasion. A participant was classified as a current drinker if they reported average consumption of alcohol at least monthly over the past year or reported any consumption in the past month that qualified as binge drinking. Binge drinking was defined as consuming on a single occasion in the past year five US standard drinks (12 g of ethanol per serving) for men or four US standard drinks for women (Dawson, 2003; Wechsler, Dowdall, Davenport, & Rimm, 1995). A former drinker was defined as someone who did not meet either of these qualifications, but had consumed alcoholic beverages at some point in their life. Lower risk drinkers were defined as those current drinkers who drank, on average, 1–40 g of ethanol per day for men and 1–20 g per day for women. Higher risk drinkers were defined as those current drinkers who drank, on average, >40 g of alcohol per day for men and >20 g per day for women which is in accordance with WHO definitions of medium- to high-risk drinkers (World Health Organization. Department of Mental Health and Substance Dependence, 2000).

Alcohol expectancies

An alcohol outcome expectancy (AOE) questionnaire was also administered to those participants who had ever drank an alcoholic beverage (Leigh & Stacy, 1993). One of the subscales of this instrument consisted of four questions about sex-related expectancies. These questions included how likely one was to be more sexually assertive, more sexually responsive, more sexually active, or to have more desire for sex after drinking alcohol. Participants chose one of six responses including no chance, very unlikely, unlikely, likely, very likely, and certain to happen, which were scored 1 through 6. A sex-related summary score was created similar to that used by other studies of alcohol expectancies in developing countries (Gálvez-Buccollini et al., 2008; Jones et al., 2001; Kalichman, Simbayi, Cain et al., 2007). The

response to each question was categorised so that an answer of no chance, very unlikely, and unlikely were given a score of 0, an answer of likely was one point, very likely two points, and certain to happen three points for a range of 0–12 points. Those who answered unlikely or less to all four questions received a score of 0, while those who answered certain to happen for all questions received a score of 12.

Statistical analysis

The survey weight for each participant residing in a given zone and parish was calculated as $[(ZP)(HZ)]^{-1}$ in which ZP was the proportion of observed zones per parish (stage 1) and HZ was the proportion of observed households per zone (stage 2). Pearson chi-square tests for categorical variables, and weighted 95% confidence intervals (CIs) for continuous variables were used to compare distributions of participant characteristics between those who engaged in high-risk sexual behaviours and those who did not. The same methods were used to compare individuals with different drinking patterns. Weighted logistic regression was used to obtain population-level estimates of the odds ratios (ORs) and 95% CI for the association between alcohol use (independent variables) and high-risk sexual behaviour (dependent variables). Model 1 adjusted for age and sex. Potential confounders such as marital status, socioeconomic status, and condom usage, for which the statistical association with high-risk sexual behaviour was at least suggestive ($p < 0.20$), and were conceptually significant were then entered into a preliminary multivariable model. Those that were statistically non-significant ($p > 0.05$) and did not attenuate or strengthen the coefficients of other variables in the model (±20%) were then removed (model 2). For the final model, the sex-related alcohol expectancy summary score was added to determine whether or not it had an effect on the overall association (model 3). A reduction in the point estimate of the association between alcohol use variables and high-risk sexual behaviour variables was considered evidence of a partial mediating effect by sex-related outcome expectancies (Baron & Kenny, 1986).

Although all participants in this study had used alcohol at one time in their lives, the use of alcohol may be different based on religious affiliation. There were participants in this study who had religions that explicitly restricted the use of alcohol, specifically Islam, Born-again Christianity, Seventh Day Adventism, and Jehovah's Witness. In order to test whether or not inclusion of these individuals in these analyses affected the results of this study, a sensitivity analysis was performed by repeating analyses among individuals who did not self-identify as belonging to any of these religions. All analyses were conducted using survey (svy) commands in Stata 11.1 (StataCorp. LP, College Station, TX).

Results

Study sample

Excluding participants who had not had sex ($N = 12$; 1.7%) or had not consumed alcohol in their lifetimes ($N = 199$; 39.7%) left a total of 293 (59.4%) participants. Of these, 288 (98%) answered all items of the AOE questionnaire and were therefore included in this analysis. The mean age (95% CI) was 29.8 years (28.6–31.0 years), and 168 (57.6%) were men. One hundred and fifty-three (54.5%) were married or co-habitating and 166

(58.2%) attended secondary education or higher (≥7 years of school). Sixty-two (20.0%) participants self-identified as having a religion that restricts alcohol. There was not a statistically significant difference in monthly ethanol intake between those who had a religion that restricts alcohol and those who did not (mean intake = 1.22 g [95% CI = 0.36, 2.08] vs. 1.54 g [95% CI = 1.14, 1.96]). A total of 241 (84.4%) participants were current drinkers and 47 (15.6%) were former drinkers. Among current drinkers, 156 (58.2%) were lower risk drinkers and 85 (41.8%) were higher risk drinkers.

Participant characteristics

Participants with two or more regular sexual partners were more likely to be men (78.5% vs. 50.8%; $p = 0.001$), currently working (84.2% vs. 65.5%; $p = 0.051$), current drinkers (92.3% vs. 81.7%; $p = 0.019$) and higher risk drinkers (46.2% vs. 31.6%) than those with <2 regular sexual partners (Table 1). Those with two or more regular sexual partners also had higher scores on all four sex-related AOE questions ($p<0.001$). Among participants with two or more regular sexual partners, only 26.0% reported using a condom for the last sexual intercourse with their regular partner. Participants reporting a casual sexual partner were younger (Mean = 26.7 years [95% CI = 24.9, 28.5] vs. 30.9 years [95% CI = 29.4, 32.4]), more likely to be male (79.4% vs. 51.9%; $p = 0.002$), less likely to be married (35.6% vs. 59.3%; $p = 0.006$), and more likely to report condom use (98.7% vs. 88.4%; $p = 0.013$) than those without a casual partner. Among participants reporting a casual sexual partner 57.2% reported using a condom for the last sexual intercourse with their casual partner.

Alcohol use and sex-related alcohol expectancy

Participants' responses to items in the sex-related expectancy subscale were internally consistent (Cronbach's alpha = 0.93). In general, mean sex-related AOE scores differed by drinking status (Table 2). Current drinkers had higher mean AOE scores for all four questions (sexually active, desire for sex, sexually responsive, and sexually active), however, the 95% CIs overlapped for these results. Current drinkers (mean [95% CI] = 3.7 [3.2, 4.3]) had a substantially higher mean sex-related AOE summary score than former drinkers (mean [95% CI] = 2.1 [0.8, 3.4]). Higher risk drinkers were more likely to report having more desire for sex when they drink (mean [95% CI] = 4.0 [3.7, 4.4] vs. 3.3 [2.9, 3.7]), and being more sexually responsive (mean [95% CI] = 4.0 [3.8, 4.3] vs. 3.3 [2.8, 3.7] than former drinkers. Higher risk drinkers had the highest mean sex-related AOE summary score (mean [95% CI] = 4.3 [3.4, 5.2]) followed by lower risk drinkers (mean [95% CI] = 3.3 [2.6, 4.0]) followed by former drinkers (mean [95% CI] = 2.1 [0.8, 3.4] ($p < 0.001$; chi-squared test for trend).

Alcohol use and regular sexual partners

Current drinkers (OR = 2.76; 95% CI = 1.15, 6.63) and higher risk drinkers (OR = 3.35; 95% CI = 1.29, 8.71) were more likely to report two or more regular sexual partners than former drinkers after controlling for age and sex (Table 3). When marital status and monthly income were added to the analyses, these associations were attenuated (current drinkers

Table 1. Characteristics of participants with and without risky sexual behaviours in Lubaga Division, Kampala, Uganda 2008–2009.

Characteristic	<2 Regular partners ($n = 223$)	≥2 Regular partners ($n = 74$)	*p*-Value	No casual sexual partner ($n = 216$)	Casual sexual partner ($n = 71$)	*p*-Value
Age (mean, year)	30.0 (28.6, 31.3)	29.3 (26.6, 32.1)	.676	30.9 (29.4, 32.4)	26.7 (24.9, 28.5)	<.001
Male gender	119 (50.8%)	49 (78.5%)	.001	109 (51.9%)	55 (79.4%)	.002
Secondary education	123 (57.8%)	43 (59.3%)	.850	125 (59.1%)	39 (60.0%)	.921
Currently working	151 (65.5%)	56 (84.2%)	.015	146 (68.5%)	57 (80.5%)	.146
Monthly income (mean, USD)	34.8 (26.5, 43.1)	81.3 (23.6, 136.0)	.096	49.3 (28.0, 70.6)	43.6 (30.5, 55.7)	.638
Married or cohabitating	100 (50.0%)	53 (67.3%)	.056	120 (59.3%)	29 (35.6%)	.006
Restrictive religion[a]	46 (19.7%)	16 (20.8%)	.864	46 (18.9%)	15 (24.3%)	.458
Ever use a condom	186 (89.6%)	67 (94.6%)	.206	182 (88.4%)	68 (98.7%)	.013
Drinking						
Current drinker	172 (81.7%)	69 (92.3%)	.019	172 (82.2%)	64 (89.3%)	.151
Ethanol per month (g)	1.3 (0.80, 1.84)	2.3 (1.42, 3.21)	.070	1.3 (0.9, 1.8)	2.3 (1.3, 3.2)	.105
Drinking risk level[b]						
Former drinker	42 (18.3%)	5 (7.7%)		40 (17.8%)	7 (10.7%)	
Low	118 (50.2%)	38 (46.2%)		118 (51.5%)	36 (45.5%)	
High	54 (31.6%)	31 (46.2%)	.038	54 (30.7%)	28 (43.9%)	.135
Sex-related AOE						
I am more sexually assertive	3.5 (3.3, 3.7)	4.3 (4.0, 4.6)	<.001	3.6 (3.4, 3.8)	4.0 (3.7, 4.4)	.046
I have more desire for sex	3.6 (3.3, 3.8)	4.3 (3.9, 4.6)	<.001	3.7 (3.5, 4.0)	3.9 (3.5, 4.2)	.482
I am more sexually responsive	3.6 (3.4, 3.7)	4.3 (4.0, 4.6)	<.001	3.7 (3.5, 3.9)	3.8 (3.5, 4.1)	.700
I become more sexually active	3.4 (3.2, 3.6)	4.2 (3.9, 4.5)	<.001	3.5 (3.3, 3.7)	3.9 (3.6, 4.2)	.017

[a]A restrictive religion was defined as any religion which explicitly restricts alcohol including Islam and Seventh Day Adventist.
[b]Low: 0–40 g for men, 0–20 g for women; high: >40 g for men, >20 g for women per day of alcohol.

Table 2. Weighted sex-related alcohol expectancy scores between different alcohol risk levels in Lubaga Division, Kampala, Uganda 2008–2009, mean (95% CIs).

	Former drinker ($n = 54$)	Current drinker ($n = 243$)	Low risk ($n = 157$)	High risk ($n = 86$)	p-Value
Sex-related AOE					
I am more sexually assertive	3.4 (3.0, 3.8)	3.8 (3.6, 4.0)	3.6 (3.4, 3.9)	4.0 (3.7, 4.3)	.021
I have more desire for sex	3.3 (2.9, 3.7)	3.8 (3.6, 4.1)	3.7 (3.4, 4.0)	4.0 (3.7, 4.4)	.003
I am more sexually responsive	3.3 (2.8, 3.7)	3.8 (3.7, 4.0)	3.7 (3.4, 4.0)	4.0 (3.8, 4.3)	.003
I become more sexually active	3.2 (2.7, 3.6)	3.7 (3.5, 3.9)	3.5 (3.3, 3.8)	3.9 (3.5, 4.2)	.021
Sex-summary score	2.1 (0.8, 3.4)	3.7 (3.2, 4.3)	3.3 (2.6, 4.0)	4.3 (3.4, 5.2)	<.001

Note: p-Value is calculated using chi-squared test for trend: former drinker, low-risk drinker, and high-risk drinker modelled as an ordinal variable.

Table 3. Associations between drinking and risky sexual behaviour in Lubaga Division, Kampala, Uganda 2008–2009, adjusted ORs (AORs) and 95% CIs, Lubaga Division, Kampala, Uganda 2008–2009.

	≥2 Regular partner			Casual sexual partner		
	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 3 AOR (95% CI)	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 3 AOR (95% CI)
Current drinker						
No	1	1	1	1	1	1
Yes	2.76 (1.15, 6.63)**	2.18 (0.84, 5.68)	1.94 (0.56, 6.73)	2.03 (0.79, 5.24)	1.94 (0.76, 4.93)	1.80 (0.67, 4.85)
AOE score			1.14 (1.04, 1.26)*			1.05 (0.94, 1.19)
Risk level						
Former	1	1	1	1	1	1
Low	2.36 (0.92, 6.06)	1.71 (0.63, 4.66)	1.60 (0.45, 5.71)	1.67 (0.64, 4.37)	1.55 (0.60, 4.04)	1.50 (0.56, 4.01)
High	3.35 (1.28, 8.71)**	2.96 (1.06, 8.53)**	2.44 (0.68, 8.80)	2.63 (0.89, 7.78)	2.55 (0.85, 7.64)	2.33 (0.71, 7.65)
AOE score			1.14 (1.04, 1.25)*			1.04 (0.93, 1.18)

Notes: Model 1: age, sex; 2: age, sex, marital status, income; 3: age, sex, marital status, income, AOE sex-summary score. Weighted analyses.
*$p < .001$.
**$p < .05$.

[OR = 2.18; 95% CI = 0.84, 5.68]; and higher risk drinkers [OR = 2.96; 95% CI = 1.06, 8.53]). When the sex-related AOE summary score was added to each model (model 3), both associations were further attenuated. For current drinkers, point estimates went from OR = 2.18 to OR = 1.94, and for higher risk drinkers OR = 2.96 to OR = 2.44. In the full model, sex-related AOE summary score was statistically associated with having two or more regular sexual partners (OR = 1.14; 95% CI = 1.04, 1.26; per one point increase).

Alcohol use and casual sexual partners

After controlling for age, sex, marital status, income, and sex-related AOE score, current drinkers (OR = 1.80; 95% CI = 0.67, 4.85) and higher risk drinkers (OR = 2.33; 95% CI = 0.71, 7.65) were more likely to report having engaged in casual sex than former drinkers, although these associations were not statistically significant. Sex-related AOE score was not statistically significantly associated with having a casual sexual partner (OR = 1.04; 95% CI = 0.93, 1.18).

Sensitivity analyses

Associations between alcohol-use patterns and high-risk sexual practices were similar in the subset of participants who did not self-identify as belonging to a religion that explicitly restricted alcohol consumption (sensitivity analysis not shown). Some associations were

no longer statistically significant, most likely due to loss of statistical power in the context of smaller sample size. The addition of the sex-related AOE score reduced the ORs of each association by a similar magnitude, as seen in the models given in Table 3.

Discussion

In this setting, being a current drinker and a higher risk drinker was associated with having multiple regular sexual partners. Sex-related expectations about the effects of alcohol were associated with both drinking and high-risk sexual behaviours. These expectations also appeared to explain, in part, the observed relationship between alcohol consumption and high-risk sexual behaviour, suggesting the possibility of an important mediating effect of expectancies on these associations.

The results of this study are in agreement with previous reports from sub-Saharan Africa that have consistently shown the association between alcohol consumption and high-risk sexual behaviour and sexually transmitted infections, including HIV/AIDS (Bajunirwe et al., 2013; Chersich & Rees, 2010; Kalichman et al., 2013; Kalichman, Simbayi, Kaufman, Cain et al., 2007; Schneider et al., 2012; Tumwesigye et al., 2012). In rural Masaka District, Uganda, a relationship was observed between having ever drunk alcohol and being infected with HIV (Mbulaiteye et al., 2000). In a longitudinal study of residents of Rakai District, Uganda, alcohol use by either partner before sex, and having two or more partners in the last year was associated with incident HIV infection (Zablotska et al., 2006). Our study provides data on alcohol use and high-risk sexual behaviour in a population-based sample of adults living in urban Kampala, and provides further evidence for a behavioural mechanism linking alcohol use to increased risk of HIV infection. According to behavioural models by Morojele et al. and others, alcohol use may lead to high-risk sexual behaviour through various pathways, including increased sexual desire and arousal, or decreased inhibitions and judgement and reasoning skills due to the physiological effect of alcohol (Morojele et al., 2006; Morojele, Kachieng'A, Nkoko et al., 2004). Alcohol use may also affect the ability to use a condom effectively or negotiate its use. Our study demonstrates that one's expectations about the effects of alcohol may also play a role in this relationship.

The associations between alcohol-use variables and having a casual sexual partner were not statistically significant in these analyses. This may have been due to the slight reduction in sample size, as the results using both high-risk sexual behaviour outcomes were in the same general direction, with similar effect sizes. Furthermore a similar point-estimate reduction was observed once sex-related AOE summary score was added to each model, which may signify that expectancy-related behaviour mechanisms may play a role between alcohol use and both high-risk sexual behaviour outcomes. Results were also similar in a group of participants whose religion does not restrict alcohol suggesting that the particular behaviours of this subgroup of participants were not having a major effect on the results of this study. This may not be surprising since, despite these people belong to a religion that restricts drinking, they were still consuming alcohol.

One's expectations about the effects of alcohol may influence how they behave while under the influence of alcohol. More specifically, these expectancies may lead to a development of sexual agenda while consuming alcohol. Expectancy outcome theory has been tested in many contexts, often in younger populations or among college students in

Western countries (Dermen et al., 1998; White et al., 2009). Cross-sectional and longitudinal studies in those populations have shown that alcohol expectancies are related to alcohol use (Jones et al., 2001). Associations between sex-related alcohol expectancies and risky sexual outcomes have been somewhat mixed (Hendershot, Stoner, George, & Norris, 2007; Leigh, 1990; White et al., 2009). Leigh et al., in a study of American adults aged 18–50 years, demonstrated that sex-related alcohol expectancies predicted drinking in sexual situations, and Hendershot et al. reported a correlation between alcohol expectancies and number of sexual partners among younger American adults (mean age = 25 years) (Hendershot et al., 2007; Leigh, 1990). While a study by White et al. reported a relationship between alcohol-related sexual expectations and drinking before sex, they did not find an independent association with casual sex among younger Americans (mean age = 19 years) (White et al., 2009).

In a context of high alcohol consumption (WHO, 2014) and high HIV rates in Uganda (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2013), sex-related alcohol expectancies can be all the more important to understand. However, fewer studies have examined the role sex-related alcohol expectancies may play in high-risk sexual outcomes within populations in developing countries. In a study of those seeking treatment in a sexually transmitted disease clinic in urban South Africa, alcohol outcome expectancies were associated with drinking before sex (Kalichman, Simbayi, Cain et al., 2007), suggesting that this mechanism is operating among high-risk adults. In another study of 312 young men in Lima, Peru, Gálvez-Buccollini and colleagues found that when alcohol expectancies were added to the models of heavy alcohol use and high-risk sexual behaviour, the associations were attenuated suggesting that that expectancies partially explain this association (Gálvez-Buccollini et al., 2008). This study supports these earlier findings by demonstrating that these associations exist in a population-based sample of men and women across a wide age-range.

Opportunities for intervention

Although the WHO has proposed many strategies to reduce alcohol-related harms, interventions targeting the role of alcohol use in HIV interventions appear to be underused in sub-Saharan Africa (Chersich & Rees, 2010; Chersich, Rees, Scorgie, & Martin, 2009; Kalichman et al., 2008; Schneider et al., 2012). Some have suggested the possibility of targeting at-risk individuals for cognitive restructuring or targeting larger populations with advertising campaigns emphasising that drinking alcohol does not need to lead to risky sexual behaviours (Dermen et al., 1998; Kalichman, Simbayi, Kaufman et al., 2007). Studies of alcohol expectancies have mostly been conducted among college students in Western countries. There is an opportunity for global health researchers to extend expectancy framework to settings like Kampala, Uganda and create interventions that explicitly target personality constructs to raise awareness among at-risk individuals (Hendershot et al., 2007). The results from this study and others support the possibility of targeting alcohol expectancies within these contexts (Gálvez-Buccollini et al., 2008; Kalichman, Simbayi, Cain et al., 2007). For example, interventions could help individuals become more aware of any expectations they may have about their behaviour while drinking alcohol, so they may learn to take precautions when drinking (i.e. carrying a condom when drinking or avoiding venues that may be more likely to lead to sexual risk-taking behaviours).

The topics of alcohol consumption and sex-related alcohol expectations can also be addressed during post-HIV test counselling, particularly among those who test negative. Inherently, individuals who seek HIV testing do so because they perceive themselves at risk, perhaps because they recently engaged in high-risk sex. Given that most who seek HIV testing will not be infected, there is a risk for the negative test results to give individuals a false sense of protection despite having engaged in high-risk sex (Matovu et al., 2007). A discussion during post-HIV test counselling about upstream factors such as alcohol consumption and mediating factors such as sex-related, alcohol expectations may mitigate any effect that testing negative may have on altering perceived risk for HIV.

Limitations

The results of our study should be interpreted in light of several limitations. This study was cross-sectional, and so causal interpretations between drinking and sexual behaviour should not be made. Furthermore, this study was not able to place high-risk sexual behaviour within specific drinking contexts, nor was it able to examine sexual incident-specific condom usage which could possibly alleviate some of the risk of having multiple or casual partners. Instead this study aimed for a reasonable general approximation of participant's drinking and sexual behaviours. There are different ways to define risky drinking, including using responses to standardised tools such as the Alcohol Use Disorder Identification Test (AUDIT). AUDIT data were not available for this study; however, we conducted an extensive alcohol use inventory and used established cut-points to define risky drinking (World Health Organization. Department of Mental Health and Substance Dependence, 2000). The alcohol expectancy questionnaire was asked only of those with a history of alcohol consumption and sexual activity. This lowered the sample size, and thus the ability to find associations in multivariable modelling as evidenced by the wide 95% CIs in Table 3, and also limited the generalisability of the study. However, asking non-drinkers to describe alcohol expectancies would most likely increase measurement error and would capture participants' perceptions and not personal experiences.

Participants for this study were selected using a population-based sampling strategy; therefore the study population included community-dwelling men and women with a wide age-range, and was a reasonable representation of the general urban population. Beverage-specific consumption of both commercial drinks and traditional brews were measured. Information on alcohol expectations among adults in resource-limited settings is rare, and a valid method for collecting expectancy data was used although it had not previously been used in this population (Leigh, 1990). The internal consistency of the sex-related expectancy questions used in this study was good and similar to those reported earlier (Cronbach's alpha current study = .93, Cronbach's alpha for Leigh & Stacy (1993) = .91) (Leigh & Stacy, 1993). Although the AOE was asked only in those who had drinking experience, as has been noted, the more personal experience one has with drinking, the more personalised their expectancies may become, and the more reliable their measure of expectancy.

Conclusions

Among Ugandan adults in urban settings, drinking behaviour was associated with high-risk sexual behaviours, including having multiple sexual partners. Sex-related expectations

about the effects of alcohol appeared to explain, in part, these observed relationships, and may be an important component to target in HIV interventions that include alcohol risk reduction.

Acknowledgements

The authors would like to thank the research assistants, Sheila Kisakye, Mustafah, Mubiru, Gladys Mpalanyi, Joan Nanfuka, and Stella Nanyonga, for their commitment to the study and dedicate this work to Keziron Muwanga (research assistant), who was tragically killed in the 11 July 2010 Kampala Bomb Attacks.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This study was funded by a grant from the National Institutes of Alcohol Abuse and Alcoholism [grant number AA015488].

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