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Determinants of hazardous drinking among black South African men who have sex with men

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Abstract

Background—There is a known heavy burden of hazardous drinking and its associated health risks among black South African MSM; however, no study to date has identified risk factors for hazardous drinking among this nor any other African MSM population.

Methods—A cross-sectional survey was conducted among 480 black South African MSM recruited using respondent-driven sampling. All analyses were adjusted using an RDS II estimator. Multivariable logistic regression was used to assess the relationship between demographic characteristics, psychosocial factors, behavioral attributes and hazardous drinking.

Results—More than half of the men (62%, 95%CI = 56%–68%) screened positive as hazardous drinkers. In multivariable analyses, living in a township (versus the city of Pretoria) (aOR = 1.9, 95%CI = 1.2–3.1, $p < .01$), more gender dysphoria (aOR = 1.4, 95%CI = 1.0–1.8, $p = .03$), having ever received money or other incentives in return for sex (aOR = 2.4, 95%CI = 1.3–4.3, $p < .01$), having been sexually abused as a child (aOR = 2.6, 95%CI = 1.1–6.4, $p = .03$), having anxiety (aOR = 5.4, 95%CI = 1.2–24.3, $p = .03$), and social network drinking behavior (aOR = 5.4, 95%CI = 1.2–24.3, $p = .03$) were positively associated with hazardous drinking. Being sexually attracted only to men (aOR = 0.3, 95%CI = 0.1–0.8, $p = .01$) was negatively associated with hazardous drinking.

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Contributors

All authors have seen, approved, and contributed significantly to this manuscript. For a breakdown of contributions: Conceived and designed the experiments: TS, VR, TL. Performed the experiments: TS, VR. Analyzed the data: JK, TS. Wrote the paper: JK, VR, TL, GL, DH, TS.

Conflict of interest

None of the authors have conflict of interest to disclose.

Discussion—Hazardous drinking is highly prevalent among black South African MSM. Multiple indicators of social vulnerability were identified as independent determinants of hazardous drinking. These findings are of heightened concern because these health problems often work synergistically to increase risk of HIV infection and should be taken into consideration by efforts aimed at reducing hazardous drinking among this critical population.

Keywords

Alcohol; Hazardous drinking; Men who have sex with men (MSM); South Africa

1. Introduction

Black South African men who have sex with men (MSM) consume high levels of alcohol (Lane et al., 2011, 2008; Rispel et al., 2011). In one study, nearly two thirds of men reported drinking regularly, with nearly half reporting that they get drunk regularly (Lane et al., 2008). In another study, over half of men reported having 10 or more drinks in a typical day of drinking and more than three quarters of men were classified as having a drinking problem (Lane et al., 2011). In another study, nearly three quarters of men reported having sex while under the influence of alcohol (Rispel et al., 2011). Alcohol use and abuse constitutes a major public health problem, contributing to injury, disease and death. Hazardous drinking is of particular concern among this population due to the high prevalence of HIV, which estimates range between 13% and 50% (Lane et al., 2011; Rispel et al., 2011; Sandfort et al., 2015), and the increased risk of HIV infection associated with excessive drinking (Bryant, 2006; Kalichman et al., 2007; Rehm et al., 2012; Woolf-King and Maisto, 2011). Alcohol use has also been shown to have negative health consequences among people living with HIV, including lack of viral suppression, common comorbid conditions, and ultimately morbidity and mortality through both biological and behavioral mechanisms (Williams et al., 2016). Despite the known burden of hazardous drinking and its associated health risks, no study to date has identified risk factors for hazardous drinking among black South African MSM, nor any other African MSM population (Sandfort et al., in press).

Researchers have observed elevated rates of concurrent psychosocial problems, including heavy alcohol use, among non-African LGBT populations (McKirnan and Peterson, 1989a,b; Sandfort et al., 2001, 2014; Stall et al., 2003, 2001), noting that they work synergistically to increase risk of HIV infection (Jie et al., 2012; Stall et al., 2003). For example, mental health problems, including anxiety (Rosario et al., 2006), and depression (Wang et al., 2007), often co-occur with substance use disorders, particularly alcohol dependence (Stall et al., 2001). Sexual minority stressors, such as internalized homophobia and external homophobia (i.e., experiences with sexual orientation-related discrimination), are associated with increased alcohol-related problems (McKirnan and Peterson, 1989b; Stall et al., 2001), and are likely of heightened importance among black South African MSM where same-sex sexuality is highly stigmatized (Adam et al., 2009; Muraguri et al., 2012; Niang et al., 2003; Smith et al., 2009; van Griensven, 2007; van Griensven and Sanders, 2008). Social network characteristics are also potential determinants of hazardous drinking as social networks are known to play a major role in many health-related behaviors (Doherty

et al., 2005; Friedman and Aral, 2001; Luke and Harris, 2007; Smith et al., 2004; Smith and Christakis, 2008; Umberson and Montez, 2010; Youm and Laumann, 2002). For example, the drinking behavior of an individual's social network members often provides a crucial context for individual decisions on how much and how often to drink (Valente, 2003). One's degree of connectedness to a specific social network has been found to be positively associated with one's likelihood of reflecting the normative behavior of that group regarding substance use (Alexander et al., 2001). Peers' alcohol use has been found to be a primary influence on an individual's alcohol use (Gaughan, 2003; Windle, 2000). There is also a potential heightened importance of social networks among stigmatized populations, such as black South African MSM (Latkin et al., 2013).

This paper aims to describe alcohol use among black South African MSM and identify determinants that put them at risk for hazardous drinking. The data for this project were collected among black MSM living in Tshwane, South Africa. These men currently live in or have recently moved from township communities. Township communities are peri-urban areas (the landscape interface between town and country) previously segregated under Apartheid whose residents continue to be characterized by limited resources, low levels of education, and high rates of unemployment. Personal social networks are the primary context in which these men learn how to express their sexuality, deal with stigma, and manage the risks of unprotected sex (Rabie and Lesch, 2009). They meet potential sex partners predominantly through these social networks or at drinking establishments. These circumstances combine to create a context where substance use, particularly excessive substance use, is normative (Lane et al., 2008; Rispel et al., 2011; Sandfort et al., 2015). Respondent-driven sampling (RDS) was chosen as the method to recruit these men because it is the most reliable way to derive valid population estimates for hidden populations such as black South African MSM (Magnani et al., 2005).

2. Materials and methods

2.1. Study population and procedures

The data used for the current project was collected as part of a study whose primary objective was to determine the prevalence of HIV infection among black MSM in Tshwane (Sandfort et al., 2015). Participants were recruited using RDS (Heckathorn, 1997; Heckathorn et al., 2002). Eligibility criteria for study participation included age older than 18; having engaged in oral, anal, or masturbatory sex with another man in the prior 12 months; living, working, or socializing in the Tshwane metro area; fluency in English, Sepedi (Northern Sotho), or isiZulu; and willingness to take an HIV rapid test. Consistent with RDS methodology, seeds, 20 in total, distributed up to five coupons to eligible men from their social networks who they were willing to recruit into the study. The seeds were referred by the community advisory board, screened to ensure that they met all of the study eligibility criteria and then interviewed about their social network size and composition. All seeds were Black and were purposively selected based on geographic place of residence in the Tshwane metro area and age. Men enrolled in the study and completed study procedures, including a 90-min interviewer-administered computer-assisted personal interview and an HIV blood test, which was conducted following a serial algorithm in accordance with South

African national guidelines. All participants were screened by licensed nurses using two licensed rapid test kits (EZ Trust HIV 1 and 2, CS Innovation; First Response, Premier Medical Corporation). Non-reactive samples were interpreted as negative. Samples that were reactive on both tests were confirmed as positive. There were no indeterminate results. Staff provided participants with up to five recruitment coupons for further distribution. All study participants received vouchers worth 150 South African Rand (~\$12 US Dollars) to be redeemed at a supermarket as primary incentive for their own participation, as well as additional vouchers worth 50 South African Rand (~\$4 US Dollars) as secondary incentives for each successful referral to the study. At one point, verification of the inclusion criteria was expanded in order to ensure that all participants met the inclusion criteria. We did not observe evidence of anything else that might have threatened the integrity of the recruitment process. Participants were linked to their referral chain using their coupon identification numbers. All study procedures were approved by the Institutional Review Board of the New York State Psychiatric Institute in the U.S. and the Research Ethics Committee of the Human Sciences Research Council in South Africa. Participants provided written informed consent for the survey. Study staff provided referrals for further HIV testing and counseling, mental health, or primary care as indicated.

2.2. Measures

Scales adapted for and previously validated in South Africa were used whenever possible. Multiple aspects of alcohol use practices were evaluated (Heath and Martin, 1991; Heath, 1991). First, men were asked if they ever drank alcohol, then if they drank alcohol in the past year. Men replied 'yes' or 'no'. They were then asked where they drink and what they drink. They were also asked if they drink before going out, if they pay for their own drinks, if they buy drinks for men that they want to have sex with, or if men who want to have sex with them buy them drinks. Men replied on 5-point scales (e.g., "Never" (0) – "Always" (4)). Hazardous drinking was evaluated using the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C), (Bohn et al., 1995; Saunders et al., 1993), a scale developed and validated by the World Health Organization for international use, including in South Africa (Bohn et al., 1995; Myer et al., 2008; Saunders et al., 1993), where it has been used in multiple studies (Jewkes et al., 2006; Peltzer et al., 2011; Peltzer et al., 2006). The AUDIT-C uses 3 items: how often the respondent drinks, how many drinks the respondent consumes in a typical day of drinking, and how frequently the respondent drinks six or more drinks at a time. Of a maximum score of 12 on the AUDIT-C, a score of four or more indicates hazardous drinking for men (Bush et al., 1998). Drug use practices were measured by asking men if they had ever used marijuana, poppers, cocaine, opiates, hallucinogens, amphetamines, and other club drugs. If they replied yes to any of these, they were asked if they had used them in the past year.

The survey also measured demographic characteristics (age, education, income, residence), psychosocial factors and behavioral attributes. Men's reasons for drinking were assessed using eleven items (Golding et al., 1992), representing three domains: drinking for a positive affect ($\alpha = 0.87$), drinking to cope with negative affect ($\alpha = 0.91$) and drinking to enhance social interactions ($\alpha = 0.80$); (overall $\alpha = 0.95$). A sample item on the drinking to enhance social interactions scale is: "In the past year, how often did you drink because a drink helps

you to have better sex?”. Men replied on a five-point scale (“Never” (1) – “Always” (5)). Men who did not drink were assigned to “Never” (1) on all of these items. The Sex-Related Alcohol Expectancy Scale (Dermen and Cooper, 1994a,b) was used to assess men’s expectancies about the effects of alcohol use on sexual behavior, representing three domains: enhancement of sexual experience ($\alpha = 0.93$), increased sexual risk taking ($\alpha = 0.91$), and disinhibition of sexual behavior ($\alpha = 0.88$) (Kalichman and Simbayi, 2004; Morojele et al., 2006); (overall $\alpha = 0.95$). A sample item is: “After a few drinks of alcohol I am more sexually responsive”. Men replied on a 4-point Likert scale (“Strongly disagree” (1) – “Strongly agree” (4)). Sexual attraction was assessed with the question “Do you currently feel more sexually attracted to men or to women?” and a 5-point response scale (1 = “Only to women”; 5 = “Only to men”). Men were coded as ‘Only attracted to men’ and ‘Also attracted to women’ because of the distribution of the participants’ responses. Sexual identification was assessed with the question “What word would you use to describe your sexuality? Would you call yourself gay, bisexual, or straight, or would you use another word?” There were a few men ($n = 2$) who described themselves as transgender and they were grouped with other gay men because of how they overlapped in terms of other measures of sexual identity (e.g., masculinity/femininity, sexual attraction to women, etc.). There were also a few straight men ($n = 15$) who reported sex with other men in the previous 12 months who were grouped with bisexual men because of how they overlapped in terms of other measures of sexual identity. Self-perceived masculinity/femininity was assessed with a 6-item scale with 3 items assessing level of masculinity and femininity each (Storms, 1979) ($\alpha = 0.95$). Sexual identity confusion and internalized homophobia were assessed with subscales adapted from the Lesbian, Gay, and Bisexual Identity Scale (LGBIS) (Mohr and Fassinger, 2000, 2006). Sexual identity confusion was assessed with 4-items (e.g., “I am not totally sure what my sexual orientation is”) ($\alpha = 0.89$). Internalized homophobia was assessed with 7-items (e.g., “I wish I were only sexually attracted to women”) ($\alpha = 0.85$). Secrecy about one’s sexual orientation was assessed with an 8-item scale (Day and Schoenrade, 1997) ($\alpha = 0.96$). Gender dysphoria was assessed over the past year using a 16-item scaled adapted from the Gender Identity/Gender Dysphoria Questionnaire for Adolescents and Adults (Deogracias et al., 2007; Singh et al., 2010) ($\alpha = 0.93$). Sample items include: “How often have you thought of yourself as a woman in the past 12 months?” and “How often have you felt unhappy about having a male body in the past 12 months?” and used a 5-point response scale (1 = “Never”; 5 = “Always”). Sexual orientation-based discrimination was assessed using a 10-item scale asking how often in the past year men had experienced such things as verbal insults, threats of physical violence, sexually harassment or rape because of having sex with men; items used a 4-point response scale (0 = “Never”; 4 = “Often”) ($\alpha = 0.87$). Men were also asked if they had ever experienced sexual abuse as a child, and if they ever received money or other incentives in return for sex (transactional sex). The survey also addressed two mental health conditions: anxiety and depression. Anxiety was considered positive if the participant responded ‘yes’ to the following two yes/no items: “Have you ever in your life had an anxiety attack – suddenly feeling fear or panic?” and “Have you had an anxiety attack in the last 4 weeks?” (Kroenke et al., 2010). Depression was assessed using the 2 items: “Over the last 2 weeks, how often have you been troubled by any of the following problems: little interest or pleasure in doing things?” and “Over the last 2 weeks, how often have you been troubled by any of the following problems:

feeling down, depressed or hopeless?” Each item featured a 5-point response scale (“Not at all” (0) – “Nearly every day” (3)) ($\alpha = 0.84$) (Kroenke et al., 2003; Kroenke et al., 2010).

The data on social network characteristics were acquired by having used RDS (Wejnert, 2010). This data includes connectedness to a social network of MSM, which is estimated using outdegree centrality: the number of other men that a participant successfully recruited for inclusion in the study (Valente et al., 2004). Reports of alcohol use among members of one’s social network who also participated in the study were used to estimate social network drinking. For this study, social network drinking behavior was calculated as the proportion of a participant’s ties that screened positive as hazardous drinkers using the AUDIT-C. That value was then weighted towards the mean by the inverse proportion of the number of ties that we had data on over the maximum number of ties.

2.3. Statistical analyses

The specific objectives of our analyses were to: 1) describe alcohol use and abuse among black South African MSM; 2) describe associations between individual characteristics, social network characteristics and hazardous drinking; 3) assess which characteristics are independently associated with hazardous drinking.

Tests to determine which variables were associated with hazardous drinking included *t*-tests for continuous and scaled variables and Chi-squared tests for dichotomous variables. All predictors explored in bivariate analyses were included in the final multivariable model. Multivariable analyses were run using logistic regression for the outcome of hazardous drinking (yes versus no). All statistical tests were 2-sided and $p < .05$ was considered statistically significant. Statistical analyses were performed with SPSS (version 17.0; SPSS, Chicago, IL) and R (version 3.3.2; R Core Team, Vienna, Austria) software packages.

Since RDS was the recruitment method used for this sample, all analyses were adjusted using an RDS II estimator (Salganik and Heckathorn, 2004; Volz and Heckathorn, 2008). This approach gives greater weight to those men with a small personal network size, since those men would be less likely to be recruited into the study. Equilibrium for certain characteristics was assessed and considered to be achieved when the proportions of the dichotomized variable changed by less than .02 between waves.

3. Results

3.1. Sample characteristics

In total 480 eligible participants were recruited in 18 waves between August 2011 and January 2013. All results presented are RDS-weighted. The mean number of peers recruited by each participant was 0.7. The coupon return rate was 32% (460/1417). Among the 20 seeds, 40% were less than 24 years old, 75% had some post-secondary education, 65% had a regular income, and 90% lived in a township (versus metropolitan Tshwane). Among the entire sample, most men (57%) were less than 24 years old, 52% had some post-secondary education, 35% had a regular income, and 57% lived in a township (see Table 1). The study reached equilibrium on the following characteristics in the respective waves: age (wave 2), education (wave 3), income (wave 3), township status (wave 12), sexual identity (wave 3),

sexual attraction (wave 3) and HIV status (wave 2). The sample has been described previously (Knox et al., 2017; Sandfort et al., 2015). The prevalence of HIV among the sample was 30% and hazardous drinking was identified as an independent risk factor for HIV infection (aOR = 1.8, 95% CI = 1.1–3.1, $p < .05$) (Sandfort et al., 2015).

3.2. Alcohol and drug use

Most men (86%) had consumed alcohol in their lifetime, including 77% of men who had consumed alcohol in the past year. Among men who consumed alcohol in the past year, 49% consumed mostly beer, 36% consumed mostly cider (fermented alcoholic beverage made from apples), 9% ($n = 33$) consumed mostly wine, and a small proportion (4%) consumed mostly spirits. The majority of men mostly consumed alcohol in bars and shebeens (informal drinking establishments located in townships) (53%), although many consumed alcohol equally as often at home as they did while going out (27%) or mostly at home (20%). Most men (53%) said they commonly consumed alcohol before going out to a bar or shebeen. More than half of men (51%) reported either buying alcohol for men that they wanted to have sex with or being bought alcohol by men who wanted to have sex with them.

In response to the items that comprise the AUDIT-C: 20% of men drank twice a week or more, 29% drank 2–4 times per month, and 28% drank once a month or less. A fifth of the men (21%) reported that they have 10 or more drinks on a typical day that they are drinking, 11% have 7–9 drinks, 23% have 5 or 6 drinks, 17% have 3 or 4 drinks, and only 5% have 1 or 2 drinks. A quarter of men (24%) reported that they have 6 or more drinks on a single occasion weekly, 22% have 6 or more drinks on a single occasion monthly, and 22% have 6 or more drinks on a single occasion less than monthly but not never. The mean AUDIT-C score was 4.7 and the median AUDIT-C score was 4.4. More than half of the men (62%, 95% CI = 56%–68%) screened positive as hazardous drinkers. Fig. 1 shows the distribution of these men among the recruitment threads. The study reached equilibrium on hazardous drinking after 2 waves.

In the past year, 16% of men had used drugs. Men most commonly used marijuana (15%). A few men had used poppers (< 1%), cocaine (1%), crack (< 1%), crystal methamphetamine (< 1%), methaqualone (< 1%), hallucinogens (< 1%), heroin (1%), or amphetamines (3%). Because hazardous drinking was found to be the vastly predominant form of substance use among this population, it served as the focus of all further analyses.

3.3. Reasons for drinking and sex-related alcohol expectancies

Table 2 shows the results of how reasons for drinking and sex-related alcohol expectancies correlated with hazardous drinking. Men who screened positive as hazardous drinkers were more likely to endorse drinking for a positive affect ($p < .001$), drinking to cope with negative affect ($p < .001$) and drinking to enhance social interactions ($p < .001$). Men who screened positive as hazardous drinkers were more likely to expect alcohol to enhance sexual experience ($p < .001$), increase sexual risk taking ($p < .001$) and disinhibit sexual behavior ($p < .001$).

3.4. Correlates of hazardous drinking

In bivariate analyses, men who screened positive as hazardous drinkers were more likely to have a secondary education or lower ($P = .03$), identify as straight or bisexual (versus gay; $p = .01$), be attracted to both men and women ($P < .001$), have ever received money or other incentives in return for sex ($p < .001$), have been sexually abused as a child ($p < .001$), have higher levels of anxiety ($p < .001$), experience more gender dysphoria ($p < .01$), and have higher levels of depression ($p < .01$) (see Table 1). Men who screened positive as hazardous drinkers were not more connected, on average, to this social network of MSM ($p = .77$). Men who screened positive as hazardous drinkers had a higher proportion of friends, on average, who were also hazardous drinkers ($p < .01$).

Table 3 shows the results of both unweighted and RDS-weighted multivariable analyses looking at independent correlates of hazardous drinking. The measures of association from the unweighted and RDS-weighted analyses are similar in terms of their direction and strength of association. There are multiple discrepancies in terms of achieving statistical significance. Among RDS-weighted analyses, living in a township (versus the city of Pretoria) (aOR = 1.9, 95%CI = 1.2–3.1, $p < .01$), more gender dysphoria (aOR = 1.4, 95%CI = 1.0–1.8, $p = .03$), having ever received money or other incentives in return for sex (aOR = 2.4, 95%CI = 1.3–4.3, $p < .01$), having been sexually abused as a child (aOR = 2.6, 95%CI = 1.1–6.4, $p = .03$), having anxiety (aOR = 5.4, 95%CI = 1.2–24.3, $p = .03$), and social network drinking behavior (aOR = 5.4, 95%CI = 1.2–24.3, $p = .03$) were positively associated with hazardous drinking. Being sexually attracted only to men (aOR = 0.3, 95%CI = 0.1–0.8, $p = .01$) was negatively associated with hazardous drinking.

4. Discussion

Black South African MSM were found to have high levels of alcohol use; nearly two thirds (62%, 95%CI = 56%–68%) of them screened positive as hazardous drinkers. Various factors were found to increase men's likelihood of being hazardous drinkers. Men who live in a township (versus the city of Pretoria), men with higher levels of gender dysphoria, men who had ever received money or other incentives in return for sex, men who had been sexually abused as a child, and men with anxiety were all more likely to be hazardous drinkers. Men who reported being sexually attracted only to men were less likely to be hazardous drinkers. Men whose social networks included a higher proportion of hazardous drinkers were more likely to be hazardous drinkers themselves.

The high levels of alcohol use found in the current study are comparable to what has been described in other studies conducted among black South African MSM, which focused on alcohol use as a risk factor for risk behavior (Lane et al., 2008) or HIV infection (Lane et al., 2011; Rispel et al., 2011). In one study, nearly two thirds of men reported drinking regularly, with nearly half reporting that they get drunk regularly (Lane et al., 2008). In another study, over half of men reported having 10 or more drinks in a typical day of drinking and more than three quarters of men were classified as having a drinking problem (Lane et al., 2011). In another study, nearly three quarters of men reported having sex while under the influence of alcohol (Rispel et al., 2011). Substance use is a major health concern among this population, especially given its association with high risk sexual behavior (Bryant, 2006;

Kalichman et al., 2007; Rehm et al., 2012; Woolf-King and Maisto, 2011) in this setting of high HIV prevalence (Lane et al., 2011; Rispel et al., 2011; Sandfort et al., 2015). Despite the heavy burden of alcohol use, among these men and other African MSM populations, the authors were unable to identify any implemented interventions that have targeted alcohol use among these men or any other African MSM population (Sandfort et al., in press). Clearly, this is a public health problem that merits further attention.

Men who were hazardous drinkers were more likely to endorse drinking for a positive affect, drinking for negative effect and drinking to enhance social interaction. Men who were hazardous drinkers were also more likely to expect alcohol to enhance sexual experience, increase sexual risk taking and disinhibit sexual behavior. Much of the research on reasons for drinking and sex-related alcohol expectancies indicate that drinking is more likely to have an intended effect on people that endorse these beliefs (Bryan et al., 2007; Dermen et al., 1998; Fromme et al., 1999; Gordon et al., 1997; McKirnan et al., 2001), thus suggesting that hazardous drinking additionally leads to increased sexual risk behavior.

The current project is the first to identify determinants of hazardous drinking among a sample of African MSM. Living in a township (versus metropolitan Tswane), a construct that captures the vulnerability of living in a low resource setting, was found to increase men's likelihood of being hazardous drinkers. This risk factor has been observed as an important indicator of social vulnerability and predictor of health risk in studies conducted among black South African MSM (Knox et al., 2013, 2011, 2010; Sandfort et al., 2013).

Other indicators of social vulnerability were also found to increase men's likelihood of being hazardous drinkers. The relationships we observed are in accordance with what has been found among non-African MSM populations. Indicators of sexual minority stress, such as gender dysphoria, have been found to be associated with substance abuse (McKirnan and Peterson, 1989b; Rosario et al., 2006; Stall et al., 2001). In this study, gender dysphoria predicted hazardous drinking while controlling for other same-sex characteristics, suggesting that there is something uniquely detrimental about these feelings that they contribute to hazardous drinking. Similar to our findings, other studies have found childhood sexual abuse (Diaz et al., 1999; Paul et al., 2001) and mental health indicators, including anxiety (Rosario et al., 2006; Stall et al., 2001), to predict substance abuse among non-African MSM populations. These findings are of heightened concern because of how these co-occurring health problems work synergistically to increase risk of HIV infection (Jie et al., 2012; Stall et al., 2003).

Men who reported being sexually attracted to both men and women were more likely to be hazardous drinkers than men who reported sexual attraction to only men. This result was observed while controlling for other potentially more proximal psychosocial characteristics that might help explain the association, such as sexual identity confusion or internalized homophobia. Another potential explanation for this might be that local community social support networks are stronger for gay MSM than they are for bisexual MSM. Further research into the dynamics of how sexual identity contributes to risk among these men, both in terms of hazardous drinking and sexual vulnerability, is needed.

The current project is also the first to consider social network characteristics in the evaluation of substance use among a sample of African MSM. We found that the size of men's social network did not impact men's likelihood of being a hazardous drinker, although the drinking behavior of their social network members did. This finding speaks to the importance of the characteristics of social network ties because they provide a context for behavior and norms (Friedman et al., 2007; Latkin et al., 2009; Luke and Harris, 2007; Valente and Fosados, 2006), more than concern for the presence of social network ties in themselves (i.e., being connected versus isolated) (Alexander et al., 2001; Helleringer and Kohler, 2007; Smith et al., 2004). This is an area that merits further exploration, particularly given the heightened importance of social networks in this setting (Latkin et al., 2013) and their potential as conduits for an intervention (Latkin, 1998).

There are certain limitations to the current study. The cross-sectional research design limits the ability to infer causality. For example, we assume that the drinking behaviors of one's social network members influences one's own drinking behavior. However, these findings may also reflect that men who drink more tend to befriend other men who drink more. There were also certain findings that were not in agreement with our expectations. For example, it is not clear why being sexually attracted only to men decreased men's likelihood of being a hazardous drinker when in previous research this was found to predict alcohol dependence (Stall et al., 2001). Furthermore, some potential risk factors were not found to be associated with hazardous drinking. This likely speaks to the exploratory nature of this study, given the lack of previous research among African MSM populations, as well as the complexity of substance use and psychosocial health among men in this setting (Cook et al., 2013; Sandfort et al., 2016, 2015). These issues merit further exploration. Unfortunately, the study did not collect information on being on treatment for HIV. Given how few men knew their current HIV status, the limited availability of antiretroviral therapy (ART) during the study period and the criteria for starting treatment at the time, we suspect that few men were on ART. The current study was conducted among black South African MSM and may have limited generalizability outside of that setting. The constructs used were almost exclusively developed in Western settings, and while many of them have previously been demonstrated to be reliable and valid, including many in South Africa, there may be additional culture-specific factors that have not been accounted for. Lastly, the data collected are self-reported and could have been subject to social desirability or recall bias.

In summary, the current study expands the literature by providing further evidence of the severity of excessive alcohol use among black South African MSM. Various determinants of hazardous drinking were identified, including many indicators of social vulnerability. The findings are of concern because these health problems often work synergistically to increase risk of HIV infection. The drinking habits of men's social network ties also was highly correlated with men's own drinking habits. These findings should be taken into consideration by efforts aimed at reducing hazardous drinking among this critical population. Specifically, intervention strategies should consider targeting MSM who are the most vulnerable, those who live in townships, who have had to engage in sex for money or favors, who have a history of childhood sexual abuse or who suffer from other mental health problems. Possible interventions might include those that not only target individuals but

their social networks (Copello et al., 2002). Efforts aimed at reducing hazardous drinking are greatly needed.

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Fig. 1.
Distribution of hazardous drinkers among networks of $n = 480$ black MSM in Pretoria, South Africa, with 3 distinct network chains extracted.

Characteristics of MSM and hazardous drinking among n = 480 black MSM in Tshwane, South Africa (RDS-weighted).

Table 1

	Total		Hazardous drinking		No hazardous drinking		X ²	P
	N	(%)	N	(%)	N	(%)		
Demographic characteristics								
Age							0.3	0.61
23 or younger	272	57%	171	63%	101	37%		
24 or older	208	43%	126	61%	82	39%		
Education							4.5	0.03
Secondary or lower	229	48%	153	67%	76	33%		
Post secondary	251	52%	144	57%	107	43%		
Regular income							0.0	0.97
No	311	65%	192	62%	119	38%		
Yes	168	35%	104	62%	64	38%		
Living in a township							10.2	0.00
No	204	43%	109	53%	95	47%		
Yes	274	57%	186	68%	88	32%		
Psychosocial factors (dichotomous)								
Sexual identification							6.7	0.01
Gay or transgender	332	70%	192	58%	140	42%		
Bisexual or straight	145	30%	102	70%	43	30%		
Sexual attraction							17.5	<.001
Only attracted to men	320	67%	177	55%	143	45%		
Also attracted to women	160	33%	120	75%	40	25%		
Ever received money or incentives for sex							18.5	<.001
No	369	77%	209	57%	160	43%		
Yes	111	23%	88	79%	23	21%		
Sexually abused as a child							12.2	<.001
No	429	89%	254	59%	175	41%		
Yes	51	11%	43	84%	8	16%		
Anxiety							17.4	<.001

	Total			Hazardous drinking			No hazardous drinking			X ²	P
	N	(%)		N	(%)		N	(%)			
No	431	89%		253	59%		178	41%			
Yes	51	11%		43	84%		8	16%			
Psychosocial factors (continuous) ^a	mean	SD		mean	SD		mean	SD		t	P
Femininity ^b	2.9	1.1		2.9	1.1		3.0	1.0		0.7	0.47
Sexual identity confusion ^c	2.0	0.6		2.1	0.6		2.0	0.5		-1.6	0.12
Secretiveness about sexuality ^c	2.2	0.9		2.2	0.9		2.2	0.9		0.1	0.92
Internalized homophobia ^b	2.1	0.5		2.2	0.5		2.1	0.5		-1.2	0.24
Gender dysphoria ^d	0.7	1.0		0.8	1.1		0.5	0.9		-2.9	0.00
Sexual orientation-based discrimination ^e	1.5	0.6		1.5	0.6		1.5	0.5		-1.6	0.10
Depression ^e	1.5	0.7		1.6	0.8		1.4	0.6		-2.6	0.01
Social network characteristics ^f											
Social network connectedness ^e	0.7	1.1		0.7	1.1		0.8	1.1		0.3	0.77
Social network drinking behavior ^f	0.6	0.1		0.7	0.1		0.6	0.2		-3.9	<.001

^a Higher scores indicate higher levels of the construct.

^b Range 1–5.

^c Range 1–4.

^d Range 0–4.

^e Range 0–5.

^f Range 0–1.

Reasons for drinking, sex-related alcohol expectancies and hazardous drinking among n = 480 black MSM in Tshwane, South Africa.

Table 2

	Total		Hazardous drinking		No hazardous drinking		t	P
	mean	SD	mean	SD	mean	SD		
Reasons for drinking								
Drinking for positive affect	2.5	1.2	3.1	0.9	1.5	0.8	-19.5	<.001
Drinking for negative affect	2.1	1.1	2.5	1.1	1.4	0.7	-12.5	<.001
Drinking to enhance social interactions	2.4	1.2	2.9	1.1	1.5	0.9	-14.9	<.001
All reasons for drinking	2.3	1.1	2.8	0.9	1.5	0.8	-17.0	<.001
Sex-related alcohol expectancies								
Enhancement of sexual experience	2.6	0.6	2.7	0.5	2.4	0.7	-6.0	<.001
Increased sexual risk taking	2.3	0.6	2.4	0.5	2.2	0.7	-3.4	<.001
Disinhibition of sexual behavior	2.3	0.6	2.4	0.5	2.1	0.7	-5.9	<.001
All sex-related alcohol expectancies	2.4	0.6	2.3	0.6	2.5	0.4	-5.6	<.001

Table 3

Risk factors for hazardous drinking among n = 480 black MSM in Tshwane, South Africa.

	Unweighted			RDS-weighted		
	aOR	95% CI	P	aOR	95% CI	P
Demographic characteristics						
Older than 24 (vs. 24 or younger)	0.7	0.5–1.1	0.16	0.7	0.4–1.1	0.12
Post secondary education (vs. high school or less)	1.0	0.7–1.6	0.85	0.9	0.5–1.3	0.48
Has a regular income (vs. not)	1.4	0.9–2.1	0.21	1.2	0.7–1.9	0.53
Living in a township (vs. not)	1.5	1.0–2.4	0.07	1.9	1.2–3.1	< 0.01
Psychosocial factors[†]						
Identify as gay or transgender (vs. bisexual or straight)	1.2	0.5–2.9	0.62	1.4	0.5–3.6	0.49
Only sexually attracted to men (vs. also attracted to women)	0.5	0.2–1.0	0.05	0.3	0.1–0.8	0.01
Femininity	0.8	0.6–1.0	0.06	0.8	0.6–1.1	0.14
Sexual identity confusion	1.1	0.7–1.7	0.63	1.1	0.7–1.7	0.80
Secretiveness about sexuality	1.1	0.8–1.5	0.75	0.9	0.7–1.3	0.64
Internalized homophobia	0.7	0.4–1.2	0.23	1.1	0.6–1.9	0.85
Gender dysphoria	1.2	0.9–1.6	0.13	1.4	1.0–1.8	0.03
Sexual orientation-based discrimination	0.9	0.6–1.4	0.61	0.8	0.5–1.2	0.31
Ever received money or incentives for sex (vs. not)	2.7	1.5–4.9	< 0.01	2.4	1.3–4.3	< 0.01
Sexually abused as a child (vs. not)	2.0	1.1–7.7	0.08	2.7	1.1–6.5	0.03
Anxiety	2.9	1.1–7.7	0.04	6.1	2.1–17.3	0.00
Depression	1.1	0.7–1.5	0.76	1.0	0.7–1.5	0.91
Social network characteristics[†]						
Social network connectedness	1.1	0.9–1.3	0.28	1.1	0.9–1.3	0.41
Social network drinking behavior	3.9	1.0–16.0	0.06	5.4	1.2–24.3	0.03

[†] Higher scores indicate higher levels of the construct.