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Correlates of self-reported substance use among men who have sex with men in South Africa

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Abstract

Correlates of self-reported substance use among men who have sex with men in South Africa

By Carolyn A Mackey

Background: The global burden of HIV is disproportionately large among men who have sex with men (MSM). Among South African MSM, HIV prevalence has been reported as high as 50%. There is sparse research focused on substance use and its relation to HIV risk among this group. The burden of substance use is high, and its relationship to risky sexual behavior among South African MSM is prominent. However, there is very little research examining the association between substance use and HIV among South African MSM.

Methods: The Sibanye Health Project was a pilot combination HIV prevention trial with MSM living in Cape Town and Port Elizabeth, South Africa from February 2015 to September 2016. Using enrollment baseline survey data and baseline HIV clinical testing, we conducted bivariate and multivariate logistic regression analyses to examine the relationship of substance use with HIV, stigmatization, and risky sexual behaviors.

Results: We found substantial prevalence of any drug use (27%), frequent drug use (15%), and heavy alcohol use (21%). Self-reported drug use was less likely in participants who tested HIV-positive at baseline (OR=0.45, CI=0.24, 0.85). Drug use was more likely among those who engaged in transactional sex (OR=2.65, CI=1.25, 5.62). Those who reported stigmatizing events were less frequent drug users (OR=0.41, CI=0.18, 0.95). Frequent drug use was less common in participants who had more than 2 male sex partners in the past year (OR=0.38, CI=0.15, 0.98), but was more common among heavy alcohol users (OR=2.66, CI=1.40, 5.05).

Conclusions: Our findings indicate that those who are living with HIV may be adopting risk-reduction strategies, like reduction in drug use, to prevent HIV transmission. Further, transactional sex and drug use is strongly correlated, but only half of those participating in transactional sex are drug users; socioeconomic factors may play a role in non-drug using transactional sex. Social isolation of MSM due to stigmatization may contribute to less frequent drug use among those who are stigmatized. To ensure appropriate risk identification and intervention strategies against HIV, it is imperative to continue to examine the relationship between substance use and HIV among MSM in South Africa.

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INTRODUCTION

The global burden of HIV among men who have sex with men (MSM) is disproportionately large (1). In sub-Saharan African countries, the HIV epidemic among MSM is often under-studied because of the large number of persons infected through heterosexual sex and vertical transmission. MSM in South Africa have estimated HIV prevalence as high as 50% (2-10), and HIV prevalence has been reported to be 4.65 times higher among MSM compared to non-MSM (10). A multitude of factors may play a role in this growing HIV epidemic among South African MSM, including environmental and behavioral factors (11). The importance of substance use as a behavioral risk factor for HIV has been established in developed countries (12-15), and may also be an important risk factor for HIV in South African MSM. There is sparse research published for South African MSM, and there is even less research primarily focused on substance use and its relation to HIV risk among this group. With HIV infection disproportionally rising among South African MSM (10), it is increasingly important to understand substance use as a risk factor for HIV infection.

Substance use is a known risk factor for risky sexual behaviors and HIV infection among MSM (12-15). This relationship has been established in high-income countries (12-15), but data is lacking in South Africa. A systematic review conducted in 2018 compiled data on the relationship between substance use with risky sexual behavior and HIV infection in African countries (16). Substance use was rarely the primary focus among studies with South African MSM, and measurement of substance use was often inconsistent and inadequate (16). Studies in South Africa have shown that MSM use drugs before, during, and after sex to facilitate sexual behaviors; substance use was

strongly related to risky sexual behaviors such as unprotected anal intercourse, having multiple partners, having sex with strangers, participating in orgies without condoms, and having sex to acquire drugs and use drug (17-19). These sexual risk activities may also lead to higher risk of acquiring STIs among MSM in South Africa (17, 20). When South African MSM were intoxicated with drugs and alcohol they were less likely to remember to use condoms, and they were more likely to participate in sexual activities they would not participate in soberly, such as orgies, sex with strangers, or anal sex (19, 21). Few studies have definitively found direct associations between substance use and HIV infection among MSM in South Africa. Lane et. al found that HIV infection was significantly less common among South African MSM who used cannabis (2), and Sandfort et al. found that there was no significant difference in the HIV prevalence among South African MSM with and without a drug problem (8). In total, these studies strongly linked substance use and various risky sexual activities, such as increased number of partners, condomless sex, and transactional sex. However, there are a limited number of studies that examine the direct relationship between substance use and HIV infection among South African MSM, and of these studies, few found an association between substance use and HIV infection (16).

Substance use in South Africa is widespread and problematic, with alcohol, cannabis, methamphetamine, mandrax, methcathinone ("CAT"), and heroin being commonly used (22). In South African MSM studies, substance use is inconsistently measured and is rarely the primary focus of research (16). Despite the limited research regarding South African MSM substance use, some papers have described general substance use trends within this group. Alcohol is commonly reported as the most used

substance in South Africa, with prevalence of usage as high as 90% among MSM (2, 17, 18). Cannabis is often reported as the second most commonly used substance with almost 40% of MSM using (2, 17, 18). Drug use patterns in South African MSM are not uniform across the country (16, 19, 22). For example, in a 2008 rapid analysis of drug use among MSM, methamphetamine was reported to be the most common drug used in Cape Town, followed by CAT; Durban's most used drugs were crack cocaine followed by methaqualone; and, crack cocaine and cocaine powder were the most commonly used drugs in Pretoria (19). About 37% of MSM patients at a health clinic in Cape Town reported ever having used crystal methamphetamine (20). Injection drug use occurs in about 7% of MSM in South Africa, with about 40% of injection drug users injecting methamphetamine (18). Despite the slight differences in substance use across South Africa, one thing remains clear: substance use is prevalent among MSM in South Africa. Substance use is strongly linked to risky sexual activities, such as having multiple partners, not using condoms, and participating in transactional sex (17-19, 21). A gap in our current knowledge exists because there are few studies that examine the relationship between substance use and HIV infection among South African MSM; of the studies that examine this relationship, there has been inconclusive associations between substance use and HIV infection among MSM in South Africa (2, 8, 16).

Substance use among South African MSM may also be correlated with stigma. South African MSM often report experiencing sexual stigma such as family exclusion, verbal harassment, and blackmail (23). In a study focusing on alcohol abuse in HIV-positive MSM in South Africa, almost all participants explained that they needed alcohol to gain confidence to pursue sexual partners, to have increased sexual stamina, and to

decrease their fear of health or social repercussions from having sex with men (24). Nearly a quarter of MSM in Cape Town, South Africa reported experiencing at least one human rights violation, and MSM who were blackmailed had a higher prevalence of HIV (4). A qualitative study showed that MSM turned to substance use as a coping strategy, and often used drugs to hide sexual feelings towards men (25). Stigma surrounding MSM in South Africa may play a role in substance use, but this factor has not been specifically studied.

The HIV epidemic is growing among MSM in South Africa (10) and HIV prevalence has been reported to be as high as 50% (2-10). As this epidemic grows, the need for detailed information about risks and preventive needs of this group increases. There is a high prevalence of substance use, and a strong relationship established between substance use and risky sexual behavior among MSM in South Africa (17-19, 21). However, there is very little research examining the direct association between substance use and HIV transmission among South African MSM. Substance abuse may be a critical component related to acquisition of HIV infection among MSM in South Africa, and there may be strategies to combat this issue if we can understand the intricacies of the relationship. We therefore conducted a study among a cohort of South African MSM to describe the prevalence of substance use and its correlation with HIV, stigma and sexual risk behaviors. We hypothesized substance use would be higher among South African MSM who were living with HIV, who had experienced stigma, or who were engaging in risky sexual behaviors.

METHODS

Study Sample

The Sibanye Health Project was a pilot combination HIV prevention trial with MSM living in Cape Town and Port Elizabeth, South Africa. All participants enrolled in the study had to be at least 18 years old and male sex at birth. Other inclusion criteria included: reported anal sex with a man in the past 12 months, reported being a current resident of the study city, ability to complete all study instruments in English, Xhosa or Afrikaans, and having a telephone. Participants were recruited at events and venues, online, and by participant referral. Following written consent, all participants recruited into the study completed a self-administered baseline survey and a clinical exam. The baseline visit took approximately 2.25 hours. The baseline survey had information regarding demographics, use of health care services, history of HIV/STI testing, male sex disclosure, alcohol and substance use, condom use history, barriers to safe sex, current HIV knowledge, and sexual network assessment. The clinical exam included rapid HIV testing with laboratory confirmation and laboratory testing for syphilis, chlamydia and gonorrhea (urethral and rectal). Participants received 65 Rand for completing baseline study procedures. This study was reviewed and approved by appropriate humans subjects research review boards.

Measures

There were 3 self-reported dependent prevalence measures: any drug use, frequent drug use, and heavy alcohol use. **Any drug use** was defined as use of any unprescribed drugs in the past 6 months. **Frequent drug use** was defined as drug use more than once per week in the past 6 months. Participants who used drugs that were not

prescribed to them in the past 6 months were then asked about specific drug use. Participants chose between "never used", "once a month", "once per week", and "more than once per week" for the following drugs: crystal methamphetamine, crack cocaine, powder cocaine, mandrax (methaqualone), ecstasy, cannabis, heroin, CAT (methcathinone), GHB, LSD, poppers, special k (ketamine), speed, sugars (mix of heroin and cocaine), prescription pain killers, Ritalin, Seroquel, inhalants, or other drugs. If a participant responded that they used at least one of the drugs more than once per week in the past 6 months, they were considered frequent drug users. **Heavy alcohol use** was defined as drinking at least 5 drinks on 5 or more days in past 30 days. Participants were asked in the past 30 days how many days did they have 5 or more alcoholic drinks on one occasion. If they responded that they had 5 or more alcoholic drinks on one occasion for 5 or more days then they were considered heavy alcohol users.

Independent measures included demographic information and sexual behaviors through self-report, and HIV/STI status through clinical testing. All participants were assigned male sex at birth, but we dichotomized gender into male identifying and not male identifying (i.e. identifying as female, transgender, or other identification). Race, age, and marital status variables were dichotomized. Sexual orientation was defined as 3 categories: gay, bisexual, and other. Working status was dichotomized into those who were unemployed or were not students, and those who were employed or students. Education was defined as 3 categories: those who did not finish high school, those who graduated high school (labeled "Matric"), and those who attended any tertiary school. Income was also defined as 3 categories: those who did not have any income, those who made South African currency 1 to 4,800 Rand per month, and those who made over 4,800

Rand per month. Number of male sex partners was dichotomized into those who had sex with 1 or 2 males in the past year and those who had sex with 3 or more males in the past year. Condomless anal sex was dichotomized into those who had anal intercourse with male(s) and did not use a condom in the past year, and those who always used condoms with their male sexual partner(s) or didn't have anal sex in the past year. Transactional sex was defined as those who had sex for food, money, or drugs/alcohol in the past year. Stigma was defined as those who in the past year were hit or beaten up, treated rudely or unfairly, made fun of or called names, felt uncomfortable in a crowd of MSM, lost employment or dismissed from job, were rejected by family members, and/or were excluded from traditional male activities because they were MSM.

Statistical Analyses

Analyses were conducted only with participants who had completed the baseline survey and clinical examination, a total of 292 participants. Bivariate analyses employed logistic regression to assess associations between independent factors and the 3 dependent measures: any drug use, frequency drug use, and heavy alcohol use. Bivariate analyses findings are reported as odds ratios, 95% confidence intervals, and Wald p-values. Three multivariate logistic regression models, one for each dependent measure, were created starting with independent variables with p-value<0.2 in bivariate analyses and HIV infection status as an a priori factor. Backwards elimination was performed. Variables that had a p-value over 0.05 were removed from the model one-at-a-time, starting with the least significant, until the model had a *Hosmer and Lemeshow Goodness-of-Fit Test* p-value of 0.75 or higher, indicating the model had good fit. HIV status was always kept in the model during the backwards elimination process.

Multivariate odds ratios, 95% confidence intervals, and Wald p-values for all variables remaining in the final models are reported. Results were assumed to be significant when the odds ratio confidence interval did not include 1.0 and p-value was less than 0.05. Data analyses were preformed using SAS 9.4 (SAS Institute, Cary, NC).

RESULTS

There were a total of 292 baseline participants (115 in Cape Town, 177 in Port Elizabeth) enrolled in the Sibanye Health Project (Table 1). The participants' mean age was 26 years and the majority were male-identifying, black, and gay-identifying. Of the baseline participants, 125 (42.8%) tested positive for HIV at baseline; only 47 (37.6%) of these HIV positive participants were aware of their HIV infection. The majority of participants had 1 or 2 male sex partners in the past year, had condomless male anal sex in the past year, and had experienced stigma in the past year. Approximately 1 in 6 participants had transactional sex in the past year. Overall, 79 participants (27.2%) were drug users, 43 (14.7%) used drugs frequently, and 57 (21.0%) were heavy alcohol users.

Any Drug Use in Past 6 Month

There were 79 participants (27.2%) that used any drug in the past 6 months (Table 1). Overall, cannabis was the most commonly used drug (70.9%), followed by methamphetamine, mandrax, sugars, heroin, and prescription pain killers (Table 2). Drug use was not uniform between study sites, with almost all drug use (except for heroin, crack, and methamphetamine) occurring at higher prevalence in Port Elizabeth than Cape Town (Table 2 and Figure 1). There were no participants who reported using CAT, LSD, poppers, SpecialK, Ritalin, or inhalents. Compared to participants in Cape Town, participants in Port Elizabeth were 2 times more likely to have used drugs (Table 3). Participants who were students or who had a job were more than half as likely to use drugs than those who were not students or did not have a job. Participants who tested HIV-positive at baseline were more than half as likely to use drugs than participants who tested HIV-negative at baseline. Participants who participated in transactional sex in the

past year were more than 2.5 times more likely to use drugs than participants who did not participate in transactional sex in the past year. There was no significant association between any drug use and stigma.

Frequent Drug Use in Past 6 Months

Overall, 43 participants (14.7%) used at least one drug frequently in the past 6 months (Table 1). Participants who were black were about a quarter as likely to be frequent drug users than participants who were not black (Table 4). Participants who were students or who had a job were about a quarter as likely to be frequent drug users than those who were not students or did not have a job. Participants who had more than 2 male sexual partners in the past year were more than half as likely to use drugs frequently than participants who had 2 or less male partners in the past year. Participants who experienced stigma in the past year were more than half as likely to be frequent drug users than participants who did not experience stigma.

Heavy Alcohol Use in Past 30 Days

Overall, 57 participants (21.0%) were heavy alcohol users (Table 1). Participants who completed some tertiary school were 2.5 times more likely to drink alcohol heavily than participants who did not finish high school (Table 5). Participants who had more than 2 partners in the past year were more than 2.5 times as likely to drink alcohol heavily than participants who had 2 or less partners in the past year. Heavy alcohol use was not significantly associated with HIV prevalence or stigma.

DISCUSSION

In our study of South African MSM living in Cape Town and Port Elizabeth, we found substantial prevalence of any drug use, frequent drug use, and heavy alcohol use. HIV-positive MSM were less likely than HIV-negative MSM to have used any drugs. MSM who had experienced stigma were less likely to have used drugs more than once a week. Two sexual risk behaviors were also associated with substance use: transactional sex was associated with higher likelihood of any drug use and having 3 or more partners was associated with higher likelihood of heavy alcohol use but lower likelihood of frequent drug use.

Drug and alcohol use were highly prevalent in these 2 South African cities, but more so in Port Elizabeth. Heavy alcohol drinking was prevalent in over 20% of the participants, drug use was prevalent in almost 30% of participants, and frequent drug use was prevalent in 15% of participants. Studies have shown that cannabis is the most common substance used with as many as 40% of South African MSM using (2, 17, 18); overall and stratified by city, cannabis was the most prevalent substance used among our cohort as well. As demonstrated in previous studies, drug use trends are not geographically uniform in South Africa (16, 19, 22). Our findings also support this non-uniformity in drug use. We found that MSM living in Port Elizabeth had higher drug use prevalence for almost all drugs, compared to MSM living in Cape Town. Heroin, while commonly used in Cape Town, was not used by any participants from Port Elizabeth. These findings demonstrated that drug use is an ongoing burden among MSM in South Africa, and that drug use patterns are differing across geographic area. Drug use patterns may also be shifting over time. In a 2008 rapid analysis of drug use among MSM,

methamphetamine and CAT were the most common drugs used in Cape Town (19). Conversely, our results demonstrated that cannabis, methamphetamine, and heroin were the most common drugs used in Cape Town, with no participants using CAT. Overall, drug patterns are differing both geographically and over time among South African MSM, which may play a role in prevalence of risky sexual behaviors and HIV.

We found that self-reported drug use over 6 months was lower in participants who tested HIV-positive at baseline, which is opposite our initial hypothesis. To explain this result, there are two plausible scenarios: 1) participants who were living with HIV greatly underreported their substance use compared to those who were not living with HIV, and/or 2) participants living with HIV actually had lower prevalence of substance use compared to those who were not living with HIV. Participants who were living with HIV can be broken into 2 groups: those who were aware of their HIV infection and those who were unaware of their HIV infection. The participants who were aware they were living with HIV may have had increased awareness of their health. Those who were unaware of their infection may have been extra wary to the fact that they were at high risk for acquiring HIV (because they actually had HIV), so may also have had increased awareness of their health. These HIV-positive participants with an increased awareness of their health likely knew drug use was not a healthy behavior, and therefore may have under-reported drug use in order to seem socially desirable. Those who were not living with HIV were, by extension, not as health-aware as those living with HIV, so these participants may not have been inclined to under-report their substance use.

Next, we will address the scenario where people living with HIV actually had a lower prevalence of substance use compared to those not living with HIV. Again,

participants who were living with HIV can be broken into 2 groups: those who are aware of their HIV infection and those who are unaware of their HIV infection. The following theory explains that those who were living with HIV took measures (i.e. reduction of drug use) to mitigate HIV transmission. Studies have shown that that the prevalence of high-risk sexual behavior is lower in persons with HIV who are aware of their infection; behavior changes can include reductions in number of sexual partners and reduction in condomless sex (26-28). Substance use as a risk-activity linked to high-risk sexual behavior may be becoming more well-known among South African MSM. There is no existing research on changes in substance use after being diagnosed with HIV, but it may be that drug use, similar to risky sexual behavior, was reduced in those who were aware of their HIV infection. Moreover, participants who were unaware of their infection may have been extra wary to the fact that they were at high risk for acquiring HIV (because they actually had HIV). Again, substance use relation to high-risk sexual behavior may be becoming common knowledge among South African MSM. Because this group believed they were at high risk for acquiring HIV, they may have actively taken safety precautions, such as reducing or stopping drug use, in order to mitigate their chances of acquiring HIV. Based on this theory, those who were living with HIV took behavioral measures to protect themselves and others, including substance use reduction. This theory explains why MSM living with HIV were less likely to use drugs – they were aware of the risks associated with drug use and were taking behavioral precautions to reduce risky sexual behavior. This is important information because it shows that awareness of HIV infection and awareness of HIV risk factors could beneficially impact

drug use behaviors; MSM in South Africa are willing to adopt risk reduction strategies to protect themselves and others.

In our cohort, drug use was more prevalent among those who engaged in transactional sex. The association between engaging in sex for food, money, or drugs/alcohol and drug use has been previously reported in several studies of South African MSM (16, 19). In our study population, half of the participants who engaged in transactional sex were drug users. In a study of transactional sex in South Africa, men often reported opportunistic cases of trading sex for methamphetamine, with the primary driver for transactional sex being drug addiction (29). Transactional sex is known to be positively associated with alcohol use severity, illicit drug use, and prescription drug use (30). In sum, drug abuse and dependency can explain why half of the participants engaged in transactional sex. Conversely, transactional sex may be more complex than participants just trading sex to acquire drugs. Only half of those participating in transactional sex used drugs, only one third used drugs frequently, and only 12% drank alcohol heavily. Half of the transactional sex was occurring not to acquire drugs or alcohol, but to acquire food and/or money. This indicates that there may be a socioeconomic factor at play. In our cohort of MSM, half were unemployed, and half were living with no income. With a large proportion of participants without employment or income, these individuals may have had to resort to using transactional sex to acquire money and food. This is an important finding for two reasons. First, it supports current literature that transactional sex is strongly associated with substance use (30). Second, it sheds light on the role that socioeconomic status may play in risky sexual behaviors like

transactional sex; in a population that was highly unemployed, about half of the transactional sex was occurring not for drugs, but for food and money.

Frequent drug use was less common among the stigmatized participants compared to non-stigmatized participants; over 70% of participants experienced stigma in the past year. It is possible that this association between stigma and frequent drug use was confounded. For instance, there may have been something about stigmatizing experiences that were a proxy for social isolation. This social isolation among stigmatized MSM reduced their access to drugs, and thereby reduced their ability to use drugs more frequently. Those who were not stigmatized, were not as isolated and therefore had more networks through which they could acquire drugs, particularly for frequent use. Participant social network was not a measured factor in the study's baseline survey. In this case, social networks, particularly social isolation of MSM, may have been confounding the relationship between stigmatizing events and frequent drug use.

The number of male sex partnerships has a significant association with 2 substance use measures: those who had 3 or more sex partners in the past year were more likely to be heavy drinkers, but were less likely to be frequent drug users. Alcohol consumption has been found to increase sexual risk behaviors (16). Alcohol use may be associated with higher partner number because the places people go to meet multiple partners may also be places they go to drink alcohol. This association between drinking and high partner number supports current literature. For example, Lane et al. found alcohol use to be associated with many sexual risk factors, one of which was multiple partnerships (17). Conversely, frequent drug use had the opposite relationship with number of sexual partners: those who used drugs frequently were half as likely to have

had at least 3 partners in the past year. This was an unexpected finding, as literature often links drug use and high risk sexual behaviors such as increased number of sexual partners (16, 31). We are not clear on why we saw this relationship. It may be related to which specific drugs were being used frequently, with the possibility that some of drugs were used more commonly in main partnerships compared to participants who did not have a main partnership (and had higher partner number). This unexpected relationship requires further analysis, specifically regarding the associations between individual drug usage and risky sexual behavior like high partner number.

Strengths & limitations

This study is unique in that it primarily focuses on substance use among South African MSM. There are numerous limitations with this study. With any self-report survey, there will be social desirability bias. Participants may have underreported drug use, alcohol use, and sexual risk behaviors, which could have resulted in prevalence of substance use among people living with HIV to be lower than it was in reality. This bias is likely differential with those who were living with HIV and who were more health-aware under-reporting more often than those not living with HIV. There were also several items that were not included in the baseline survey that may have increased the utility for comparing this study to other studies of substance use among MSM in South Africa. For example, many studies on drug use and sexual risk among South African MSM examine risky sexual behavior while under the influence of drugs and alcohol. Our baseline survey did not have information about sexual acts while under the influence of drugs or alcohol. Though there was information on frequency of drug usage which could indicate potential dependence or addiction, there were not specific questions designed to

ascertain these severe substance use problems. It could be helpful in future studies create survey questions related to substance use dependence and addiction, such as questions about withdrawal from substances, tolerance to substances, any legal problems associated with substance use, any attempts to quit using a substance, physical and mental problems related to use, or activities that are hindered from using substances(32). Substance use questions like these could help to assess and quantify the burden of substance dependence. A final limitation to this study is sample size. We had a cohort of 292 MSM in South Africa. We were restricted on the subsets of data we could use. For example, we hoped to examine injection drug use, but only 7 participants were injection drug users, so we were unable to use injection drug use as an outcome measure. A larger sample size would have allowed different modeling outcomes or techniques to be applied without losing power.

Future directions

We found that South African MSM living with HIV are less likely to use substances. This is a groundbreaking and important finding, as it indicates that those who are living with HIV are actively adopting risk-reducing strategies to keep themselves and others safe from HIV. Continued screening and education practices with South African MSM about HIV risk and risk-reduction strategies are needed to expand awareness and encourage risk-reducing behavior. Further, transactional sex and drug use are strongly correlated but only half of those participating in transactional sex are doing so for drugs. The other half are likely engaging in transactional sex solely for food or money. This may be due to the fact that half of South African MSM in our study were also unemployed with no income. An unexpected finding was that frequent drug use was less common in

participants who had 3 or more male sex partners in the past year but was more common among heavy alcohol drinkers. The relationship between specific substance and number of partners is one that requires further exploration, but may be helpful in identifying risk reduction strategies for sexual risk behaviors and substance use.

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Table 1. Characteristics of 292 South African men who have sex with men enrolled in the Sibanye Health Project, February-September 2015

	n (%)
Testing Site	
Cape Town	115(39.4)
Port Elizabeth	177(60.6)
Age	
Mean (sd)	26.2 (6.8)
Less than 25	165(56.5)
25 or more	127(43.5)
Gender Identity	
Not Male	29(9.9)
Male	263(90.1)
Race	
Not Black	38(13.0)
Black	254(87.0)
Sexual Orientation	
Gay	192(65.8)
Bisexual	73(25.0)
Straight, other, or missing	27(9.3)
Married	
No	274(96.5)
Yes	10(3.5)
Education	
Did not finish high school	141(48.3)
Matric	104(35.6)
Tertiary	47(16.1)
Work/student	
No	142(48.6)
Yes	150(51.4)
Income	
No income	162(55.5)
R1 to R4,800	64(21.9)
More than R4,800	66(22.6)
STI at baseline	
Negative	168(57.5)
Positive	124(42.5)
HIV at baseline	
Negative	167(57.2)
Positive	125(42.8)
Aware of infection	47(37.6)
Unaware of infection	78(62.4)

Number of male sex partners in past year	
1 or 2	165(57.3)
3 or more	123(42.7)
Condomless male anal sex in past year	
No	83(36.6)
Yes	144(63.4)
Transactional sex in past year	
No	223(83.2)
Yes	45(16.8)
Experienced stigma in past year	
No	68(24.8)
Yes	206(75.2)
Any drug use in past 6 months	
No	211(72.8)
Yes	79(27.2)
Frequent drug use in past 6 months	
No	249(85.3)
Yes	43(14.7)
Heavy alcohol use in past 30 days	
No	215(79.0)
Yes	57(21.0)

Table 2. Types of drugs used by South African men who have sex with men, Sibanye Health Project, February-September 20105

	Total	Cape Town	Port Elizabeth
N	79	26	53
Drug	**n(%)**	**n(%)**	**n(%)**
Cannabis	56(70.9)	15(57.7)	41(77.4)
Methamphetamine	22(27.9)	12(46.2)	10(18.9)
Mandrax	20(25.3)	5(19.2)	15(28.3)
Sugars	8(10.1)	1(3.8)	7(13.2)
Heroin	7(8.9)	7(26.9)	0(0.0)
Prescription pain	6(7.6)	2(7.7)	4(7.5)
Cocaine	5(6.3)	2(7.7)	3(5.7)
Crack	3(3.8)	2(7.7)	1(1.9)
Speed	3(3.8)	1(3.8)	2(3.8)
Ecstasy	2(2.5)	1(3.8)	1(1.9)
Others*	5(6.3)	2(7.7)	3(5.7)

*other drugs include seroquel, GHB, and others

Table 3. Bivariate and multivariate analysis of self-reported drug use in past 6 months among men who have sex with men in Cape Town and Port Elizabeth, South Africa: Sibanye Health Project, February-September 2015

Characteristic	Total	Any Drug Use in Past 6 Months				
			Bivariate		Multivariate	
	n(%)	Yes, n(%)	OR (95% CI)	p-value	OR (95% CI)	p-value
Testing Site						
Cape Town	115(39.4)	26(23.0)				
Port Elizabeth	177(60.6)	53(29.9)	1.43 (0.83, 2.46)	0.1969	2.01 (1.01, 4.01)	**0.0466**
Age						
18 to 24	165(56.5)	7(25.9)				
25 or more	127(43.5)	72(27.4)	1.03 (0.61, 1.73)	0.9145		
Sexual Orientation						
Gay	192(65.8)	40(20.9)				
Bisexual	73(25.0)	28(38.4)	2.35 (1.31, 4.22)	**0.0043**		
Straight or other	27(9.3)	11(42.3)	2.77 (1.18, 6.49)	**0.0192**		
Race						
Not Black	38(13.0)	18(48.7)				
Black	254(87.0)	61(24.1)	0.34 (0.17, 0.68)	**0.0024**	0.46 (0.19, 1.11)	0.0823
Marriage						
No	274(96.45)	75(27.4)				
Yes	10(3.5)	4(44.4)	2.12 (0.55, 8.12)	0.2712		
Work or Student						
No	142(48.6)	50(35.7)				
Yes	150(51.4)	29(19.3)	0.43 (0.25, 0.73)	**0.0020**	0.46 (0.25, 0.86)	**0.0139**
Education						
Did not finish high school	141(48.3)	42(30.2)				
Matric	104(35.6)	26(25.0)	0.77 (0.43, 1.37)	0.3707		
Tertiary	47(16.1)	11(23.4)	0.71 (0.33, 1.52)	0.3726		

Income						
No income	162(55.5)	41(25.6)				
R1 to R4,800	64(21.9)	17(26.6)	1.05 (0.54, 2.03)	0.8850		
More than R4,800	66(22.6)	21(31.8)	1.35 (0.72, 2.54)	0.3436		
STI at Baseline						
Negative	168(57.5)	48(28.7)				
Positive	124(42.5)	31(25.2)	0.84 (0.49, 1.42)	0.5037		
HIV at baseline						
Negative	167(57.2)	57(34.3)				
Positive	125(42.8)	22(17.7)	0.41 (0.24, 0.72)	**0.0020**	0.45 (0.24, 0.85)	**0.0139**
Number of male sex partners in past year						
Less than 3	165(57.3)	46(28.1)				
3 or more	123(42.7)	32(26.0)	0.90 (0.53, 1.53)	0.7000		
Condomless male anal sex in past year						
No	83(36.6)	23(28.1)				
Yes	144(63.4)	33(22.9)	0.76 (0.41, 1.42)	0.3909		
Transactional sex in past year						
No	223(83.2)	51(23.0)				
Yes	45(16.8)	23(51.1)	3.51 (1.81, 6.80)	**0.0002**	2.65 (1.25, 5.62)	**0.0110**
Experienced stigma in past year						
No	68(24.8)	26(38.2)				
Yes	206(75.2)	48(23.4)	0.49 (0.27, 0.89)	**0.0184**	0.83 (0.42, 1.66)	0.6010
Heavy alcohol use						
No	215(79.0)	61(28.5)				
Yes	57(21.0)	15(26.3)	0.90 (0.46, 1.73)	0.7438		

Table 4. Bivariate and multivariate analysis of self-reported frequent drug use (drug use more than once per week) in past 6 months among men who have sex with men in Cape Town and Port Elizabeth, South Africa: Sibanye Health Project, February-September 2015

Characteristic	Total	Frequent Drug Use in Past 6 Months				
			Bivariate		Multivariate	
	n(%)	Yes, n(%)	OR (95% CI)	p-value	OR (95% CI)	p-value
Testing Site						
Cape Town	115(39.4)	15(13.0)				
Port Elizabeth	177(60.6)	28(15.8)	1.25 (0.64, 2.46)	0.5137		
Age						
18 to 24	165(56.5)	19(11.5)				
25 or more	127(43.5)	24(18.9)	1.79 (0.93, 3.44)	0.0802	1.73 (0.77, 3.89)	0.1829
Sexual Orientation						
Gay	192(65.8)	14(7.3)				
Bisexual	73(25.0)	21(28.8)	5.13 (2.44, 10.80)	**<.0001**		
Straight or other	27(9.3)	8(29.6)	5.35 (1.99, 14.39)	**0.0009**		
Race						
Not Black	38(13.0)	16(42.1)				
Black	254(87.0)	27(10.6)	0.16 (.08, 0.35)	**<.0001**	0.23 (0.09, 0.62)	**0.0036**
Marriage						
Not married	274(96.45)	40(14.6)				
Married	10(3.5)	3(30.0)	2.51 (0.62, 10.1)	0.1961		
Work or Student						
Not a student and no job	142(48.6)	31(21.8)				
Student or has job	150(51.4)	12(8.0)	0.31 (0.15, 0.63)	**0.0013**	0.24 (0.10, 0.59)	**0.0018**
Education						
Did not finish high school	141(48.3)	30(21.3)				
Matric	104(35.6)	11(10.6)	0.44 (0.21, 0.92)	**0.0294**		
Tertiary	47(16.1)	2(4.3)	0.16 (0.04, 0.72)	**0.0163**		

Income						
No income	162(55.5)	21(13.0)				
R1 to R4,800	64(21.9)	12(18.8)	1.55 (0.71, 3.37)	0.2692		
More than R4,800	66(22.6)	10(15.12)	1.20 (0.53, 2.71)	0.6623		
STI at Baseline						
No	168(57.5)	29(17.3)				
Yes	124(42.5)	14(11.3)	0.61 (0.31, 1.21)	0.1574		
HIV at baseline						
Negative	167(57.2)	34(20.4)				
Positive	125(42.8)	9(7.2)	0.30 (0.14, 0.66)	**0.0026**	0.51 (0.20, 1.27)	0.1470
Number of male sex partners in past year						
Less than 3	165(57.3)	30(18.2)				
3 or more	123(42.7)	13(10.6)	0.53 (0.26, 1.07)	0.0761	0.38 (0.15, 0.98)	**0.0458**
Condomless male anal sex in past year						
No	83(36.6)	14(16.9)				
Yes	144(63.4)	14(9.7)	0.53 (0.24, 1.18)	0.1190		
Transactional sex in past year						
No	223(83.2)	26(11.7)				
Yes	45(16.8)	14(31.1)	3.42 (1.61, 7.26)	**0.0013**	2.18 (0.82, 5.81)	0.1187
Experienced stigma in past year						
No	68(24.8)	18(26.5)				
Yes	206(75.2)	22(10.7)	0.33 (0.17, 0.67)	**0.0019**	0.41 (0.18, 0.95)	**0.0382**
Heavy alcohol use						
No	215(79.0)	36(16.7)				
Yes	57(21.0)	4(7.0)	0.38 (0.13, 1.10)	0.0746		

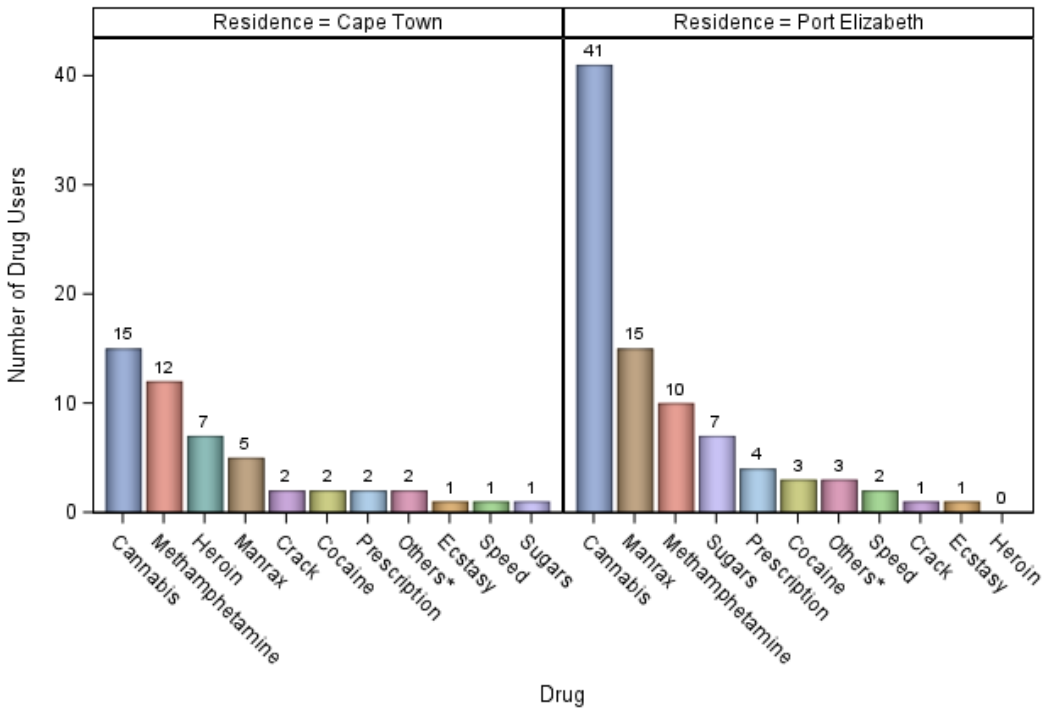
Table 5. Bivariate and multivariate analysis of self-reported heavy alcohol use (5 or more drinks on one occasion) on 5 or more days in past 30 days among men who have sex with men in Cape Town and Port Elizabeth, South Africa: Sibanye Health Project, February-September 2015

Characteristic	Total	Heavy Alcohol Use				
			Bivariate		Multivariate	
	n(%)	Yes, n(%)	OR (95% CI)	p-value	OR (95% CI)	p-value
Testing Site						
Cape Town	115(39.4)	24(22.6)				
Port Elizabeth	177(60.6)	33(19.9)	0.85 (0.47, 1.53)	0.5854		
Age						
18 to 25	165(56.5)	37(23.9)				
25 or more	127(43.5)	20(17.1)	0.66 (0.36, 1.21)	0.1757	0.61 (0.32, 1.16)	0.1335
Sexual Orientation						
Gay	192(65.8)	41(22.5)				
Bisexual	73(25.0)	12(18.5)	0.78 (0.38, 1.59)	0.4938		
Straight or other	27(9.3)	4(16.0)	0.66 (0.21, 2.02)	0.4612		
Race						
Not Black	38(13.0)	7(20.0)				
Black	254(87.0)	50(21.1)	1.07 (0.44, 2.59)	0.8817		
Marriage						
Not married	274(96.45)	52(20.2)				
Married	10(3.5)	3(30.0)	1.70 (0.42, 6.79)	0.4542		
Work or Student						
Not a student and no job	142(48.6)	22(17.1)				
Student or has job	150(51.4)	35(24.5)	1.58 (0.87, 2.86)	0.1350	1.26 (0.65, 2.44)	0.4941
Education						
Did not finish high school	141(48.3)	20(15.9)				
Matric	104(35.6)	21(20.8)	1.39 (0.71, 2.74)	0.3396	1.28 (0.62, 2.62)	0.5025
Tertiary	47(16.1)	16(35.6)	2.92 (1.35, 6.35)	**0.0067**	2.49 (1.03, 6.01)	**0.0419**

Income						
No income	162(55.5)	24(16.8)				
R1 to R4,800	64(21.9)	18(28.1)	1.94 (0.96, 3.91)	0.0633	1.78 (0.84, 3.74)	0.1304
More than R4,800	66(22.6)	15(23.08)	1.45 (0.72, 3.07)	0.2829	0.99 (0.43, 2.78)	0.9871
STI at Baseline						
No	168(57.5)	32(20.5)				
Yes	124(42.5)	25(21.6)	1.06 (0.59, 1.92)	0.8351		
HIV at baseline						
Negative	167(57.2)	27(27.7)				
Positive	125(42.8)	30(25.2)	1.57 (0.88, 2.83)	0.1300	1.32 (0.70, 2.49)	0.3868
Number of male sex partners in past year						
Less than 3	165(57.3)	20(13.1)				
3 or more	123(42.7)	37(31.9)	3.11 (1.69, 5.74)	**0.0003**	2.66 (1.40, 5.05)	**0.0028**
Condomless male anal sex in past year						
No	83(36.6)	12(15.8)				
Yes	144(63.4)	38(28.2)	2.09 (1.02, 4.30)	**0.0454**		
Transactional sex in past year						
No	223(83.2)	51(24.2)				
Yes	45(16.8)	5(12.8)	0.46 (0.17, 1.24)	0.1257		
Experienced stigma in past year						
No	68(24.8)	11(17.5)				
Yes	206(75.2)	43(21.8)	1.32 (0.63, 2.75)	0.4581		
Any drug use in past 6 months						
No	211(72.8)	42(21.5)				
Yes	79(27.2)	15(19.7)	0.90 (0.46, 1.73)	0.7438		
Frequent drug use in past 6 months						
No	249(85.3)	53(22.8)				
Yes	43(14.7)	4(10.0)	0.38 (0.13, 1.10)	0.0746		

FIGURES

Figure 1. Types of drugs used by South African men who have sex with men, stratified by city of residence: Sibanye Health Project, February-September 2015



*other drugs include seroquel, GHB, and others