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Racial differences in the validity of self-reported drug use among men who have sex with men in Atlanta, GA

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Abstract

Background—Men who have sex with men (MSM), particularly young black MSM, are disproportionately affected in the United States' HIV epidemic. Drug use may contribute to these disparities, yet previous studies have failed to provide evidence of elevated use among black MSM, relying exclusively on self-reported usage. This study uses biological assays to validate self-reports of drug use and explore the potential for misclassification to distort findings on racial patterns of use in this population.

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Contributors

All authors contributed to this work. Author White led writing and conducted analyses. Author Rosenberg conceptualized and designed the analysis, contributed to the writing, and designed the study. Authors Cooper, del Rio, and Salazar contributed to the writing. Author Sanchez oversees study operations and contributed to the writing. Author Sullivan designed and is principal investigator of the study, and contributed to the writing.

Conflict of Interest

None declared

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Methods—From an Atlanta-based cohort study of 454 black and 349 white MSM from 2010 to 2012, participants' self-reported drug use was compared to urine drug screening findings. The sensitivity of self-report was calculated as the proportion reporting recent usage among those who screened positive. Multivariable regression models were constructed to examine racial patterns in self-report, urine-detection, and self-report sensitivity of marijuana and cocaine usage, adjusted for socio-demographic factors.

Results—In analyses that adjusted for age, education, income, sexual orientation, and history of arrest, black MSM were less likely to report recent use of marijuana ($P<0.001$) and cocaine ($P=0.02$), but equally likely to screen positive for either drug. This discrepancy between self-reported and urine-detected drug use was explained by significantly lower sensitivity of self-report for black participants ($P<0.001$ for marijuana, $P<0.05$ for cocaine).

Conclusions—The contribution of individual drug-related risk behaviors to the HIV disparities between black and white MSM should be revisited with methods that validate self-reports of illegal drug use.

Keywords

drug use; HIV/AIDS; MSM; race; validity

1. INTRODUCTION

The HIV epidemic in the United States is characterized by disproportionately high rates of infection among men who have sex with men (MSM), particularly young black MSM (Centers for Disease Control and Prevention, 2012; Prejean et al., 2011). In the period from 2006 to 2009, the greatest change in HIV incidence was observed among black MSM ages 13 to 29, for whom incidence increased 48 percent (Prejean et al., 2011). Despite several decades of accumulated research, the reasons for these racial disparities in HIV among MSM remain insufficiently understood (Millett et al., 2012).

A substantial body of literature describes a link between substance use and risky sexual behavior (Colfax et al., 2005, 2004; Fendrich et al., 2013; Hirshfield et al., 2004; McKirman et al., 2001; McNall and Remafedi, 1999; Rusch et al., 2004; Vosburgh et al., 2012), and ultimately with HIV acquisition (Koblin et al., 2006). Although associations may vary depending on the substance type (Colfax et al., 2004; Hirshfield et al., 2004; Koblin et al., 2006; McNall and Remafedi, 1999; Rusch et al., 2004) and the level of reporting – global, situation, or event-specific (Stall and Purcell, 2000; Vosburgh et al., 2012), the use of substances has long been recognized as a risk factor for sexually transmitted infections. Based on this information, one of the hypotheses that has been proposed to explain the observed patterns in HIV incidence is that black MSM may be more likely than white MSM to use substances (Harawa et al., 2004; Millett et al., 2007). However, a recent series of meta-analyses testing this and other hypotheses reported that levels of alcohol and drug use are generally equal if not lower among black MSM relative to their white counterparts (Millett et al., 2007, 2012), providing little support for substance use as a potential driver of racial differences in HIV acquisition.

There is reason to remain cautious about the findings from these studies. Most research on substance use among MSM has relied on self-report, either through self-administered (Colfax et al., 2005; Halkitis et al., 2005; Kipke et al., 2007) or researcher-administered surveys (Bingham et al., 2003; Harawa et al., 2004; Irwin and Morgenstern, 2005; Rhodes et al., 2006; Rietmeijer et al., 1998; Siegel et al., 2004; Sullivan et al., 1998). Among general (not MSM-specific) populations, studies assessing the validity of self-reported illicit drug use behaviors have provided evidence of misclassification that is differential by race: in comparisons of self-reported interview data to biological assays of hair, urine, and/or saliva, black participants have been found to be more likely to underreport use of marijuana, cocaine, and opiates, relative to whites (Fendrich and Johnson, 2005; Fendrich et al., 2004; Johnson and Bowman, 2003; Richardson et al., 2003).

These differences in validity may be reflective of unmeasured confounding, recruitment biases, or of racially-differential acceptability of and reactions to the measurement tools. Regarding this latter factor, black men may have more concerns about privacy and confidentiality, perhaps linked to distrust and fear of legal consequences (Johnson and Bowman, 2003; Richardson et al., 2003). Drug-related arrests are significantly higher among blacks, a difference that is only partially explained by the nature or extent of drug use, pointing to the influence of racial biases and discrimination in the legal system (Mitchell and Caudy, 2013). Additionally, researchers have noted possible interviewer effects (particularly if the interviewer is white), social desirability bias, and a desire to avoid reinforcing racial stereotypes regarding drug use (Johnson and Bowman, 2003).

Although data from general populations provide reason to question the validity of self-reported drug use by race, the issue has not been explored among MSM. Evidence suggests that findings among heterosexual populations may not be reliably extrapolated to MSM because MSM report higher levels of use and a wider variety of drugs (Stall et al., 2001; Stall and Purcell, 2000), have different patterns of use by age, and exhibit differential rates of misreporting for certain substances (Mackesy-Amity et al., 2008). Concerns about privacy and discrimination, interviewer effects, and social desirability biases may also manifest differently among MSM because these men face a unique set of social stressors as sexual minorities (Crawford et al., 2002; Meyer, 1995). To the extent that drug use reporting patterns might vary by race among MSM, the previously reported findings on drug use and race among MSM may be biased. To address this knowledge gap, we assessed racial differences in self-reported drug use, drug screen positivity, and self-report validity and explored factors associated with drug use and reporting among a cohort of black and white non-Hispanic MSM in Atlanta, GA.

2. METHODS

2.1. Study design

Data for this study were collected during the baseline visit of *InvolveMENT*, a prospective cohort study of MSM in Atlanta, GA designed to understand the multilevel determinants of HIV and sexually transmitted infection (STI) prevalence and incidence disparities between black and white MSM. The design, recruitment, and baseline composition of *InvolveMENT* is described elsewhere (Kelley et al., 2012). In brief, participants were recruited through

venue-based sampling (MacKellar et al., 2007; Muhib et al., 2001) using a sampling frame of venues attended by MSM that was adapted from the 2008 round of the National HIV Behavioral Surveillance System (NHBS-MSM-2), with supplemental recruitment through Facebook. Men were eligible if they identified as non-Hispanic white or non-Hispanic black, resided in the Atlanta metropolitan area with no plans to move in the next two years, reported sex with a man in the preceding three months, were not currently in a mutually monogamous relationship with a man, and were not currently enrolled in another HIV prevention study. Initially, men 18 years were considered eligible; three months after enrollment began, eligible ages were restricted to < 40 years due to the emerging consensus that a disproportionate burden of new HIV infections are among younger MSM (Centers for Disease Control and Prevention, 2013; Prejean et al., 2011).

During the recruitment period from July 2010 to December 2012, a total of 811 men provided informed consent and enrolled in *InvolveMENT*. Two participants provided consent but declined to enroll, citing concerns about the mandatory reporting of HIV test results. Of the 811 men who enrolled, eight were subsequently removed from analyses (six duplicate enrollments, two determined to not have met eligibility criteria), yielding a total sample of 803 men (454 black non-Hispanic, 349 white non-Hispanic). The study was approved by Emory University's Institutional Review Board.

At the baseline visit, participants received HIV prevention counseling and provided three specimens: urine, which was used for gonorrhea, chlamydia, trichomonas, and drug testing; a self-administered rectal swab, which was used for rectal gonorrhea and chlamydia testing; and blood, which was used for syphilis and HIV testing. Participants additionally completed a computer-assisted self-interview (CASI) questionnaire that collected information on demographic characteristics, use of illicit drugs, and other HIV-related behaviors. As a confidential and private mode of interviewing, CASI questionnaires have been reported to facilitate greater reporting of sensitive or stigmatized behaviors (Gribble et al., 1999; Schroder et al., 2003), including drug use (Perlis et al., 2004).

2.2. Drug assessments

Drawing from the instrument used for National HIV Behavioral Surveillance of men who have sex with men (NHBS-MSM; MacKellar et al., 2007; Sanchez et al., 2006), the baseline questionnaire asked, "In the past 12 months, have you used any non-injection drugs, other than those prescribed for you?" Participants who responded yes were further asked to indicate how often they used a range of non-injection substances in the past 12 months: marijuana, crack cocaine, powdered cocaine, ecstasy, methamphetamine, opiates (smoked or snorted heroin), poppers (amyl nitrite), ketamine, GHB (gamma-Hydroxybutyrate), hallucinogens (e.g., LSD, mushrooms), downers (e.g., Valium, Ativan, Xanax), and non-medical use of prescribed painkillers (e.g., Oxycontin, Vicodin, Percocet). Response options included "didn't use" and seven frequencies of usage ranging from "more than once a day" to "less than once a month." For this analysis, responses were classified as "didn't use" or "used," regardless of frequency. In addition to these questions specific to non-injection drugs, participants were asked about use of non-prescription drugs injected with a needle to assess injection as a possible risk for HIV infection, but the specific drugs were not elicited.

Urine samples were screened for cocaine, marijuana, opiates, ecstasy (MDMA, 3,4-methylenedioxy-N-methylamphetamine), and methamphetamine using a generic five panel screening test (model WDOA-554, DrugTestsInBulk.Com, West Hills, CA). The estimated detection periods for the test used are 2–4 days for cocaine and opiates, 5–30 days for marijuana, 1–3 days for ecstasy, and 3–5 days for methamphetamine. In the consent process, participants were informed that their urine would be screened for common drugs of abuse, but that results would be used exclusively for research purposes and would not influence study participation. Furthermore, the study has an NIH certificate of confidentiality, which protects the data from subpoena; this was explained to participants during the consent process in order to reduce concerns about the disclosure of sensitive and/or illegal behaviors.

2.3. Analysis

Patterns in drug use were assessed using three outcomes. The first two measured the period prevalence of each individual drug by self-report of any use in the past twelve months and positive test results from the urinalysis. The third outcome quantified the validity of self-reported usage and was defined as the proportion of men who reported use among those who screened positive (i.e., sensitivity of self-report). The differential recall periods between self-report and urine screening precluded a broader analysis of classification; the validity of self-report among those who screened negative (i.e., specificity) cannot be determined because it is possible that drug use occurred within the past twelve months, but not within the drug-specific detection window for the test kit.

For the twelve drug types queried in the questionnaire, the proportions of black and white participants reporting use were tallied and compared using unadjusted prevalence ratios. Similar calculations compared the prevalence of positive test results by race for each of the five drugs screened for in the urinalysis. The sensitivity of self-report for these drugs was compared using “sensitivity ratios” to indicate the relative likelihood of self-report among those who screened positive.

Additionally, to explore and account for possible confounding and interaction in the associations with race, five variables that have been linked to patterns of substance use were included in analyses for control: age (Fendrich et al., 2004; Mackesy-Amiti et al., 2008; Stall et al., 2001), education, income (Fendrich and Johnson, 2005; Fendrich et al., 2004; Siegel et al., 2004; Stall et al., 2001), sexual orientation (Marshal et al., 2008), and arrest history (Johnson and Bowman, 2003). To examine differences in the underlying experiences and demographic characteristics of the sample, these five variables were compared across black and white participants using chi-squared tests. HIV status was not included in multivariable analyses because it is associated with both race and substance use, such that conditioning on this factor could induce a spurious association between race and drugs (Cole et al., 2010). However, a sensitivity analysis was conducted among only HIV-negative men to explore the influence of HIV status on misreporting by HIV status.

The remainder of the analysis focused on reported use of and urine-detected cocaine and marijuana; few participants screened positive for other drugs, and prior research indicates that these are two of the most prevalent drugs used by MSM (Sanchez et al., 2006; Stall et al., 2001; Sullivan et al., 1998) and they are commonly used in the context of sex (Sanchez

et al., 2006). For these two drugs, the prevalence and associations of the drug use outcomes by each of the five control variables was assessed, stratified by race (i.e., trivariate analyses). For each drug, racial differences in the associations between the outcome indicators and the control variables were assessed by a Wald chi-square test of the interaction coefficients in logistic regression models. In models where the interaction was non-significant, the product term was dropped, and a Wald test for the control variable term provided a race-adjusted test of significance.

A final set of models was fitted to assess racial differences in the prevalence of self-reported use, urine-detected use, and in the sensitivity of self-report for both marijuana and cocaine, while adjusting for all control variables. Interactions significant in the trivariate models were considered in these models. Significance at the $\alpha=0.05$ level and two-sided P values were used for all significance testing. As some variables had missing responses, all analyses were restricted to complete cases; participants with missing responses on one or more component variable were dropped. Analyses were performed using SAS version 9.3 (SAS Institute, Cary, NC), and SUDAAN version 10 (RTI International, Research Triangle Park, NC) was used to calculate prevalence ratios via the predictive margins method (Lane and Nelder, 1982).

3. RESULTS

As shown in Table 1, the analysis sample was 57% black and 43% white. Relative to white participants, black participants were younger, less likely to have completed college, and had lower annual household income. Black participants were also less likely to identify as gay and more likely to report a history of arrest. The prevalence of HIV in the sample was 30%, and black participants were 3.3 times as likely as white participants to test HIV-positive at baseline.

A total of 314 participants (39%) reported use of at least one the 12 surveyed drug types in the past twelve months, and 224 participants (28%) screened positive for at least one of the five drugs screened in the urine assay. For all drugs except non-injection heroin, use of which was self-reported by only two participants, black participants were significantly less likely to report use than white participants (Table 2). The most commonly reported drugs by both racial groups were marijuana and cocaine. Relative to white participants, black participants had a 32% lower prevalence of self-reported marijuana use and a 58% lower prevalence of self-reported cocaine use. In contrast, black participants were 39% more likely than white participants to screen positive for recent marijuana use and 46% more likely to screen positive for recent cocaine use, although this latter estimate was not significant ($P=0.17$). The sensitivity of self-report results help to illuminate these disparate patterns of self-reported and urine-detected drug use. Among participants who screened positive, black men were 29% less likely to report marijuana and 35% less likely to report cocaine use relative to white men.

In addition to race, other covariates were significantly associated with the reported use of marijuana and cocaine (Table 3). Self-reported marijuana use was associated with educational attainment, income, and history of arrest, after adjusting for race. Self-reported

cocaine use was associated with income and history of arrest, and a significant interaction was observed between race and age group. Younger black participants (aged 18 to 24) were less likely to report use of cocaine than older black participants, but no such age gradient was observed among white participants. In the fully adjusted model, racial differences in self-reported marijuana use persisted (Table 6). The model indicated a 41% lower adjusted prevalence of self-reported marijuana use among black participants. In the fully adjusted model of self-reported cocaine use, the interaction between race and age group persisted, with a similar pattern of less reported cocaine use among black participants < 35 years.

The prevalence and correlates of urine-detected marijuana and cocaine use are shown in Table 4. Similar to self-reported marijuana use, urine-detected marijuana use was associated with educational attainment, annual income, and history of arrest. Urine-detected cocaine use was associated with age group, income, and history of arrest. In the fully-adjusted models, black and white participants had equivalent levels of urine-detected marijuana ($P=0.78$) and cocaine use ($P=0.84$) (Table 6).

Focusing on those who screened positive for marijuana or cocaine, the prevalence of self-reported use across levels of the covariates is presented in Table 5. When controlling for race, no other covariates were associated with the sensitivity of self-reported use of either drug. In line with these results, inclusion of all covariates in full multivariable models of self-report sensitivity had minimal effect on the estimates of racial differences in reporting (Table 6): relative to white participants, black participants were 29% less likely to report marijuana use and 36% less likely to report cocaine use. These findings of lower sensitivity among black participants persisted in the sensitivity analysis restricted to HIV-negative men.

4. DISCUSSION

The results from both the questionnaire and the urine screen data indicate a high prevalence of drug use among MSM, as well as a high prevalence of underreporting drug use. Across a variety of traditional risk factors, we observed similar patterns in self-reported and urine-detected marijuana and cocaine use; participants with lower levels of education, lower income, and those with a history of arrest were more likely to report drug use and to screen positive. This congruency of self-report and urine screen results suggests that misreporting of drug use occurs equally across these factors, which was confirmed by the finding that self-report sensitivity was not associated with any of these covariates.

In contrast, these self-report and urine screen data indicate conflicting patterns in drug use by race. Drawing from self-reported behaviors alone, black participants appear less likely to use recreational non-injected drugs than white participants. Yet, the urine screen results indicate that black participants were more or equally likely to use marijuana and equally likely to use cocaine. This discrepancy between reported and detected levels of drug use by race is reflected in the unadjusted sensitivity ratios, which indicate that marijuana- and cocaine-using black participants were less likely than white participants to report their recent drug use behavior in response to computer-administered questions in this study.

The fully-adjusted models of self-report sensitivity for both marijuana and cocaine use suggest that these racial differences are independent of other socio-demographic

characteristics. This finding is consistent with prior studies of the validity of self-reported drug use among general populations (Fendrich and Johnson, 2005; Johnson and Bowman, 2003; Richardson et al., 2003), and it points to the influence of some unmeasured quality that distinguishes the experiences of white and black MSM. Hypotheses proposed to explain differences among general populations may be relevant, such as that black men might have more concerns about privacy and fear of legal consequences, stemming from perceptions of discrimination in the application of criminal justice. Another factor that may influence truthful reporting of drug use is fear of losing social welfare benefits; many states, including Georgia, have passed or proposed legislation requiring welfare recipients to pass drug screens (National Conference of State Legislatures, 2013; Radel et al., 2011). This may have been only partly controlled in our adjustment for income. Further research is needed to explore these hypotheses and consider other factors driving misclassification that may be unique to MSM.

Whereas in the unadjusted analysis of urine-detected drug use black participants were found to be more likely to screen positive for marijuana, no racial difference was observed in the fully-adjusted model. A similar, but not statistically significant, pattern across unadjusted and adjusted analyses was observed for cocaine. These findings signal that black MSM may have higher overall levels of marijuana use, which may be explained by racial differences in the distributions of education, income, and history of arrest. Our finding of relatively low urine-detected methamphetamine suggests that this drug is not as commonly used in the southern, urban context of Atlanta, in contrast with other studies reporting high prevalence of methamphetamines among MSM in other US regions (Buchacz et al., 2005; Colfax et al., 2005; Colfax and Shoptaw, 2005; Hirshfield et al., 2004; Plankey et al., 2007; Rhodes et al., 2006).

This study is, to our knowledge, the first to use biological indicators to explore drug use by race among MSM. Relying exclusively on self-reported data, the bulk of the literature indicates that black MSM are less likely than white MSM to use drugs (Harawa et al., 2004; Millett et al., 2012; Sullivan et al., 1998), although a few studies have reported equal or slightly higher likelihood of use for specific drugs (Irwin and Morgenstern, 2005; Siegel et al., 2004; Sullivan et al., 1998; Valleroy et al., 2002). By comparing self-reported behaviors with biological assays, our study reveals that the lower levels of marijuana and cocaine use among black participants suggested by self-reported data are driven by racial differences in reporting. It is possible that findings from previous studies of substance use among MSM also underestimate the ratio of substance use among black MSM compared to white MSM. Consequently, the role of non-injection substances in influencing HIV sexual risk and disparities among MSM should be revisited using laboratory assessments of drug and alcohol use in future studies. Such studies might screen larger samples of MSM using urine-detection kits, which are affordable at approximately \$4/test, or utilize assays with longer detection periods, such as those developed for hair and sweat (Dolan et al., 2004). Future research might further investigate the causes of misreporting, incorporate measures of drug use frequency and context (i.e., during sex) to better understand drug use patterns, or derive correction factors with which to adjust self-report estimates.

The results from this study add to the growing evidence demonstrating the bias possible in relying on self-reported risk behaviors for HIV/STI studies and the potential for this bias to produce misleading findings. Recent studies have utilized objective markers to illustrate the extent and implications of inaccurate reporting of sex occurrence and of condom use among heterosexuals (Gallo et al., 2013; Rose et al., 2009), and in reporting HIV status awareness among MSM (Sanchez et al., 2012). Although reviews of the literature have found little support for differences in individual risk behaviors as drivers of the race disparities among MSM (Millet et al., 2012), to the extent that these conclusions are reliant upon self-reported data, it is prudent to critically reevaluate these behaviors with more accurate measures (Millet et al., 2007, 2012).

4.1. Limitations

Our study has several limitations. First, as noted above, the short detection period of urine-based screening limited the sample of participants who screened positive for the substances of interest. By restricting sensitivity analyses to this smaller pool of participants with positive drug screen results, our power to detect some true differences may have been limited. Second, because we used a recall period that was broader than the window of detection for the biological assay, we were unable to conduct a more complete analysis of classification that considers specificity. Nonetheless, our analysis of sensitivity of self-report among those with drug metabolites in their urine is robust. Third, study procedures designed to maximize procedural transparency and participant privacy, including informing participants that their urine would be screened, that we had an NIH certificate of confidentiality, and administering the questionnaire through CASI technology (Gribble et al., 1999; Perlis et al., 2004; Schroder et al., 2003), may have increased the likelihood of valid self-reporting. Our findings may thus represent an underestimate of reporting biases absent such assurances. A final limitation is that the study was restricted to men living in Atlanta. The unique historical and social context of the Southeast regarding racial dynamics may limit the generalizability of the findings to MSM in other regions. Additionally, prior research has indicated that drug use patterns vary across the country (Hirshfield et al., 2004; Stall et al., 2001; Sullivan et al., 1998) and reporting biases may depend on the type of drug (Colón et al., 2010; Fendrich and Johnson, 2005; Fendrich et al., 2004); accordingly, the findings from this study may not necessarily apply to other substances not studied, such as alcohol, or those for which we had insufficient levels of urine-detected use to calculate self-report sensitivity, such as methamphetamine.

4.2. Conclusion

In this study of MSM in Atlanta, we found that estimates of marijuana and cocaine based on self-report were biased. Based on urine-screen results, black MSM reported elevated or similar levels of drug use compared to white MSM. The role of drug use and other individual risk factors in contributing to racial disparities in HIV among MSM should be revisited with measures that are more accurate than self-report alone.

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Table 1

Characteristics of 803 men who have sex with men enrolled in an HIV/STI incidence cohort study in Atlanta, GA, 2010–2012, by race

	Black		White		Chi-square P value
	%	(n/N)	%	(n/N)	
Total	56.5	(454/803)	43.5	(349/803)	
Age					<0.001
18–24	40.3	(183/454)	30.7	(107/349)	
25–34	45.8	(208/454)	45.3	(158/349)	
35+	13.9	(63/454)	24.1	(84/349)	
Education					<0.001
High school or less	25.5	(115/451)	10.3	(36/348)	
Some college / 2yr degree	44.6	(201/451)	35.6	(124/348)	
College / advanced degree	29.9	(135/451)	54.0	(188/348)	
Annual Household Income					<0.001
Under \$10,000	26.9	(114/424)	13.7	(47/342)	
\$10,000 to \$19,999	27.1	(115/424)	17.8	(61/342)	
\$20,000 to \$39,999	31.1	(132/424)	24.6	(84/342)	
\$40,000 and up	14.9	(63/424)	43.9	(150/342)	
Sexual orientation					<0.001
Gay	77.8	(350/450)	93.1	(325/349)	
Bisexual	18.9	(85/450)	5.2	(18/349)	
Other ^a	3.3	(15/450)	1.7	(6/349)	
History of arrest					0.010
Never arrested	57.5	(261/454)	66.5	(232/349)	
Arrested	42.5	(193/454)	33.5	(117/349)	
HIV serostatus ^b					<0.001
Negative	56.6	(257/454)	86.8	(303/349)	
Positive	43.4	(197/454)	13.2	(46/349)	

^a Includes responses of heterosexual and 'other.'

^b HIV serostatus based on results from rapid and confirmatory testing at the baseline visit.

Table 2

Self-reported and urine-screen based prevalence of substance use and sensitivity of self-reported use by race among a sample of men who have sex with men in Atlanta, GA, 2010–2012

	Black		White		Unadjusted PR	95% CI
	%	(n/N)	%	(n/N)		
SELF-REPORTED USE						
Marijuana	28.8	(130/451)	42.7	(147/344)	0.68	0.56, 0.82
Cocaine	10.3	(45/435)	24.9	(84/337)	0.42	0.30, 0.58
Ecstasy	8.6	(37/431)	15.9	(54/339)	0.54	0.36, 0.80
Methamphetamine	1.8	(8/433)	12.6	(43/341)	0.15	0.07, 0.31
Non-injection opiates	0.2	(1/428)	0.3	(1/334)	0.78 ^a	
Poppers	6.8	(30/438)	20.6	(70/340)	0.33	0.22, 0.50
Painkillers	5.9	(25/427)	16.4	(56/342)	0.36	0.23, 0.56
Downers	2.1	(9/430)	13.3	(45/339)	0.16	0.08, 0.32
Hallucinogens	0.9	(4/429)	8.9	(30/337)	0.10	0.04, 0.30
Ketamine	0.7	(3/427)	6.2	(21/337)	0.11	0.03, 0.38
GHB	0.7	(3/430)	8.6	(29/336)	0.08	0.03, 0.26
Injection drugs	0.7	(3/453)	3.4	(12/348)	0.19	0.05, 0.68
URINE-DETECTED USE						
Marijuana	26.7	(121/454)	19.2	(67/349)	1.39	1.07, 1.81
Cocaine	7.9	(36/454)	5.4	(19/349)	1.46	0.85, 2.50
MDMA (Ecstasy)	0.7	(3/454)	0.6	(2/349)	1.15 ^a	
Methamphetamine	0.4	(2/454)	3.2	(11/349)	0.14	0.03, 0.63
Opiates	1.1	(5/454)	0.0	(0/349)	N/A ^a	
SENSITIVITY OF SELF-REPORT ^b						
Marijuana	64.2	(77/120)	91.0	(61/67)	0.71	0.60, 0.82
Cocaine	54.3	(19/35)	84.2	(16/19)	0.65	0.45, 0.93
MDMA (Ecstasy)	33.3	(1/3)	50.0	(1/2)	0.67 ^a	
Methamphetamine	100.0	(2/2)	81.8	(9/11)	1.22 ^a	
Opiates	0.0	(0/5)	N/A	N/A	N/A ^a	

Abbreviations: CI, confidence interval; GHB, gamma-Hydroxybutyrate; MDMA, 3,4-methylenedioxy-N-methylamphetamine; N/A, not applicable or not calculable; PR, prevalence ratio.

^a Confidence interval not computed due to small cell size.

^b Defined as the number self-reporting use of a given drug type in the past 12 months among those who screened positive for that drug type, divided by the total number that screened positive.

Urine-detected marijuana and cocaine use among a sample of men who have sex with men in Atlanta, GA, 2010–2012: distribution and correlates, by race

	Marijuana				Cocaine							
	Black		White		P value interaction with race	P value adj. for race	Black		White		P value interaction with race	P value adj. for race
	%	(n/N)	%	(n/N)			%	(n/N)	%	(n/N)		
Overall	26.7	(121/454)	19.2	(67/349)	N/A	0.014	7.9	(36/454)	5.4	(19/349)	N/A	0.170
Age												
18–24	28.4	(52/183)	22.4	(24/107)		0.496	4.4	(8/183)	1.9	(2/107)	0.052	<0.001
25–34	24.0	(50/208)	19.0	(30/158)			6.7	(14/208)	7.6	(12/158)		
35+	30.2	(19/63)	15.5	(13/84)			22.2	(14/63)	6.0	(5/84)		
Education												
High school or less	33.9	(39/115)	38.9	(14/36)	0.114	<0.001	10.4	(12/115)	8.3	(3/36)	0.332	0.158
Some college / 2yr deg.	32.3	(65/201)	21.0	(26/124)			9.5	(19/201)	4.8	(6/124)		
College / advanced deg.	12.6	(17/135)	14.4	(27/188)			3.7	(5/135)	5.3	(10/188)		
Annual Income												
Under \$10,000	38.6	(44/114)	36.2	(17/47)	0.246	<0.001	5.3	(6/114)	4.3	(2/47)	0.960	0.031
\$10,000 to \$19,999	22.6	(26/115)	32.8	(20/61)			12.2	(14/115)	11.5	(7/61)		
\$20,000 to \$39,999	22.7	(30/132)	15.5	(13/84)			7.6	(10/132)	4.8	(4/84)		
\$40,000 and up	14.3	(9/63)	11.3	(17/150)			4.8	(3/63)	4.0	(6/150)		
Sexual orientation												
Gay	26.9	(94/350)	17.8	(58/325)	0.117	0.685	7.7	(27/350)	4.9	(16/325)	0.216	0.751
Bisexual	25.9	(22/85)	38.9	(7/18)			7.1	(6/85)	16.7	(3/18)		
Other ^a	26.7	(4/15)	33.3	(2/6)			13.3	(2/15)	0.0	(0/6)		
History of arrest												
Never arrested	19.9	(52/261)	16.8	(39/232)	0.304	<0.001	3.8	(10/261)	3.4	(8/232)	0.630	<0.001
Arrested	35.8	(69/193)	23.9	(28/117)			13.5	(26/193)	9.4	(11/117)		

Abbreviations: adj., adjusted; deg., degree; N/A, not applicable.

^aIncludes responses of heterosexual and 'other.'

Table 5

Sensitivity of self-report^a for marijuana and cocaine use among a sample of men who have sex with men in Atlanta, GA, 2010–2012: distribution and correlates, by race

	Marijuana					Cocaine				
	Black		White		P value interaction with race	Black		White		P value interaction with race
	%	(n/N)	%	(n/N)		%	(n/N)	%	(n/N)	
Overall	64.2	(77/120)	91.0	(61/67)	N/A	54.3	(19/35)	84.2	(16/19)	N/A
Age					0.362					0.972
18–24	62.7	(32/51)	100.0	(24/24)		42.9	(3/7)	100.0	(2/2)	
25–34	62.0	(31/50)	90.0	(27/30)		64.3	(9/14)	83.3	(10/12)	
35+	73.7	(14/19)	76.9	(10/13)		50.0	(7/14)	80.0	(4/5)	
Education					0.668					0.995
High school or less	63.2	(24/38)	78.6	(11/14)		54.5	(6/11)	100.0	(3/3)	
Some college / 2yr deg.	66.2	(43/65)	100.0	(26/26)		57.9	(11/19)	100.0	(6/6)	
College / advanced deg.	58.8	(10/17)	88.9	(24/27)		40.0	(2/5)	70.0	(7/10)	
Annual Income					0.666					>0.999
Under \$10,000	61.4	(27/44)	94.1	(16/17)		83.3	(5/6)	100.0	(2/2)	
\$10,000 to \$19,000	80.8	(21/26)	90.0	(18/20)		42.9	(6/14)	100.0	(7/7)	
\$20,000 to \$39,000	58.6	(17/29)	92.3	(12/13)		50.0	(5/10)	75.0	(3/4)	
\$40,000 and up	55.6	(5/9)	88.2	(15/17)		100.0	(2/2)	66.7	(4/6)	
Sexual orientation					0.996					0.885
Gay	64.5	(60/93)	89.7	(52/58)		57.7	(15/26)	87.5	(14/16)	
Bisexual	59.1	(13/22)	100.0	(7/7)		33.3	(2/6)	66.7	(2/3)	
Other ^b	75.0	(3/4)	100.0	(2/2)		100.0	(2/2)	NA	(-/0)	
History of arrest					0.072					0.808
Never arrested	55.8	(29/52)	94.9	(37/39)		55.6	(5/9)	87.5	(7/8)	
Arrested	70.6	(48/68)	85.7	(24/28)		53.8	(14/26)	81.8	(9/11)	

Abbreviations: adj., adjusted; deg., degree; N/A, not applicable.

^a Defined as the number self-reporting use of a given drug type in the past 12 months among those who screened positive for that drug type, divided by the total number that screened positive.

^b Includes responses of heterosexual and 'other.'

Summary of associations between drug use indicators and race (black vs. white) among a sample of men who have sex with men in Atlanta, GA, 2010–2012

Table 6

	Self-Reported Use		Urine-Detected Use		Sensitivity of Self-Report ^a	
	Black/white PR	95% CI	Black/white PR	95% CI	Black/white PR	95% CI
Marijuana ^b						
Unadjusted	0.68	0.56, 0.82	1.39	1.07, 1.81	0.71	0.60, 0.82
Adjusted ^c	0.59	0.48, 0.73	0.96	0.73, 1.27	0.71	0.60, 0.84
Cocaine ^b						
Unadjusted ^d			1.46	0.85, 2.50	0.65	0.50, 0.93
Ages 18–24	0.20	0.09, 0.46				
Ages 25–34	0.43	0.28, 0.66				
Ages 35+	0.93	0.46, 1.86				
Adjusted ^{c,d}			1.06	0.59, 1.91	0.64	0.42, 1.00 ^e
Ages 18–24	0.13	0.05, 0.33				
Ages 25–34	0.38	0.24, 0.59				
Ages 35+	0.73	0.36, 1.45				

Abbreviations: CI, confidence interval; N/A, not applicable; PR, prevalence ratio.

^a Defined as the number self-reporting use of a given drug type in the past 12 months among those who screened positive for that drug type, divided by the total number that screened positive.

^b The sample sizes for each analysis differ, as participants with missing responses to one or more variables in a given analysis were dropped, and because of the analytic criteria for the sensitivity outcome. For marijuana use, from left to right, the sample sizes for the unadjusted analyses were 795, 803, and 187; for adjusted analyses, these were 751, 759, and 174. For cocaine use, from left to right, the sample sizes for the unadjusted analyses were 772, 803, and 54, respectively; for adjusted analyses, these were 728, 759, and 50.

^c Controlling for age, education, income, sexual orientation, and history of arrest.

^d A significant interaction was observed between age and race for self-reported cocaine use, but not for urine-detected use or self-report sensitivity.

^e The upper bound for this confidence interval is rounded from 0.997.