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The Association Between Substance Use and Unprotected Anal Intercourse Among
Young Black MSM in Atlanta, GA Participating in the Element Study.

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Master of Public Health

Epidemiology

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B.S.
The University of Georgia
2015

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Abstract

The Association Between Substance Use and Unprotected Anal Intercourse Among Young Black MSM in Atlanta, GA Participating in the Element Study.

By Jelani B. Cheek

Black MSM (men who have sex with men) are disproportionately infected with HIV compared with non-black MSM in the United States. Substance use is a primary factor for high-risk sexual behavior, which may lead to HIV infection. Studies examining substance use in black MSM, particularly young black MSM limited. The current study aims at examining the possible association of five substances (marijuana, cocaine, ecstasy, poppers, and opiates) and insertive and receptive unprotected anal intercourse (UAI) among young black MSM in Atlanta, GA. The study data is derived from baseline survey data of 465 young black MSM, ages 18-29 years participating in the Ele[men]t Cohort study in Atlanta, GA. 419 participants were eligible for analysis. Multivariate logistic regression was utilized to test the association between each of the five substances with insertive and receptive UAI. Marijuana was the most frequently used substance among the cohort at 66.7% followed by poppers (17.7%), cocaine (14.1%), opiates (7.6%), and ecstasy (6.9%). The odds of using poppers in the past six months among those who reported receptive UAI is significantly higher (adjusted odds ratio [AOR]: 2.13 (95% CI: 1.17, 3.87)) compared with participants who did not indicate receptive anal intercourse, adjusted for alcohol use, baseline HIV status, and factors of SES. Substance use is becoming more acceptable and accessible in the United States and this may have important implications on trends in HIV incidence. The current study examined the frequencies at which substances were used among young black MSM in Atlanta, GA and the associations with insertive and receptive unprotected anal intercourse. The findings from this study will contribute to filling the gaps in literature on this subject and assist in future studies to combat the HIV epidemic.

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Table of Contents

Introduction	1
Methods	4
Recruitment.....	4
Baseline Study Event	5
Measures	5
Analysis.....	6
Results	7
Discussion	9
References	14
Tables	20

Introduction

HIV surveillance illustrates that infection continues to disproportionately affect men who have sex with men (MSM) more than any other group in the United States, with an estimated 615,000 (56%) MSM currently infected [1]. African Americans represent approximately 14% of the population, but have the highest incidence rate among all other racial/ethnic groups [2]. Racial disparities between black MSM and white MSM have been observed throughout the years. HIV incidence among black MSM is estimated to be five times those of white MSM and HIV prevalence twice that of white MSM [3-6]. High-risk sexual behavior among MSM is commonly unprotected anal intercourse (UAI), with receptive anal intercourse associated with a higher risk of HIV acquisition than insertive anal intercourse [7]. Although black MSM are more likely to be affected by HIV, previous research indicates no difference in high-risk sexual behavior engagement between black MSM and other racial/ethnic MSM groups [8].

Substance use is a primary factor in high-risk sexual behavior [7]. Substance use, such as marijuana, cocaine, ecstasy, poppers, and opiates can vary depending on an individual's age and race [9]. The majority of research focusing on association between substance use and HIV in MSM concentrates on white MSM, where methamphetamine use is predominant [9]. Black MSM in general, report more powder and crack cocaine use than white or Latino MSM [10-12]. However, the types of drugs used among black MSM varies by age, with older black MSM typically reporting a higher frequency of powder/crack cocaine and heroin usage than younger black MSM [13-15]. A study by

Morgan et al. found that 8.5% of black MSM under 30 years reported general cocaine/crack use compared to 31.3% of black MSM aged 30 and older who reported general cocaine/crack use [9]. Marijuana is a drug that is more common among young black MSM and Morgan et al. found 69.8% of participants under age 30 reported general use of marijuana, compared with 50% of participants over age 30 [9]. Several studies have found a positive association between marijuana use and risky sexual behavior [9, 16, 17] while others have found no association [18].

Young black MSM is the sub-population with the highest HIV incidence rate in the United States. However, literature studying the association between substance use and sexual risk behavior in young black MSM is scant [1, 9]. Examining correlates of substance use behaviors is pertinent to identifying individuals at highest risk where targeted interventions are needed to reduce risk [19]. Research has shown that there is no difference in risky sexual behavior between black MSM and other racial MSM groups, however black MSM experience more frequent and severe consequences of drug and alcohol use compared with white MSM, leading to health disparities such as poorer physical health, increased incarceration, and higher rates of gang involvement [10, 20-22].

The current analysis uses data from the Element cohort to examine the association between unprotected anal intercourse (both insertive and receptive), and illicit substance use in the past six months among a sample of young black MSM in Atlanta (ages 18-31 years), while controlling for factors of socioeconomic status (SES) and alcohol use. The

main objectives of this study are to: 1) quantify the risk of unprotected anal intercourse (UAI) among participants who use substances compared with participants who do not use substances, 2) assess the prevalence and frequency of substance use in our cohort, and 3) identify future research questions and provide data for future interventions within the target group. We hypothesize a higher risk of UAI among participants using illicit substances within six months of the baseline survey, controlling for factors of SES and alcohol use, compared with those who did not use illicit substances within six months of the baseline survey.

Methods

The current study data was derived from the Ele[men]t study, conducted by PRISM Health at Emory University. Baseline survey data consisted of 300 HIV-negative young black men who have sex with men (YBMSM) and 165 HIV-positive young black MSM (YBMSM) in Atlanta, GA. Informed consent was obtained from all eligible participants prior to data collection.

Recruitment

Participants were recruited through a variety of methods, including: physical venues, internet venues, peer referral, and spontaneous calls. A screening questionnaire was administered to potential participants to assess eligibility for the study. Eligible potential participants were offered study participation and contact information was received to provide further steps to participants. Peer referrals were given to participants in the form of a referral code after completing the baseline study visit to recruit a maximum of three people per participant. Data collected from men who meet the eligibility criteria was stored in the secured, HIPAA-compliant servers of SurveyGizmo.

Inclusion criteria(enrollment). Potential recruits identified as Black/African-American males between the ages of 18 and 29 years. Participants must have engaged in sexual intercourse with another male in the past three months. Participant must also live in the Atlanta area and plan to remain for two years, have the ability to complete the survey in English, provide at least two means of contact, and not be enrolled in an HIV prevention trial.

Exclusion criteria (enrollment). Self-reported multiple or non-Black/African-American race(s) or self-reported Hispanic ethnicity. *Exclusion criteria (follow-up).* Participants screened HIV-positive.

Baseline Study Event

Data collection at the baseline visit included a survey, laboratory testing, and a questionnaire administered by trained HIV counselors. Specimen collection was conducted by an Emory University trained phlebotomist. Blood samples from participants were used to screen for HIV using an FDA-approved HIV rapid test. Participants with a preliminary positive HIV results received standard counseling messages per CDC recommendations [23]. All preliminary positive results were confirmed with an antigen/antibody 4th generation test as well as a CD4 and viral load count. Blood samples for participants screened HIV negative were assessed for acute infection with a more sensitive HIV nucleic acid testing. Participants were compensated \$100 for their baseline visit.

Measures

For the purpose of the study, we used data solely from the computer-assisted self-interview(CASI) questionnaire completed during the baseline study event.

Dependent measures. Insertive unprotected anal intercourse (IUA) and receptive UAI (RUAI) are assessed to measure high-risk sexual behavior among YBMSM in Atlanta. We required all participants to answer the question, “Of the [x] male partners you had sex with in the last six months, how many did you have anal sex with?” The

CASI then assessed in two separate questions, whether participants enacted in IUAI and RUAI in a three-level response, “yes”, “no”, or “don’t know”.

Independent measures. Marijuana, cocaine, ecstasy, poppers, and opiates are measured to estimate the association between each drug and RUAI and IUAI. All participants were required to answer the question, “In the past six months, have you taken any of these substances?”; in a multi-check question.

Covariates. Survey information assessing education level, income, baseline HIV status, alcohol consumption, homelessness, and number of sexual partners were under consideration in each model.

Analysis

Analysis was restricted to 419 participants, all indicated either having receptive UAI, insertive UAI, or protected anal intercourse. Univariate analysis was conducted to report frequencies on demographic information and substance use among the cohort, stratified on RUAI and IUAI. Significant associations were measured by χ^2 statistic ($P < 0.05$). Unadjusted ORs were calculated during bivariate analysis to assess the association between the five independent variables (marijuana, cocaine, ecstasy, poppers, opiates) and both RUAI and IUAI. We used multivariate logistic regression models to adjust for education, income, homelessness, baseline HIV status, and number of UAI partners in the past six months. Adjusted odds ratios (AOR) and 95% confidence intervals were reported. All statistical analyses were conducted with SAS 9.4.

Results

Four hundred and sixty-five men were enrolled in the study, with 419 (90.1%) providing data assessing whether participants had insertive and/or receptive unprotected anal intercourse (UAI) in the past six months. The Element Cohort consisted of African American men of aged 18-24 years and 25-29 (43.2% versus 56.8%; $p = 0.005$). Most men in our cohort self-identified as homosexual or bisexual (75.9% versus 19.8%; $p = <0.0001$). Concentrating on factors of socioeconomic status, 308 (73.5%) had some or more college education, 217 (51.8%) earned an income of at least \$20,000 per year, 360 (85.92%) did not consider themselves homeless, and 244 (58.2%) had health insurance (Table 1). Approximately equal proportions of men reported having insertive and/or receptive UAI in the past six months in the survey (58.0% versus 54.2%, respectively). Focusing on the number of male partners in the past six months reported by participants, 293 reported more than one partner and 126 reported only one partner (69.9% versus 30.1%; $p = <0.0001$). The frequency of substance use in the past six months was assessed for participants who indicated IUAI and RUAI. In our cohort, 74 (17.7%) participants reported poppers use. More participants used poppers and had IUAI compared to using poppers and not having IUAI (21.4% versus 12.5%; $p = 0.018$) and similarly for receptive UAI (23.8% versus 10.4%; $P <0.001$).

Tables 2a and 2b illustrate the bivariate and multivariate analyses assessing the association between drug use and unprotected anal intercourse, both insertive and receptive. Education, number of male partners in the past six months, baseline HIV

status, and alcohol use in the past six months were controlled for in each multivariate logistic regression model. Comparable frequencies of marijuana use among those who reported insertive UAI versus those who did not have insertive UAI was observed in the bivariate analysis (38.0% versus 28.6%; Odds ratio (OR): 0.88 (95% Confidence Interval (CI): 0.59, 1.33)). Men using marijuana were 25% less likely to have UAI after adjusting for alcohol consumption in the past six months, baseline HIV status, and factors of SES (adjusted odds ratio (aOR): 0.75, 95% CI: 0.47, 1.17), but this was not statistically significant. Similarly, cocaine was also associated with a lower risk of insertive UAI (OR: 0.85 (95% CI: 0.50, 1.53); aOR: 0.85 (95% CI: 0.46, 1.56)), but was not statistically significant. Ecstasy, poppers, and opiates were all associated with increased risk for insertive UAI, but none were statistically significant (Table 2a). In the bivariate analysis, poppers were statistically significantly associated with an increased risk of insertive UAI (OR: 1.91 (95% CI: 1.11, 3.28)), however after controlling for factors previously mentioned, the OR decreased slightly and was not statistically significant (AOR: 1.78 (95% CI: 0.99, 3.22)).

In the assessment of substance use in the past six months on the odds of receptive unprotected anal intercourse, only were statistically significantly associated with 2.7 time increased odds of having receptive UAI (OR: 2.68 (95% CI: 1.54, 4.68)). Controlling for confounders, only poppers use remained statistically significantly related to receptive UAI. Men using poppers were more than 2 times more likely to have receptive UAI (aOR: 2.13 (95% CI: 1.17, 3.87)) compared to men who did not use poppers.

Discussion

Young black MSM in the United States are disproportionately contracting HIV compared with white and Latino MSM. Substance use is a predictor of unprotected anal intercourse (UAI), and is often studied to assess HIV incidence. However, few studies have examined substance use and UAI specifically in young black MSM. The current study assesses reported substance use in the past six months and the possible association with insertive and receptive UAI in young black MSM in Atlanta, GA from the Element Cohort.

In this cohort, alcohol use was ubiquitous and marijuana use was most common substance after alcohol, with 66.7% of participants indicating use in the past six months. Poppers, cocaine, opiates, and ecstasy use was much less common. Reported popper use in the past six months was the only substance statistically significantly associated with a higher risk of receptive unprotected anal intercourse after adjusting for alcohol use, baseline HIV status, and SES. The risk of RUAI was 2 times higher for MSM using poppers compared to those who did not.

Popper use has been well documented as a predictor of HIV infection in previous studies [24-26]. Consistent with a previous study conducted in Beijing, China, we found popper use to be significantly associated with receptive unprotected anal intercourse (RUAI), but not insertive unprotected anal intercourse (IUAI) [27]. As stated by Zhang et al., the result can be explained for two reasons: men who use poppers do so due to the effect of

dilating the anal sphincter to reduce pain during anal intercourse and, receptive intercourse position is associated with a decreased likelihood of condom use, due to the autonomy and decision-making factors possessed by the individual in the insertive intercourse role [28]. The second explanation is that poppers have pharmacological and neurological effects which can modify mental states and reduce sexual inhibition, which may have an effect on decreased condom usage [29, 30]. Other studies have not seen high rates of popper use in young black MSM with most studies reporting rates less than 10% [9,31]. However, the current study found that 17.7% of our cohort reported popper use in the past six months. The use of poppers among young black MSM may be of particular concern and future studies analyzing longitudinal data should be conducted to further our understanding on the role of this substance on HIV incidence among this population.

To understand the frequency of substance use in young black MSM, we examined the frequency of use of various substances in this cohort. Alcohol was used by the majority of participants (91.4%) and is a known predictor of high-risk sexual activity. Due to this, we controlled for reported alcohol use in the past six months instead of assessing it as a main predictor for the both UAI outcomes in the multivariate logistic regression analysis. Marijuana use was the second highest reported substance (66.7%). Consistent with previous studies, marijuana use among our cohort of young black MSM was greater than 50% [9, 32-33]. Use of marijuana was not found to be associated with RUAI or IUAI, consistent with results reported by Morgan et al. [9]. The next most frequently used substances were poppers (17.7%) and cocaine (14.1%). Both substances are typically seen more commonly among non-black MSM compared with black MSM [9,31]. The

data suggest that young black MSM could be using these substances at a higher frequency than previously reported. However, the frequency of reported ecstasy and opiate use found in this cohort are consistent with previously published data from a similar cohort of young black MSM [31, 33]. Other substances were reported by participants in the baseline survey, however the frequency of each substance was too small to examine (less than 5%).

Our study has several limitations that need to be addressed. The significant findings in the current study represent prevalent estimates and also illustrate the magnitude of general substance use on RUAI and IAUI in YBMSM. However, the data for this study are cross-sectional and thus, cannot provide a causal inference or establish temporality. Analyzing longitudinal data would be recommended in future studies to establish a causal relationship. Secondly, we are relying on self-reported data of general substance use in the past six months. Quantifying the use of substance use in a longitudinal study would allow identification of changes in substance use and high-risk sexual behavior over time. Third, the study only assesses general use of substances and not the effect of each substance as a sex-drug. We cannot establish a temporal relationship between substance use and high-risk sexual behavior, however our data represents the prevalence of RUAI and IAUI in the past six months among YBMSM who use particular substances in general. Furthermore, the study is limited to YBMSM who live in and around the Atlanta metropolitan area and limits the generalizability of our results. Finally, an underlying personality trait such as sensation seeking may make UAI and substance use more likely [34]. Studies scoring sensation-seeking behavior have correlated high scores with both

substance use and UAI, however these data were not collected in the Element study [35, 36].

The findings from this study have important implications as substance use is increasing in the United States. Currently, there is an ongoing opioid epidemic, where the CDC has estimated that the number of overdose deaths involving opioids in 2016 is five times higher than in 1999 [37]. Although the proportion of reported opioid use in YBMSM in the current study and previous studies are relatively low and consistent, trends in usage must continue to be studied in this population. Reported marijuana usage in this study and similar studies show consistently high use among YBMSM and with a more permissive view of marijuana use trending across the nation, marijuana use may continue to rise [38]. Although a significant association was not established between reported marijuana use and either UAI outcomes, marijuana use may be associated with other correlates of HIV incidence, which can have important implications on this population [9]. Overall, substances are becoming more accessible and acceptable in the United States. To fully understand the effects of substance use on UAI and ultimately, HIV incidence in YBMSM, longitudinal studies examining general and sex-drug use should be conducted.

HIV incidence among YBMSM continues to be the highest in the country with rates three to five times higher than their white or Latino counterparts [39]. As researchers, we must continue to understand the factors that contribute to these disparities. The CDC estimates that if HIV incidence rates persist, one out of every two BMSM will contract HIV within

their lifetime [40]. Understanding the role of substance use on HIV incidence in YBMSM is one facet of controlling the epidemic.

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Tables

Table 1. Characteristic information on 419 Black MSM in Atlanta, stratified by reported insertive and/or receptive unprotected anal intercourse (UAI) in the past six months

Variables			Insertive UAI*			Receptive UAI*		
	Total n=419	p-value	Yes n=243 (58.0%)	No n=176 (42.0%)	p-value	Yes = 227 (54.2%)	No n = 192 (45.8%)	p-value
	No. (%)		No. (%)	No. (%)		No. (%)	No. (%)	
Age at Baseline, y		0.005***			0.43			0.55
18-24	181 (43.20)		101 (41.56)	80 (45.45)		95 (41.85)	86 (44.79)	
25-31	238 (56.80)		142 (58.44)	96 (54.55)		132 (58.15)	106 (55.21)	
Sexual Orientation		<0.0001***			0.32			0.26
Homosexual	318 (75.89)		176 (73.03)	142 (80.68)		181 (80.09)	137 (71.73)	
Bisexual	83 (19.81)		55 (22.82)	28 (15.91)		38 (16.81)	45 (23.56)	
Heterosexual	2 (0.48)		1 (0.41)	1 (0.57)		1 (0.44)	1 (0.52)	
Other	14 (3.34)		9 (3.73)	5 (2.84)		6 (2.65)	8 (4.19)	
HIV Status at Baseline		<0.0001***			0.64			0.55
Negative	272 (64.92)		160 (63.64)	112 (63.64)		138 (60.79)	134 (69.79)	
Positive	147 (35.20)		83 (36.36)	64 (36.36)		89 (39.31)	58 (30.21)	
Highest Education Completed		<0.0001***			0.18			0.95
High School or less	110 (26.25)		58 (23.87)	52 (29.55)		610 (26.43)	50 (26.04)	
Some College or above	308 (73.51)		185 (76.13)	123 (69.89)		167(73.57)	141 (73.44)	
Income Before Taxes (yearly)					0.02***			0.2
Under \$20,000	176 (42.00)		90 (37.04)	86 (48.86)		103 (45.37)	73 (38.02)	
\$20,000 or more	217 (51.79)		136 (55.97)	81 (46.02)		113 (49.78)	104 (54.17)	
Homeless (past 6 months)		<0.0001***			0.8			0.045***
Yes	52 (12.41)		31 (12.76)	21 (11.93)		35 (15.42)	17 (8.85)	
No	360 (85.92)		208 (85.60)	152 (86.36)		189 (83.26)	171 (89.06)	
Insurance		<0.0001***			0.18			0.4
Yes	244 (58.23)		149 (61.32)	95 (53.98)		130 (57.27)	114 (59.38)	
No	160 (38.19)		87 (35.80)	73 (41.48)		92 (40.53)	68 (35.42)	
No. of UAI partners		<0.0001***			0.08			0.048***
1 partner	126 (30.07)		65 (26.75)	61 (34.66)		59 (25.99)	67 (34.90)	
> 1 partner	293 (69.93)		178 (73.25)	115 (65.34)		168 (74.01)	125 (65.10)	
Substance Use*								
Alcohol	383 (91.41)	-	229 (94.24)	154 (87.50)	0.015***	216 (94.71)	168 (87.50)	0.009***
Marijuana	279 (66.67)	<0.0001***	159 (65.43)	120 (68.18)	0.56	153 (67.40)	126 (65.63)	0.7
Cocaine	58 (14.05)	<0.0001***	32 (13.17)	26 (14.77)	0.64	38 (16.74)	20 (10.42)	0.06
Ecstasy	29 (6.92)	<0.0001***	20 (8.23)	9 (5.11)	0.21	17 (7.49)	12 (6.25)	0.62
Opiates	32 (7.64)	<0.0001***	23 (9.47)	9 (5.11)	0.1	22 (9.69)	10 (5.21)	0.09
Poppers	74 (17.66)	<0.0001***	52 (21.40)	22 (12.50)	0.018***	54 (23.79)	20 (10.42)	<0.001***
None	19 (4.53)	<0.0001***	7 (2.88)	12 (6.82)	0.06	6 (2.64)	13 (6.77)	0.043***

* Columns and rows are not mutually exclusive. Participants can be in both the insertive and receptive uai groups and/or use multiple substances

** No specified option in the survey. Participants could self-identify their sexual orientation by fill in the blank

*** P < 0.05

Table 2a. The association between substance use in the past six months and insertive unprotected anal intercourse among young black MSM in Atlanta participating in the Ele[men]t Study

Substance Use (past 6 months)*	Insertive UAI*		OR (95% CI)	aOR (95% CI)
	Yes	No		
Marijuana	159 (38.0)	120 (28.6)	0.88 (0.59, 1.34)	0.75 (0.47, 1.17)
Cocaine	32 (7.6)	26 (6.2)	0.85 (0.50, 1.53)	0.85 (0.46, 1.56)
Ecstasy	20 (4.8)	9 (2.2)	1.66 (0.74, 3.75)	1.81 (0.76, 4.34)
Poppers	52 (12.4)	22 (5.3)	1.91 (1.11, 3.28)**	1.78 (0.99, 3.22)
Opiates	23 (5.5)	9 (2.2)	1.94 (0.88, 4.30)	1.75 (0.77, 3.96)

* Columns and rows are not mutually exclusive. Participants can be in both the insertive and receptive uai groups and/or use multiple substances

** Statistically significant association using chi-squared test of independence, alpha level = 0.05

Table 2b. The association between substance use in the past six months and receptive unprotected anal intercourse among young black MSM in Atlanta participating in the Ele[men]t Study

Substance Use (past 6 months)*	Receptive UAI*		OR (95% CI)	aOR (95% CI)
	Yes	No		
Marijuana	153 (36.5)	126 (30.1)	1.08 (0.72, 1.63)	0.88 (0.57, 1.38)
Cocaine	38 (9.1)	20 (4.8)	1.73 (0.97, 3.09)	1.58 (0.83, 2.98)
Ecstasy	17 (4.1)	12 (2.9)	1.21 (0.57, 2.61)	1.01 (0.45, 2.29)
Poppers	54 (12.9)	20 (4.8)	2.68 (1.54, 4.68)**	2.13 (1.17, 3.87)**
Opiates	22 (5.3)	10 (2.4)	1.95 (0.90, 4.23)	1.88 (0.83, 4.26)

* Columns and rows are not mutually exclusive. Participants can be in both the insertive and receptive uai groups and/or use multiple substances

** Statistically significant association using chi-squared test of independence, alpha level = 0.05