Research Article

Impact of Alcohol Use and Drug Use on STD/HIV-Related Sexual Risk Behaviors among African American College Students

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Abstract

Objective: The study explored associations between alcohol use, drug use, as well as sexually transmitted disease (STD)/human immunodeficiency virus (HIV)-related sexual risk behaviors among African American college students.

Participants: The study used data from 294 African American college students enrolled at Winston-Salem State University (WSSU).

Methods: Participants completed a telephone interview and online self-report survey. A series of frequency analyses and regression analyses were used to examine how alcohol use and drug use interactively affect college students' STD/HIV-related sexual risk behaviors. the college students had (p<0.001) after controlling for age and gender. However, no association was found between alcohol use and condom use.

Results and findings: The findings indicate that alcohol use was positively associated with the number of sexual partners the college students had (p<0.001) after controlling for age and gender. However, no association was found between alcohol use and condom use.

Conclusions: Our findings support the need for targeted STD/HIV prevention and emphasize the importance of reducing alcohol use among African American College students on campuses.

Introduction

College students are among the highest risk groups and are more likely to exhibit sexual risk behaviors and contracting sexually transmitted diseases (STD) and human immunodeficiency virus (HIV) [1]. STDs are the most pervasive infectious diseases occurring among sexually experienced college students in the United States [2]. The school environment of congregated sexually active young adults offers increased opportunities for STD/HIV-related risk behaviors, including unsafe sex, multiple sexual partners, inconsistent condom use, alcohol use, and other drug use.

The transmission of STD and HIV on African Americans is a significant health concern in the United States (US). Although African Americans represent 14 percent of the US population, they account for 44% of newly diagnosed HIV infections and 41% of current HIV population [3,4]. African American college students are a population with specific risks and needs. For example, the riskier sexual behaviors were often found to exist among African American college students in Historically Black Colleges and

Universities (HBCUs) [5]. Compared with Caucasian students attending a traditionally white institution (TWI), black students attending HBCUs were more likely to have STD infections (OR=4.4) and more likely to have been tested for HIV (OR=8.4) [5]. Using a sample of the 1,130 college students from a large, urban, minority-serving university in a community with a high HIV/AIDs prevalence, Trepka and his colleagues found that 14% of participants had high-risk sexual behaviors (having more than one sexual partner in last year and not using a condom during last vaginal intercourse) and 11.9% of students had consistent high-risk sexual behavior [6]. Alleyne examine African American female college students aged 18-24 attending a minority-serving university and found that the type of sexual relationship in which the participants' were involved were associated with their condom use and other STD/HIV-related risk behaviors [7].

Alcohol use and drug use continue to constitute social and health problems, more so among college students. Some studies found that individuals who drank alcohol during the past 30 days were more likely to report not using a condom at last sex [8]. Alcohol use and drug use were often associated with higher perceived risk of HIV because they increased African American college students'

STD/HIV-related sexual risk behaviors such as with condom use and number of sexual partners [9-11]. Some studies found that being African American who practices alcohol use and marijuana use was more likely to be associated with STD/HIV-related sexual risk behaviors [12].

Sexual risk behaviors and drug use are two important factors associated with the occurrences of STDs and STDs diagnosis among African American college students [6,11,13]. One consequence of alcohol use and drug use is STD/HIV-related risk sexual behavior, a major problem in African American college students already facing the problems of STDs/HIV. Some clinical studies indicate that heavy and dependent substance users often engage in high frequency and high-risk sexual behaviors among African American college students [14,15]. A study found that males reporting male partnerships those who used marijuana (OR = 17.5, p = 0.01) and those who used alcohol along with illegal drugs (OR = 8.8, $p = 0.03$) were significantly more likely to report multiple partnerships [16]. Brown and Vanable found that the persons with unprotected vaginal sex were 39% and 32% more likely to use alcohol prior to sex. Adefuye and his colleagues reported that African American college students who use alcohol and illegal drugs were more likely to have multiple sexual partners and that marijuana use was correlated with inconsistent condom use [16]. Seth found that women who use alcohol were more likely to have multiple partners and risky partners [17]. The relationships among alcohol use, drug use and high-risk sexual activities revealed that alcohol use and drug use are two interrelated factors and that reducing alcohol and other drug use are important for college HIV prevention efforts [18].

Alcohol use was found to increase high risky sexual behaviors because it can influence a person's sexual decision making and reduce the ability of risk awareness and perceptions [19]. College students who use drug and alcohol are more likely to engage in unintended and unprotected sexual activity [20]. College students who drank alcohol during the past 30 days were more likely to report not using a condom at last sex [16]. However, some studies found no association between alcohol use and condom use [11].

This study determines the coexistence of alcohol and other drug use and their effects on STD/HIV-related sexual risk behaviors in a population of African American college students attending a historically black university. Previous studies examined alcohol use and drug use individually, but failed to examine their relationships with STD/HIV-related sexual risk behaviors. In addition, few studies have been undertaken to examine the impacts of alcohol use and drug use on STD/HIV–related sexual risk behaviors among African American college students. The purpose of this study was twofold: first, to examine the prevalence of alcohol use, drug use, and STD/HIV-related sexual risk behaviors among African American college students; and second, to examine the impacts of alcohol use and drug use on STD/HIV-related sexual risk behaviors. The research findings will help us to better understand African American college students' needs and enhance their health promotion and improve STD/HIV prevention by reducing alcohol use, drug use, and STD/HIV-related sexual risk behaviors.

Methodology
Participants
A total of 344 students were randomly selected from the student population of Winston-Salem State University. Among these

344 students, 85.2% (294) are African American, 9.3% (32) are Caucasian, and 5.5% (19) are other ethnicity. In this study, Only African American students were included to assess students' drug use, STD/HIV-related sexual risk behaviors, and perceptions on the most prevalent health topics.

Measures
The survey instrument used in this study was developed by the American College Health Association-National College Health Assessment (ACHA-NCHA). The datum was collected by ACHA in 2008 with the help of the student health service of Winston-Salem State University (WSSU).

High-risk sexual behaviors often increase the probability of negative consequences associated with HIVs or STDs. Among African American college students, the exposure to STDs is dependent on the prevalence and patterns of the primary high-risk sexual behaviors associated with alcohol use and other drug use. These behaviors often include two broad categories: (1) having multiple sexual partners; having risky, casual or unknown partners; and (2) Inconsistent use of condoms or unprotected intercourse. For example, the students were asked "how many sex partners you had within the last year?" and "how often did you or your partner(s) use a condom within the last 30 days?"

Alcohol use and drug use factors were examine to identify their relationship with STD/HIV-related sexual risk behaviors. The students were asked how many days they use alcohol and different drugs in the last 30 days. The drug uses in this study included marijuana use, cocaine use, and amphetamine use.

Statistical Aanalysis
Analyses were based on data gathered from 294 African American college students enrolled at WSSU. The Statistical software SPSS 22.0 was used in this study [21]. Frequency analyses were used to examine alcohol use, drug use, and the prevalence of STD/HIV-related sexual risk behaviors among African American college students. Basic frequency analyses were used to determine the significant differences in students' STD/HIV-related risk sexual behaviors, between those who had alcohol use and other drug use and those who did not have. In this study, t-tests were used for continuous measures and chi-square tests were used for categorical measures. For example, t-tests were used to compare the use of alcohol use and drug use on STD/HIV- related sexual risk behaviors.

The multivariate analysis was performed with a regression model using an AMOS program [22]. To examine how alcohol use and marijuana use impact students' STD/HIV-related risk behaviors, Structural Equation Modeling (SEM) was used to assess the relationship among alcohol use, marijuana use and the students' HIV/STD-related risk behaviors. SEM is an important multivariate technique for estimating and testing the assumption related to the direct effects of school experiences on STD/HIV related risk behaviors. SEM has a significant advantage because it not only permits the measurement of several variables and their interrelationships simultaneously, but it also allows us simultaneously to examine multiple dependent relationships between variables. In this study, SEM was used as a versatile tool to operationalize and examine the associations between alcohol use and drug use and STD/HIV–related risk behaviors. At the same time, age and gender were controlled. P values <0.05 were considered significant.

Results

Descriptive Statistics and Sample Characteristics

In this study, the ages of the student population ranged from 16 to 55 years old with a mean age of 33.43 years (S.D. 10.06). About 90.5% (266) of samples are female students. The participants had completed a mean of 11.19 years of education (S.D. 1.87, range 6-16). About 30.4% of the respondents were employed either full- or part-time jobs.

STD/HIV-Related Sexual Risk Behaviors

The information presented in Table 1 displays the percentage of college students who reported the number of sexual partners during last year. More than 22% of students had no sexual partner and 50.6% of the students (50.6%) had one sexual partner. However, 27% students had more than one sexual partner. About 25.2% female students and 37.2% of male students had more than one sexual partner. Male student were 12.0% more likely to have more than one sexual partner than female students.

Table 2 shows the frequency of condom use for the students and their partner (s) during anal intercourse, oral sex, and vaginal intercourse with the last 30 days. About 5.3% of students never or rarely used condoms during anal intercourse; 33.8% of students never or rarely used condoms during oral sex; and 24.3% of students never or rarely used condoms during vaginal intercourse.

Table 1: Number of Sexual Partners during Last Year

College students reported the number of sexual partners during last year	Gender		
	Female (%)	Male (%)	Total (%)
Having had no sexual partner	22.5	25.7	22.4
Having had 1 sexual partner	52.3	37.1	50.6
Having had 2 sexual partners	13.8	17.1	14.7
Having had 3 sexual partners	5.0	14.3	5.9
Having had 4 sexual partners	3.7	5.7	3.8
Having had 5or more sexual partners	2.7	0	2.4

Table 2: Frequency of Condom Use for You or Your Partner (s)

Types of sexual activities	Anal intercourse (%)	Oral sex (%)	Vaginal intercourse (%)
Never did intercourse	79.2	36.9	17.6
Have not done intercourse in last 30 days	13.8	23.7	20.1
Never use condom	4.9	32.8	19.7
Rarely use condom	0.4	1.0	4.6
Sometimes use condom	0	0.7	4.6
Mostly use condom	1.0	2.1	8.5
Always use condom	0.7	2.8	25.0

Alcohol Use and Marijuana Use

Alcohol use and marijuana use as self-reported primary problems were often associated with high-risk sexual behaviors. In this study, about 33.5% of African American college students reported alcohol use and 4.8% reported marijuana use in the last 30 days. In addition, 60.8% of students had experiences of alcohol use and 17.5% of students had experiences of marijuana use.

Table 3: Alcohol Use and Marijuana Use

	Alcohol use in last 30 days (%)	Marijuana use in last 30 days (%)
Never used	39.2	82.5
Used, but not in the last 30 days	27.3	12.7
Used 1-2 days	16.0	2.4
Used 3-5 days	9.6	0.3
Used 6-9 days	5.1	0.3
Used 10-19 days	1.4	0
Used 20-29 days	0.7	0.7
Used all 30 days	0.7	1.0

Relationship between Alcohol use, Drug use, and HIV-related Risk Beahviors

Table 5 shows the intercorrelations among alcohol use, drug use, and high-risk sexual behaviors. All intercorrelations were significant at $p<0.05$ level and ranged from 0.12 to 0.40 except the relationship among condom use and number of sexual partners and marijuana use. A bivariate statistical analysis shows that alcohol use was significantly associated with condom use, number of sexual partners in the last 30 days. Alcohol use were found to be positively associated with number of sexual partners ($p< 0.001$) and condom use ($p<0.01$). Relatively lower correlation coefficient was found between marijuana use and the number of sexual partners (0.12). No association was found between marijuana use and condom use. In addition, the study found that alcohol use was positively associated with marijuana use ($p < 0.001$).

Table 4: Correlations between Alcohol use, Drug use and STD/HIV-Related Risk Behaviors

	Factors			
	1	2	3	4
1. How many sexual partners	1.000	0.228**	0.123*	0.081
2. How many days did you use alcohol		1.000	0.402***	0.156**
3. How many days did you use marijuana			1.000	0.068
4. How often did you and your partners use a condom				1.000

Relationship between Alcohol use, Drug use, and HIV-related Risk Beahviors

More than one-third of students drank alcohol in last 30 days. Among the students who used alcohol, approximately 41% of college students had multiple sexual partners in the last 30 days prior to the survey, while among the non-alcohol users, only 23% did so. In addition, among the students who used alcohol, 30.3% of students never used or rarely used condom during their sexual intercourse in last 30 days; while among non-alcohol users, only 21.3% did so.

Approximately 5% of student reported marijuana use in last 30 days. Among the students who used marijuana, 50% of students had multiple sexual partners in the last 30 days prior to the survey; while among the students who did not use marijuana, only 28% did so. Among the students who used marijuana, 35.7% did not use

condom during sex; while among the non-users, about 23.6% did not use condom during sex.

Table 5: Number of Sexual Partners by Alcohol Use and Marijuana Use

College students reported the number of sexual partners during last year	Alcohol use (%)		Marijuana use (%)	
	Yes (98)	No (195)	Yes (14)	No (277)
Having had no sexual partner	5.1	30.9	0.0	23.0
Having had 1 sexual partner	54.1	46.1	50.0	48.9
Having had 2 sexual partners	21.4	12.6	28.6	14.7
Having had 3 sexual partners	9.2	5.2	0.0	7.0
Having had 4 sexual partners	5.1	4.2	14.3	4.0
Having had 5or more sexual partners	5.0	1.0	7.1	2.2

Table 6: Frequency of Condom Use for You and Your Partners during Vaginal Intercourse by Alcohol Use and Marijuana Use

College students reported condom use in last 30 days	Alcohol use (%)		Marijuana use (%)	
	Yes (96)	No (188)	Yes (14)	No (267)
Never did intercourse	4.2	24.5	0.0	18.7
Have not done intercourse in last 30 days	15.6	22.3	21.4	20.2
Never use condom	24.0	17.6	14.3	19.9
Rarely use condom	6.3	3.7	21.4	3.7
Sometimes use condom	9.4	2.1	21.4	3.7
Mostly use condom	7.3	9.0	0.0	9.0
Always use condom	33.3	20.7	21.4	24.7

Effects of Alcohol Use and Marijuana Use on Students' STD/HIV- related Risk Behaviors

Table 7 displays the results of alcohol use and marijuana use predicting STD/HIV-related risk behaviors. Structural Equation Modeling (SEM) was also used to assess the relationship between alcohol use and marijuana use and STD/HIV-related sexual risk behaviors among African American college students. STD/HIV-related risk behaviors were modeled by some variables including number of multiple sexual partners, condom use, alcohol use, and marijuana use. Alcohol use was a significant predictor of multiple sexual partners with a beta of 0.242. In this model, older age and alcohol use were associated with having multiple sexual partners and inconsistent condom use.

Table 7: Standardized Regression Coefficients for the Effects of Alcohol use and Drug use

	Multiple sexual partners	Condom use
Age	-0.136*	-0.349***
Gender	-0.059	-0.105
How many days did you use alcohol	0.242***	0.068
How many days did you use marijuana	-0.023	-0.109

*$p < .05$; ** $p < .01$; ***$p < .001$

Comment

The main goals in this study are to examine the effects of alcohol use and drug use on HIV/STD-related risk behaviors among African American college students. Although the individual effect of alcohol use or drug use has been explored in previous research, this study has tended to focus on their interactive relationships with STD/HIV-related sexual risk behaviors. In addition, African American college students are at a higher risk for STD infection and other negative health consequences, however, the roles of alcohol use and drug use on STD/HIV-related risk behaviors among African American college students have received limited attention. Therefore, the study adds to available evidences by examining the effects of alcohol use and drug use on HIV/STD-related risk behaviors among African American college students.

Previous literatures have pointed that drinking can lead to unprotected sexual intercourse and that college students who drink heavily are more likely to engage in high-risk sexual activities. Previous studies also found a global association between increased alcohol use and decreased condom use [8]. Alcohol use and drug use alters bodily chemistry which may cause him/her to engage in high-risk sexual activities that he/she may never engage in if he/she were in his/her right state of min. This altering of behaviors puts one at risk for all types of negative health consequences, especially STD/HIV-related risk.

The present study demonstrated interesting and surprising findings. After controlling for age and gender variables, alcohol use was found to have significant association with number of multiple sexual partners. This finding is consistent with previous research results [16]. However, contrary to previous findings, no association between alcohol use and condom use was found in this sample. This finding was somewhat unexpected. Results from previous research have not been consistent as to the role of alcohol use [17,18]. The background effects of alcohol use may be used to explain the relationship between alcohol use and condom use. College students tend to consume alcohol during social interactions and activities. Alcohol consumption in such scenario may facilitate students to seek sexual partners; however, it may not be related to frequency of condom use. Traditional explanation the relationship between alcohol use and condom use-such as sexual arousal-may not well explain the relationships between alcohol use and condom use in school environment. In addition, contrary to findings in previous studies, no associations were found between drug use and STD/HIV related sexual risk behaviors [16].

Frequency analyses also found that alcohol use and drug use were associated with the practice of HIV/STD-related risk behaviors: Specifically, a significantly higher proportion of alcohol users (30.3% vs. 21.3%) and of marijuana users (35.7% vs. 23.6%) never or rarely used condoms in their last encounter compared to non-users. In addition, a significantly higher proportion of alcohol users (40.8% vs. 33.0%) and of marijuana users (50.0% vs. 28.1%) had multiple sexual partners during last year compared to non-users. These findings highlight the importance of addressing the unique needs to scale up public health education regarding the dangers of substance use and its associated sexual risk behavior among African American college students. In this study, age was found to have significant effect on STD/HIV-related high risk behaviors. This research finding is consist with the findings by Adefuye [23]. Adefuye's research showed that low condom use rate was a problem

among older students and multiple partnerships were a problem among younger students. They concluded that the older students were less likely to report condom use.

Whilst the present study provides continuous support for the relationship between alcohol use, marijuana use, and risk behaviors, there are several limitations worth highlighting.

First, the data was collected in the form of telephone interview with the students. The students' self-reported data may cause potential biases. It is possible that the students may underreport their own use of alcohol and marijuana. Therefore, the results must be interpreted cautiously and may not be generalized to other populations. In addition, the majority of study samples (90.5%) are female students. The data may be biased by this gender difference. Third, the measurements for alcohol use and drug use will require further refinement. More studies are needed to further explore alcohol use and drug use that predict STD/HIV-related risk behaviors in detail.

Despite these limitations, the present study provides valuable information and a useful conceptual framework for understanding alcohol and drug use and STD/HIV-related sexual risk behaviors among African American college students. With increasing numbers of college students infected with STDs, our findings support the need for targeted HIV prevention among African American College students on campuses. The findings also emphasize the importance of increasing prevention and intervention efforts in health promotion for African American college students. With strong evidences to guide preventions and educations, health professionals and school educators can effectively engage African American college students in dialogue about STD/HIV prevention and sexual health education.

References

1. Gayle HD, Keeling RP, Garcia-Tunon M, Kilbourne BW, Narkunas JP, et al. (1990) Prevalence of the human immunodeficiency virus among university students. N Engl J Med 323: 1538-1541.
2. Hoban M (2007) American college health association national college health assessment spring 2006 reference group data report (abridged). Journal of American College Health 55: 195-206.
3. CDC (2012) Estimated HIV incidence among adults and adolescents in the united states, 2007-2010. HIV Surveillance Supplemental Report 17.
4. CDC (2014) Monitoring selected national HIV prevention and care objectives by using HIV surveillance data - United States and 6 U.S. dependent areas- 2012. HIV Surveillance Supplemental Report 19.
5. Hou SI (2009) HIV-related behaviors among black students attending historically black colleges and universities (HBCUs) versus white students attending a traditionally white institution (TWI). AIDS Care 21: 1050-1057.
6. Trepka MJ, Kim S, Pekovic V, Zamor P, Velez E, et al. (2008) High-risk sexual behavior among students of a minority-serving university in a community with a high HIV/AIDS prevalence. J Am Coll Health 57: 77-84.
7. Alleyne B (2008) HIV risk behaviors among a sample of young black college women. Journal of HIV/AIDS & Social Services 7: 351-371.
8. Certain HE, Harahan BJ, Saewyc EM, Fleming MF (2009) Condom use in heavy drinking college students: The importance of always using condoms. J Am Coll Health 58: 187-194.
9. Morrison TC, DiClemente R J, Wingood GM, Collins C (1998) Frequency of alcohol use and its association with STD/HIV-related risk practices, attitudes and knowledge among an african-american community-recruited sample. Int J STD AIDS 9: 608-612.
10. Rothman EF, Wise LA, Bernstein E, Bernstein J (2009) The timing of alcohol use and sexual initiation among a sample of black, hispanic, and white adolescents. J Ethn Subst Abuse 8: 129-145.
11. Seth P, Sales JM, DiClemente RJ, Wingood GM, Rose E, et al. (2011) Longitudinal examination of alcohol use: A predictor of risky sexual behavior and trichomonas vaginalis among african-american female adolescents. Sex Transm Dis 38: 96-101.
12. McGuire J, Wang B, Zhang L (2012) Substance use and sexual risk behaviors among mississippi public high school students. J Miss State Med Assoc 53: 323-328.
13. Shegog MLO (2009) HIV/STI risk behaviors among african american college students enrolled in predominantly white institutions. ProQuest Information & Learning.
14. Oye-Adeniran BA, Aina OF, Gbadegesin A, Ekanem EE (2014) Substance use and sexual behaviour among female students in nigerian universities. Int Q Community Health Educ 35: 73-83.
15. Johnson RL, Douglas W, Nelson A (1992) Sexual behaviors of african-american male college students and the risk of HIV infection. J Natl Med Assoc 84: 864-868.
16. Adefuye AS, Abiona TC, Balogun JA, Lukobo-Durrell M (2009) HIV sexual risk behaviors and perception of risk among college students: Implications for planning interventions. BMC Public Health 9: 281-2458-9-281.
17. Brown JL, Vanable PA (2007) Alcohol use, partner type, and risky sexual behavior among college students: Findings from an event-level study. Addict Behav 32: 2940-2952.
18. Butcher AH, Manning DT, O'Neal EC (1991) HIV-related sexual behaviors of college students. J Am Coll Health 40: 115-118.
19. Norris J, Masters NT, Zawacki T (2004) Cognitive mediation of women's sexual decision making: The influence of alcohol, contextual factors, and background variables. Annu Rev Sex Res 15: 258-296.
20. Fierros-Gonzalez R, Brown JM (2002) High risk behaviors in a sample of mexican-american college students. Psychol Rep 90: 117-130.
21. IBM Crop (2013) IBM SPSS statistics for windows, version 22.0. Armonk, NY: IBM corp 22.0.
22. IBM Corp (2014) IBM SPSS AMOS [Version 21.0]. [Computer program]. Armonk, NY: IBM corp 21.0.
23. Adefuye AS, Abiona TC, Balogun JA, Lukobo-Durrell M (2009) HIV sexual risk behaviors and perception of risk among college students: Implications for planning interventions. BMC Public Health 9: 281-245.