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ABSTRACT

Association Between Alcohol and Substance Use and Risky Sexual Behaviors in African American Adolescents in the United States

By

Jeanette Renay McFall

December 13, 2016

Introduction:

African American adolescents have a higher prevalence of risky sexual behavior compared to Hispanic and White adolescents. African American adolescents account for 65% of HIV diagnoses among individuals aged 13 to 24 years (Jackson et al., 2015). The rising rate of new STI and HIV cases remains a public health concern and the need for intervention in target populations is outstanding. The objective of this study is to measure the association between alcohol and other substance use and risky sexual behaviors in African American adolescents in the United States.

Methods:

Data from the Centers for Disease Control and Prevention's (CDC) 2015 National Youth Risk Behavior Surveillance Survey (YRBS) was used in this study. SAS 9.3 software package was used for descriptive analysis, univariate logistic regression, and multivariate logistic regression of assessing the relationship between alcohol and drug use with risky sexual behaviors in black adolescents in comparison with white adolescents.

Results:

When controlling for age, gender, and all other variables, African American adolescents that reported ever consuming alcohol were 2.2 (OR=2.2 95% CI=1.6-3.2 $p < .0001$) times more likely to ever had sex, 3.8 (OR=3.8 95% CI= 2.9-4.9 $p < .0001$) times more likely to have had sex with 4 or more people in the past 3 months, and 1.3 (OR=1.3 95% CI=0.8-2.1 $p < .0001$) times more likely to have had sexual intercourse with at least 4 people in their lifetime. When asked if they ever used marijuana, adolescents that reported at least once were 4.5 (OR=4.5 95% CI= 3.2-6.5 $p < .0001$) likely to have engaged in sexual intercourse, 3.8 (OR=3.8 95% CI=2.6-5.5 $p < .0001$) times more likely to have had sex with four or more people in the past 3 months, and 6.1 (OR=6.1 95% CI=3.7-10.2 $p < .0001$) times more likely to have at least 4 sexual partners in their lifetime.

Conclusions:

The findings of this study indicate that use of illicit substances does increase risky sexual behaviors in African American Adolescents. Further implications of this study can be utilized in

the development of intervention programs. Intervention programs should target African American adolescents that engage in risky sexual behaviors and any substance use.

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African American Adolescents in the United States

by

JEANETTE R. MCFALL

B.S., TROY UNIVERSITY

A Thesis Submitted to the Graduate Faculty
of Georgia State University in Partial Fulfillment

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30303

APPROVAL PAGE

Association Between Alcohol and Substance Use and Risky Sexual Behaviors in
African American Adolescents in the United States

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Author's Statement Page

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____Jeanette R. McFall_____

Signature of Author

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Introduction

Background

The rates of STI and HIV transmission are an ongoing threat to public health in the United States. Young adults, aged 15-24, account for 50% of new STI cases and 20% of new HIV cases each year (Jackson, 2016). Adolescents are more likely to engage in risky sexual behaviors which could lead to poor health outcomes in their adult lives. STD infections, positive HIV status, or adolescent pregnancy may have severe consequences for young adults' fulfillment of developmentally appropriate roles involving education, work, marriage, and parenthood (Brook, 2004).

Adolescents are reporting a higher prevalence of alcohol and illicit drug use. The use of alcohol and other illicit drugs yields impaired judgment and lowers inhibitions. Having sex with multiple partners and not using condoms are especially prevalent in adolescents who use substances (Thurstone, 2013). Experimental and normative levels of substance use and risky sexual behaviors can be considered risk factors for depression, suicidal ideations, and suicide attempt (Waller, 2006). Minority adolescents are at higher risk for engaging in risky sexual behavior compared to Non-Hispanic white adolescents. African American adolescents (AAA) account for 65% of HIV diagnoses among individuals aged 13 to 24 years (Jackson, 2015). Many studies speculate that the higher prevalence for this group could be that AAA is more likely to have sex at an earlier age and have multiple sex partners.

Purpose

This present study will expand upon the previous research available that investigates the association between alcohol and other illicit drug use and risky sexual behaviors in AAA. The objective of this study is to measure the relationship between alcohol and other drugs and risky

sexual behaviors in African American adolescents in the United States. We expect that AAA that use or abuse alcohol and illicit drugs are more likely to engage in risky sexual behaviors.

Understanding the relationship between illicit drug use and risky sexual behaviors can help identify at-risk groups within this group; which in turn can inform intervention programs and health care providers that aid African American adolescents that engage in risky sexual behaviors or abuse illicit drugs.

Literature Review

Illicit Substance Use and Risky Sexual Behaviors

African American adolescents are at a particularly high risk for sexually transmitted infections (STIs). A variety of factors influence risk-taking behavior and specifically sexual risk taking among adolescents (Seth, 2011). Substance use may influence the judgment of adolescents, leading to sexual risk taking, while the social strain of participating in unsafe sexual behavior could lead to substance use (Castrucci, 2002). The bidirectional relationship between risky sexual behaviors and substance use has been investigated an extensive amount. Multiple studies have addressed the issues of gender differences in regards to alcohol and substance use. Other factors influence the relationship between illicit drug use and risky sexual behaviors including gender, age, and socioeconomic status (Brook, 2004).

The rate of STIs and unplanned pregnancy are consistently higher among African American (non-Hispanic Black) adolescents as compared to non-Hispanic white adolescents (Lee, 2014). Researchers examining ethnic differences in risky behavior have reported that African American adolescents are more likely than are Latinos to have multiple sex partners and to initiate sexual activity at a younger age (Brook, 2004). The use of alcohol and other illicit

drugs are associated with increased risky sexual behaviors. Alcohol use can interfere with cognitive processing of information, which may often influence sexual decision-making and increase the likelihood of risky sexual behavior due to lower perceptions of risk (Seth, 2014). Among a sample of African American males and females, a higher frequency of alcohol use was associated with a history of STIs, higher risk perception of contracting HIV, lower condom use self-efficacy, larger number of sexual partner, lower HIV prevention knowledge, negative condom attitudes, and low intention to use condoms in the future (Seth, 2014).

The 2007 National Survey on Drug Use and Health has also show that black youth, from 12 to 17, have a higher lifetime use of illicit drug use than white youth (28.5% vs. 27.7 (Schaefer, 2015). Overall the rate of adolescent heroin use has remained stable over time from 2.4% in 1999 to 2.9% in 2011. However, the Substance Abuse and Mental Health Service Administration (SAMHSA) estimated that there was a total of 334,000 heroin users ages 12 and older in 2012, including an additional 156,000 persons who were first time users (Schaefer, 2015). A comparison of data from four national surveys in the United States also found much higher rates of heroin use among street youth (13.6%) and shelter youth (4.4%) than youth living at home (0.5%) (Brands, 2005). Heroin use and opioid dependency are still a major public health concern with use being more frequent among street youth. Street youth using heroin, cocaine or methamphetamine exhibited more HIV risk behavior in their sexual activities than youths not using these drugs (Brands, 2005).

Depressive Symptomology

Depressive symptomatology has been associated with the risky sexual behaviors and substance use. Depressive symptoms may not support healthy decision making and subsequent healthy behavior, including safe sexual decision making and safe sex behavior (Seth, 2011).

Psychological distress has also been associated with low self-efficacy to negotiate consistent condom use and low perceived relationship control among youth, which may diminish and adolescent's condom use (Elkington, 2010). The relationship between depressive symptomology and substance use has been detailed in the literature as bidirectional. Elkington et al, found that substance use was associated with psychological distress across adolescence, and adolescents who used more substances more frequently reported greater psychological distress (2010).

Poor school attendance and performance, deterioration of relationships with peers and family, other health and psychological problems such as anxiety and oppositional-defiant disorders, substance use, and sexual activity have all been found to be associated with depressive disorders in adolescence (Waller, 2006). Depressive symptomology varies amongst genders. Studies have found the rates of depressive symptoms ranging 40% to 55% among African American female adolescents (Jackson, 2015). Previous literature states that females who reported depressive symptomology were more likely to report an STI. According to Seth et al, one cross-sectional study reported that African American female adolescents who reported higher levels of depressive symptoms were more likely to report having an STI, multiple sex partners, sex while high on drugs and alcohol, non-monogamous male partner, low frequency of sexual communication with their partner, and fear of communicating about condom use (2012).

Culturally Specific Intervention Programs

African American adolescents who report having more social support are less likely to engage in risky sexual behaviors (Bachanas, 2002). Previous literature outlines the importance of providing social support to adolescents and education on HIV/STI prevention. Since there has been a steady decline in teen birth rates with a 17% decrease from 2007 to 2010, this has been associated with the strong prevention messages directed toward adolescents (Lee, 2014).

Prevention programs and social support are essential to lowering the risk of engaging in risky sexual behaviors and substance use. However, there is a persistent gap between best practices in sexual education and what is realistic for African American adolescents living in economically and educationally disadvantaged communities (Lee, 2014). Previous literature suggests social support, peer norms, and HIV knowledge are important components in the framework for implementing effective prevention programs.

The need for intervention and prevention programs in African American communities is consistently growing. There is limited synthesis of published data describing factors influencing African American adolescents' sexual behaviors, common factors across intervention programs found to be effective in reducing STI/HIV, and unplanned pregnancy rates for African American adolescents (Lee, 2014). Although substance use prevention interventions have focused on some of the issues that are especially salient in immigrant and minority communities, such as acculturative stress, ethnic identity development, improving parent-child communication, and maintaining protective cultural values (Unger, 2015). Social support is important in the implementation of prevention programs. Family-based prevention programs are critically important in the behavioral and physical health arenas; effective programs can reduce or eliminate problems encountered by children as they enter the adolescent years, promote healthy and productive behavior, and reduce current and future costs to society in terms of social and medical services that need to be provided (Forehand, 2004). Studies suggested that peer norms were more influential than familial influence on African American adolescents risky taking behavior. Bachanas et al findings that peer norms predicted that teens who had peers that engaged in risky sexual behaviors were more likely to report engaging in risky sexual behaviors (2002).

Methods

Source of Data

Data from the Centers for Disease Control and Prevention's (CDC) 2015 National Youth Risk Behavior Surveillance Survey (YRBS) was used in this study. YRBS monitors six types of health-risk related behaviors that contribute to the leading causes of death and disability among youth and adults including behaviors that contribute to unintentional injuries and violence, sexual behaviors related to unintended pregnancy and sexually transmitted diseases, including HIV infection, alcohol and other drug use, tobacco use, unhealthy dietary habits, and inadequate physical activity (CDC, 2016). YRBS includes national, state, territorial, tribal government, and local school-based surveys of representative samples of 9th through 12th grade. The sampling frame for the 2015 National YRBS consisted of all regular public and private school with students in at least one of grades 9-12 in the 50 states and the District of Columbia (CDC, 2016). A three-stage cluster sample design produced a nationally representative sample of students in grades 9-12 who attend public and private schools. The first stage of sampling consisted of 1,259 primary sampling units (PSU) composed of counties, subareas of large counties, or groups of smaller, adjacent counties (CDC, 2016). The PSUs were categorized into 16 strata per their metropolitan statistical area status and the percentage of black and Hispanic students. From the 1,259 PSUs, 54 were sampled with probability proportional to overall school enrollment size for the PSU (CDC, 2016). The second stage consisted of sampling 180 schools with grades 9-12 with probability proportional to school enrollment size from within the 54 PSUs. The last stage of sampling consisted of random sampling in each of grades 9-12 one or two classrooms from either a required subject or a required period (CDC, 2016). All students in sampled classes were eligible to participate. The 2015 YRBS standard questionnaire contains 89 questions. The

national YRBS includes an additional ten questions along with the 89 questions from the standard questionnaire.

Measure and Variables

Demographic variables chosen for this study were age, gender, and race/ethnicity. The questionnaire responses used for the selected demographic variables were Q1, Q2, and raceeth for age, gender, and race/ethnicity respectively. Exposure variables were chosen from questions related to alcohol and drug use with regards the use of alcohol, marijuana, cocaine, heroin, ecstasy, prescription drugs, hallucinogenic drugs such as LSD, methamphetamines, and injection drugs. Risky sexual behaviors were defined as having multiple sex partners, having ever had sex, current sexual activity, and reported condom use. YRBS provides supplemental dichotomous variables that start with the prefix QN. For QN variables responses of interest (ROI) are set to '1' and all other responses are set to '2' or 'missing.' Variables were chosen from the following questions with ROIs for QN variables in bold print are listed below.

Demographic Variables

YRBS includes questions that are asked to obtain demographic information about the study participants. Study Participants ranged from ages 12 years and older. Participants chose between races of American Indian/Alaskan Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander. White, Hispanic/Latino, Multiple-Hispanic/Latino, and Multiple-Non-Hispanic Latino. For this study, participants that reported being Black or African American and white were chosen. Participants reported gender as either male or female.

Exposure Variables

Participants responded to questions about illicit drug use and alcohol use in regards to their use or consumption within the last 30 days of when the study was given. Participants that reported using marijuana, cocaine, heroin, methamphetamines, ecstasy, hallucinogenic drugs, and prescription drugs. If a participant reported using any of these drugs at least once in the past 30 days were included in the ROIs. Participants were asked the number of days they consumed at least one drink of alcohol. Responses of at least one or more days were included as ROIs. Participants were asked how many times they had ever injected drugs during their lifetimes. Response of one or more times were included as ROIs.

Response Variables

Participants were asked questions related to their sexual behavior. Responses of yes when asked had they ever engaged in sexual intercourse were included as ROIs. Participants were asked about the number of sexual partners they have had in a lifetime as well as the past three months of being given the survey. Responses of four or more people were included in ROIs. A response of yes after being asked if they used or their partner used condoms during their last sexual encounter was included as a ROIs.

Statistical Analysis

Statistical Analysis Software (SAS) 9.3 software package was used for the analysis of the study data, Data was adjusted to exclude missing data for each variable. Survey frequency was used to generate descriptive statistics. Univariate analysis was performed to determine crude odds ratios between alcohol and drug use variables and variables for risky sexual behaviors. Multivariate logistic regression was conducted to control for covariates such as age and gender. In this study, variables related to alcohol and drug use were the primary exposure variables while

variables related to risky sexual behaviors were the dependent variables. Age was recoded into a dichotomous variable that includes two age groups; 15 years old and younger and 16 years or older. A P value < .05 and 95% CI were used to determine statistical significance.

Results

Association of Gender and All Variables

For the results of the study Non-Hispanic white adolescents were analyzed in comparison to African American adolescents. Table 1 shows the descriptive statistics and univariate analysis of each variable and its impact on gender for Non-Hispanic white subjects (N= 6262). Among this comparison group, white females (35.25%) reported ever using alcohol more than white males (30.99%). White females (21.17%) also had higher reports of ever having sex compared to white males (20.04%). White males had higher reporting of ever using cocaine (2.48%) and methamphetamines (1.29%) compared to their female counterparts who reported ever using cocaine (1.75%) and methamphetamines (0.87%). 16.45% of white female responders reported having sex within the past three months with at least four people which is higher than the 14.47% of white males that reported the same response. White females (28.56%) also reported using a condom with their partner the last time they had sexual intercourse, where 27.56% of white males had the same response. When asked during the past 30 days, how many times did they use prescription drugs without a doctor's prescription, 8.55% of females reported at least one day while 8.08% of white males reported at least one day. More white males (17.79%) reported using marijuana at least one time in the last 30 days compared to white females at 17.5%. White males reported using LSD, heroin, ecstasy, and injection drug use at least once were at 4.24%, 0.77%,

2.6%, and 0.71% respectively; whereas white females reported at 2.69%, 0.42%, 1.96%, and 0.36% for the same responses.

For Table 1, univariate logistic regression was used to measure the impact of each variable on gender. Since males were more likely to report using alcohol and other substances compared to their female, males were chosen as the variable interest while females were considered the referent group. Statistically significant results were those with a $P < .05$. White males were 1.5 (OR=1.52 95% CI=1.19-1.95 $p=.0010$) times more likely to have used alcohol at least once compared to white females. The results show that white males were 1.96 (OR=1.96 95% CI=1.21-3.17 $p=.0060$) times more likely to have used heroin at least once compared to their female counterparts. Since 1.29% of white males reported they had used methamphetamines at least once, white males are 1.58 (OR=1.58 95% CI=1.11-2.25 $p=.0105$) times more likely to report the use of methamphetamines compared to white females. For white males who reported using ecstasy at least once in the past 30 days, they were 1.42 times more likely (OR=1.42 95% CI=1.12-1.80 $p=.0045$) than white females to use ecstasy at least once.

Table 1: Descriptive Statistics and Univariate Analysis of Non-Hispanic White Adolescents by Gender

Variable	Non-Hispanic White Females	Non-Hispanic White Males	OR (95% CI) Males vs. Females	P-Value
Ever Used Alcohol				
Yes	35.25%	30.99%	0.79 (0.71-0.88)	<.0001
No	16.01%	17.75%		
Missing				
Ever Used Marijuana				
Yes	17.50%	17.79%	1.11 (1.00-1.24)	0.0445
No	33.82%	30.89%		
Missing				
Ever Used Cocaine				
Yes	1.75%	2.48%	1.52 (1.19-1.95)	0.0010
No	49.50%	46.26%		
Ever Used Heroin				
Yes	0.42%	0.77%	1.96 (1.21-3.17)	0.0060
No	50.89%	47.91%		

Ever Used Meth	Yes	0.87%	71.29%	1.58 (1.11-2.25)	0.0105
	No	50.39%	47.45%		
Ever Used Ecstasy	Yes	1.96%	2.60%	1.42 (1.12-1.80)	0.0045
	No	49.28%	46.16%		
	Missing				
Ever Used Prescription Drugs	Yes	8.55%	8.08%	0.99 (0.87-1.14)	0.9304
	No	42.73%	40.63%		
	Missing				
Ever Injected Drugs	Yes	0.36%	0.71%	2.10 (1.24-3.48)	0.0055
	No	50.97%	47.96%		
	Missing				
Ever Used LSD	Yes	2.69%	4.24%	1.73 (1.38-2.18)	<.0001
	No	48.69%	44.39%		
	Missing				
Ever Had Sex	Yes	21.17%	20.04%	0.99 (0.89-1.09)	0.8299
	No	30.04%	28.75%		
	Missing				
Multiple Sex Partners	Yes	4.92%	5.22%	1.14 (0.96-1.34)	0.1328
	No	46.41%	43.45%		
	Missing				
Current Sexual Activity	Yes	16.45%	14.47%	0.89 (0.80-0.99)	0.0395
	No	34.80%	34.28%		
	Missing				
Condom Use	Yes	28.56%	27.56%	1.23 (1.03-1.48)	0.238
	No	24.62%	19.27%		
	Missing				

Table 2 displays the descriptive statistics and univariate analysis with regards to each variables' impact on gender for African American adolescents (N=1385). African American males had higher frequencies of reporting engaging in risky sexual behavior and using illicit drugs. 30.39 % of African American females reported to having drunk alcohol at least one day in the past 30 days compared to 26.47% of African American males. 24.18% of African American males reported using marijuana at least once while 22.31% of African American females reported the same response. More African American males (2.04%) reported using cocaine at least once in the past 30 days; whereas only 0.87% of African American females reported the

same response. When asked the percentage of African American males that reported using heroin, methamphetamines, and ecstasy at least once in the past 30 days at 1.17%, 1.06%, and 2.19% respectively. African American females that reported using the heroin, methamphetamines, and ecstasy at least once were 0.15%, 0.16%, and 1.24% respectively. The percentage of African American males (8.85%, 1.24%, 2.28%) that reported using other illicit drugs (prescription drugs, injection drugs, and LSD) at least once were higher than African American females (5.12%, 0.25%, 0.68%). African American males were more likely to report engaging in risky sexual behaviors compared to their female counterparts. 29.76% of males reported having ever engaged in sexual intercourse, which is higher than females with only 21.58% reporting they had engaged in sexual intercourse. 14.29% of African American males also reported having 4 or more sexual partners; higher than females (5.39%). African American males (20.89%) reported having sex with at least four people within the past three months while 15.57% of females reported the same response. However, 39.96% of African American males reported using condoms with their partner during their last sexual encounter while only 19.45% of females reported using a condom with their partner during their last sexual encounter.

The univariate analysis for Table 2, measures the impact of each variable on gender for African American adolescents. Females were used as the referent group, so a higher percentage of males reported using illicit substances and engaging in risky sexual behaviors. African American males are 1.36 (OR=1.36 95% CI=1.10-1.69 p=.0052) times more likely to use marijuana compared to African American females. The results may lead to an overestimation of association between gender and the use of heroin, methamphetamines, injection drug, and LSD due to a significant amount of missing data for these responses. The table shows that males are 8.77 (OR=8.77 95% CI=2.00-38.30 p=.0039) times more likely to use heroin, 6.76 (OR=6.76 95% CI=1.52-30.06

p=.0121) more times likely to use meth, 5.21 (OR=5.21 95% CI=1.50-18.09 p=.0093) times more likely to use injection drugs, and 3.78 (OR=3.78 95% CI=1.50-9.49 p=.0048) times more likely to use LSD or other hallucinogenic drugs compared to females. African American males were 2.55 (OR=2.55 95% CI=1.29-5.05 p=.0074) times more likely to use cocaine than females. Males were also 1.94 (OR=1.94 95% CI=1.06-3.55 p=.0319) times more likely to report using ecstasy at least once compared to female counterparts. African American males were at greater odds of engaging in risky sexual behaviors in comparison to African American females. Males have a 2.20 (OR=2.20 95% CI= 1.77-2.73 p= <.0001) higher odds of having engaged in sexual intercourse compared to females. Males have a 3.69 (OR=3.69 95% CI=2.74-4.96 p= <.0001) greater odds of having 4 or more sexual partners than females. Males have a 2.88 (OR=2.88 95% CI=1.97-4.21 p= <.0001) higher odds of using a condom during sexual intercourse than females.

Table 2: Descriptive Statistics and Univariate Analysis of African American Adolescents by Gender

Variable	African American Females	African American Males	OR (95% CI) Males vs Females	P-Value
Ever Used Alcohol				
Yes	30.39%	26.47%	0.85 (0.68-1.05)	0.1346
No	21.27%	21.87%		
Ever Used Marijuana				
Yes	22.31%	24.18%	1.36 (1.10-1.69)	0.0052
No	29.78%	23.73%		
Ever Used Cocaine				
Yes	0.87%	2.04%	2.55 (1.29-5.05)	0.0074
No	50.69%	46.39%		
Ever Used Heroin				
Yes	0.15%	1.17%	8.77 (2.00-38.30)	0.0039
No	51.41%	47.07%		
Ever Used Meth				
Yes	0.16%	1.06%	6.76 (1.52-30.06)	0.0121
No	50.37%	48.40%		
Ever Used Ecstasy				
Yes	1.24%	2.19%	1.94 (1.06-3.55)	0.0319
No	50.55%	46.01%		
Ever Used Prescription Drugs				
Yes	5.12%	8.85%	2.03 (1.48-2.79)	<.0001
No	46.49%	39.55%		
Ever Injected Drugs				
Yes	0.25%	1.24%	5.21 (1.50-18.09)	0.0093
No	50.29%	48.23%		
Ever Used LSD				
Yes	0.68%	2.28%	3.78 (1.50-9.49)	0.0048
No	51.54%	45.51%		
Ever Had Sex				
Yes	21.58%	29.76%	2.20 (1.77-2.73)	<.0001
No	29.91%	18.75%		
Multiple Sex Partners				
Yes	5.39%	14.29%	3.69 (2.74-4.96)	<.0001
No	46.47%	33.95%		
Current Sexual Activity				
Yes	15.57%	20.89%	1.79 (1.43-2.24)	<.0001
No	32.61%	27.23%		
Condom Use				
Yes	19.45%	39.96%	2.88 (1.97-4.21)	<.0001
No	43.13%	16.91%		

Figure 1 Comparison of Alcohol and Drug Use and Risky Sexual Behaviors Among Males and Females

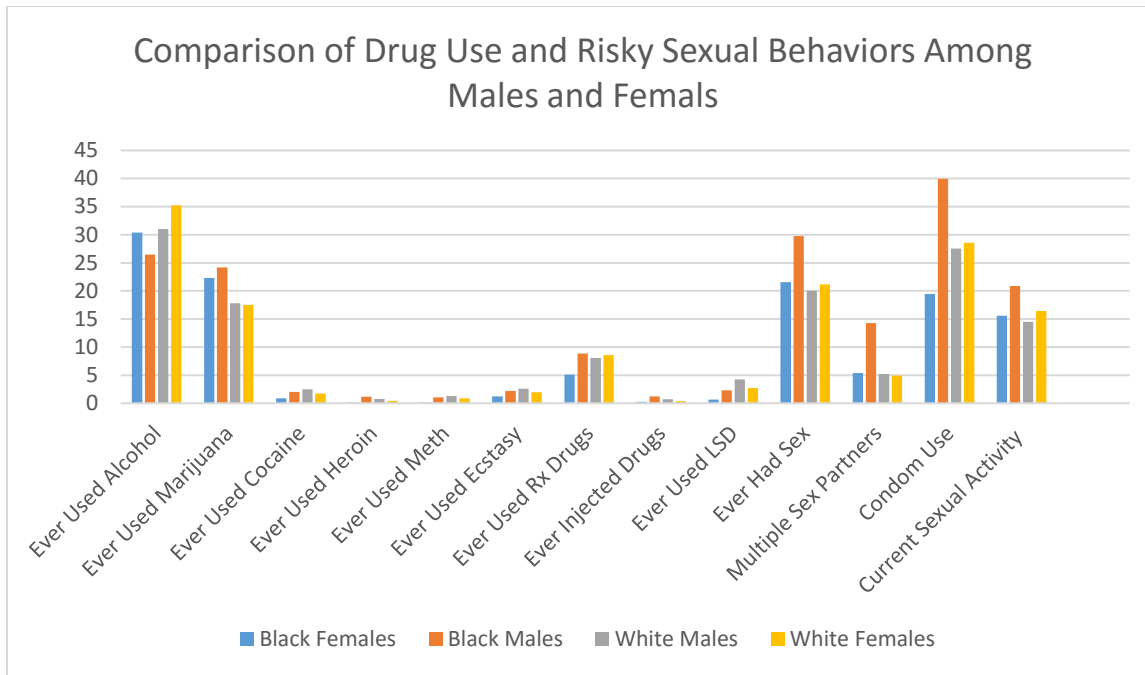


Figure 1 shows a comparison of variables for males and females for both Non-Hispanic whites and African American adolescents. Both genders for each race had lower frequencies of reporting cocaine, heroin, meth, ecstasy, injection drugs, and LSD. White females had a higher percent of reporting alcohol use compared to black females, black males, and white males. Black males had a higher percentage of reporting marijuana use and prescription drug use. Black males also reported higher frequencies of engaging in risky sexual behaviors. Black males reported having ever had sex, having multiple sex partners, and having 4 or more sex partners in the last three months. Condom use was reported higher among black males.

Association of Age and All Variables

Figure 2: Comparison of Drug Use and Alcohol Consumption with Risky Sexual Behaviors Among Adolescents

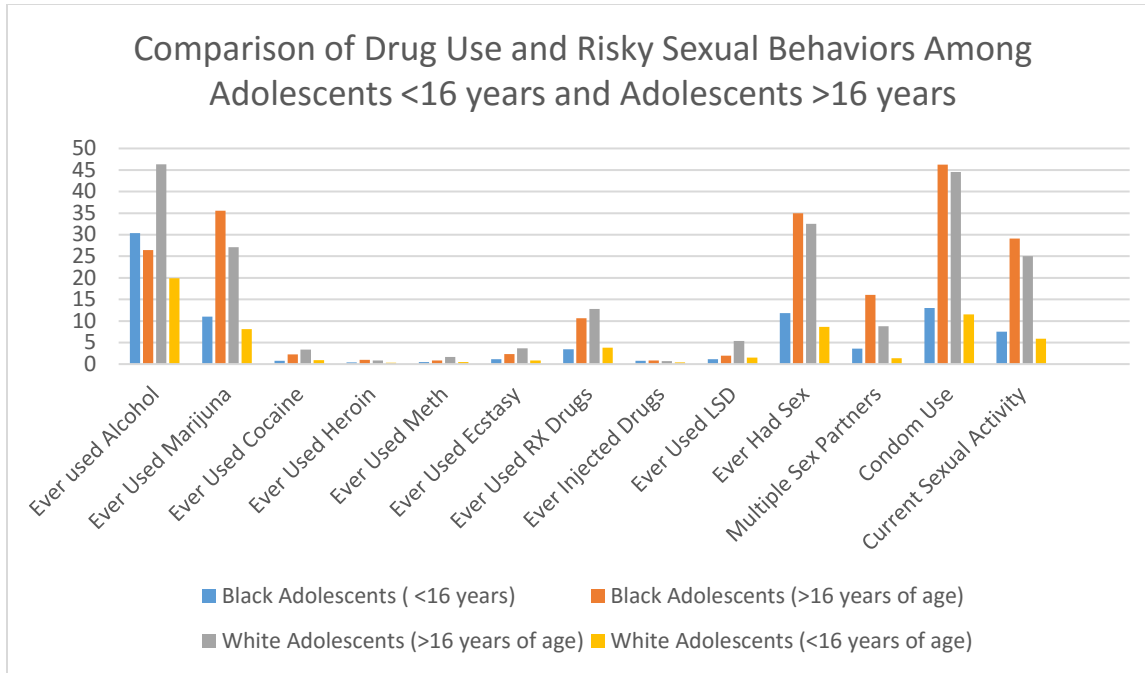


Figure 2 shows a comparison of illicit substance use and risky sexual behaviors among adolescent age groups (<16 years and >16 years) for both Non-Hispanic whites and African American adolescents. White Adolescents older than 16 years old reported higher percentages of having ever used alcohol and prescription drug use compared to the other three groups. All four groups reported low rates of cocaine, heroin, ecstasy, injection drugs, and LSD use. African American adolescents reported higher percentages of marijuana use. African American adolescents older than 16 years of age reported higher rates of engaging in risky sexual behaviors including having ever had sex, having multiple sex partners, and having 4 or more partners in the last three months. African American adolescents older than 16 years of age reported more condom use among the four groups.

Table 3 displays the descriptive statistics and univariate analysis with regards to each variables' impact on age for Non-Hispanic white adolescents. Adolescents were divided into two age groups those younger than 16 years old (younger adolescents) and those 16 years of age and

older. (older adolescents). 46.32 % of adolescents 16 and older reported to having drunk alcohol at least one day in the past 30 days compared to 19.88% of adolescents younger than 16 years old. 27.13% of adolescents 16 and older reported using marijuana at least once while 8.13% of adolescents younger than 16 years of age reported the same response. Adolescents 16 and older (3.33%) reported using cocaine at least once in the past 30 days; whereas only 0.88% of adolescents younger than 16 years reported the same response. When asked the percentage of adolescents 16 and older that reported using heroin, methamphetamines, and ecstasy at least once in the past 30 days at 0.85%, 1.65%, and 3.67% respectively. Adolescents younger than 16 that reported using the heroin, methamphetamines, and ecstasy at least once were 0.32%, 0.49%, and 0.87% respectively. The percentage of adolescents older than 16 years old (12.78%, 0.67%, 5.40%) that reported using other illicit drugs (prescription drugs, injection drugs, and LSD) at least once were higher than adolescents younger than 16 years old (3.82%, 0.38%, 1.49%). Adolescents older than 16 years old were more likely to report engaging in risky sexual behaviors compared to their younger counterparts. 32.55% of older adolescents reported having ever engaged in sexual intercourse, which is higher than younger adolescents with only 8.63% reporting they had engaged in sexual intercourse. 8.77% of older adolescents also reported having 4 or more sexual partners; higher than younger adolescents (1.34%). Older adolescents (24.99%) reported having sex with at least four people within the past three months while 5.90% of younger adolescents reported the same response. 44.54% of older adolescents reported using condoms with their partner during their last sexual encounter while only 11.49% of younger adolescents reported using a condom with their partner during their last sexual encounter.

As shown in Table 3, the univariate analysis measures the impact of each variable on age group for Non-Hispanic white adolescents. Older adolescents were used as the referent group.

Younger adolescents were 0.44 (OR=0.44 95% CI=0.40-0.49 p= <.0001) times more likely to have ever had alcohol compared to older adolescents. Younger adolescents are 0.38 (OR=0.38 95% CI=0.34-0.43 p=<.0001) times more likely to use marijuana compared to older adolescents. The table shows that younger adolescents are 0.65 (OR=0.65 95% CI=0.39-1.09 p=.1078) times more likely to use heroin, 0.51(OR=0.51 95% CI=0.33-0.77 p=.0013) more times likely to use meth, 0.97 (OR=0.97 95% CI=0.58-1.62 p=.9123) times more likely to use injection drugs, and 0.54 (OR=0.54 95% CI=0.41-0.71 p= <.0001) times more likely to use LSD or other hallucinogenic drugs compared to older adolescents. Younger adolescents were 0.45 (OR=0.45 95% CI=0.33-0.60 p=<.0001) times more likely to use cocaine than older adolescents. Young adolescents were also 0.40 (OR=0.40 95% CI=0.29-0.53 p= <.0001) times more likely to report using ecstasy at least once compared to the older group of adolescents. When asked if they used prescription drugs without a doctor's prescription in the past 30 days, younger adolescents were 0.46 (OR=0.46 95% CI=0.40-0.54 p= <.0001) more likely to have used prescription drugs at least once compared to older adolescents. Younger adolescents have a 0.29 (OR=0.29 95% CI=0.26-0.33 p= <.0001) greater odds of having engaged in sexual intercourse compared to older adolescents. Young adolescents have a 0.23 (OR=0.23 95% CI=0.19-0.30 p= <.0001) higher odds of having 4 or more sexual partners than females. When asked how many sexual partners they have had in the past 30 days; young adolescents were 0.30 (OR=0.30 95% CI=0.26-0.34 p= <.0001) times more likely to have at least four sexual partners compared to older adolescents. Young adolescents have a 0.81(OR=0.81 95% CI=0.64-1.02 p= .0778) greater odds of using a condom during sexual intercourse than older adolescents.

Table 3: Descriptive Statistics and Univariate Analysis of Non-Hispanic White Adolescents by Age Group

Variable	Non-Hispanic White Adolescents (15 years and younger)	Non-Hispanic White Adolescents (16 years and older)	OR (95% CI) 15 years and younger vs. 16 years and older	P-value
Ever Used Alcohol Yes No	19.88% 16.67%	46.32% 17.14%	0.44 (0.40-0.49)	<.0001
Ever Used Marijuana Yes No	8.13% 28.49%	27.13% 36.25%	0.38 (0.34-0.43)	<.0001
Ever Used Cocaine Yes No	0.88% 35.64%	3.33% 60.15%	0.45 (0.33-0.60)	<.0001
Ever Used Heroin Yes No	0.32% 36.15%	0.85% 62.67%	0.65 (0.39-1.09)	0.1078
Ever Used Meth Yes No	0.49% 36.04%	1.65% 61.82%	0.51 (0.33-0.77)	0.0013
Ever Used Ecstasy Yes No	0.87% 35.66%	3.67% 59.80%	0.40 (0.29-0.53)	<.0001
Ever Used Prescription Drugs Yes No	3.82% 32.76%	12.78% 50.64%	0.46 (0.40-0.54)	<.0001
Ever Injected Drugs Yes No	0.38% 36.22%	0.67% 62.73%	0.97 (0.58-1.62)	0.9123
Ever Used LSD Yes No	1.49% 31.43%	5.40% 61.68%	0.54 (0.41-0.71)	<.0001
Ever Had Sex Yes No	8.63% 27.90%	32.55% 30.92%	0.29 (0.26-0.33)	<.0001
Multiple Sex Partners Yes No	1.34% 35.22%	8.77% 54.67%	0.23 (0.19-0.30)	<.0001
Current Sexual Activity Yes No	5.90% 30.66%	24.99% 38.45%	0.30 (0.26-0.34)	<.0001
Condom Use Yes No	11.49% 7.61%	44.54% 36.36%	0.81 (0.64-1.02)	0.0778

Table 4 displays the descriptive statistics and univariate analysis with regards to each variables’ impact on age for African American adolescents. 26.47 % of adolescents 16 and older reported to having drank alcohol at least one day in the past 30 days compared to 30.39% of

adolescents younger than 16 years old. 35.57% of adolescents 16 and older reported using marijuana at least once while 11.01% of adolescents younger than 16 years of age reported the same response. Adolescents 16 and older (2.25%) reported using cocaine at least once in the past 30 days; whereas only 0.73% of adolescents younger than 16 years reported the same response. When asked the percentage of adolescents 16 and older that reported using heroin, methamphetamines, and ecstasy at least once in the past 30 days at 1.02%, 0.82%, and 2.33% respectively. Adolescents younger than 16 that reported using the heroin, methamphetamines, and ecstasy at least once were 0.37%, 0.49%, and 1.17% respectively. The percentage of adolescents older than 16 years old (10.64%, 0.82%, 1.93%) that reported using other illicit drugs (prescription drugs, injection drugs, and LSD) at least once were higher than adolescents younger than 16 years old (3.43%, 0.74%, 1.14%). Adolescents older than 16 years old were more likely to report engaging in risky sexual behaviors compared to their younger counterparts. 34.97% of older adolescents reported having ever engaged in sexual intercourse, which is higher than younger adolescents with only 11.84% reporting they had engaged in sexual intercourse. 16.08% of older adolescents also reported having 4 or more sexual partners; higher than younger adolescents (3.60%). Older adolescents (29.07%) reported having sex with at least four people within the past three months while 7.51% of younger adolescents reported the same response. 46.22% of older adolescents reported using condoms with their partner during their last sexual encounter while only 13.03% of younger adolescents reported using a condom with their partner during their last sexual encounter.

As shown in Table 4, the univariate analysis measures the impact of each variable on age group for African American adolescents. Older adolescents were used as the referent group. Younger adolescents were 0.55 (OR=0.55 95% CI=0.43-0.68 p= <.0001) times more likely to

have ever had alcohol compared to older adolescents. Younger adolescents are 0.38 (OR=0.38 95% CI=0.30-0.49 p=<.0001) times more likely to use marijuana compared to older adolescents. The table shows that younger adolescents are 0.66 (OR=0.65 95% CI=0.24-1.85 p=.4305) times more likely to use heroin, 1.13 (OR=1.13 95% CI=0.41-3.15 p=.8070) more times likely to use meth, 1.71 (OR=1.71 95% CI=0.69-4.24 p=.2467) times more likely to use injection drugs, and 1.18 (OR=1.18 95% CI=0.53-2.61 p= .6819) times more likely to use LSD or other hallucinogenic drugs compared to older adolescents. Younger adolescents were 0.60 (OR=0.60 95% CI=0.29-1.22 p= .1580) times more likely to use cocaine than older adolescents. Young adolescents were also 0.92 (OR=0.92 95% CI=0.50-1.70 p= .7959) times more likely to report using ecstasy at least once compared to the older group of adolescents. When asked if they used prescription drugs without a doctor's prescription in the past 30 days, younger adolescents were 0.55 (OR=0.55 95% CI=0.39-0.79 p= .0010) more likely to have used prescription drugs at least once compared to older adolescents. Younger adolescents have 0.33 (OR=0.33 95% CI=0.26-0.42 p= <.0001) greater odds of having previously engaged in sexual intercourse compared to older adolescents. Young adolescents have a 0.35 (OR=0.35 95% CI=0.25-0.49 p= <.0001) greater odds of having 4 or more sexual partners than females. When asked how many sexual partners they have had in the past 30 days, young adolescents were 0.34 (OR=0.35 95% CI=0.26-0.44 p= <.0001) times more likely to have at least four sexual partners compared to older adolescents. Young adolescents have a 1.19 (OR=1.19 95% CI=0.76-1.89 p= .4419) greater odds of using a condom during sexual intercourse than older adolescents.

Table 4: Descriptive Statistics and Univariate Analysis for African American Adolescents by Age Group

Variable	African American Adolescents (15 years and younger)	African American Adolescents (16 years and older)	OR (95% CI) <16 years vs. >16 years	P-value
Ever Used Alcohol				
Yes	30.39%	26.47%	0.55 (0.43-0.68)	<.0001
No	21.27%	21.87%		
Ever Used Marijuana				
Yes	11.01%	35.57%	0.38 (0.30-0.49)	<.0001
No	23.88%	29.54%		
Ever Used Cocaine				
Yes	0.73%	2.25%	0.60 (0.29-1.22)	0.1580
No	34.12%	62.89%		
Ever Used Heroin				
Yes	0.37%	1.02%	0.66 (0.24-1.85)	0.4305
No	34.58%	64.04%		
Ever Used Meth				
Yes	0.49%	0.82%	1.13 (0.41-3.15)	0.8070
No	34.12%	64.57%		
Ever Used Ecstasy				
Yes	1.17%	32 (2.33)	0.92 (0.50-1.70)	0.7959
No	33.92%	858 (62.58)		
Ever Used Prescription Drugs				
Yes	3.43%	10.64%	0.55 (0.39-0.79)	0.0010
No	31.49%	54.45%		
Ever Injected Drugs				
Yes	0.74%	0.82%	1.71 (0.69-4.24)	0.2467
No	33.94%	48.23%		
Ever Used LSD				
Yes	1.14%	1.93%	1.18 (0.53-2.61)	0.6819
No	32.24%	64.70%		
Ever Had Sex				
Yes	11.84%	34.97%	0.33 (0.26-0.42)	<.0001
No	23.03%	25.56%		
Multiple Sex Partners				
Yes	3.60%	16.08%	0.35 (0.25-0.49)	<.0001
No	31.35%	48.97%		
Current Sexual Activity				
Yes	7.51%	29.07%	0.34 (0.26-0.44)	<.0001
No	27.45%	35.98%		
Condom Use				
Yes	13.03%	46.22%	1.19 (0.76-1.89)	0.4419
No	7.07%	32.98%		

Association of Alcohol and Drug Use and Risky Sexual Behaviors

Table 5: Univariate Associations of Substance Use and Risky Sexual Behaviors

Variable	Ever had Alcohol OR (95%CI)	Ever used Marijuana OR (95% CI)	Ever used Cocaine OR (95% CI)	Ever used Heroin OR (95% CI)	Ever used Meth OR (95% CI)	Ever used Ecstasy OR (95% CI)	Ever used Rx Drugs OR (95% CI)	Ever used LSD OR (95% CI)	Ever Injected Drugs OR (95% CI)
Ever had Sex									
Yes	3.9 (3.1-4.9)	7.4 (5.8-9.4)	7.2 (2.8-18.4)	5.2 (1.5-17.8)	14.2 (1.9-107.5)	11.2 (3.9-31.1)	4.9 (3.3-7.1)	7.2 (2.1-24.0)	17.1 (2.3-128.2)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Current Sexual Activity									
Yes	3.8 (2.9-4.9)	6.3 (4.9-8.1)	4.8 (2.4-9.7)	4.9 (1.8-13.9)	5.1 (1.6-15.9)	7.9 (3.8-16.5)	3.4 (2.4-4.6)	4.6 (1.9-11.0)	14.6 (3.4-63.5)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Condom Use									
Yes	0.7 (0.4-1.1)	0.7 (0.4-1.0)	0.3 (0.2-0.6)	0.3 (0.1-1.0)	0.1 (0.03-0.7)	0.34 (0.17-0.9)	0.9 (0.6-1.4)	0.7 (0.3-1.8)	0.7 (0.3-1.8)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Multiple Sex Partners									
Yes	3.8 (2.8-5.4)	8.5 (6.0-12.1)	9.4 (4.8-18.4)	16.2 (5.3-49.1)	17.4 (4.9-61.6)	6.9 (3.8-12.6)	3.5 (2.5-4.9)	4.2 (1.9-9.2)	11.4 (4.1-31.9)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 5, displays univariate associations between substance use and risky sexual

behaviors in African American Adolescents. Data was assessed to measure the impact of substance use on risky sexual behaviors. For subjects that reported having alcohol, they were 3.9 (OR=3.9 95% CI=3.1-4.9 p= <.0001) times more likely to ever had sex, 3.8 (OR=3.8 95% CI= 2.9-4.9 p= <.0001) times more likely to have had sex with 4 or more people in the past 3 months, and 3.8(OR=3.8 95% CI=2.8-5.4 p= <.0001) times more likely to have had sexual intercourse with at least 4 people in their lifetime. When asked if they ever used marijuana, adolescents that reported at least once were 7.4 (OR=7.4 95% CI= 5.8-9.4 p=<.0001) likely to have engaged in sexual intercourse, 6.3 (OR=6.3 95% CI=4.9-8.1 p= <.0001) times more likely to have had sex with four or more people in the past 3 months, and 8.5 (OR=8.5 95% CI=6.0-12.1 p= <.0001) times more likely to have at least 4 sexual partners in their lifetime. African American Adolescents were 7.2 (OR= 7.2 95% CI=2.8-18.4 p= <.0001) times more likely to report ever

having sexual intercourse, 4.8 (OR=4.8 95% CI=2.4-9.7 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 9.4 (OR=9.4 95% CI=4.8-18.4 p= <.0001) more times likely to have at least four sexual partners in a lifetime. Adolescents that reported using heroin at least once in the past 30 days were 5.2 (OR= 5.2 95% CI=1.5-17.8 p= .0094) times more likely to report ever having sexual intercourse, 4.9 (OR=4.9 95% CI=1.8-13.9 p= .0022) more likely to have had sex with four or more people in the past 3 months, and 16.2 (OR=16.2 95% CI=5.3-49.1 p= <.0001) more times likely to have at least four sexual partners in a lifetime. African Americans adolescents that reported using meth at least once were 14.2 (OR= 14.2 95% CI=1.9-107.5 p= <.0001) times more likely to report ever having sexual intercourse, 4.8 (OR=4.8 95% CI=2.4-9.7 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 9.4 (OR=9.4 95% CI=4.8-18.4 p= <.0001) more times likely to have at least four sexual partners in a lifetime. When asked how many times they used ecstasy in the past 30 days, were 7.2 (OR= 7.2 95% CI=2.8-18.4 p= <.0001) times more likely to report ever having sexual intercourse, 4.8 (OR=4.8 95% CI=2.4-9.7 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 9.4 (OR=9.4 95% CI=4.8-18.4 p= <.0001) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using prescription drugs without a doctor's prescription at least once in the past 30 days, they were 4.9 (OR= 4.9 95% CI=3.3-7.1 p= <.0001) times more likely to report ever having sexual intercourse, 3.4 (OR=3.4 95% CI=2.4-4.6 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 3.5 (OR=3.5 95% CI=2.5-4.9 p= <.0001) more times likely to have at least four sexual partners in a lifetime. When asked if they have used LSD or hallucinogenic drugs in the past 30 days, adolescents that reported using LSD or other hallucinogenic drugs at least once were 7.2 (OR= 7.2 95% CI=2.1-24.0 p= <.0001) times more likely to report ever

having sexual intercourse, 4.6 (OR=4.6 95% CI=1.9-11.0 p= .0006) more likely to have had sex with four or more people in the past 3 months, and 4.2 (OR=4.2 95% CI=1.9-9.2 p= .0003) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using injection drugs at least once within the past 30 days of being given the study, they were 17.1 (OR= 17.1 95% CI=2.3-128.5 p= .0058) times more likely to report ever having sexual intercourse, 14.6 (OR=14.6 95% CI=3.4-63.5 p= .0003) more likely to have had sex with four or more people in the past 3 months, and 11.4 (OR=11.4 95% CI=4.1-31.9 p= <.0001) more times likely to have at least four sexual partners in a lifetime.

Table 6: Multivariate Associations of Substance Use and Risky Sexual Behaviors in African American Adolescents

Variable	Ever had Alcohol OR (95%CI)	Ever used Marijuana OR (95% CI)	Ever used Cocaine OR (95% CI)	Ever used Heroin OR (95% CI)	Ever used Meth OR (95% CI)	Ever used Ecstasy OR (95% CI)	Ever used Rx Drugs OR (95% CI)	Ever used LSD OR (95% CI)	Ever Injected Drugs OR (95% CI)
Ever had Sex									
Yes	2.2 (1.6-3.2)	4.5 (3.2-6.5)	1.4 (0.3-7.8)	0.006 (<.001- >999.9)	>999.999 (<.001->999.9)	2.9 (0.6-14.7)	1.5 (0.9-2.5)	2.3 (0.5-11.5)	>999.999 (<.001- >999.9)
No	1.00	1.00	1.00			1.00	1.00	1.00	
Current Sexual Activity									
Yes	2.2 (1.5-3.3)	3.8 (2.6-5.5)	1.0 (0.2-4.0)	0.007 (<.001- >999.9)	0.8 (0.3-22.3)	5.5 (1.4-22.1)	1.1 (0.7-1.7)	1.1(0.3-3.7)	>999.999 (<.001- >999.9)
No	1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Condom Use									
Yes	0.6 (0.3-1.2)	0.8 (0.4-1.4)	0.3 (0.04-2.2)	109.13(<.001- >999.9)	0.02 (<.001- >999.9)	0.3 (0.1-1.0)	1.3 (0.7-2.4)	3.9 (0.7-20.5)	1.2 (0.1-9.6)
No	1.00	1.00	1.00			1.00	1.00	1.00	1.00
Multiple Sex Partners									
Yes	1.3 (0.8-2.1)	6.1 (3.7-10.2)	2.4 (0.6-9.2)	0.11 (<.001- >999.9)	1.5 (0.1-34.5)	2.3 (0.8-6.2)	1.1 (0.7-1.7)	0.8 (0.3-2.5)	2.8 (0.4-21.8)
No	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00

Multivariate logistic regression was conducted for Table 6 to assess the impact of the exposure variables (alcohol and drug use variables) on outcome variables (risky sexual behaviors) while adjusting for all other variables (age, gender, and alcohol/drug use). For subjects that reported having alcohol, they were 2.2 (OR=2.2 95% CI=1.6-3.2 p= <.0001) times

more likely to ever had sex, 3.8 (OR=3.8 95% CI= 2.9-4.9 p= <.0001) times more likely to have had sex with 4 or more people in the past 3 months, and 1.3 (OR=1.3 95% CI=0.8-2.1 p= <.0001) times more likely to have had sexual intercourse with at least 4 people in their lifetime. When asked if they ever used marijuana, adolescents that reported at least once were 4.5 (OR=4.5 95% CI= 3.2-6.5 p=<.0001) likely to have engaged in sexual intercourse, 3.8 (OR=3.8 95% CI=2.6-5.5 p= <.0001) times more likely to have had sex with four or more people in the past 3 months, and 6.1 (OR=6.1 95% CI=3.7-10.2 p= <.0001) times more likely to have at least 4 sexual partners in their lifetime. African American Adolescents were 1.4 (OR= 1.4 95% CI=0.3-7.8 p= <.0001) times more likely to report ever having sexual intercourse and 2.4 (OR=2.4 95% CI=0.6-9.2 p= <.0001) more times likely to have at least four sexual partners in a lifetime. The statistical software package also reported the odds ratio for adolescents that reported using heroin at least once in the past 30 days were 0.006 (OR= .006 95% CI= <.0001->999.99)) times more likely to report ever having sexual intercourse, 0.007 (OR=.007 95% CI= <.0001->999.99) more likely to have had sex with four or more people in the past 3 months, and 0.11 (OR=0.11 95% CI= <.0001->999.99) more times likely to have at least four sexual partners in a lifetime. African Americans adolescents that reported using meth at least once were 0.8 (OR=0.8 95% CI=0.3-22.3 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.5 (OR=1.5 95% CI=0.1-34.5 p= <.0001) more times likely to have at least four sexual partners in a lifetime. The statistical software package reported the odds ratio for adolescents that reported having sexual intercourse as >999.999 with a 95% CI of <.0001->999.99). When asked how many times they used ecstasy in the past 30 days, were 2.9 (OR= 2.9 95% CI=0.6-14.7 p= <.0001) times more likely to report ever having sexual intercourse, 5.5 (OR=5.5 95% CI=1.4-22.1 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and

2.3 (OR=2.3 95% CI=0.8-6.2 $p < .0001$) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using prescription drugs without a doctor's prescription at least once in the past 30 days, they were 1.5 (OR= 1.5 95% CI=0.9-2.5 $p = <.0001$) times more likely to report ever having sexual intercourse, 1.1 (OR=1.1 95% CI=0.7-1.7 $p = <.0001$) more likely to have had sex with four or more people in the past 3 months, and 1.1 (OR=1.1 95% CI=0.7-1.7 $p = <.0001$) more times likely to have at least four sexual partners in a lifetime. When asked if they have used LSD or hallucinogenic drugs in the past 30 days, adolescents that reported using LSD or other hallucinogenic drugs at least once were 2.3 (OR= 2.3 95% CI=0.5-11.5 $p = <.0001$) times more likely to report ever having sexual intercourse, 1.1 (OR=1.1 95% CI=0.7-1.7 $p = <.0001$) more likely to have had sex with four or more people in the past 3 months, and 0.8 (OR=9.4 95% CI=4.8-18.4 $p = <.0001$) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using injection drugs at least once within the past 30 days of being given the study, they were 2.8 (OR=2.8 95% CI=0.4-21.8 $p = <.0001$) more times likely to have at least four sexual partners in a lifetime. However, the statistical software package also reported the odds ratio for adolescents that reported having sexual intercourse and having sex with four or more people in the past 30 days as >999.999 with a 95% CI of <.0001->999.99).

Table 7 follows the same model as Table 6. The same multivariate logistic regression was done for white adolescents controlling for age, gender, and all other variables. For subjects that reported using alcohol, they were 3.2 (OR=3.2 95% CI=2.7-3.8 $p = <.0001$) times more likely to ever had sex, 3.4 (OR=3.4 95% CI= 2.7-4.1 $p = <.0001$) times more likely to have had sex with 4 or more people in the past 3 months, and 3.8 (OR=3.8 95% CI=2.3-6.3 $p = <.0001$) times more likely to have had sexual intercourse with at least 4 people in their lifetime. When asked if they

ever used marijuana, adolescents that reported at least once were 3.8 (OR=3.8 95% CI= 3.3-4.5 p=<.0001) likely to have engaged in sexual intercourse, 2.9 (OR=2.9 95% CI=2.5-3.4 p= <.0001) times more likely to have had sex with four or more people in the past 3 months, and 4.4 (OR=4.4 95% CI=3.3-5.9 p= <.0001) times more likely to have at least 4 sexual partners in their lifetime. White Adolescents that reported using cocaine at least once in the past 30 days were 2.6 (OR=2.6 95% CI=1.5-4.7 p= <.0001) times more likely to report ever having sexual intercourse, 2.7 (OR=2.7 95% CI=1.8-4.0 p= <.0001) more times likely to have at least four sexual partners in a lifetime, and 1.8 (OR=1.8 95% CI= 1.2-2.7 p= <.0001) times more likely to have had sex with 4 or more people in the past three months. The analysis reported the odds ratio for adolescents that reported using heroin at least once in the past 30 days were 4.0 (OR= 4.0 95% CI= 0.8-19.7)) times more likely to report ever having sexual intercourse, 0.8 (OR=0.8 95% CI= 0.3-2.5) more likely to have had sex with four or more people in the past 3 months, and 3.1 (OR=3.1 95% CI= 1.1-8.8) more times likely to have at least four sexual partners in a lifetime. White adolescents that reported using meth at least once were 1.6 (OR= 1.6 95% CI= 0.7-3.7) times more likely to report ever having sexual intercourse, 0.9 (OR=0.9 95% CI=0.5-1.6 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.9 (OR=1.9 95% CI=1.1-3.3 p= <.0001) more times likely to have at least four sexual partners in a lifetime. When asked how many times they used ecstasy in the past 30 days, were 2.0 (OR= 2.0 95% CI=1.2-3.5 p= <.0001) times more likely to report ever having sexual intercourse, 1.5 (OR=1.5 95% CI=1.0-2.2 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.3 (OR=1.3 95% CI=0.9-1.9 p= <.0001) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using prescription drugs without a doctor's prescription at least once in the past 30 days, they were 1.3 (OR= 1.3 95% CI=1.1-1.6

p= <.0001) times more likely to report ever having sexual intercourse, 1.3 (OR=1.3 95% CI=0.9-1.9 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.7 (OR=1.7 95% CI=1.3-2.1 p= <.0001) more times likely to have at least four sexual partners in a lifetime. When asked if they have used LSD or hallucinogenic drugs in the past 30 days, adolescents that reported using LSD or other hallucinogenic drugs at least once were 1.5 (OR=1.5 95% CI=1.0-2.1 p= <.0001) times more likely to report ever having sexual intercourse, 1.1 (OR=1.1 95% CI=0.8-1.5 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.4 (OR=1.4 95% CI=1.0-2.0 p= <.0001) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using injection drugs at least once within the past 30 days of being given the study, they were 1.2 (OR=1.2 95% CI=0.4-3.7 p= <.0001) more times likely to have at least four sexual partners in a lifetime, 4.0 (OR=4.0 95% CI=1.1-15.2 p= <.0001) more times likely to have sexual intercourse, and 9.9 (OR=9.9 95% CI=2.9-34.4 p= <.0001) more times likely to have sex with four or more people in the past three months.

Table 7: Multivariate Association of Substance Use and Risky Sexual Behaviors in White Adolescents

Variable	Ever had Alcohol OR (95%CI)	Ever used Marijuana OR (95% CI)	Ever used Cocaine OR (95% CI)	Ever used Heroin OR (95% CI)	Ever used Meth OR (95% CI)	Ever used Ecstasy OR (95% CI)	Ever used Rx Drugs OR (95% CI)	Ever used LSD OR (95% CI)	Ever Injected Drugs OR (95% CI)
Ever had Sex									
Yes	3.2 (2.7-3.8)	3.8 (3.3-4.5)	2.6 (1.5-4.7)	4.0 (0.8-19.7)	1.6 (0.7-3.7)	2.0 (1.2-3.5)	1.3 (1.1-1.6)	1.5 (1.0-2.1)	4.0 (1.1-15.2)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Current Sexual Activity									
Yes	3.4 (2.7-4.1)	2.9 (2.5-3.4)	1.8 (1.2-2.7)	0.8 (0.3-2.5)	0.9 (0.5-1.6)	1.5 (1.0-2.2)	1.3 (0.9-1.9)	1.1(0.8-1.5)	9.9 (2.9-34.4)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Condom Use									
Yes	1.0 (0.7-1.4)	0.7 (0.5-0.8)	0.6 (0.4-1.0)	2.0 (0.6-7.2)	0.9 (0.4-1.7)	0.7 (0.4-1.1)	0.8 (0.5-1.2)	1.0 (0.7-1.5)	0.7 (0.2-2.1)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Multiple Sex Partners									
Yes	3.8 (2.3-6.3)	4.4 (3.3-5.9)	2.7 (1.8-4.0)	3.1 (1.1-8.8)	1.9 (1.1-3.3)	1.3 (0.9-1.9)	1.7 (1.3-2.1)	1.4 (1.0-2.0)	1.2 (0.4-3.7)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 8 is a comparison of the multivariate associations between both adolescent groups. Comparable variables chosen were alcohol use, marijuana use and prescription drug use due to them having more narrow confidence intervals and statistically significant p-values. In comparison, white adolescents were more likely to engage in risky sexual behaviors after reported alcohol use. African American adolescents were more likely to engage in the risky sexual behaviors after reporting using marijuana than white adolescents. The odds of engaging in risky sexual behaviors after using prescription drugs were similar amongst both age groups. The odds didn't significantly increase when either adolescent groups reported using prescription drugs. The comparison shows that there is little difference in the odds of African American adolescents and white adolescents engaging in risky sexual behavior

Table 8: Comparison of Multivariate Associations between AAA and White Adolescents

Multivariate Association of Substance Use and Risky Sexual Behaviors						
	African American Adolescents (N=1385)			Non-Hispanic White Adolescents (N=6262)		
Variable	Ever had Alcohol OR (95%CI)	Ever used Marijuana OR (95% CI)	Ever used Rx Drugs OR (95% CI)	Ever had Alcohol OR (95%CI)	Ever used Marijuana OR (95% CI)	Ever used Rx Drugs OR (95% CI)
Ever had Sex						
Yes	2.2 (1.6-3.2)	4.5 (3.2-6.5)	1.5 (0.9-2.5)	3.2 (2.7-3.8)	3.8 (3.3-4.5)	1.3 (1.1-1.6)
No	1.00	1.00	1.00	1.00	1.00	1.00
Current Sexual Activity						
Yes						
No	2.2 (1.5-3.3)	3.8 (2.6-5.5)	1.1 (0.7-1.7)	3.4 (2.7-4.1)	2.9 (2.5-3.4)	1.4 (1.1-1.7)
	1.00	1.00	1.00	1.00	1.00	1.00
Condom Use						
Yes						
No	0.6 (0.3-1.2)	0.8 (0.4-1.4)	1.3 (0.7-2.4)	0.9 (0.7-1.4)	0.6 (0.5-0.8)	0.7 (0.6-2.1)
	1.00	1.00	1.00	1.00	1.00	1.00
Multiple Sex Partners						
Yes	1.3 (0.8-2.1)	6.1 (3.7-10.2)	1.1 (0.7-1.7)	3.8 (2.3-6.3)	4.4 (3.3-5.9)	1.7 (1.3-2.1)
No	1.00	1.00	1.00	1.00	1.00	1.00

A multivariate association for both groups was conducted to measure the impact of substance use on risky sexual behaviors controlling for age, race, gender, and all other variables. For subjects that reported using alcohol, they were 3.0 (OR=3.0 95% CI=2.6-3.5 p= <.0001) times more likely to ever had sex, 3.1 (OR=3.1 95% CI= 2.6-3.7 p= <.0001) times more likely to have had sex with 4 or more people in the past 3 months, and 2.3 (OR=2.3 95% CI=1.7-3.3 p= <.0001) times more likely to have had sexual intercourse with at least 4 people in their lifetime. When asked if they ever used marijuana, adolescents that reported at least once were 4.0

(OR=4.0 95% CI= 3.4-4.6 $p < .0001$) likely to have engaged in sexual intercourse, 3.1 (OR=3.1 95% CI=2.7-3.6 $p < .0001$) times more likely to have had sex with four or more people in the past 3 months, and 4.8 (OR=4.8 95% CI=3.7-6.2 $p < .0001$) times more likely to have at least 4 sexual partners in their lifetime. Adolescents that reported using cocaine at least once in the past 30 days were 2.4 (OR=2.4 95% CI=1.4-4.1 $p < .0001$) times more likely to report ever having sexual intercourse, 1.7 (OR=1.7 95% CI=1.1-2.5 $p < .0001$) more times likely to have at least four sexual partners in a lifetime, and 2.6 (OR=2.6 95% CI= 1.8-3.8 $p < .0001$) times more likely to have had sex with 4 or more people in the past three months. The analysis reported the odds ratio for adolescents that reported using heroin at least once in the past 30 days were 2.1 (OR= 2.1 95% CI= 0.5-8.8) times more likely to report ever having sexual intercourse, 0.7 (OR=0.7 95% CI= 0.2-2.0) more likely to have had sex with four or more people in the past 3 months, and 2.4 (OR=2.4 95% CI= 0.9-6.5) more times likely to have at least four sexual partners in a lifetime. Adolescents that reported using meth at least once were 1.8 (OR= 1.8 95% CI= 0.8-4.1) times more likely to report ever having sexual intercourse, 0.9 (OR=0.9 95% CI=0.5-1.5 $p < .0001$) more likely to have had sex with four or more people in the past 3 months, and 1.9 (OR=1.9 95% CI=1.1-3.3 $p < .0001$) more times likely to have at least four sexual partners in a lifetime. When asked how many times they used ecstasy in the past 30 days, were 2.2 (OR= 2.2 95% CI=1.3-3.6 $p < .0001$) times more likely to report ever having sexual intercourse, 1.5 (OR=1.5 95% CI=1.0-2.2 $p < .0001$) more likely to have had sex with four or more people in the past 3 months, and 1.4 (OR=1.4 95% CI=1.0-2.1 $p < .0001$) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using prescription drugs without a doctor's prescription at least once in the past 30 days, they were 1.3 (OR= 1.3 95% CI=1.1-1.6 $p < .0001$) times more likely to report ever having sexual intercourse,

1.3 (OR=1.3 95% CI=1.1-1.6 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.5 (OR=1.5 95% CI=1.2-1.9 p= <.0001) more times likely to have at least four sexual partners in a lifetime. When asked if they have used LSD or hallucinogenic drugs in the past 30 days, adolescents that reported using LSD or other hallucinogenic drugs at least once were 1.5 (OR=1.5 95% CI=1.1-2.1 p= <.0001) times more likely to report ever having sexual intercourse, 1.2 (OR=1.2 95% CI=0.9-1.6 p= <.0001) more likely to have had sex with four or more people in the past 3 months, and 1.3 (OR=1.3 95% CI=0.9-1.8 p= <.0001) more times likely to have at least four sexual partners in a lifetime. For adolescents that reported using injection drugs at least once within the past 30 days of being given the study, they were 6.2 (OR=6.2 95% CI=1.8-21.5 p= <.0001) more times likely to have at least four sexual partners in a lifetime, 13.0 (OR=13.0 95% CI=4.1-41.9 p= <.0001) more times likely to have sexual intercourse, and 1.6 (OR=1.6 95% CI=0.6-1.8 p= <.0001) more times likely to have sex with four or more people in the past three months.

Table 9 :Multivariate Association of Substance Use and Risky Sexual Behaviors

Variable	Ever had Alcohol OR (95%CI)	Ever used Marijuana OR (95% CI)	Ever used Cocaine OR (95% CI)	Ever used Heroin OR (95% CI)	Ever used Meth OR (95% CI)	Ever used Ecstasy OR (95% CI)	Ever used Rx Drugs OR (95% CI)	Ever used LSD OR (95% CI)	Ever Injected Drugs OR (95% CI)
Ever had Sex									
Yes	3.0 (2.6-3.5)	4.0 (3.4-4.6)	2.4(1.4-4.1)	2.1 (0.5-8.8)	1.8 (0.8-4.1)	2.2 (1.3-3.6)	1.3 (1.1-1.6)	1.5 (1.1-2.1)	6.2 (1.8-21.5)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Current Sexual Activity									
Yes	3.1 (2.6-3.7)	3.1 (2.7-3.6)	1.7 (1.1-2.5)	0.7 (0.2-2.0)	0.9 (0.5-1.5)	1.5 (1.0-2.2)	1.3 (1.1-1.6)	1.2(0.9-1.6)	13.0 (4.1-41.9)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Condom Use									
Yes	0.9 (0.6-1.2)	0.7 (0.5-0.8)	0.6 (0.4-0.9)	2.3(0.7-8.1)	0.8 (0.4-1.6)	0.7 (0.4-1.1)	0.8 (0.6-1.0)	1.0 (0.7-1.4)	0.7 (0.3-1.9)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Multiple Sex Partners									
Yes	2.3 (1.7-3.3)	4.8 (3.7-6.2)	2.6 (1.8-3.8)	2.4 (0.9-6.5)	1.9 (1.1-3.3)	1.4 (1.0-2.1)	1.5 (1.2-1.9)	1.3 (0.9-1.8)	1.6 (0.6-4.0)
No	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Discussion

The purpose of this study was to assess the association between alcohol and drug use and risky sexual behaviors in African American adolescents in the United States. There was increasing odds for engaging in risky sexual behavior after reported use of alcohol and other substances for African American adolescents. Compared to white adolescents, African American adolescents were more likely to engage in the use of marijuana. African American males were more likely to engage in risky sexual behavior including having 4 or more sexual partners in their lifetime, having sex with 4 or more people in the past three months, and having ever engaged in sexual intercourse compared to African American females, non-Hispanic white males, and non-Hispanic white females. However, African American males were more likely to report condom use during their last sexual encounter, whereas African American females were the least likely to report condom use during their last sexual encounter. Adolescents older than 16 years of age were more likely to engage in risk-taking behaviors for both racial groups. Compared to white adolescents in this same age group, African American adolescents were more likely to engage in risky sexual behaviors. Reported condom use was slightly higher for African American Adolescents ages 16 and older compared to white adolescents in the same age demographic and both white and African American adolescents younger than 16 years old. Both races reported small percentages of heroin, cocaine, methamphetamines, injection drugs, and LSD or other hallucinogenic drug use. Alcohol consumption and marijuana use were significantly associated with the increase of risky sexual behaviors in both African American and white adolescents. When comparing African American adolescents to white adolescents, African American adolescents that engaged in marijuana had higher odds of engaging in risky sexual behaviors. However white adolescents that used alcohol and prescription drugs were more likely

to engage in risky sexual behaviors compared to African American Adolescents. This was not an expected outcome since all the previously literature available eluded to the common idea that African Americans were the higher risk group. The low reporting of heroin wasn't anticipated since there has been a rise in heroin use among adolescents. Geographic area may be considered for this low reporting. Heroin use is more common among street youth and youth living in shelters. This study included participants that were enrolled in school so the respondents that may live on the streets or in shelter may have been little or nonexistent in this sample.

Limitations

Limitations of this study include overestimation of association for illicit drugs such as heroin, cocaine, LSD, methamphetamines, and injection drugs and risky sexual behaviors. There was a significant amount of missing data for questions related to the previously mentioned drugs. The missing data could be due to numerous factors. Many of the respondents opted not to give responses to questions that referenced these drugs.

The data has the potential of being biased due to nonresponse bias or recall bias. Many of the respondents were asked to recall past events which could lead to an under or overestimation of actual responses given. Subjects that opted to either underestimate actual events could cause an underestimation of the percentage for ROIs or overestimation for the same responses.

Sample size for African American adolescents could create potential bias in the results. Since the sample size was significantly smaller for this group compared to the white adolescents. The smaller sample size could account for more random error in the data analysis. This could also lead to inaccurate measurements of associations between the relationship for substance use and alcohol use. In the inclusion of only school students in this survey doesn't account for youth

that have dropped out of school or live on the streets/shelters. Exclusion of drop-outs and/or street youth potentially impacts the relationship between substance use and risky sexual behaviors.

Implications

This study was designed to add to the previous literature available for adolescent substance use and risky sexual behaviors. Further implications of this study can be utilized in the development of intervention programs. Intervention programs should target adolescents that engage in risky sexual behaviors and any substance use. African American males are more likely to engage in risky sexual behaviors compared to African American females and non-Hispanic white adolescents. More intervention programs that target African-American males are needed since this group seems to be at more risk than other groups. Further research is needed to assess any mediating or moderating variables that could be associated with this relationship between substance use and risky sexual behaviors.

Conclusion

The findings of this study indicate that use of illicit substances does increase risky sexual behaviors in African American Adolescents. While other potential mediating and moderating variables were not considered in this study, additional research is warranted. Further investigation into the socioeconomic status and depressive symptoms could likely add to the literature available and be useful in the implications of intervention programs and provider support networks for adolescent groups.

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Appendices

Q1. How old are you?

- A. 12 years old or younger
- B. 13 years old
- C. 14 years old
- D. 15 years old
- E. 16 years old
- F. 17 years old
- G. 18 years old

Q2. What is your sex?

- A. Female
- B. Male

Race/ethnicity

- 1. American Indian/Alaskan Native
- 2. Asian
- 3. Black or African American
- 4. Native Hawaiian or other Pacific Islander
- 5. White
- 6. Hispanic/Latino
- 7. Multiple-Hispanic/Latino
- 8. Multiple-Non-Hispanic Latino

Exposure variables for alcohol and drug use

QN41. During your life, on how many days did you have at least one drink of alcohol?

- A. 0 days
- B. 1 or 2 days**
- C. 3 to 9 days**
- D. 10 to 19 days**
- E. 20 to 39 days**
- F. 40 to 99 days**
- G. 100 or more days**

QN91. During your life, how many times have you used hallucinogenic drugs such as LSD, acid, PCP, angel dust, mescaline, or mushrooms?

- H. 0 times

- I. 1 or 2 times**
- J. 3 to 9 times**
- K. 10 to 19 times**
- L. 20 to 39 times**
- M. 40 to 99 times**
- N. 100 or more times**

*The following questions use the same responses as above.

QN47. During your life, how many times have you used marijuana?

QN50. During your life, how many times have you used any form of cocaine, including powder, crack, or freebase?

QN52. During your life, how many times have you used heroin (also called smack, junk, or China White)?

QN53. During your life, how many times have you used methamphetamines (also called speed, crystal, crank or ice)?

QN54. During your life, how many times have you used ecstasy (also called MDMA)?

QN57. During your life, how many times have you taken a prescription drug (such as Oxycontin, Percocet, Vicodin, codeine, Adderall, Ritalin, or Xanax) without a doctor's prescription?

QN58. During your life, how many times have you used a needle to inject any illegal drug into your body?

- A. 0 times
- B. 1 time**
- C. 2 or more times**

Variables for Risky Sexual Behaviors

QN60. Have you ever had sexual intercourse?

- A. Yes**
- B. No

QN62. During your life, how many people have you had sexual intercourse?

- A. I have never had sexual intercourse.

- B. 1 person
- C. 2 persons
- D. 3 people
- E. 4 people**
- F. 5 people**
- G. 6 or more people**

QN63. During the past three months, how many people did you have sexual intercourse?

- A. I have never had sexual intercourse.
- B. I have had sexual intercourse, but not in the past three months
- C. 1 person
- D. 2 persons
- E. 3 people
- F. 4 people**
- G. 5 people**
- H. 6 or more people**

QN65. The last time you had sexual intercourse, did you or your partner use a condom?

- A. I have never had sexual intercourse.
- B. Yes**
- C. No