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Using Marijuana, Drinking Alcohol, or a Combination of Both: The Association of Marijuana, Alcohol, and Sexual Risk Behavior Among Adolescents

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Abstract

Introduction: Although the association between alcohol use and sexual risk behavior has been well documented, there is little understanding of whether marijuana use alone or combining marijuana with alcohol use contributes to sexual risk behavior among adolescents.

Methods: A diverse sample of sexually active adolescents ($n = 616$) age 12–18 (50.32% Hispanic; 31.17% Black) completed a survey on alcohol use, marijuana use, and sexual risk behavior during a visit to a primary care clinic.

Results: Adolescents were more likely to report having had two or more sexual partners in the past three months if they reported using both alcohol and marijuana ($OR = 3.90, p < .0001$), alcohol alone ($OR = 2.51, p < .0001$), or marijuana alone ($OR = 1.89, p < .001$) compared to adolescents who reported no use during the past month. Adolescents were more likely to report having both two or more partners and condomless sex if they used both alcohol and marijuana ($OR = 3.19, p < .001$) or alcohol alone ($OR = 3.41, p < .01$) in the past month compared with adolescents who reported marijuana alone or no use.

Conclusions: Providers should screen for both alcohol and marijuana use among adolescents and discuss how use of alcohol or alcohol in conjunction with marijuana may be associated with sexual risk behaviors.

Keywords

Adolescents; Alcohol; Drug Use; Marijuana; Sexual Risk; Substance Use

Introduction

Approximately half of all adolescents in the United States initiate sexual intercourse before the end of high school (Eaton et al., 2012). The onset of sexual activity is considered to be a developmentally adaptive part of adolescence (Welsh, Rostosky, & Kawaguchi, 2000); however unprotected sexual intercourse poses a high risk for unintended pregnancy and

sexually transmitted infections (STIs; Eaton 2012). There is a significant association between alcohol consumption and sexual risk behavior in adolescents (Baskin-Sommers & Sommers, 2006; Bryan et al., 2007; Connell et al., 2009). Additionally, adolescent alcohol use has been shown to be highly predictive of subsequent sexual risk behavior in young adulthood (Khan et al., 2012; Muchimba et al., 2013).

Studies have also suggested that marijuana use may be associated with sexual risk behavior among adolescents (Bryan et al., 2012; Hendershot et al., 2010), but findings are less robust and much less is understood about this association. Some studies suggest that marijuana use may actually be associated with decreased sexual risk (Valera et al., 2009) because it increases caution when making decisions involving sexual risk behavior (Metrik et al., 2012), whereas others have shown that marijuana use may increase risk (De Genna et al., 2007; Guo et al., 2002; Hittner & Kennington, 2008). Unfortunately, many previous studies that found correlations between marijuana use and sexual risk behavior did not distinguish between discrete episodes of marijuana use and the combined use of marijuana and alcohol and/or other substances (e.g., stimulants; Drumright et al., 2006; Shrier, 1997; Tapert et al., 2001), thus it is difficult to determine whether marijuana use actually contributed to the sexual risk behavior.

Metrik et al. (2016) conducted one of the first studies to examine the independent contributions of alcohol and marijuana use on sexual risk behavior among 18–30 year olds. They found that among 112 adult self-reported marijuana smokers, both alcohol and marijuana use were independently associated with greater odds of having sexual intercourse, but use of these substances was not associated with increased odds of unprotected intercourse with a casual partner (Metrik et al., 2016). They also found that heavy alcohol use and marijuana use had a synergistic effect increasing the likelihood of unprotected sex with a main partner when taken together (Metrik et al., 2016). The independent and combined effects of alcohol and marijuana use on sexual risk behavior have yet to be studied among adolescents. The current study adds to this literature by assessing whether adolescents aged 12 to 18 who reported alcohol use alone, marijuana use alone or alcohol use combined with marijuana use had greater odds of having multiple sexual partners and/or having unprotected sex than adolescents who reported no use of these substances.

Method

Sample description

A consecutive sample of adolescents in clinic waiting rooms were recruited from one of four family community clinics in two cities (one in Los Angeles, CA and three in Pittsburgh, PA). Every adolescent between the ages of 12 and 18 that came to the clinics for an appointment was asked to be part of the project. These primary care clinics were selected because they have a large percentage of minority patients and serve a high proportion of low-income patients who do not have insurance or who are insured through Medicare and/or Medicaid. Approximately 3,309 adolescents were approached to be in the project. Of these, 27% (n = 892) were ineligible due to age being under 12 or over 18, lack of English proficiency, being present for an appointment other than their own, or disability status. About 18.5% of adolescents (n = 614) declined to participate, mostly due to time constraints or the

adolescent being at the clinic for family planning and not wanting their parent(s) to know they were there (i.e., they did not want us to obtain parental consent). This yielded a total sample of 1,803 adolescents who enrolled or provided consent to obtain contact information (opt-in rate of 81.5%). Of the 1,803 adolescents, 230 did not complete the baseline within the study field period or had provided poor contact information. Thus the final enrolled sample included 1,573 adolescents. For interested adolescents, we obtained parental consent and assent if under 18, or consent if 18. Adolescents were then screened by project staff using the NIAAA screening guide, and completed a survey via the web that included standard measures of substance use and sexual risk behavior. Adolescents were paid \$25 for their participation. We obtained a certificate of confidentiality and all study protocols and procedures were approved by the institution's Institutional Review Board and the clinics. Of the 1,573 eligible and consented adolescents, 616 (39.2%) reported having previously engaged in sexual intercourse. Because the present analyses focus on risky sexual behavior, we only included participants in our analytic sample that reported ever having sex in their lifetime ($n = 616$; D'Amico, 2016).

Measures

Socio-demographic characteristics included age, gender, mother's education, race/ethnicity and family structure (i.e., 2-parent household versus single-parent household). Respondents were classified into one of four racial/ethnic groups: Hispanic, African American, multi-racial/other and non-Hispanic White (reference group). Mother's education was coded as a dichotomous indicator of greater than or equal to some college education.

Alcohol and marijuana use were assessed using well-established measures of adolescent substance use (Austin & Skager, 2008; Ellickson et al., 2003, Johnston et al., 2016). Analyses focus on past month substance use. Adolescents were asked, "During the past month, how many days did you [drink at least one full drink of alcohol] [use marijuana]?" To evaluate effects of using more than one substance on sexual risk behaviors, we categorized past month substance use into no use (as the reference group), marijuana use only, alcohol use only, or both alcohol and marijuana use.

Sexual risk behavior was assessed using 3 items from the Youth Risk Behavior Survey (Brener et al., 2004). Sexually active adolescents were asked "In the past 3 months, with how many people did you have sexual intercourse?" Responses ranged from "I have had intercourse, but not during the past 3 months" to "6 or more people." We dichotomized the responses into 2 or more partners versus 0 or 1 partner as previous research has shown that having 2 or more partners in this time frame is associated with higher risk behavior (e.g., alcohol use, marijuana use, involved in sexual violence) among adolescents (Valois et al., 1999). Respondents were also asked "The last time you had sexual intercourse, did you or your partner use a condom?" Response options were "yes" or "no." We also created a higher risk outcome variable for adolescents that met both of the following criteria: reporting no condom use at last sexual intercourse *and* reporting 2 or more partners in the past 3 months. We refer to this as "combined sexual risk."

Data analysis

We conducted a series of logistic regression models that first evaluated the bivariate and then multivariate association of each of our predictors (demographic information, alcohol use, and marijuana use variables) with each of our three sexual risk behavior outcomes. For the bivariate analyses, each predictor was entered into the model separately to examine the direct association of the predictor on each of the three sexual risk behavior outcome variables. We then tested the associations between substance use and risky sexual behavior after controlling for demographic covariate in separate multivariable models for each of the 3 outcome sexual risk variables. All analyses were clustered within clinic to control for site location effects. Due to missingness in the mother's education variable, this variable was imputed using an ordinal logistic regression model with race/ethnicity, city (LA/Pittsburg), and an indicator of living in a two parent household (Gelman et al., 2006; Rubin et al., 2002).

Results

Descriptive Results

Demographic, alcohol, marijuana, and sexual risk behavior variables for the 616 adolescents who reported previous sexual behavior are presented in Table 1. About twice as many adolescents reported both alcohol and marijuana use in the past month ($n = 174$, 28.29%), versus use of alcohol only ($n = 84$, 13.66%) or marijuana only ($n = 82$, 13.33%). With respect to patterns of alcohol use over the past month, over half the sample ($n = 357$, 58.05%) reported no use of alcohol, one-fourth ($n = 167$, 27.15%) reported drinking on 1–2 days, and the remaining 14.8% ($n = 92$) reported drinking on 3 or more days in the last month. The number of adolescents that endorsed heavy drinking (5 or more drinks of alcohol) during the past 30 days was relatively small ($n = 149$, 23.18%) therefore; we used indication of any use of alcohol during the past 30 days for the following analyses. Similar to alcohol use patterns, over half the sample ($n = 359$, 58.37%) reported no use of marijuana during the past month. However, one-fifth ($n = 135$, 21.96%) reported using marijuana on 1–5 days, and the remaining one-fifth ($n = 122$, 19.67%) reported using marijuana on 6 or more days in the last month. Over one-third of the sample reported that they did not use a condom the last time they had sex ($n = 224$, 36.42%), and 17% reported having two or more partners in the last three months ($n = 105$). Those adolescents that reported using both alcohol and marijuana in the past 30 days were also more likely to report having used alcohol or other drugs immediately prior to sex ($n = 66$, 38.15%) compared to adolescents that reported using only alcohol ($n = 12$, 14.29%) or only marijuana ($n = 12$, 14.63%).

Bivariate analyses

Being of older age, being female, being of mixed/other race/ethnicity (as compared to white), being African American or Latino/Latina (as compared to white), having a less educated mother, and living in a single-parent household were each associated with greater odds of not using a condom during the last time adolescents engaged in sexual intercourse (Table 2). Using alcohol only ($p=.07$), or using both alcohol and marijuana during the past 30 days ($p=.07$) were marginally significantly related to not using a condom during last sexual intercourse. We found that using alcohol only, using marijuana only, or using both

alcohol and marijuana during the past 30 days were all significantly associated with a greater likelihood of having two or more partners during the past three months. Finally, being of older age, having a less educated mother, living in a single-parent household, using alcohol only, or using both alcohol and marijuana during the past 30 days were all significantly associated with combined sexual risk.

Multivariable Modeling

Table 3 provides results from the multivariable models. Although females were more likely to report no condom use at last sex, males were more likely to report having two or more partners in the past three months. Regarding alcohol and marijuana use, results varied by outcome. Adolescents were more likely to report having had two or more sexual partners in the past three months if they reported using both alcohol and marijuana (OR = 3.90, $p < .0001$), alcohol alone (OR = 2.51, $p < .0001$), or marijuana alone (OR = 1.89, $p < .001$) compared to adolescents who reported no use during the past 30 days. Adolescents were also more likely to report having both two or more partners and having condomless sex the last time they had sexual intercourse if they reported using both alcohol and marijuana in the past 30 days (OR = 3.19, $p < .001$) or using alcohol alone (OR = 3.41, $p < .01$) as compared to adolescents who reported the use of marijuana alone or no use of either marijuana or alcohol.

Discussion

This study is the first to compare sexual risk behavior among adolescents who reported use of alcohol only, marijuana only, or use of both substances in the past 30 days to adolescents who reported no use of these substances. Adolescents who reported both alcohol and marijuana use in the past 30 days were also more likely to report two or more partners, and to have combined risk—that is a higher likelihood of condomless sex and two or more partners. Adolescents that reported only drinking in the past month were similarly more likely to engage in risky sexual behaviors than those who reported using marijuana alone. In contrast, those who reported marijuana use only in the past month reported a higher likelihood of two or more partners.

Findings are consistent with that of Metrik et al.'s (2016) study with young adults and emphasize the importance of understanding how the combined effects of alcohol and marijuana may affect adolescent sexual behavior. Of note, we did not use a timeline follow-back like the Metrik study, which would have allowed us to examine the temporality of combined substance use with sexual risk behavior (e.g., were both alcohol and marijuana being used in combination the last time the adolescent engaged in condomless sex?) Nonetheless, our results mirror those of that study. We did collect episodic data on whether adolescents used substances immediately prior to engaging in sex, and those adolescents that reported using both alcohol and marijuana in the past 30 days were also more likely to report having used alcohol or other drugs immediately prior to sex compared to adolescents that reported using only alcohol or only marijuana, suggesting that many were using these substances before engaging in sexual behavior. We did collect a measure of heavy drinking (5 or more drinks of alcohol), however, the number of adolescents who endorsed this item

during the past 30 days was relatively small so we used endorsement of any use of alcohol during the past 30 days for the current analyses. Future studies with this younger age group should examine the role of heavy drinking and the use of these substances immediately before or during sexual activity as it is well known that that alcohol and marijuana use can affect cognitive processing of information, inhibitory control, and risk perception (Fromme et al., 1999; Metrik et al., 2012; Norris et al., 2004).

Consistent with Metrik et al.'s study among young adult marijuana smokers, we also found that adolescents who reported use of both alcohol and marijuana in the past month had the highest odds of engaging in condomless sex, but in our case, only if they also had multiple partners. Although our findings are consistent with past research indicating that marijuana use is associated with a greater number of partners (De Genna et al., 2007; Guo et al., 2002), we did not find as in previous studies that marijuana use alone was associated with greater odds of condomless sex (Hittner & Kennington, 2008).

Overall, these results suggest that the combined use of both alcohol and marijuana is associated with the greatest sexual risk among these adolescents. Other work has also shown that sexual risk-taking may be exacerbated by the use of both of these substances among adults (Li et al., 2012; Volkow et al., 2014). It has been posited that this may be due to the fact that alcohol reduces inhibitions (De Wit, 2009) and increases a person's willingness to engage in sexual risk behavior (Stoner et al., 2007; Testa et al., 2000) whereas marijuana use can increase the likelihood of engaging in sexual activity (Anderson & Stein, 2011). However, consistent with Metrik et al., we found that aside from a slight overall increase in sexual behavior, marijuana use alone may not serve as an independent risk factor for engaging in high-risk sexual behavior among these adolescents.

Results have important implications for addressing sexual behavior among adolescents that report use of alcohol and marijuana. There has been considerable emphasis on the role of primary care providers in screening adolescents for alcohol and drug use, mental health issues, and other risky behaviors. However, providers endorse a number of barriers to screening, with time constraints being among the most commonly cited challenges (Van Hook et al., 2007; Sterling et al., 2012). Screening for alcohol and marijuana use may help providers identify adolescents that are also likely to participate in high-risk sexual behavior. Therefore, although screening for substance use does take time during a primary care visit, this practice has the potential to identify adolescents who are at-risk for a broader spectrum of health-related concerns that could be addressed in the primary care appointment.

In terms of demographics, female adolescents were more likely to report unprotected sex that last time they had sex, perhaps because they are less likely to carry condoms (Wingwood, 1998; Worth 1989), whereas male adolescents were more likely to report having more sexual partners, and having both more sexual partners and unprotected sex. This is consistent with studies among adult populations that have found that men report more permissive attitudes and engaging in more casual sex than do women (Petersen & Hyde, 2010; Regan & Berscheid, 1999). African American and/or Latina/Latino adolescents also reported more sexual partners than their white peers. Previous research has similarly found that sexual risk behaviors are more prevalent among Black and Latina/Latino

adolescents than their white counterparts (Blum et al., 2000; Khan et al., 2012). Importantly, Carlson et al. (2014) suggests that social and contextual factors such as neighborhood disadvantage (i.e., high poverty, high unemployment rates, high proportion of single parent households) may largely account for these racial and ethnic disparities. Although the current study did not obtain information on poverty or unemployment status of adolescents' families or neighborhoods, this study did recruit adolescents from clinics serving a large proportion of low-income patients. Moreover, we did find that adolescents from two parent households and whose mothers attended at least some college (variables that may serve as proxies for these broader social and contextual factors) were more likely to report using a condom the last time they had sex. Thus, providers could prioritize screening and intervention efforts in socioeconomically racial/ethnic minority populations who are most in need given racial/ethnic disparities in preventive services available to adolescents through primary care (Stevens & Shih, 2003). Alternatively, having a two parent household may be an indicator of higher levels of parental monitoring, which has been linked to lower levels of adolescent risk-behaviors (Borawski et al., 2003; DiClemente et al., 2001; Romer et al., 2009).

Limitations

It is important to consider our findings in light of limitations. First, we did not use a timeline follow-back or other similar method, which would have allowed us to examine the temporality of combined substance use with sexual risk behavior. Second, the question about condomless sex was limited to the most recent sexual encounter, unlike the question regarding number of partners in the past three months. Therefore, we did not have data on the number of unprotected sex acts or the number of partners with whom an adolescent had condomless sex over a comparable time frame. Third, given the opt-in rate of 81.5% there is potential for bias in the sample. Specifically, patients under 18 who did not receive parental consent may come from different types of households, which may affect substance use and sexual behavior. Fourth, because the sample was purposefully selected from clinics that target minority and low-income patients the results may not necessarily be generalizable to the broader community. In addition, alcohol and marijuana use in the past month were operationalized using dichotomized variables in the present study due to the limited range of use given the age of the sample; thus we were unable to examine the association between the frequency/severity of substance use and sexual risk behaviors. Finally, analyses use cross-sectional data, and inferences about causality cannot be made. Future work in this area should examine these associations over time and better determine the context of the risk sexual experience.

Conclusions

The current study highlights the importance of screening for sexual risk among adolescents that report alcohol and marijuana use, particularly for those adolescents that report use of both substances. Providers could therefore focus more attention on safer sex practices with adolescents who report the use of alcohol and/or alcohol and marijuana during the primary care visit.

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Table 1

Sample Demographic Characteristics and Risk Behavior Rates (N = 616)

Demographic Variable	Mean	SD
Age	16.75	4.96
	<i>n</i>	%
Female	378	61.87
Race Ethnicity		
White	86	13.96
African American	192	31.17
Hispanic/Latina(o)	310	50.32
Mixed Race/Other	28	4.55
Mom Some College or More ^a	166	30.68
Two parent household	137	22.24
Risk Behavior Variable	<i>n</i>	%
Substance Use		
No Use	275	44.72
Alcohol Only	84	13.66
Marijuana Only	82	13.33
Alcohol + Marijuana	174	28.29
Sex Risk Behavior		
No Sex Risk Behavior	326	53.01
No Condom During Last Sex	224	36.42
2 or More Partners (Last 3 months)	105	17.07
No Condom + 2 or More Partners (Last 3 months)	40	6.50

^a.75 cases were missing mother's education.

Table 2

Bivariate Associations Between Demographic Characteristics and Substance Use With Sexual Risk Behavior

	No Condom				2 or More Partners				No Condom + 2 or More Partners			
	OR	95% CI	P-value		OR	95% CI	P-value		OR	95% CI	P-value	
Age	1.14	1.04	1.25	.005	1.16	0.94	1.43	.167	1.47	1.10	1.96	.009
Female	1.89	1.42	2.50	<.001	0.56	0.32	1.01	.053	0.59	0.24	1.47	.258
Race Ethnicity												
White (reference group)												
African American	1.24	0.84	1.85	.281	1.91	1.39	2.62	<.001	2.18	0.72	6.54	.166
Hispanic/Latina(o)	1.15	0.65	2.02	.640	1.94	1.44	2.61	<.001	2.12	0.94	4.80	.071
Mixed Race/Other	1.92	1.37	2.70	.000	1.49	0.56	3.96	.426	1.06	0.26	4.39	.932
Mom Some College or More ^a	0.73	0.62	0.85	<.001	1.08	0.58	2.01	.800	0.61	0.39	0.96	.031
Two parent household	0.55	0.41	0.74	<.001	1.04	0.69	1.57	.858	0.73	0.55	0.95	.021
Substance Use												
No Use (reference group)												
Alcohol + Marijuana	1.58	0.97	2.59	.069	3.79	3.03	4.75	<.001	3.60	2.08	6.24	<.001
Alcohol Only	1.56	0.96	2.54	.072	2.53	2.12	3.01	<.001	3.99	1.79	8.89	.001
Marijuana Only	1.20	0.82	1.75	.359	2.23	1.46	3.41	.000	2.62	0.87	7.88	.085

^a.75 cases were missing mother's education.

Table 3

Multivariable Models Between Demographic Characteristics and Substance Use With Sexual Risk Behavior

	No Condom				2 or More Partners				No Condom + 2 or More Partners			
	OR	95% CI	P-value		OR	95% CI	P-value		OR	95% CI	P-value	
Age	1.08	0.97	1.20	.141	1.17	0.99	1.41	.105	1.47	1.16	1.87	.001
Female	1.71	1.35	2.16	.001	0.47	0.23	0.94	.032	0.44	0.16	1.19	.107
Race Ethnicity												
White (reference group)												
African American	1.22	0.84	1.77	.287	2.25	1.92	2.65	<.001	2.29	0.83	6.31	.110
Hispanic/Latina(o)	1.19	0.71	1.99	.504	1.81	1.21	2.71	.004	1.74	0.83	3.67	.145
Mixed Race/Other	2.06	1.42	2.99	.001	1.62	0.69	3.81	.273	1.24	0.43	3.59	.695
Mom Some College or More	0.70	0.53	0.91	<.001	1.15	0.59	2.22	.685	0.59	0.36	0.95	.031
Two parent household	0.56	0.44	0.73	.001	1.06	0.73	1.55	.752	0.66	0.43	1.02	.062
Substance Use												
No Use (reference group)												
Alcohol + Marijuana	1.47	0.94	2.29	.094	3.90	3.43	4.44	<.001	3.19	1.73	5.87	<.001
Alcohol Only	1.48	0.89	2.47	.130	2.51	2.28	2.75	<.001	3.41	1.52	7.63	.003
Marijuana Only	1.31	0.91	1.88	.147	1.89	1.33	2.69	<.001	2.25	0.76	6.70	.146