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Alcohol Mixed with Energy Drinks: Are There Associated Negative Consequences beyond Hazardous Drinking in College Students?

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Abstract

Objective—The consumption of alcohol mixed with energy drinks (AmED) is prevalent among college students as is hazardous drinking, a drinking pattern that places one at risk for alcohol-related harm. The present study, therefore, examined associations between AmED use, hazardous drinking, and alcohol-related consequences in college students.

Methods—Based on a probability sample conducted in 2010, participants were 606 undergraduate students aged 18-25. AmED consumption included lifetime and past year use. Hazardous drinking and alcohol-related consequences were measured during the past year. Point prevalence was used to estimate rates of AmED use, and chi-square, ANOVA, and logistic regression were used to examine associations between AmED use, hazardous drinking, and alcohol-related consequences.

Results—Lifetime and past year AmED use prevalence rates were 75.2% and 64.7%, respectively. Hazardous drinkers who engaged in AmED use were significantly more likely than past year hazardous drinkers who did not engage in AmED use to have had unprotected sex (*OR* = 2.35, CI 1.27-4.32).

Conclusions—AmED use appears to be highly prevalent among college students, and AmED use may confer additional risk for unprotected sex beyond hazardous drinking. Unprotected sex has implications for public health, and students who drink hazardously and consume AmED may be at greater risk.

Keywords

energy drink; alcohol drinking patterns; negative consequences; college students

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1.1 Introduction

Energy drinks are beverages designed to increase energy through the combination of typically high levels of caffeine and other ingredients such as taurine and B vitamins (Heckman, Sherry, & Gonzalez, 2010). Energy drink use in the United States has been on the rise in recent years as evidenced by a 136% increase in sales from 2005 to 2009 (Mintel Oxygen, 2010). The primary consumers of energy drinks are teenagers and young adults, and in particular, young adult males (Berger, Fendrich, Chen, Arria, & Cisler, 2011; Simon & Mosher, 2007). The marketing efforts of energy drink companies appear to confirm these observations; for example, as evidenced by cross promotions with extreme sporting events (Agriculture and Agri-Food Canada, 2008).

Recent investigations have highlighted potential concerns about energy drink consumption by children, adolescents, and young adults (Gunja & Brown, 2012; Seifert, Schaechter, Hershorin, & Lipshultz, 2011), especially vulnerable subgroups among these populations (Seifert et al., 2011). For example, Seifert and colleagues (2011) have discussed that large doses of caffeine may increase the risk of cardiac events among children and adolescents with certain genetic and behavioral health disorders. Furthermore, health officials have voiced concerns about the recent trend of mixing alcohol with energy drinks (e.g., Arria & O'Brien, 2011). Although, the United States Food and Drug Administration (FDA) in 2010 effectively banned premixed alcoholic energy drinks from the market (Food and Drug Administration, 2010), continued mixing of alcohol with energy drinks at bars and restaurants or on one's own, especially if frequent, has been associated with alcohol-related consequences among college students (Brache & Stockwell, 2011; O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008). Such consequences have included riding in a car with a driver who has been drinking, been hurt or injured, and having taken advantage of someone sexually or been taken advantage of sexually by another (Brache & Stockwell, 2011; O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008).

To date, most of the research on alcohol mixed with energy drinks (AmED) has focused on non-probability samples of college students. In addition, of the studies that have examined associations between AmED use and alcohol-related consequences, although controlling for alcohol use, to the best of our knowledge none have specifically controlled for hazardous drinking—a pattern of alcohol use that alone places one at risk for alcohol-related harm (Babor & Higgins-Biddle, 2001). The present study aims, therefore, were to: (1) among a probability sample of college students, estimate the prevalence of AmED use, including premixed AmED use prior to the FDA ban; and (2) in this same sample, examine the associations between AmED use, hazardous drinking, and several alcohol-related negative consequences that in previous studies have been found associated with AmED use.

1.2 Material and methods

1.2.1 Sample and procedure

This study was a cross-sectional design and part of a larger study that examined a direct alcohol biomarker. The study took place at a large, public, urban university located in the Midwestern United States during the summer and fall semesters of 2010. Based on a probability sample, a total of 1200 undergraduate college students aged 18 to 25 were selected to participate in study procedures, which included an interview, a Web-based Computerized Self-Administered Interview (CASI), and the collection of hair and fingernail biological samples. Of the 1200 selected students, 78 were study ineligible due to enrollment status (i.e., not enrolled during the 2010 spring and summer semesters). In total, 606 students participated in the study for a response rate (American Association for Public

Opinion Research, 2011) of 54%. Participants were 61.6% female and 81.8% White. Participant average age was 21.5 (*SD* = 1.7) years, and 62.4% of participants self-identified as upperclassmen (3rd or 4th year in college). In the 2010 spring semester, 44.9% lived with friends or others not related to them, 30.5% lived with a relative, 12.4% lived by themselves, and 12.2% lived in a dormitory. Less than 1% of the student undergraduate population is involved with a fraternal organization, and only one fraternity owns a chapter house that is officially recognized by the university.

Participants completed all study procedures during one research visit and were compensated up to $35.00 for their participation in the larger study. The majority of visits were conducted in study offices located on campus with the exception of 16 visits, which were conducted on location with students during the study period. Prior to participation, students provided written informed consent. All study procedures were approved by the Western Institutional Review Board and the Social & Behavioral Sciences Institutional Review Board at the University of Wisconsin.

1.2.2 Measures

Alcohol mixed with Energy Drink (AmED) Use—Students reported both lifetime and past year AmED use. AmED use included both mixed drinks, for example, vodka and Red Bull®, and premixed alcoholic energy drinks as study data were collected prior to the federal ban on premixed alcoholic energy drinks (US Food and Drug Administration, 2010).

Alcohol Use—Past year alcohol use was assessed by the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The AUDIT-C, scale range 0-12, assesses frequency and quantity of alcohol use in standard drink units (National Institute on Alcohol Abuse and Alcoholism, 2005). Based on AUDIT-C scores (Dawson, Grant, Stinson, & Zhou, 2005), students were categorized into one of the following three groups: abstainer (0); nonhazardous drinker (1-4); or hazardous drinker (≥5).

Alcohol-Related Negative Consequences—Past year alcohol-related negative consequences among alcohol consuming participants were determined, yes or no, by items derived or modified from the Core Alcohol and Drug Survey for college students (Presley, Meilman, & Lyerla, 1994). The following items were examined: driven a car while under the influence (36.4%); been hurt or injured (16%); and experienced unwanted sexual contact as a result of consuming alcohol (9.1%). These items are similar to those examined in previous alcohol and energy drink studies (O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008; Thombs et al., 2010). The item of “had unprotected sex” (29.6%) as a result of alcohol consumption was also examined as an additional negative consequence.

1.2.3 Data reduction and statistical analysis

Based on the AmED use questions and the AUDIT-C measure, the following past year alcohol and energy drink use categories were created: (1) nonhazardous drinkers (34.6%); (2) hazardous drinkers (12.3%); or hazardous drinkers who also engaged in AmED use (53.1%). Because of the focus on alcohol-related negative consequences, abstainers (AUDIT-C score 0; *n* = 45) were excluded from all analyses with the exception of prevalence estimates.

Data were analyzed by point estimate, chi-square, ANOVA with Tukey-Kramer adjustment for multiple comparisons, and logistic regression. Logistic regression analyses were covariate adjusted by gender, race/ethnicity, and age. All analyses were performed using SAS/STAT software, Version 9.3 (SAS Institute Inc., 2011).

1.3 Results

1.3.1 Prevalence of AmED use

Approximately 75% of students engaged in lifetime AmED use, including both mixed and/or premixed use (75.2%), while almost 65% of students engaged in AmED use in the past year (64.7%). The majority of both lifetime and past year AmED use was mixed (40.6%, 39.3%, respectively) or mixed and premixed (29.5%, 19.1%, respectively) versus premixed only (5.1%, 6.3%, respectively). Finally, past year hazardous drinkers were more likely than past year nonhazardous drinkers (81.2% versus 48.5%) to be past year AmED users, $X^2(1) = 64.65$, $p < .001$.

1.3.2 AmED use and alcohol-related negative consequences

Table 1 presents associations between past year nonhazardous and hazardous drinking pattern, AmED use, and alcohol-related negative consequences. Logistic regression analysis revealed a pattern whereby past year nonhazardous drinkers were significantly less likely than past year hazardous drinkers to have experienced three of the four alcohol-related negative consequences: driven a car under the influence; been hurt or injured; and had unprotected sex. Past year hazardous drinkers who consumed AmED were significantly more likely than past year hazardous drinkers to have had unprotected sex. Total AUDIT-C scores were significantly different between the alcohol and energy drink groups: nonhazardous drinkers ($M = 2.88$, $SD = 1.10$); hazardous drinkers ($M = 6.23$, $SD = 1.30$); and hazardous drinkers who engaged in AmED use ($M = 7.14$, $SD = 1.59$) ($F(2, 558) = 550.52$, $p < .001$).

Finally, although not the focus of the present study, certain demographics were associated with alcohol-related negative consequences. For every one year increase in age, the odds of having driven a car while under the influence increased by 14%. Males were more likely than females as were non-minority Whites than minorities to have been hurt or injured. Finally, males were less likely than females to have experienced unwanted sexual contact.

1.4 Discussion

1.4.1 AmED use is highly prevalent

The present study sought to estimate the prevalence of AmED use, including premixed AmED use, among a probability sample of college students. AmED use was found to be highly prevalent among students as evidenced by 3 out of 4 students having consumed AmED in their lifetime (75%), and 2 out of 3 students having consumed AmED in the past year (65%). These estimates, although most studies report a 30-day prevalence rate, are some of the highest reported in the alcohol and energy drink literature. For example, based on data collected in 2008, Marczinski (2011) found that 44% of US college students had consumed AmED at least once in their lifetime, while Attila and Çakir (2011) found that 37.2% of Turkish college students had consumed AmED. Finally, 1 out of 3 students in the present study had consumed a premixed AmED in their lifetime (35%) prior to the 2010 FDA ban.

1.4.2 AmED use and alcohol-related negative consequences

The present study also sought to determine whether or not AmED use is associated with alcohol-related negative consequences regardless of nonhazardous or hazardous drinking pattern. Among students who consumed alcohol in the past year, the logistic regression results showed that nonhazardous drinkers were less likely than hazardous drinkers to have experienced the alcohol-related negative consequences over which students may have more control: driven a car while under the influence; been hurt or injured; and/or had unprotected

sex. No difference, however, was found between nonhazardous, hazardous, and hazardous drinkers with AmED use on the alcohol-related negative consequence of experienced unwanted sexual contact. This latter finding is somewhat inconsistent with previous research by Palmer and colleagues (2010), who found that college students who experienced unwanted sexual contact had greater alcohol consumption than those who did not. Likewise, men were less likely than women to experience unwanted sexual contact, a finding similar to previous research (Banyard et al., 2007).

In general, our study findings suggest that AmED use may not confer additional risk beyond hazardous drinking on the alcohol-related negative consequences of driven a car while under the influence, been hurt or injured, and experienced unwanted sexual contact. These findings are somewhat inconsistent with previous research (O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008; Thombs et al., 2010); yet differences in method such as different alcohol measures (O'Brien et al., 2008) exist between the present and previous studies. Further research is needed to understand these differences and to take into account other constructs such as site-specific behavioral norms that may also account for such differences.

Finally, as students aged, they were more likely to have driven a car while under the influence, which is similar to previous research (Hingson, Zha, & Weitzman, 2009), and this finding may be tied to the legal drinking age. That is, students aged 21 or older may begin to frequent drinking establishments in which driving may be required or preferred. In addition, men were more likely than women as were non-minority Whites in comparison to minorities to have been hurt or injured as a result of their alcohol use. These findings also appear to be broadly consistent with previous research (O'Brien et al., 2006).

1.4.3 AmED use and unprotected sex

The only difference found in our study between hazardous drinkers and hazardous drinkers who consumed AmED was that the latter group had over twice the odds of having had unprotected sex. This finding is similar to previous research among college students (Miller, 2008; Snipes & Benotsch, 2012), which, for example, found increased frequency of energy drink use to be associated both with increased frequency of alcohol use and higher sexual risk-taking (Miller, 2008). In a more recent study by Miller (2012), however, that focused specifically on AmED use and various forms of sexual risk-taking, AmED use among college students was found to not be associated with unprotected sex.

Our finding that AmED use may confer additional risk beyond hazardous drinking in terms of unprotected sex warrants further discussion. In a recent pilot study conducted in Australia that interviewed 10 young consumers of AmEDs (aged 21-31 years), 5 of the 10 participants indicated that AmEDs counteracted the drowsy effects of alcohol, thereby contributing to a “wakeful drunkenness” state (Pennay & Lubman, 2012). This “wakeful drunkenness” state has been discussed previously in the alcohol and energy drink literature as one that may lead to risky behavior (Arria & O'Brien, 2011). In addition, alcohol intoxication has been found in previous research to be related to perceived likelihood of engaging in unprotected sex among college students (e.g., Abbey, Saenz, & Buck, 2005). The role of energy drink marketing is an additional point of discussion. The most popular energy drink in the United States, Red Bull™ “gives wings to people who want to be mentally and physically active” (Red Bull Energy Drink, n.d.), and although sex is not specifically mentioned, some Red Bull™ advertising targeted to college students is sexually suggestive (Red Bull's sex commercial, n.d.). In addition, some energy drink brands do make specific claims of enhancing sex drive or sex performance (Miller, 2009). For example, brands such as Sex Drive energydrink™ leave no doubt as to the message being sent. Finally, it is possible that risk-taking propensity may account for the association between hazardous drinking and AmED use and increased odds of having had unprotected sex (see Miller, 2012), including,

in part, for the higher total AUDIT-C scores among hazardous drinkers who engaged in AmED use than hazardous drinkers. Further research is needed in this area as previous research has also found AmED use among college students in Canada to be associated with alcohol-related consequences even after controlling for risk-taking propensity (Brache & Stockwell, 2011).

1.4.4 Study strengths and limitations

Strengths of this study include a probability sample as many previous alcohol and energy drink studies have relied on convenience samples, including studies that have found similar findings in terms of the association between AmED use and unprotected sex (e.g., Snipes & Benotsch, 2012). The present study therefore strengthens previous research because of the probability sample design. An additional strength was data on premixed AmED use prior to the 2010 FDA ban, which was able to estimate the use prevalence of these drinks. A final strength was a focus on AmED use while controlling for hazardous drinking, a drinking pattern that already places one at risk for alcohol-related harm.

Several limitations also need to be considered when interpreting the results of this study. This study was based on a cross-sectional design, and as a result, causal relationships between AmED use, hazardous drinking, and alcohol-related negative consequences cannot be established. Instead, the results presented are based on global association. The study was also conducted at one university in the Midwestern United States, and therefore, the generalizability of study findings may be limited. Finally, partner type was not assessed in terms of students who had unprotected sex as unprotected sex with a casual partner, for example, is considered to be higher risk (see, e.g., Miller, 2008).

1.4.5 Future research

One area for future research is AmED use expectancy; that is, what do AmED users expect will happen after consuming AmED. Although a considerable amount of research exists on alcohol expectancy, very little research exists on AmED use expectancy, especially as related to sexual activity. This is largely, in part, because there is no validated measure of AmED use expectancy at this time. In addition, future research is needed to examine event-level relationships between AmED use and alcohol-related negative consequences.

1.5 Conclusions

In summary, AmED use appears to be highly prevalent among college students, and AmED use may confer additional risk beyond hazardous drinking in terms of unprotected sex. Unprotected sex among college students has public health implications for the spread of sexually transmitted diseases, including HIV, and unplanned pregnancy. Finally, premixed AmED use accounted for a relatively smaller proportion of total AmED use. In light of this, further discussion on the part of policymakers is warranted as to the highly prevalent consumption of AmED and to the potential risks of mixing alcohol with caffeine.

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References

Abbey A, Saenz C, Buck PO. The cumulative effects of acute alcohol consumption, individual differences and situational perceptions on sexual decision making. Journal of Studies on Alcohol. 2005; 66:82–90. [PubMed: 15830907]

Agriculture and Agri-Food Canada. The energy drink segment in North America. 2008. http://www.ats.agr.gc.ca/us/4387_e.htm#2

American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. Deerfield, IL: 2011. http://www.aapor.org/AM/Template.cfm?Section=Standard_Definitions2&Template=/CM/ConentDisplay.cfm&ContentID=3156

Arria AM, O'Brien MC. The “high” risk of energy drinks. The Journal of the American Medical Association. 2011; 305:600–601.

Attila S, Çakir B. Energy-drink consumption in college students and associated factors. Nutrition. 2011; 27:316–322. [PubMed: 20579846]

Babor, TF.; Higgins-Biddle, JC.; Saunders, JB.; Monteiro, MG. 2. World Health Organization, Department of Mental Health and Substance Dependence; Geneva, Switzerland: 2001. The Alcohol Use Disorders Identification Test: Guidelines for use in primary care. http://whqlibdoc.who.int/hq/2001/WHO_MSD_MSB_01.6a.pdf

Banyard VL, Ward S, Cohn ES, Plante EG, Moorhead C, Walsh W. Unwanted sexual contact on campus: A comparison of women's and men's experiences. Violence and Victims. 2007; 22:52–70. [PubMed: 17390563]

Berger LK, Fendrich M, Chen HY, Arria AM, Cisler RA. Sociodemographic correlates of energy drink consumption with and without alcohol: Results of a community Survey. Addictive Behaviors. 2011; 36:516–519. [PubMed: 21276661]

Brache K, Stockwell T. Drinking patterns and risk behaviors associated with combined alcohol and energy drink consumption in college drinkers. Addictive Behaviors. 2011; 36:1133–1140. [PubMed: 21840130]

Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): An effective brief screening test for problem drinking. Archives of Internal Medicine. 1998; 158:1789–1795. [PubMed: 9738608]

Dawson DA, Grant BF, Stinson FS, Zhou Y. Effectiveness of the derived Alcohol Use Disorders Identification Test (AUDIT-C) in screening for alcohol use disorders and risk drinking in the US general population. Alcoholism: Clinical & Experimental Research. 2005; 29:844–854.

Food and Drug Administration. FDA Warning Letters issued to four makers of caffeinated alcoholic beverages. Nov 17. 2010 http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm234109.htm

Gunja N, Brown JA. Energy drinks: Health risks and toxicity. Medical Journal of Australia. 2012; 196:46–49. [PubMed: 22256934]

Heckman MA, Sherry K, Gonzalez de Mejia E. Energy drinks: An assessment of their market size, consumer demographics, ingredient profile, functionality, and regulations in the United States. Comprehensive Reviews in Food Science and Food Safety. 2010; 9:303–317.

Hingson RW, Zha W, Weitzman ER. Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18-24, 1998-2005. Journal of Studies on Alcohol and Drugs, (Suppl 16). 2009:12–20.

Marczinski CA. Alcohol mixed with energy drinks: Consumption patterns and motivations for use in U.S. college students. International Journal of Environmental Research and Public Health. 2011; 8:3232–3245. [PubMed: 21909303]

Miller KE. Energy drinks, race, and problem behaviors among college students. Journal of Adolescent Health. 2008; 43:490–497. [PubMed: 18848678]

Miller, KE. Energy Drinks: Where the Science Meets Main Street. Cortland, NY: 2009. Who's getting wired up and why? Proceedings from SUNY Youth Sports Institute.

Miller, KE. Journal of Caffeine Research. Advance online publication; 2012. Alcohol mixed with energy drink use and sexual risk-taking: Casual, intoxicated, and unprotected sex. 10.1089/caf.2012.0015

Mintel Oxygen. Energy drink market experiences a jolt in sales, but stalls in attracting new customers, reports Mintel. 2010. http://www.mintel.com/press-centre/press-releases/584/energy-drink-market-experiences-a-jolt-in-sales-but-stalls-in-attracting-new-customers-reports-mintel

National Institute on Alcohol Abuse and Alcoholism. Helping patients who drink too much: A clinician's guide. Bethesda, MD: US Department of Health and Human Services, National Institutes of Health; 2005.

O'Brien MC, McCoy TP, Champion H, Mitra A, Robbins A, Teuschlser H, DuRant RH. Single question about drunkenness to detect college students at risk for injury. Academic Emergency Medicine. 2006; 13:629–636. [PubMed: 16614453]

O'Brien MC, McCoy TP, Rhodes SD, Wagoner A, Wolfson M. Caffeinated cocktails: Energy drink consumption, high-risk drinking, and alcohol-related consequences among college students. Academic Emergency Medicine. 2008; 15:453–460. [PubMed: 18439201]

Palmer RS, McMahon TJ, Rounsaville BJ, Ball SA. Coercive sexual experiences, protective behavioral strategies, alcohol expectancies and consumption among male and female college students. Journal of Interpersonal Violence. 2010; 25:1563–1578. [PubMed: 20040711]

Pennay A, Lubman DI. Alcohol and energy drinks: A pilot study exploring patterns of consumption, social contexts, benefits and harms. BMC Research Notes. 2012 10.1186/1756-0500-5-369.

Presley CA, Meilman PW, Lyerla R. Development of the Core Alcohol and Drug Survey: Initial findings and future directions. The Journal of American College Health. 1994; 42:248–255.

Red Bull Energy Drink. Red Bull USA nd Web. Sep 20.2012

Red Bull's sex commercial. care2petitionsite, nd Web. Dec 26.2012

SAS Institute Inc. SAS/STAT® 9.3 user's guide. Cary, NC: SAS Institute Inc; 2011.

Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. Addiction. 1993; 88:791–804. [PubMed: 8329970]

Seifert SM, Schaechter JL, Hershorin ER, Lipshultz SE. Health effects of energy drinks on children, adolescents, and young adults. Pediatrics. 2011; 127:511–528. [PubMed: 21321035]

Simon M, Mosher J. Alcohol, Energy Drinks, and Youth: A Dangerous Mix. Marin Institute: Alcohol Industry Watchdog. 2007

Snipes DJ, Benotsch EG. High-risk cocktails and high-risk sex: Examining the relation between alcohol mixed with energy drink consumption, sexual behavior, and drug use in college students. Addictive Behaviors. 2012 Advance online publication doi:10.1016/j.addbeh.2012.07.011.

Thombs D, O'Mara RJ, Tsukamoto M, Rossheim ME, Weiler RM, Merves ML, et al. Event-level analyses of energy drink consumption and alcohol intoxication in bar patrons. Addictive Behaviors. 2010; 35:325–330. [PubMed: 19954894]

Highlights

Alcohol mixed with energy drinks (AmED) is highly prevalent among college students AmED use may be associated with increased risk for unprotected sex beyond hazardous drinking Unprotected sex has implications for public health

Table 1

Associations between Past Year Alcohol mixed with Energy Drink (AmED) Use, Nonhazardous and Hazardous Drinking Pattern, and Alcohol-Related Negative Consequences (*n* = 561)

	Driven a Car Under the Influence *OR* (95% CI)	Been Hurt or Injured *OR* (95% CI)	Experienced Unwanted Sex. Contact *OR* (95% CI)	Had Unprotected Sex *OR* (95% CI)
Gender				
Male	1.18 (0.81, 1.71)	1.66 (1.03, 2.68) *	0.42 (0.22, 0.83) *	1.41 (0.95, 2.10)
Female	Ref[a]	Ref	Ref	Ref
Race/Ethnicity				
Non-Minority	0.94 (0.58, 1.53)	2.40 (1.05, 5.48) *	0.96 (0.43, 2.14)	1.18 (0.69, 2.03)
Minority	Ref	Ref	Ref	Ref
Age	1.14 (1.02, 1.27) *	0.94 (0.81, 1.10)	0.94 (0.78, 1.15)	1.05 (0.93, 1.18)
Alcohol and Energy Drink Use				
Nonhazardous	0.45 (0.25, 0.83) *	0.33 (0.13, 0.88) *	0.69 (0.20, 2.39)	0.42 (0.21, 0.87) *
Drinker	Ref	Ref	Ref	Ref
Hazardous	1.52 (0.88, 2.63)	1.92 (0.90, 4.10)	2.83 (0.97, 8.30)	2.35 (1.27, 4.32) **
Drinker				
Hazardous				
Drinker + AmED				
Use				

[a]Reference category.

* $p < .05$.

** $p < .01$.