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Alcohol and Energy Drink Use among Adolescents Seeking Emergency Department Care

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Abstract

Emergency Department (ED) visits due to energy drinks rose drastically from 2007 to 2011. Consuming alcohol mixed with energy drinks by young people is particularly concerning. Among youth (ages 14–20) in the ED reporting past-year alcohol use, we assessed frequency, reasons, and medical consequences of consuming alcohol and energy drinks in the same beverage or on the same occasion, and relationships with other risk behaviors. The sample included 439 youth ($M_{\text{age}}=18.6$ years, $SD=1.4$; 41% male; 73% Caucasian); those who drank alcohol, but not energy drinks (Non-users; 41%, $n=178$), those who drank alcohol and energy drinks on separate occasions (Separate; 23%, $n=103$), and those who combined alcohol and energy drinks in the same beverage

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Contributors

As Co-PIs on the grant from which this data came, Drs. Walton and Cunningham designed the overall study and were responsible for data collection. Drs. Chermack and Blow were Co-Investigators on the study and contributed to the overall design and selection of measures. Dr. Polshkova conducted literature searches. Dr. Bonar conducted literature searches and developed the analytic plan in consultation with Drs. Walton, Cunningham, and Chermack. Dr. Bonar wrote the initial draft of the manuscript and consulted with the data analyst on statistical analyses. All authors contributed to the drafting and revising of the manuscript and provided important intellectual content. All authors approved the final manuscript.

Conflict of Interest

Dr. Walton owns stock in Nurish Brands. All other authors declare that they have no conflict of interest.

or on the same occasion (Combined; 36%, n=158). Common reasons for combining energy drinks and alcohol were hiding the flavor of alcohol (39%) and liking the taste (36%). Common consequences were feeling jittery (71%) and trouble sleeping (46%). Combined users had the highest rates of risk behaviors (e.g., drug use, sexual risk behaviors, driving after drinking) and alcohol use severity. Multinomial logistic regression indicated that men, those who had sex after substance use, those who had used drugs, and those with higher alcohol severity were more likely to be Combined users than Non-Users. Those with higher alcohol severity were also more likely to be Combined users than Separate users. Combining energy drinks and alcohol is associated with higher rates of other risk behaviors among young drinkers. Future studies are needed to determine longitudinal relationships of energy drink use on substance use problem trajectories.

Keywords

energy drinks; alcohol; adolescents; emergency department

1. Introduction

The consumption of caffeinated energy drinks among adolescents and emerging adults, a group targeted by marketing of energy drinks (Heckman, Sherry, & De Mejia, 2010) has become a public health concern (Pennington, Johnson, Delaney, & Blankenship, 2010; Pomeranz, Munsell, & Harris, 2013; Sepkowitz, 2013). Emergency Department (ED) visits related to energy drink use doubled from 2007–2011, with 20,783 visits in 2011; 42% were accounted for by 12–25 year-olds (Substance Abuse and Mental Health Service Administration, 2013). Among 13–25 year-old ED patients, 35% of adolescents and 58% of young adults used energy drinks in the past month (Cotter et al., 2013). Energy drink use has been positively associated with quantity and frequency of alcohol use, alcohol dependence, marijuana and other drug use, and risk behaviors including risky sex, fighting, not using a seatbelt, and risk-taking (Arria et al., 2010; Arria et al., 2011; Azagba, Langille, & Asbridge, 2014; Friis, Lyng, Lasgaard, & Larsen, 2014; K. E. Miller, 2008a; Patrick & Maggs, 2014; Terry-McElrath, O'Malley, & Johnston, 2014; Trapp et al., 2014).

Researchers' attention has turned toward the potential risks of combining alcohol and energy drinks (Howland & Rohsenow, 2013; Howland et al., 2011; Reissig, Strain, & Griffiths, 2009). In fact, 13% of the energy-drink related ED visits in 2011 involved alcohol (Substance Abuse and Mental Health Service Administration, 2013). Among 126 young adults at an ED, 24% had combined alcohol with energy drinks in the past month (Cotter et al., 2013). Among college drinkers, energy drink use on alcohol drinking days was associated with negative consequences of drinking (Patrick & Maggs, 2014). Researchers have proposed mechanisms by which combined use may lead to consequences (Arria et al., 2011): 1) caffeine is an antagonist of adenosine which mediates alcohol's effects (Dohrman, Diamond, & Gordon, 1997), potentially reducing perceived intoxication; and 2) caffeine delays sleep leading to prolonged drinking episodes (Arria et al., 2011).

Laboratory-based studies yield mixed results on the subjective and objective effects of combined alcohol/energy drink use. After combined administration, one study reported

reduced perceived motor impairment compared to alcohol alone, but co-administration did not affect objective motor coordination or visual reaction time differently than alcohol alone (Ferreira, de Mello, Pompeia, & de Souza-Formigoni, 2006). A within-subjects experiment indicated that combined administration resulted in lower perceived mental fatigue and stronger feelings of stimulation versus alcohol alone, but impairments on objective measures of information processing and motor coordination did not differ between alcohol-only and combined administrations (Marczinski, Fillmore, Henges, Ramsey, & Young, 2012). Compared to alcohol only, energy drink only, and placebo, combined use resulted in more perceived stimulation, but only energy drinks alone increased risk-taking (Peacock, Bruno, & Martin, 2013). In a within-subjects design, combined use increased alcohol priming (the desire for “another drink”) over time compared to baseline, for a longer period post-consumption than alcohol alone (Marczinski, Fillmore, Henges, Ramsey, & Young, 2013). In one study, co-administration of caffeine (not energy drinks specifically) reduced perceived intoxication compared to alcohol (Marczinski & Fillmore, 2006); while others (Alford, Hamilton-Morris, & Verster, 2012) reported that combined use did not negatively impact subjective or objective measures differently than alcohol with placebo. In a between subjects design using a go/no-go paradigm, combined use resulted in increased response activation compared to alcohol alone, though response inhibition did not differ; subjective effects for combined use resulting in increased stimulation were also noted (Marczinski, Fillmore, Bardgett, & Howard, 2011). One concern is that these laboratory studies may be limited by not testing “real-world” amounts of alcohol/energy drink combinations that more accurately reflect youths’ consumption (P. Miller, 2013).

Cross-sectional surveys, mostly with college students, report links between combined alcohol/energy drink use with quantity of alcohol consumed, hazardous drinking, heavy episodic drinking, alcohol consequences, marijuana, ecstasy and cocaine use, unprotected sex, and sex after substance use (L. Berger, Fendrich, & Fuhrmann, 2013; L. K. Berger, Fendrich, Chen, Arria, & Cisler, 2011; Cotter et al., 2013; Mallett, Marzell, Scaglione, Hultgren, & Turrise, 2013; O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008; Patrick & Maggs, 2014; Price, Hilchey, Darredeau, Fulton, & Barrett, 2010; Snipes & Benotsch, 2013). In a study conducted in college bars, people who reported combined use that night were more likely to have a breath alcohol concentration over 0.08 and to intend to drive that night compared to those not reporting combined use (D. Thombs et al., 2011).

Little is known about the reasons for combined use among young people. An Australian community study reported frequently cited motives for included: functional reasons (e.g., stay out later, feel more energy), enjoying the taste, other drinkers were drinking combined beverages, drink specials, energy drinks were included in the drink, to have fun, and someone else purchasing the drink (Peacock et al., 2013) Marcszinki found that among college students reporting regular combining the strongest motivations were to feel less tired and to get drunk faster and drink more (Marczinski, 2011).

The present study addresses a gap in the current literature by examining reasons for, consequences, of and correlates of combined alcohol/energy drink use among young people (14–20 years old) from an ED setting who were presenting for medical or injury related care. This venue has been under-utilized in examining combined alcohol/energy drink use as

much of the research in this domain has focused on college student samples, or in communities outside of the U.S. Because of the recent increase in energy-drink related ED visits and brief alcohol interventions delivered in EDs for youth have yielded positive effects (e.g., Monti et al., 2007), these data could be useful for tailoring ED-based prevention/intervention efforts and may also be informative for interventions delivered in other settings (Carey, Scott-Sheldon, Elliott, Garey, & Carey, 2012).

2. Method

2.1 Study Setting and Design

The present data come from a cross-sectional screening sample of an ED-based randomized controlled trial (RCT) for underage drinking at the University of Michigan, Department of Emergency Medicine. This ED is a Level-1 trauma center serving about 85,000 patients annually from the surrounding suburban communities. This trial was approved by the Institutional Review Board; we received a Certificate of Confidentiality from the National Institutes of Health.

2.2 Patient Sample and Recruitment

Patients aged 14–20 were identified via ED medical records and approached by research assistants (RAs) in ED waiting and treatment areas. Inclusion/exclusion criteria are detailed in prior articles (Bonar et al., 2014; Dooley-Hash, Banker, Walton, Ginsberg, & Cunningham, 2012; Dooley-Hash, Lipson, Walton, & Cunningham, 2012; Whiteside et al., 2013); patients were most often excluded if they could not consent due to medical problems, if parents were not present (for minors), or if they presented for acute sexual assault. Recruitment took place 7 days a week (except major holidays) from September 2010 through March 2013 on evening shifts (2pm–12am). We sampled from day (8am–6pm) and midnight shifts (12am–8am) on a rotating basis because it was not possible to staff the ED 24 hours a day. This current analysis uses data collected after June 2012 when questions about energy drinks were added to the screening surveys.

2.3 Screening Procedures

Written, informed consent was obtained from patients (aged 18–20) or their parent/ guardian (if aged 14–17, assent was obtained). Questionnaires were self-administered privately on a tablet computer, taking approximately 20 minutes. Participants chose a gift (\$1.00 value; e.g., lotion, deck of cards) for their participation in the screening survey. RAs ensured patient privacy so that accompanying guests could not view survey responses on computers.

2.4 Measures

2.4.1 Alcohol Use Disorders Identification Test—One item from the AUDITConsumption (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998) assessed past-year alcohol use (never to 4 or more times/week); we selected participants for further analyses if they chose any affirmative response. The 10-item AUDIT assessed past 3-month alcohol use severity (Knight, Sherritt, Harris, Gates, & Chang, 2003; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) using modified items for adolescents (Chung et al., 2000). Total scores range from 0 to 40; among adolescents in the ED a cut-off of 4 or more

indicates presence of a possible alcohol use disorder (Chung et al., 2000). Internal consistency in our sample was .89.

2.4.2 Energy Drink Use, Reasons, and Consequences—Items were adapted from prior studies on alcohol and energy drinks. Participants were asked, “In the past 12 months, on how many days did you drink a Red Bull (or similar energy drink)?” (K. E. Miller, 2008b) with response options: 0 days, 1–2, 3–5, 6–9, 10–19, 20–39, or 40 or more. Those indicating more than 0 received the next question that we developed, “In the past 12 months, on how many days did you have energy drinks and alcohol on the same occasion and/or in the same beverage?” using the same response choices. All remaining questions related to past 12-month combined use (thus only asked of those who reported combined use) and were shown below this heading: “These questions refer to drinking energy drinks and alcohol during the same occasion (e.g., at the same time or within a couple hours of each other);” we used the National Survey on Drug Use and Health’s definition of “occasion” (United States Department of Health Human Services. National Institutes of Health. National Institute on Drug Abuse, 2010). Using prior research (Malinauskas, Aeby, Overton, Carpenter-Aeby, & Barber-Heidal, 2007; Pennington et al., 2010), we developed a list of 8 consequences of energy drink use (see Table 1) and asked participants to select those they had experienced. A modified item from the Substance Abuse Outcomes Module (Booth, Kirchner, Fortney, Ross, & Rost, 2000; Smith et al., 2006; Smith Jr. et al., 1996) asked about medical visits due to combined use. Patients were also asked to select all that applied from a list of 12 reasons for combined use that we created based on prior work (see Table 2) (Malinauskas et al., 2007; O'Brien et al., 2008; Oteri, Salvo, Caputi, & Calapai, 2007).

2.4.3 Risk Behaviors—Items from the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) (Humeniuk et al., 2008; WHO ASSIST Working Group, 2002) assessed past-year (yes/no) use of cannabis, cocaine, inhalants, methamphetamine, hallucinogens, and street opioids, as well as misuse of prescription stimulants, sedatives, or opioids. Using the Young Adult Driving Questionnaire (YADQ) (Donovan, 1993) and a single item from the Youth Risk Behavior Survey, (“Youth Risk Behavior Surveillance United States, 2009,” 2009) we created a dichotomous variable reflecting any past-year driving after or drinking or riding with a driver who had been drinking. Items assessing sexual activity and sexual risk behaviors were adapted from the National Longitudinal Study of Adolescent Health (Bearman, Jones, & Udry, 1997; Harris et al., 2003; Sieving et al., 2001). Participants were asked whether they ever had sexual intercourse. Those responding “yes” were asked for the past 12 months their number of sexual partners (dichotomized into 2 or more vs. 0 or 1), consistency of condom use (all of the time vs. less than all the time), and sexual intercourse following substance use (at least some of the time vs. none of the time).

2.4.5 Demographics—Items from national surveys (Bearman et al., 1997; United States Department of Health and Human Services, National Institutes of Health, & National Institute on Drug Abuse, 2008) were adapted to assess gender, age, race (dichotomized as European American vs. African American/Other for these analyses due to limited racial

variability in the sample), current school enrollment, and whether participants (or parents) received public assistance as an indicator of socio-economic status.

2.5 Data Analysis

We divided participants who reported past-year alcohol use into three groups, those who: drank alcohol, but not energy drinks (Non-users; 41%, $n=178$), drank alcohol and energy drinks on separate occasions (Separate; 23%, $n=103$), and combined in the same occasion or beverage (Combined; 36%, $n=158$). Frequencies and descriptive statistics were calculated for all variables. ANOVAs and chi-square analyses evaluated bivariate differences in demographics, risk behaviors, and alcohol use severity among the three groups. For drug use, we combined illicit drugs, except marijuana, into a single “other illicit drug” category. Significant variables were included in multinomial logistic regression analyses evaluating correlates of energy drink/alcohol group. Variables for sexual risk were highly inter-correlated, thus sexual intercourse after substance use was chosen to include in the regression analyses. Drug use was also highly inter-Alcohol and Energy Drinks 10 correlated, therefore we created a dichotomous variable reflecting any past-year drug use to include in the model.

3. Results

3.1 Sample

From June 2012–March 2013, 2414 patients aged 14–20 years old came to the ED, 1500 (62.1%) were eligible for screening and 914 (37.9%) were excluded (most often for insufficient cognitive orientation [26.3%] or lack of parent/guardian available for consent among minors [15.9%]). A total of 532 (35.5%) eligible patients were missed (most often because RAs were occupied with other patients, 39.7%); 968 (64.5%) were approached, 158 (16.3%) refused, and 810 (83.7%) were screened. Missed participants and screened participants were compared on gender and age group (14–17 year-olds vs. 18–20 year-olds). Missed participants were more likely to be younger (47.5% vs. 33.9% of screened; $\chi^2 = 25.27$, $p < .001$) and male (47.2% vs. 33.4% of screened; $\chi^2 = 26.39$, $p < .001$). Refused participants were more likely to be male (20.3% vs. 13.4% screened; $\chi^2 = 8.27$, $p < .01$), but age group did not differ.

Of the 810 patients screened, 439 (54.2%) reported past-year alcohol use and comprised the sample for the current analyses. Demographic and risk behavior characteristics of these youth are shown in the last column in Table 3. These youth were on average 18.6 years old ($SD = 1.4$ years); 41% were male and 73% were Caucasian. The majority were enrolled in school (83%), and 20% received public assistance. On the day of the survey, 69% reported that they came to the ED for a medical reason whereas 31% came for an injury.

3.2 Energy Drink Use, Reasons for and Consequences of Combined Use

Of the 439 past-year alcohol drinkers, 59.5% ($n = 261$) reported any energy drink consumption, with 33% consuming on 1–2 days, 22% on 3–5 days, 26% on 6–19 days, and 20% on more than 20 days. Of those reporting any energy drink consumption, 60.5% reported combined use with alcohol, with the frequency of combined consumption equaling

1–2 days for 42%, 3–5 days for 26%, 6–19 days for 24%, and 20 or more days for 7%. For the 261 combined users, the most frequently chosen reasons were: hiding the flavor or alcohol (39.2%), liking the taste (35.8%), and staying awake (32.3%; Table 2). The most frequently indicated consequences including: feeling jittery, restless, on edge, or nervous (71.1%), and trouble sleeping (46.2%; Table 1). Ten participants (6.3%) reported needing medical attention after combined use in the past year.

3.3 Characteristics of combined alcohol and energy drink users compared to others

Bivariate analyses examining differences among groups of combined users ($n = 158$, 36%), separate users ($n = 103$, 24%), and non-users ($n = 178$, 41%) are displayed in Table 3. Gender was the only demographic variable significantly associated with group; there were more males in the combined (49%) and separate groups (47%), than the non-user group (29.2%; $p < .001$). Regarding substance use, driving, and sexual risk, the overall pattern of results showed the highest rates of risky behaviors in the combined use group. Specifically, drug use varied across groups with 75% reporting marijuana use, 28% reporting other illicit drug use, and 34% reporting prescription drug misuse, versus 48%, 7%, and 13%, respectively, of separate users and 42%, 8%, and 12%, respectively, of non-users ($p < .001$). AUDIT scores were higher among combined users compared to the other groups ($p < .001$); the mean score among combined users ($M = 9.4$, $SD = 6.9$) was more than double that of separate ($M = 3.3$, $SD = 3.8$) and non-users ($M = 4.2$, $SD = 5.0$). Over half of combined users (57%) reported risky driving-related behavior, compared to 41% of separate users and 28% of non-users ($p < .01$). Lifetime sexual activity, multiple partners, and sexual intercourse after substance use were highest among the combined users; however, inconsistent condom use did not differ across groups.

Results of multinomial logistic regression are in Table 4; gender (reference group = female), sex after substance use (reference group = none), AUDIT score, drinking and driving/riding with a drinking driver (reference group = none), and any drug use (reference group = no) were entered simultaneously as independent variables. Variables significantly associated with reporting combined use versus non-use included male gender ($OR = 2.39$), having reported sex after using alcohol/drugs ($OR = 2.41$), having used any drugs ($OR = 2.20$), and higher AUDIT scores ($OR = 1.10$). Higher AUDIT scores ($OR = 1.24$) were also associated with reporting combined use compared to separate use, but no other significant variables distinguished these two groups. Finally, male gender ($OR = 2.44$) and lower AUDIT scores ($OR = 0.90$) were significantly related to reporting separate use compared to non-use. Driving after drinking/riding with a drinking driver did not differ across groups in both models.

4. Discussion

This study is one of the first to assess combined alcohol/energy drink use by adolescents and emerging adults from a non-college setting, and provides data relevant to the delivery and tailoring of brief interventions delivered in the ED, a setting where screening and brief interventions are recommended (Ehrlich et al., 2010; Sindelar, Barnett, & Spirito, 2004). Consistent with prior work (e.g., (L. Berger et al., 2013; L. K. Berger et al., 2011; Mallett et

al., 2013; O'Brien et al., 2008; Price et al., 2010) and theories of risk behavior clustering (Jessor, 1982), bivariate we found that among youth who drank alcohol in the past year, those reporting any combined alcohol/energy drink use were more likely to report several other risk behaviors and had the highest alcohol use severity. Also, in bivariate analysis separate users had higher rates than non-users for several risk behaviors, and appeared more similar to the combined users.

In multivariate analyses, compared to non-users, combined users were more likely to be male, have had sex after substance use, have used other drugs, and have more severe alcohol use. Compared to separate users, combined users differed significantly in terms of higher AUDIT scores. In addition, compared to non-users, separate users were more likely to be male and, somewhat surprisingly, to have modestly lower AUDIT scores. It is unclear, among a sample where all used alcohol in the past year, why separate users would have lower AUDIT scores than non-users and this result requires further exploration and validation. In multivariate analyses, driving after drinking or riding with a drinking driver was not significant when including other factors, suggesting this is not one of the most potent correlates of combined use in these youth. However, the risks of alcohol and energy drink use for impaired driving remain an important concern given that combined users in a bar setting were more likely to intend to drive (D. L. Thombs et al., 2010).

Further, combined users indicated a number of reasons for such use, most often to mask the flavor of alcohol and liking the taste; other possible reasons (e.g., avoiding a hangover, not looking as drunk) were not frequently endorsed. Participants reported medical consequences of combined use, mostly frequently stimulant effects, but also stomach irritation and 6% had sought medical attention due to combined use. While these medical consequences may not have been perceived by many as severe enough to warrant medical attention, the long-term health effects of repeated, combined use remains to be investigated.

Limitations of these data include the cross-sectional design, which does not support causal assumptions. Although our eligibility and participation rates are similar to, or exceed, that of other brief intervention studies for young people based in emergency care settings (e.g., (Monti et al., 2007; Spirito et al., 2011; Walton et al., 2010)), it is possible that this data may not generalize to the full population of adolescents attending this ED, for example, because we could not survey youth who were coming the ED unconscious or unaccompanied by a legal guardian. In addition, as these data came from youth in a single ED, findings may not generalize to adolescents in other EDs or in other settings. Further, our definition of combined use — “in the same occasion or in the same beverage” — and using “a couple hours” to define an occasion may have been ambiguous, resulting in overestimating combined use. We used this definition due to concerns about consuming energy drinks just prior to going out drinking or throughout the night (but not mixed in an alcoholic beverage) to attempt to prolong the drinking occasion; thus, we assumed ingestion in a close time period may be as risky as co-ingestion in the same beverage. With regard to reasons and consequences assessed, recently published studies have expanded lists (Peacock et al., 2013) which were not available during our data collection. Further, we do not have information on whether participants' visits to the ED were related to energy drink use.

Despite these limitations, these data are novel and may inform future research and interventions, particularly for youth in the ED. For example, it may be important to address the combined use of alcohol and energy drinks, particularly given strong associations with alcohol misuse and other drug use, which is unlikely to have been incorporated into prior alcohol interventions among youth (Carey et al., 2012; Maio et al., 2005; Monti et al., 2007; Spirito et al., 2011; Walton et al., 2010) because mixing these beverages is a relatively new phenomenon. Our research suggests that motives regarding hiding alcohol's flavor and enjoying the taste of combined drinks, as well as the perceived need for more energy may be important to consider in adapting such interventions. For example, using a motivational interviewing approach among those who engage in this behavior, tailored interventions could incorporate weighing the pros and cons of combining alcohol and energy drinks in relation to health risks and future goals; further, discussion could focus on safer ways to address their specific motives for mixing (e.g., identifying beverages that they like the taste of; promoting sleep hygiene and self-care to more safely increase energy level).

Finally, with regard to future research, combined use may be a marker for increased risk-taking behavior, in general, and longitudinal studies should further evaluate this relationship. Given the potential negative health effects resulting from other drug use, drinking and driving, and sexual risk behaviors for youth, future research is also needed to understand the event level, causal effects of acute, combined use of alcohol/energy drinks on other risk behaviors and related consequences.

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Highlights

- Combined alcohol/energy drink consumers are likely to engage in risky behaviors.
- Combined users had the highest alcohol use severity.
- Common motives for combining were hiding the alcohol flavor and liking the taste

Table 1

Percent of Combined Users Who Reported Various Consequences of Combined Energy drink and Alcohol Use

	N (%)
Feeling jittery, restless, on edge, or nervous	65 (71.1%)
Trouble sleeping/insomnia	73 (46.2%)
Increased alertness or energy followed by sudden drop in energy	55 (34.8%)
Stomach pain or irritation	53 (33.5%)
Feeling irritable	48 (30.4%)
Irregular heartbeat/racing heart	46 (29.1%)
Headaches	45 (28.5%)
Muscle twitching	29 (18.4%)
Had to go to doc/clinic/ED	10 (6.3%)

Table 2

Reasons for Alcohol and Energy Drink Use among Those Who Combine

	N (%) or M (SD)
Hide flavor of alcohol	69 (39.2%)
Like the taste of energy drink and alcohol mixed	63 (35.8%)
Stay awake	51 (32.3%)
Needed more energy, in general	45 (28.5%)
Enjoy the effects of energy drinks and alcohol	35 (19.9%)
Having trouble staying awake	19 (12.0%)
Stay awake to complete an important task after drinking	12 (7.6%)
Drink more and not <i>feel</i> as drunk	12 (7.6%)
Avoid hangover	6 (3.8%)
Treat or cure a hangover	4 (2.5%)
Drink more and not <i>look</i> as drunk	4 (2.5%)
Needed to stay awake to drive in a car for a long time	2 (1.3%)

Table 3

Bivariate Analyses for Energy Drink Use Groups with Demographics and Other Risk Behaviors

	Combined Users (N=158, 36.0%) M (SD) or N (%)	Separate Users (N=103, 23.5%) M (SD) or N (%)	Non-Users (N=178, 40.5%) M (SD) or N (%)	Total (N=439) M (SD) or N (%)
Demographics				
Age	18.8 (1.4)	18.5 (1.4)	18.5 (1.4)	18.6 (1.4)
Gender (Ref=Male)***	78 (49.4%)	48 (46.6%)	52 (29.2%)	178 (40.6%)
Race (Ref=Caucasian)	123 (77.9%)	76 (73.8%)	122 (68.5%)	321 (73.1%)
Currently in School	129 (81.7%)	83 (80.6%)	152 (85.4%)	364 (82.9%)
On Public Assistance	36 (22.8%)	15 (14.6%)	37 (20.8%)	88 (20.1%)
Sexual Risk Behaviors				
Ever Had Sex***	135 (85.4%)	74 (71.8%)	117 (65.7%)	326 (74.3%)
Past-Year Inconsistent Condom Use	40(25.3%)	32(31.1%)	39(21.9%)	111(25.3%)
Past-Year Multiple Sex Partners**	95(60.1%)	39(37.9%)	58(32.6%)	192(43.7%)
Past-Year Sex After Substance Use***	111 (70.3%)	35(34.0%)	59(33.2%)	205(46.7%)
Substance use				
AUDIT Score*** ^a	9.4 (6.9)	3.3 (3.8)	4.2 (5.0)	5.8 (6.1)
Marijuana use***	119 (75.3%)	49 (47.6%)	74 (41.6%)	242 (55.1%)
Other illicit drug use***	44 (27.9%)	7 (6.8%)	14 (7.9%)	65 (14.8%)
Prescription drug misuse***	53 (33.5%)	13 (12.6%)	21 (11.8%)	87 (19.8%)
Any drug use***	123(77.9%)	53(51.5%)	78(43.8%)	254(57.9%)
Driving-Related Risk Behaviors				
Past-year Drinking and Driving or Riding**	90(57.0%)	42(40.8%)	67(37.6%)	199(45.3%)

Note. Ref = reference group.

Any drug use reflects all other drug variables combined.

^aCombined users' mean AUDIT scores differed significantly ($p < .001$) from both Separate Users and Non-Users, but there was no significant difference in mean AUDIT scores between Separate Users and Non-Users.

*
 $p < .05$

**
 $p < .001$

 $p < .001$

Table 4

Multinomial Logistic Regression Analyses Evaluating Gender and Risk Behaviors Associated with Energy Drink Grouping

	Combined users Vs. Non-Users [ref] OR (95%CI)	Combined Users Vs. Separate Users [ref] OR (95%CI)	Separate Users Vs. Non-Users [ref] OR (95%CI)
Male	2.39(1.44–3.97) ***	0.83(0.45–1.51)	2.44(1.45–4.11) ***
Sex after alcohol/drugs	2.41(1.38–4.18) **	1.85(0.97–3.54)	1.23(0.68–2.24)
AUDIT Score	1.10(1.05–1.16) ***	1.24(1.15–1.35) ***	0.90(0.84–0.98) **
Driving after drinking/riding	1.13(0.68–1.89)	0.94(0.51–1.74)	1.21(0.71–2.07)
Any drug use	2.20(1.26–3.84) **	1.55(0.81–2.96)	1.57(0.91–2.72)

Note. Ref = reference group

*
 $p < .05$

**
 $p < .001$

 $p < .001$