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Early Drinking and Its Association with Adolescents' Participation in Risky Behaviors

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Abstract

BACKGROUND—Adolescent alcohol use is a significant public health problem. Drinking before 13 years of age is correlated to the use of illicit drugs, and other risky behaviors, such as cigarette smoking.

OBJECTIVE—The purpose of this research was to examine the relationship between adolescents' early alcohol use and participation in risky behaviors such as smoking marijuana and cigarettes, as well as risky sexual behaviors.

STUDY DESIGN—Respondents for this cross-sectional secondary analysis came from a sample of 809 racially diverse adolescents in a community-based study examining familial influences on offspring outcomes.

RESULTS—Early-onset drinking, compared to nondrinking, was significantly related to participating in many of the risky behaviors. Many of the relationships persisted in the multivariable models that adjusted for demographic characteristics.

CONCLUSIONS—Early drinking was associated with participation in various risky behaviors (e.g., multiple sexual partners, unprotected intercourse) which may negatively alter an adolescent's future. Screening should focus on the co-occurrence of such behaviors.

Keywords

early alcohol use; risky behaviors; binge drinking; adolescents; marijuana

In the U.S., adolescent alcohol use is a significant public health problem (U.S. Department of Health and Human Services [DHHS], 2007). According to a national survey, 75% of adolescents in grades 9 through 12 reported having at least one alcoholic drink in their lifetime, and 45% reported having at least one alcoholic drink during the past 30 days (Centers for Disease Control and Prevention [CDC], 2008). Underage drinking is linked to the three leading causes of adolescent mortality: unintentional injury, homicide, and suicide (CDC, 2008). In addition, underage drinking is associated with numerous adverse social, health, and economic consequences (Hingson & Kenkel, 2004). The estimated costs

associated with underage drinking are more than \$53 billion, which includes \$19 billion from traffic accidents and \$29 billion related to violent crime (Bonnie & O'Connell, 2004).

Others have identified sociodemographic (age, gender) and other variables (e.g., family history of alcoholism) that are risk factors associated with underage drinking. In addition, underage drinking is associated with other risky behaviors, such as risky sexual behaviors. However there remains an incomplete understanding of the association between early-onset drinking and adverse health outcomes. Previous research (Grant & Dawson, 1997; Hingson, Edwards, Heeren, & Rosenbloom, 2009), however, has been retrospective, querying adults (> 18 years of age) about their participation in behaviors during adolescence. This adolescent sample is able to provide data on lifetime and recency of participation in the risky behaviors. The purpose of the study was to examine the prevalence of risky behaviors and age at first drink (AFD) in adolescents of varying degrees of risk for alcohol-related misuse.

BACKGROUND AND SIGNIFICANCE

Data from epidemiological and cross-sectional research supports that the age of the first alcoholic drink is a powerful predictor of current and future alcohol-related problems. Using respondents (> 18 years) from the National Longitudinal Alcohol Epidemiologic Survey, Grant and Dawson (1997), found the age of 14 years or younger was a significant predictor of lifetime alcohol abuse and dependence, as defined by the *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV)* (American Psychiatric Association, 1994). The odds of alcohol dependence decreased by 14% while the odds of alcohol abuse decreased by 8% for each year the age of the first drink increased (Grant & Dawson, 1997). Ellickson, Tucker, and Klein (2003) found an early AFD (i.e., grade 7) was also significantly related to school-related problems such as excessive absenteeism and poor grades and delinquency. The prevalence of problems such as illicit drug use and criminality persisted into young adulthood.

Hingson et al. (2009) found an early AFD was associated with accidental injuries (e.g., falling or accidentally cutting oneself) and motor vehicle accidents. Others report an association between aggressive behavior when drinking (Ellickson et al., 2003; Hingson et al., 2009), being rebellious (King & Chassin, 2007), stealing (King & Chassin, 2007), and driving after drinking (Lynskey, Bucholz, Madden, & Heath, 2007). Adolescent drinking is also associated with an increased propensity to engage in risky sexual behaviors, such as sex with multiple partners and unplanned and unprotected intercourse. Ellickson et al. (2003) and Stueve and O'Donnell (2005) found an association between an early AFD and the co-occurrence of risky sexual behaviors such as unprotected sexual intercourse leading to early pregnancy or parenthood, multiple partners, or being drunk or high during intercourse.

Researchers note an association between early drinking and adolescents' use of other illicit drugs including cigarette smoking (Agrawal et al., 2006; Callas, Flynn, & Worden, 2004; Ellickson et al., 2003; Sartor et al., 2009), marijuana use (Callas et al., 2004; Ellickson et al., 2003; Sartor et al., 2009), and the use of harder drugs (Ellickson et al., 2003).

Adding to this focus on adolescent risky behaviors, other researchers have found an association between disordered eating and alcohol use. In their research, Neumark-Sztainer et al. (1997) found that risk-taking behaviors, including cigarette smoking and alcohol and marijuana use, were associated with disordered eating. Using data from the Youth Risk Behavior Surveillance System (YRBS), one group of researchers examined the relationship between fasting, using non-prescribed diet products and purging (i.e., vomiting or using laxatives) and illegal drugs, including alcohol use (Pisetsky, Chao, Dierker, May, & Striegel-Moore, 2008). They found a significant association between disordered eating and

binge drinking. Focusing on adolescent females, Striegel-Moore and Huydic (1993) found a modest association between past month disordered eating and problem drinking.

Jessor and Jessor (1977) developed the Problem-Behavior Theory (PBT) to explain adolescents' involvement in socially undesirable behaviors (Jessor & Jessor, 1977). The associations between the various behaviors are due to an underlying predisposition for unconventionality (Jessor & Jessor, 1977), meaning those adolescents engaging in one of the behaviors are likely to engage in other risky behaviors. Expanding on PBT, Bartlett, Holditch-Davis, and Belyea (2005) found three clusters of adolescents' risky behaviors (e.g., alcohol use, unprotected sexual intercourse, having sexual intercourse while under the influence of alcohol or other drugs, lying to parents): normal cluster (meaning low levels of participation in risky behaviors); problem cluster (meaning higher prevalence of the risky behaviors); and deviant cluster (meaning the highest prevalence of the risky behaviors). Even though the adolescents in the normal cluster reported lowest prevalence of the risky behaviors, they still reported significant alcohol use, as did those in the problem and deviant clusters.

Unhealthy lifestyle choices, such as the early use and abuse of alcohol, tobacco, and other drugs, disordered eating, and other risky behaviors begin in adolescence. In addition, these behaviors involve an active decision to engage in the behaviors, and thus, are amenable to change. Just as an adolescent may decide to engage in a particular risky behavior, with education and accurate information, they may decide to not engage in the behavior. Given the potential for the consequences associated with early alcohol use and that many health practices, positive or negative, begin in adolescence, this research examined the relationship between an early AFD and adolescents' participation in risky behaviors, comparing three adolescent groups; nondrinkers, early-onset drinkers, and late-onset drinkers.

METHODS

Design and Sample

For this cross sectional, secondary analysis, data used in this study were derived from the first wave of the Missouri Family Study (MOFAM), an ongoing prospective community-based family study in which the main objective is to examine familial influences (paternal alcoholism) on adolescent offspring outcomes, including alcohol, tobacco, and illicit drug use, in a sample of ethnically diverse families (Edens, Glowinski, Pergadia, Lessov-Schlaggar, & Bucholz). Families were selected using birth record data from the state; this strategy has been described in detail for ascertainment of families of twins (Heath et al., 2002), and has been applied in the present study. Index children were chosen from birth years to be aged 13, 15, 17 or 19 at their baseline interview, and families with two or more full siblings were oversampled.

The parent study was reviewed and approved by the Institutional Review Board (IRB) of Washington University School of Medicine. Respondents were compensated for their time and effort in completing the telephone interviews. The IRB of the University of Missouri-St. Louis approved this secondary analysis.

Data Collection and Instrument

Sociodemographic, behavioral, and alcohol drinking data were collected via a telephone interview using an instrument from the Collaborative Study on the Genetics of Alcoholism (COGA), the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) (Bucholz et al., 1994; Kuperman, Schlosser, Lindral, & Reich, 1999). The SSAGA is a polydiagnostic instrument designed to assess physical, psychological, and social indications of alcohol abuse or dependence, and other psychiatric disorders (Bucholz et al., 1994). The

SSAGA has acceptable interrater test-retest reliability for *DSM-III-R* alcohol and other drug dependency diagnoses ($K = .70 - .90$; Bucholz et al., 1994). The adult and child versions of the SSAGA were administered to mothers and offspring, respectively.

Because interviews were conducted by telephone and typically in the respondent's home, a number of measures were taken to ensure that the information shared by the offspring was kept confidential. All respondents were told that their information would be completely confidential and would not be shared with any member of their family, including their parents. At the time of her own interview, mothers were told that information about their child's interview would not be shared with them. Exceptions to this rule were instances of harm to the child, including current suicidality and child abuse. The consent document specifically detailed that if instances of harm to or by the child were revealed, that confidentiality would be broken.

Definitions of Variables

Three classifications of families were created. Families were classified as "Recurrent drunk driving" (RDD) if the father had two or more drunk driving convictions based on driving records. Families in which mothers reported that the biological father of the offspring had a history of excessive drinking (but no drunk driving convictions) were classified as "high risk (HR)." The last classification was the control group.

The data described below were collected from the respondent's answers. Several categories of drinking were established based upon several questions. The first two alcohol use questions included: "Not counting sips, have you ever had any kind of drink with alcohol in it?", and "So you've never had even one full drink of alcohol?" Based upon the respondent's answers, three categories of drinking levels were developed: those who had never had a full drink of alcohol, early-onset drinkers (had their first full alcoholic drink at age 12 or younger), and late-onset drinkers (had their first full alcoholic drink after 12 years of age). We selected 12 years of age to be consistent with the age of initiation used in the Youth Risk Behavior Survey (CDC, 2008). Other alcohol-related questions were designed to determine the age of first full drink of alcohol, history (i.e., past year) and frequency of binge drinking, and the prevalence of binge drinking among those reporting ever binge drinking. We created gender-specific measures for binge drinking, using five or more standard drinks in a 24 hour period for males and four or more for females.

Behaviors associated with drinking, such as physical or verbal aggression, binge eating, sexual intercourse, unprotected intercourse, driving when drunk, and being a passenger with a driver who has had a lot to drink, were only asked of adolescents who reported ever consuming alcohol on six or more occasions. We created additional variables to reflect engaging in any risky sexual behavior when drinking ("risky sex when drinking") and any risky behavior when drinking ("Any risk when drinking"). Respondents were asked about their lifetime use of marijuana and cigarettes, including the age of first use.

The variable "weight loss attempts" was based on the respondents answering "Yes" to at least one of the following questions: "In order to lose weight or prevent weight gain did you ever" "Make yourself vomit?" "Take laxatives?" "Diet strictly?" "Fast – that is, not eat anything at all?" "Exercise vigorously for a long time?" and "Take water pills or diuretics?" We created the variable "Feel fat" based upon respondents answers to the questions "Did you ever feel fat, even though your family or friends were very concerned that you were much too thin?" and "Was there a period of time when people thought you were thin, but you were very dissatisfied with yourself because you thought you were not thin enough?" Other questions related to disordered eating were designed to assess if respondents had ever eaten a large amount of food in a short period of time ("Binge eating") and "Past-year binge

eating.” Using the variables “Weight loss attempts” and “Binge eating,” we created two variables to reflect those who participated in either of the aforementioned behaviors in their lifetime (“Disordered eating”), or within the past year (“Past-year disordered eating”).

The questions related to sexual intercourse were only asked of those 15 years of age and older, and queried if they had ever had sexual intercourse (without being forced), the age at which they first had consensual intercourse, the number of sexual partners, and if they had ever had intercourse without using a condom. “Multiple partners” was defined as having more than four sexual partners. The variable “Sum of risky sexual behaviors” reflects respondents participating in none, one, or two of the sexual behaviors.

Analysis

Analyses were performed using SAS software, version 9.2 of the SAS System for Linux (SAS Institute, Cary, NC).

Continuous demographic variables were compared across drinking status groups (i.e., non-drinker, early-onset, late-onset) using analysis of variance (ANOVA). When significant ($p < 0.05$) and within the ANOVA model, Tukey-adjusted p -values were used for pairwise comparisons of groups. Chi-square tests were used for between group comparisons of categorical demographic variables. When significant, Bonferroni-adjusted p -values were used for pairwise comparisons of groups.

Generalized estimating equations (GEEs) were used for analyses to account for the correlation between responses from members of the same family. Wald chi-square statistics (χ^2), degrees of freedom (df), and p -values (p) from univariable models are reported comparing the frequency of the risky behavior across drinking groups. The risky behavior was the outcome variable and the drinking onset status group was the predictor variable.

To determine the stability of the association between drinking status and risky behaviors after adjusting for relevant demographic characteristics, multivariable GEE models were explored. An a priori decision was made that race and family type should be included in all multivariable models to account for the family ascertainment strategy. Additional potential covariates (i.e., gender, income, and age) were entered individually into a GEE model that already included race and family type. Additional covariates that were significant in these models were included together in a multivariable model. Chi-square statistics are reported for each predictor variable included in the GEE model, after adjusting for all variables in the model. When there was a significant group effect and within the context of the overall GEE model, statistical contrasts were used to assess pairwise comparisons between drinking groups. Adjusted odds ratios (ORs) with 95% confidence intervals are reported for the multivariable models. ORs reflect the increased odds of the presence of the risky behavior as compared to the lower ordered drinking group, after adjusting for all other variables in the model. Nondrinkers are used as the reference group for the nondrinkers vs. the early-onset drinkers, and the nondrinkers vs. the late-onset drinkers; early drinkers are the referent group for the early-onset vs. the late-onset drinkers. Multivariable models could not be explored for some variables (i.e., binge eating when drinking and early marijuana use) due to sparse data in the cross-tabulations.

A total of 47 respondents refused to provide income data. To avoid the loss of these respondents from multivariable models that included income, missing values were replaced with the median income of the total sample. The data were also analyzed with the omission of data from respondents who did not provide a value for this covariate. The resultant p -values and ORs did not differ significantly from the inclusive dataset. We used the inclusive data set for the analyses.

RESULTS

Sociodemographic characteristics

Among 809 adolescents (13 to 19 years of age), 50% ($n = 404$) were female and the mean age was 15.90 ($SD = 1.93$). Approximately 50% ($n = 404$) were Black. In all 57% ($n = 246$) of the nondrinkers were Black. Drinkers, whether early- or late-onset, were more likely to be White ($p = .0003$) (Table 1). Overall 24 of the early-onset drinkers were females, and 153 ($n = 49\%$) of the late-onset drinkers were female. The proportion of females was equivalent across drinking groups ($p = .44$). For family risk type, the post hoc test that the proportion of adolescents in each family classification indicates late-onset drinkers were more likely to be in the HR or RDD family, compared to the nondrinkers ($p = .01$). More than half (54%) of the respondents reported never having had a full drink of alcohol. Among those reporting a full drink of alcohol ($n = 370$), 15% ($n = 55$) had their first drink before 13 years of age, and 315 (85%) at 13 years of age, or older. The mean age of first drink was 14.65 years of age ($SD = 2.00$).

The average age for first intercourse was 15.15 years of age ($SD = 1.57$). For the nondrinkers, the average age of first intercourse was 15.16 years of age ($SD = 1.49$), 14.71 years ($SD = 1.63$) of age for the early-onset drinkers, and 15.22 years of age ($SD = 1.53$) for the late-onset drinkers. The mean ages for cigarette smoking were as follows; 12.57 years of age among the nondrinkers ($n = 72$), 10.93 years of age among the early-onset drinkers ($n = 41$), and 13.33 years of age among the late-onset drinkers ($n = 219$).

Univariable results

In Table 2 the univariable analyses for the prevalence of the risky behaviors for the three groups are presented. More than one-half (62%) of the drinkers reported past-year binge drinking. There were no significant differences between early- and late-onset drinkers in the alcohol-related behaviors. A striking finding is the prevalence (96%) of past-year binge drinking among those reporting ever binge drinking. Drinking status was significantly related to weight loss attempts, binge eating, and disordered eating.

More than half of those queried (those aged 15 and older) have had sexual intercourse (Table 2). Drinkers, whether early- or late-onset, were significantly more likely to report having had sexual intercourse, multiple sexual partners, not using a condom, and engage in at least one risky sexual behavior, when treated as a count. Drinkers were also significantly more likely to report using marijuana or smoking cigarettes, compared to the nondrinkers.

Among those reporting ever smoking a cigarette, 42% smoked their first cigarette before age 13. Early-onset drinkers were significantly more likely to report smoking marijuana before age 13, compared to nondrinkers and late-onset drinkers. Early drinkers were significantly more likely to report smoking their first cigarette before 13 years of age, compared to nondrinkers and late-onset drinkers.

Multivariable results

Table 3 shows the results of the multivariable models for the three drinking groups (nondrinkers, early-onset drinkers, and late-onset drinkers), and participation in the risky behavior, adjusting for the demographic characteristics in the multivariable model. Although early- or late-onset drinking was not associated with the drinking measures such as past-year drinking, past-year binge drinking among those reporting ever binge drinking, risky sex when drinking, or drunk driving/riding, significant associations were observed for many of the other risky behaviors.

Drinking status, early or late, was associated with participating in “Weight loss attempts,” compared to the nondrinking status, but not when comparing early-onset with late-onset drinkers. The prevalence for “Past-year weight loss attempts” and “Past-year binge eating” was similar across all three groups. Early-onset drinkers were significantly more likely to report feeling fat, compared to nondrinkers and late-onset drinkers. Early- and late-onset drinkers were more likely to report binge and disordered eating, compared to nondrinkers, but within the drinking onset groups, no differences were observed in these behaviors. When examining the recency (i.e., past year) of disordered eating, early-onset drinkers were significantly more likely to participate in this behavior compared to nondrinkers and late-onset drinkers.

Early-onset drinkers were more likely to participate in the sexual behaviors as compared with nondrinkers; they were 24 times more likely to report having had sex, 4 times as likely to report multiple partners, and almost 6 times more likely to have sex without using a condom, compared with nondrinkers. Comparisons between nondrinkers and late-onset drinkers revealed elevated ORs for all of the sexual behaviors; the latter were almost 12 times 4 four times as likely to have sex without using a condom. Although there were no differences between early- and late-onset drinkers for the individual sexual behaviors, early-onset drinkers were significantly more likely than their late-onset counterparts to participate in one of the sexual behaviors.

Compared to their nondrinking counterparts, but not to each other, early- and late-onset drinkers were also significantly more likely to have ever used marijuana and cigarettes. However, early-onset drinkers were also significantly more likely to report early cigarette smoking, when compared with both nondrinkers and late-onset drinkers, but no differences were observed across drinking groups for early sexual intercourse. We were not able to examine early marijuana use in a multivariable model owing to the sparseness of the data.

DISCUSSION

Lifetime prevalence of alcohol use (46%) among these adolescents was lower, compared to the adolescents in the YRBS (75%; CDC, 2008). Although the prevalence of having consumed drunk alcohol before 13 years of age was lower in this sample compared to those in the YRBS (15% vs. 23.8%, respectively; CDC, 2008), results indicate that with a mean 14.64 years of age for those ever having a full drink of alcohol, the sample in the present study is below the target baseline goal of 16.1 years of age in *Healthy People 2010* (DHHS, 2010) for the average age of first use of alcohol. Given the potential for the various deleterious effects of alcohol use, especially the earlier one begins drinking, this is a major cause for concern.

Results indicate that the prevalence of the adolescents’ participation in various risky behaviors is high. The prevalence of their participation in various alcohol-related risky behaviors is higher, or almost identical, when compared with those in the YRBS. It may be this design, administering the interview to the adolescents via telephone, captures those (i.e., dropouts, those absent from school the day of the survey, and those attending alternative schools) omitted from the in-school design of the YRBS, who may have a higher prevalence of participating in the behaviors. Binge drinking was a common activity among the drinkers in this research, with a prevalence of 66%, but even more cause for concern is the prevalence among those who reported ever binge drinking (96%).

Findings from this research indicate drinking status, whether early- or late-onset, is associated with participating in other risky behaviors, thus supporting the PBT (Jessor & Jessor, 1977), which says adolescents’ problem behaviors do not occur randomly, but are

likely to co-occur. For instance, drinkers were more likely to report early cigarette smoking. Early- and late-onset drinkers were more likely than nondrinkers to report having had sexual intercourse. A similar relationship is observed for all the other sexual behaviors, except for early sexual intercourse. The findings suggest alcohol use has a relationship with the likelihood of having sexual intercourse and multiple partners and not using a condom. This relationship may be explained not only by the PBT (Jessor & Jessor, 1977), but by other mechanisms, including the pharmacological action of alcohol which may impair judgment and lower inhibitions, and the environment (i.e., peer influences).

Prevalence of participation in some of the risky behaviors, components of the PBT identified by Jessor and Jessor (1977), was consistent with prevalences found by some researchers, but higher for others. Of particular note were the sexual behaviors. Almost 50% of adolescents in the YRBS (CDC, 2008) had ever had sexual intercourse, compared to 55% of the adolescents in this sample. In addition, 33% reported having had sexual intercourse with four or more partners during their lifetime, compared to 15% of those in the YRBS (CDC, 2008). Also of note is the prevalence for these sexual behaviors among the early-onset drinkers, compared with the nondrinkers; early-onset drinkers were significantly more likely to participate in the behaviors, compared with the nondrinkers, with a prevalence higher than that reported in the YRBS (CDC, 2008). This persisted in the multivariable analyses which adjusted for demographic characteristics. This is especially troubling as the questions related to sexual behaviors in this research were only asked of those 15 years of age and older. Had all of the respondents been questioned on their participation in the sexual behaviors the prevalence might be higher, indicating more adolescents engaging in the risky sexual behaviors.

As such, the most effective interventions do not focus on one behavior, but those that are likely to co-occur. In addition, interventions to postpone the first alcoholic drinker are also warranted.

CONCLUSION

Drinking, whether early- or late-onset, was associated with various risky behaviors that carry with them the potential to negatively alter an adolescent's future. Relationships that were statistically significant in the univariable analyses maintained their significance in the multivariable analyses. In addition, early cigarette smoking and marijuana use were more common among the early-onset drinkers, compared with nondrinkers and the late-onset drinkers. Problem drinking behaviors in underage drinkers appear to be similar among early- and late-onset drinkers, and worse when comparing early-onset drinker to nondrinkers. However, there are other behaviors linked to early drinking, such as negative eating-related behaviors (e.g., binge eating or any past-year disordered eating behavior), sexual behaviors such as multiple sexual behaviors or intercourse without a condom, cigarette smoking, and early cigarette smoking.

There is evidence that many adolescents in this research participated in risky behaviors, irrespective of whether they began their alcohol use early (12 years of age, or younger) or not. Therefore, it seems appropriate to screen underage drinkers for participation in other risky behaviors. Given the prevalence of alcohol use among adolescents, in nationally representative samples and this research, and the potential for immediate and long-term consequences associated with alcohol use, especially early use, the findings lend support for the routine screening for alcohol use, and additional screening for those who engage in early alcohol use. The American Academy of Pediatrics (AAP) recommends discussing alcohol use as part of adolescents' routine health care (AAP, 2001; Kulig, 2005). Health care providers, including nurses, working with adolescents should consider screening for alcohol

use, as even casual use, regardless of amount or frequency, is illegal, and carries risk for negative consequences. A provider might begin with the questions based upon the HEEADSS (Home, Education/employment, peer group Activities, Sexuality, Suicide/depression, Safety), a psychosocial interview providing structured questions to enhance communication and decrease stress when interviewing adolescents (Goldenring & Rosen, 2004). Results indicating alcohol use prompt the need for additional screening, using a developmentally appropriate instrument, validated for use with adolescents. One such instrument endorsed by AAP is the CRAFFT, a six-item behavioral health instrument developed to screen for high-risk alcohol and other drug use disorders in persons under 21 years of age (Knight, Sheritt, Shrier, Harris, & Chang, 2002). A score greater than two indicates potential problems with alcohol use and warrants additional assessment and possibly intervention.

In addition to screening for any alcohol use, the age of the first alcoholic drink should be assessed, as other findings (Ellickson et al., 2003; Grant & Dawson, 1997; Hingson et al., 2009; Stueve & O'Donnell, 2005) and this research indicate early-onset drinking, compared to nondrinking, is consistently associated with associated with alcohol-related problems and participating in other risky behaviors.

Although not always statistically significant in this research, adolescent underage drinking, whether early or late, is linked to engaging in other serious behaviors when drinking (e.g., aggressive behavior, sexual intercourse when drinking, risky behavior when drinking, and drunk driving/riding. This also supports the need for routine screening for adolescent alcohol use, and these frequently co-occurring behaviors.

The age of the first alcoholic drink should also be assessed, as nationally representative samples and this research indicate early-onset drinking, compared to nondrinking, is associated with participating in other risky behaviors.

The propensity of drinkers, whether early- or late-onset, to engage in other risky behaviors, is consistent with Jessor's PBT, which explains the co-occurrence of risky behaviors, and with the clustering of risky behaviors in other research (Bartlett et al., 2005). The propensity to engage in multiple behaviors might be related to a risk-taking, sensation-seeking, impulsive personality with an underlying predisposition for unconventionality (Jessor & Jessor, 1977). As such, the most effective interventions would target not a single behavior, such as binge drinking, but several behaviors, such as any use of alcohol, tobacco, or marijuana. Effective interventions would have been empirically tested and would target those behaviors with a high prevalence in the target community. Communities That Care (CTC) is such an intervention. Using findings from prevention science and a public health approach, CTC focuses on strengthening protective factors that help lessen adolescents' participation in various risky behaviors (Substance Abuse and Mental Health Services Administration [SAMHSA], n.d.). Rather than a focus on decreasing risk factors that predict adolescent alcohol use, CTC includes interventions that prevent participation in various risky behaviors, including early alcohol use and marijuana use and cigarette smoking (SAMHSA, n.d.).

Considering the potential consequences of unprotected sexual intercourse and having multiple partners, and how these behaviors can damage lives, participation in risky sexual behaviors is a cause for concern. Each of the potential consequences related to unprotected sexual intercourse carries with it the risk for immediate and long-term consequences. Immediate consequences can include sexually transmitted diseases (STDs) such as Chlamydia and gonorrhea. All STDs, however, are not curable but instead, remain in the body as a constant reminder of earlier choices. These include HIV and herpes simplex-2.

Another long-term consequence includes early, unplanned pregnancies, which may limit an adolescent's future choices and perhaps cause the adolescent to make life choices (e.g. dropping out of high school) that further limit one's future. Health care providers working with adolescents, regardless of the setting, should recognize the multiple risks they face from alcohol use and sexual behaviors. Health care providers must recognize that alcohol use and sexual behaviors frequently co-occur. Early-onset drinking was also associated with early cigarette smoking, even compared to late-onset drinking. If early alcohol use is occurring, it is likely that early smoking is also occurring. Hence, early cigarette smoking might be a marker for early-onset drinking, and should also definitely be assessed by health care providers.

Limitations include the cross-sectional design, the use of self-report data, and no information on the sexual behaviors of those younger than 15 years of age. Because we used only paternal drinking behaviors to determine family type, it may be we have inadvertently omitted adolescents' early AFD and participation in risky behaviors among adolescents whose mothers drink excessively, which was not an exclusion criteria for the parent study. However, alcohol problems are much less common in females, so it is likely there would not be many families where only the mother exhibits excessive drinking. In addition, because of the theory of assortative mating, it is probable the fathers who drink excessively selected mates with similar patterns of alcohol use.

The lack of a standard definition for the terms "Diet strictly" and "Exercise vigorously for a long period of time", used to create the variable "Lose weight," means respondents may have different interpretations of the terms, which is another limitation of the study. Another limitation is inability to determine if the nondrinkers had ever been a passenger with a driver who has had a lot to drink. It may be that even if an adolescent is not drinking, their peer group includes those who are imbibing and driving after binge drinking, which still puts the nondrinker at risk for injury. Subsequent research should assess this relationship. Another limitation is that questions for the alcohol-related problem behaviors were only asked of those with a high exposure to drinking, meaning they reported having drank on at least six occasions. Those drinking on fewer than six occasions may have participated in the various risky behaviors, but that would not be reflected in these analyses.

Another limitation is the unmeasured association between pre-existing mental health problems and the risky behaviors. Internalizing symptomatology, especially depression, is related to adolescent alcohol use (Saraceno, Munafó, Heron, Craddock, van den Bree, 2009), and could be affecting the risky behaviors measured in this research.

Despite the limitations, there are strengths of the research, including the use of the community-based sample, instead of a clinical-based sample which would yield prevalence rates that are artificially inflated rates. Another strength is the partitioning the sample into three groups, thus permitting between group comparisons. Lastly, we were able to determine the adolescents' recency of participation in the risky behaviors.

As noted earlier, even though a smaller percentage of adolescents in this sample had tried alcohol, compared to those in the YRBS, their prevalence in many of the risky behaviors was almost identical, and in some cases higher, than the prevalence of those in the YRBS. The prevalence of binge drinking and past-year binge drinking in the subset of the population suggest binge drinkers may be at increased risk for developing alcohol abuse problems in the future and should be targeted for additional screening and alcohol abuse prevention programs. These prevalence data should be a concern for health care professionals concerned with adolescent health.

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References

- Agrawal A, Grant JD, Waldron M, Duncan AE, Scherrer JF, Lynskey MT, Madden PA, Bucholz KK, Heath AC. Risk for initiation of substance use as a function of age of onset of cigarette, alcohol and cannabis use: Findings in a Midwestern female twin cohort. *Preventive Medicine*. 2006; 43:125–128. [PubMed: 16697036]
- American Academy of Pediatrics. Alcohol use and abuse: A pediatric concern. *Pediatrics*. 2001; 108:185–189. [PubMed: 11433075]
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition*. Washington, DC: American Psychiatric Association; 1994.
- Bartlett R, Holditch-Davis D, Belyea M. Clusters of problem behaviors in adolescents. *Research in Nursing & Health*. 2005; 28:230–239. [PubMed: 15884028]
- Bonnie, RJ.; O'Connell, ME., editors. *Reducing underage drinking: A collective Responsibility*. Committee on Developing a Strategy to Reduce and Prevent Underage Drinking. 2004. Retrieved from http://www.nap.edu/catalog.php?record_id=10729#toc
- Bucholz KK, Cadoret R, Cloninger CR, Dinwiddie SH, Hesselbrock VM, Nurnberger JI, Schuckit MA. A new, semi-structured psychiatric interview for use in genetic linkage studies: A report on the reliability of the SSAGA. *Journal of Studies on Alcohol*. 1994; 55:149–158. [PubMed: 8189735]
- Callas PW, Flynn BS, Worden JK. Potentially modifiable psychosocial factors associated with alcohol use during early adolescence. *Addictive Behaviors*. 2004; 29:1503–1513. [PubMed: 15451120]
- Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance – United States, 2007. *Surveillance Summaries*. MMWR, Morbidity and Mortality Weekly Report. 2008; 57 (No. SS-4).
- Edens EL, Glowinski AL, Pergadia ML, Lessov-Schlaggar CN, Bucholz KK. Nicotine addiction in light smoking African American mothers. *Journal of Addiction Medicine*. 2010; 4:55–60. [PubMed: 20582148]
- Ellickson PL, Tucker JS, Klein DJ. Ten-year prospective study of public health problems associated with early drinking. *Pediatrics*. 2003; 111:949–955. [PubMed: 12728070]
- Goldenring JM, Rosen DS. Getting into adolescent heads: An essential update. *Patient Care for the Nurse Practitioner*. 2004; 21:64–90. Retrieved from http://find.galegroup.com.ezproxy.umsi.edu/gtx/printdoc.do?contentSet=IAC-Documents&docType=IAC&isIllustration=false&sort=DateDescend&tabID=T002&prodId=HRC A&retrieveFormat=&docId=A137230901&searchId=R1&orientation=¤tPosition=1&userGroup=morenetumsl&docLevel=&resultListType=RESULT_LIST&noOfPages=1&inPS=true&pageIndex=0&relatedDocId=&scale=&queryId=R1.
- Grant BF, Dawson DA. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*. 1997; 9:103–110. [PubMed: 9494942]
- Heath AC, Howells W, Bucholz KK, Glowinski AL, Nelson EC, Madden PA. Ascertainment of a mid-western US female adolescent twin cohort for alcohol studies: assessment of sample representativeness using birth record data. *Twin Research*. 2002; 5:107–112. [PubMed: 11931688]
- Hingson RW, Edwards EM, Heeren T, Rosenbloom D. Age of drinking onset and injuries, motor vehicle crashes, and physical fights after drinking and when not drinking. *Alcoholism: Clinical and Experimental Research*. 2009; 33:783–790.
- Hingson, R.; Kenkel, D. Social, health, and economic consequences of underage drinking. In: Bonnie, RJ.; O'Connell, ME., editors. *Reducing Underage Drinking: A Collective Responsibility*. 2004. Retrieved from http://books.nap.edu/openbook.php?record_id=10729&page=351

- Jessor, R.; Jessor, SL. Problem behavior and psychosocial development: A longitudinal study of youth. New York, NY: Academic Press; 1977.
- King KM, Chassin L. A prospective study of the effects of age of initiation of alcohol and drug use on young adult substance dependence. *Journal of Studies on Alcohol and Drugs*. 2007; 68:256–265. [PubMed: 17286344]
- Knight JR, Sherritt L, Shrier LA, Harris SK, Chang G. Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. *Archives of Pediatrics and Adolescent Medicine*. 2002; 156:607–614. [PubMed: 12038895]
- Kulig JW. Tobacco, alcohol, and other drugs: The role of the pediatrician in prevention, identification, and management of substance abuse. *Pediatrics*. 2005; 115:816–821. [PubMed: 15741395]
- Kuperman S, Schlosser SS, Lindral J, Reich W. Relationship of child psychopathology to parental alcoholism and antisocial personality disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1999; 38:686–692. [PubMed: 10361786]
- Lynskey MT, Bucholz KK, Madden PA, Heath AC. Early-onset alcohol-use behaviors and subsequent alcohol-related driving risks in young women: A twin study. *Journal of Studies on Alcohol and Drugs*. 2007; 68:798–804. [PubMed: 17960297]
- Neumark-Sztainer D, Story M, Toporoff E, Himes JH, Resnick MD, Blum RW. Covariations of eating behaviors with other health-related behaviors among adolescents. *Journal of Adolescent Health*. 1997; 20:450–458. [PubMed: 9178082]
- Pisetsky EM, Chao YM, Dierker LC, May AM, Striegel-Moore RH. Disordered eating and substance use in high-school students: Results from the Youth Risk Behavior Surveillance System. *International Journal of Eating Disorders*. 2008; 41:464–470. [PubMed: 18348283]
- Saraceno L, Munafó M, Heron J, Craddock N, van den Bree MBM. Genetic and on-genetic influences on the development of co-occurring alcohol problem use and internalizing symptomatology in adolescence: A review. *Addiction*. 2009; 104:1100–1121. [PubMed: 19438423]
- Sartor CE, Agrawal A, Lynskey MT, Bucholz KK, Madden PAF, Heath AC. Common genetic influences on the timing of first use for alcohol, cigarettes, and cannabis in young African-American women. *Drug and Alcohol Dependence*. 2009; 102:49–55. [PubMed: 19261395]
- Striegel-Moore RH, Huydic ES. Problem drinking and symptoms of disordered eating in female high school students. *International Journal of Eating Disorders*. 1993; 14:417–425. [PubMed: 8293023]
- Stueve A, O'Donnell LN. Early alcohol initiation and subsequent sexual and alcohol risk behaviors among urban youths. *American Journal of Public Health*. 2005; 95:887–893. [PubMed: 15855470]
- Substance Abuse and mental Health Services Administration. Communities That Care planning system. (n.d.). Retrieved from <http://ncadi.samhsa.gov/features/ctc/resources.aspx>
- U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and improving health and objectives for improving health. (Vols. 1 & 2, 2nd ed.). 2000. Retrieved from <http://www.healthypeople.gov/Document/tableofcontents.htm#partb>
- U.S. Department of Health and Human Services. The Surgeon Generals' call to action to prevent and reduce underage drinking. 2007. Retrieved from <http://www.surgeongeneral.gov/topics/underagedrinking/calltoaction.pdf>

Table 1

Sample demographics

Variable	Total Sample (<i>N</i> = 809; <i>n</i> (%))	Drinking Group			<i>p</i> ^{<i>a</i>}
		Nondrinker (<i>n</i> = 439; <i>n</i> (%))	Early-Onset (<i>n</i> = 55; <i>n</i> (%))	Late-Onset (<i>n</i> = 315; <i>n</i> (%))	
Age 15 years	578 (71)	252 (57)	34 (62) ^{<i>b</i>}	292 (93) ^{<i>b,c</i>}	<0.0001
Black race	404 (50)	246 (56)	19 (35) ^{<i>b</i>}	139 (44) ^{<i>b</i>}	0.0003
Female gender	404 (50)	227 (52)	24 (44)	153 (49)	0.44
Family type					
Control	340 (42)	205 (47)	18 (33)	117 (37) ^{<i>b</i>}	0.01 ^{<i>d</i>}
High risk	211 (26)	109 (25)	16 (29)	86 (27) ^{<i>b</i>}	
RDD	258 (32)	125 (28)	21 (38)	112 (36) ^{<i>b</i>}	
Family income (\$)	44,132 ± 32,067 median=40,000	44,223 ± 34,583 median=40,000	44,414 ± 29,435 median=45,000	43,957 ± 28,786 median=40,000	0.61 ^{<i>d</i>}

Note: RDD = recurrent drunk driving. Data are mean ± standard deviation or number of respondents (percent of group).

^{*a*} *p*Value compares drinking groups by ANOVA for continuous variables and chi-square test for categorical variables.

^{*b*} *p* < .05 compared to nondrinkers by post hoc test.

^{*c*} *p* < .05 compared to early-onset drinkers by post-hoc test.

^{*d*} Because of violation of required assumptions, *p* value compares all groups using rank-transformed data.

Table 2

Univariable models

Risky Behavior	Drinking Group				Univariable Model Results ^a				
	Total Sample (N = 809)	Nondrinker (n = 439)	Overall Model			Pairwise Contrasts			
			Early-Onset (n = 55)	Late-Onset (n = 315)	χ^2 (df); p Value	Nondrinker vs. Early-Onset	Nondrinker vs. Late-Onset	Early-Onset vs. Late-Onset	
Alcohol-related behaviors for early- and late-onset drinkers									
Past-year drinking	326/370 (88)	NA	46 (84)	280 (89)	$\chi^2(1)=1.36, p=0.24$	NA	NA	NA	NA
Binge drinking	238/363 (66)	NA	33/54 (61)	205/309 (66)	$\chi^2(1)=0.80, p=0.37$	NA	NA	NA	NA
Past-year binge drinking	225/362 (62)	NA	30/54 (56)	195/308 (63)	$\chi^2(1)=1.41, p=0.24$	NA	NA	NA	NA
Past-year binge drinking, among those reporting ever binge drinking	227/237 (96)	NA	31/33 (94)	196/204 (96)	$\chi^2(1)=0.33, p=0.57$	NA	NA	NA	NA
Aggressive behavior when drinking	73/192 (38)	NA	14/31 (45)	59/161 (37)	$\chi^2(1)=0.90, p=0.34$	NA	NA	NA	NA
Binge eating when drinking	22/139 (16)	NA	1/26 (4)	21/113 (19)	$\chi^2(1)=2.71, p=0.10$	NA	NA	NA	NA
Sex when drinking	41/220 (19)	NA	7/38 (18)	34/182 (19)	$\chi^2(1)=0.00, p=0.98$	NA	NA	NA	NA
Unprotected intercourse when drinking	34/249 (14)	NA	7/38 (18)	27/211 (13)	$\chi^2(1)=0.82, p=0.37$	NA	NA	NA	NA
Risky sex when drinking	55/249 (22)	NA	11/38 (29)	44/211 (21)	$\chi^2(1)=1.19, p=0.27$	NA	NA	NA	NA
Any risk when drinking	106/249 (43)	NA	18/38 (47)	88/211 (42)	$\chi^2(1)=0.52, p=0.47$	NA	NA	NA	NA
Drunk driving/riding	68/220 (31)	NA	14/38 (37)	54/182 (30)	$\chi^2(1)=0.96, p=0.33$	NA	NA	NA	NA
Eating-related behaviors									
Weight loss attempts	230/808 (28)	101 (23)	24 (44)	105/314 (33)	$\chi^2(2)=17.1, p=0.0002$	0.001	0.0006	0.16	
Past-year weight loss attempts	143/201 (71)	63/90 (70)	17/22 (77)	63/89 (71)	$\chi^2(2)=0.61, p=0.74$	NA	NA	NA	
Feel fat	205/808 (25)	97 (22)	24 (44)	84/314 (27)	$\chi^2(2)=13.6, p=0.001$	0.0003	0.09	0.01	
Binge eating	230/808 (28)	91 (21)	26 (47)	113/314 (36)	$\chi^2(2)=29.2, p<0.0001$	<0.0001	<0.0001	0.10	
Past-year binge eating	165/230 (72)	60/91 (66)	20/26 (77)	85/113 (75)	$\chi^2(2)=2.14, p=0.34$	NA	NA	NA	
Disordered eating	372/808 (46)	161 (37)	36 (6)	175/314 (56)	$\chi^2(2)=34.9, p<0.0001$	<0.0001	<0.0001	0.14	
Past-year disordered eating	270/372 (73)	113/161 (70)	33/36 (92)	124/175 (71)	$\chi^2(2)=7.08, p=0.03$	0.009	0.93	0.01	
Sexual behaviors ^d									
Had intercourse	318/578 (55)	68/252 (27)	28/34 (82)	222/29 (76)	$\chi^2(2)=116, p<0.0001$	<0.0001	<0.0001	0.37	

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Risky Behavior	Drinking Group						Univariable Model Results ^a		
	Total Sample (N = 809)	Nondrinker (n = 439)	Early-Onset (n = 55)	Late-Onset (n = 315)	Overall Model		Pairwise Contrasts		
					$\chi^2(df; p \text{ Value})$		Nondrinker vs. Early-Onset	Nondrinker vs. Late-Onset	Early-Onset vs. Late-Onset
Multiple partners	106/318 (33)	12/68 (18)	12/28 (43)	82/222 (37)	$\chi^2(2)=9.39, p=0.009$	0.01	0.004	0.004	0.52
No condom	148/318 (47)	14/68 (21)	17/28 (61)	117/222 (53)	$\chi^2(2)=20.1, p<0.0001$	0.0003	<0.0001	<0.0001	0.42
Sum of risky sexual behaviors					$\chi^2(2)=140, p<0.0001$	<0.0001	<0.0001	<0.0001	0.25
0	260/578 (45)	184/252 (73)	6/34 (18)	70/292 (24)					
1	119/578 (21)	41/252 (16)	7/34 (21)	71/292 (24)					
2	19/578 (34)	27/252 (11)	21/34 (62)	151/292 (52)					
Marijuana use	214/26)	30 (7)	26 (47)	158 (50)	$\chi^2(2)=138, p<0.0001$	<0.0001	<0.0001	<0.0001	0.59
Cigarette smoking	332 (41)	72 (16)	41 (75)	219 (70)	$\chi^2(2)=205, p<0.0001$	<0.0001	<0.0001	<0.0001	0.42
Early behaviors									
Early marijuana use	25/214 (12)	2/30 (7)	9/26 (35)	14/158 (9)	$\chi^2(2)=14.0, p=0.0009$	0.009	0.66	0.0003	
Early cigarette smoking	141/332 (42)	35/72 (49)	31/41 (76)	75/219 (34)	$\chi^2(2)=24.2, p<0.0001$	0.004	0.02	<0.0001	
Early sexual intercourse ^b	167/318 (53)	39/68 (57)	17/28 (61)	111/222 (50)	$\chi^2(2)=2.27, p=0.32$	NA	NA	NA	NA

Note. NA = not applicable. Data are the number of respondents participating in the risky behavior. Figures in parentheses denote percentage of group. To denote missing data, a denominator is included when the number of respondents to the item is not equal to the total number of possible respondents in the group.

^a Chi-square statistics compare the presence of the risky behavior across drinking groups by generalized estimating equation (GEE). Within the context of the GEE model and when significant ($p < .05$), statistical contrasts were used to assess pairwise comparisons between drinking groups. p Values are reported for each pairwise contrast. Otherwise, these are listed at "NA."

^b Includes respondents 15 years old or older.

Table 3

Final Multivariable models

Risky Behavior	Multivariable Model Results ^a			
	Overall Model		Pairwise Contrasts	
	$\chi^2(df); p$ Value	Nondrinker vs. Early-Onset	Nondrinker vs. Late-Onset	Early-Onset vs. Late-Onset
Alcohol-related behaviors for early- and late-onset drinkers				
Past-year drinking				NA
Drinking group	$\chi^2(1)=2.17; .14$			
Race	$\chi^2(1)=8.66; .003$			
Family type	$\chi^2(2)=2.76; .25$			
Binge drinking				NA
Drinking group	$\chi^2(1)=0.99; .32$			
Race	$\chi^2(1)=53.4; <.0001$			
Family type	$\chi^2(2)=7.22; .03$			
Age	$\chi^2(1)=43.1; <.0001$			
Past-year binge drinking				
Drinking group	$\chi^2(1)=0.10; .75$			
Race	$\chi^2(1)=47.3; <.0001$			
Family type	$\chi^2(2)=4.71; .09$			NA
Age	$\chi^2(1)=4.97; .03$			
	$\chi^2(1)=32.8; <.0001$			
Past-year binge drinking, among those reporting ever binge drinking				NA
Drinking group	$\chi^2(1)=0.21; .64$			
Race	$\chi^2(1)=0.14; .71$			
Family type	$\chi^2(2)=0.14; .93$			
Income	$\chi^2(1)=6.90; .009$			
Aggressive behavior when drinking				NA
Drinking group	$\chi^2(1)=0.88; .35$			
Race	$\chi^2(1)=0.29; .59$			
Family type	$\chi^2(2)=5.86; .05$			
Gender	$\chi^2(1)=8.15; .004$			
Sex when drinking				NA
Drinking group	$\chi^2(1)=0.32; .57$			
Race	$\chi^2(1)=0.52; .47$			
Family type	$\chi^2(2)=5.03; .08$			
Age	$\chi^2(1)=9.25; .002$			
Unprotected intercourse when drinking				NA

Risky Behavior	Multivariable Model Results ^a			
	Overall Model	Pairwise Contrasts		
	$\chi^2(\text{df}); p$ Value	Nondrinker vs. Early-Onset	Nondrinker vs. Late-Onset	Early-Onset vs. Late-Onset
Drinking group	$\chi^2(1)=1.19; .27$			
Race	$\chi^2(1)=1.65; .20$			
Family type	$\chi^2(2)=1.54; .46$			
Age	$\chi^2(1)=4.40; .04$			
Risky sex when drinking				NA
Drinking group	$\chi^2(1)=2.62; .11$			
Race	$\chi^2(1)=0.83; .36$			
Family type	$\chi^2(2)=6.00; .05$			
Age	$\chi^2(1)=10.1; .002$			
Any risk when drinking				NA
Drinking group	$\chi^2(1)=1.00; .32$			
Race	$\chi^2(1)=8.10; .004$			
Family type	$\chi^2(2)=6.54; .04$			
Gender	$\chi^2(1)=6.37; .01$			
Age	$\chi^2(1)=6.85; .009$			
Drunk driving/riding				NA
Drinking group	$\chi^2(1)=2.28; .13$			
Race	$\chi^2(1)=5.77; .02$			
Family type	$\chi^2(2)=0.76; .68$			
Age	$\chi^2(1)=9.30; .002$			
Eating-related behaviors				
Weight loss attempts		.0004; 2.95 (1.62–5.39)	.0003; 1.86 (1.33–2.59)	.12; .63 (0.35–1.14)
Drinking group	$\chi^2(2)=19.6; <.0001$			
Race	$\chi^2(1)=4.02; .04$			
Family type	$\chi^2(2)=1.05; .59$			
Income	$\chi^2(1)=9.54; .002$			
Past-year weight loss attempts		NA	NA	NA
Drinking group	$\chi^2(2)=0.42; .81$			
Race	$\chi^2(1)=0.05; .48$			
Family type	$\chi^2(2)=1.75; .42$			
Feel fat		.0001; 3.27 (1.78–6.03)	.08; 1.36 (0.96–1.93)	.005; .42 (0.22–0.77)
Drinking group	$\chi^2(2)=15.1; .0005$			
Race	$\chi^2(1)=0.40; .53$			
Family type	$\chi^2(2)=0.50; .78$			
Gender	$\chi^2(1)=35.2; <.0001$			
Income	$\chi^2(1)=12.1; .0005$			
Binge eating		.0001; 3.88 (2.09–7.19)	<.0001; 2.64 (1.82–3.83)	.23; .68 (0.37–1.27)

Risky Behavior	Multivariable Model Results ^a			
	Overall Model	Pairwise Contrasts		
	$\chi^2(df); p$ Value	Nondrinker vs. Early-Onset	Nondrinker vs. Late-Onset	Early-Onset vs. Late-Onset
Drinking group	$\chi^2(2)=35.2; <.0001$			
Race	$\chi^2(1)=4.83; .03$			
Family type	$\chi^2(2)=0.43; .80$			
Age	$\chi^2(1)=4.44; .04$			
Past-year binge eating		NA	NA	NA
Drinking group	$\chi^2(2)=1.14; .57$			
Race	$\chi^2(1)=2.05; .15$			
Family type	$\chi^2(2)=1.58; .45$			
Disordered eating				
Drinking group	$\chi^2(2)=37.8; <.0001$	$<.0001; 3.70 (2.03-6.75)$	$<.0001; 2.27 (1.69-3.06)$	.11; .61 (0.34-1.12)
Race	$\chi^2(1)=5.94; .01$			
Family type	$\chi^2(2)=0.06; .97$			
Income	$\chi^2(1)=5.27; .02$			
Past-year disordered eating				
Drinking group	$\chi^2(2)=6.73; .03$	.01; 5.12 (1.48-17.7)	.28; 1.34 (0.79- 2.27)	.02; .26 (0.08-0.84)
Race	$\chi^2(1)=0.24; .62$			
Family type	$\chi^2(2)=1.48; .48$			
Age	$\chi^2(1)=4.65; .03$			
Sexual behaviors ^{a2}				
Had intercourse				
Drinking group	$\chi^2(2)=96.1; <.0001$	$<.0001; 24.0 (7.75-74.5)$	$<.0001; 11.8 (7.13-19.6)$	.19; .49 (0.17-1.41)
Race	$\chi^2(1)=32.9; <.0001$			
Family type	$\chi^2(2)=2.13; 0.34$			
Income	$\chi^2(1)=10.3; .001$			
Age	$\chi^2(1)=40.1; <.0001$			
Multiple partners				
Drinking group	$\chi^2(2)=8.58; .01$	.01; 3.96 (1.40-11.2)	.007; 2.78 (1.32 - 5.82)	.39; .70 (0.31-1.57)
Race	$\chi^2(1)=1.44; .23$			
Family type	$\chi^2(2)=4.37; .11$			
Gender	$\chi^2(1)=11.2; .0008$			
Age	$\chi^2(1)=8.16; .004$			
No condom				
Drinking group	$\chi^2(2)=14.8; .0006$	.0006; 5.79 (2.13-15.8)	.0005; 3.66 (1.77-7.60)	.26; .63 (0.29-1.40)
Race	$\chi^2(1)=0.02; .90$			
Family type	$\chi^2(2)=1.23; .54$			
Gender	$\chi^2(1)=5.55; .02$			
Age	$\chi^2(1)=12.8; .0003$			

Risky Behavior	Multivariable Model Results ^a			
	Overall Model	Pairwise Contrasts		
	$\chi^2(\text{df}); p$ Value	Nondrinker vs. Early-Onset	Nondrinker vs. Late-Onset	Early-Onset vs. Late-Onset
Sum of risky sexual behaviors (0–2)		<.0001; 21.8 (9.76–48.7)	<.0001; 9.88 (6.64–14.7)	.04; .45 (0.21–0.96)
Drinking group	$\chi^2(2)=140; <.0001$			
Race	$\chi^2(1)=30.0; <.0001$			
Family type	$\chi^2(2)=2.19; .33$			
Income	$\chi^2(1)=9.07; 0.003$			
Age	$\chi^2(1)=51.2; <.0001$			
Marijuana use		<.0001; 10.9 (5.72–20.6)	<.0001; 9.02 (5.77–14.4)	.56; .83 (0.45–1.54)
Drinking group	$\chi^2(2)=107; <.0001$			
Race	$\chi^2(1)=3.28; .07$			
Family type	$\chi^2(2)=10.3; .006$			
Age	$\chi^2(1)=26.9; <.0001$			
Cigarette smoking		<.0001; 14.4 (7.17–28.8)	<.0001; 8.60 (5.90–12.5)	.15; .60 (0.30–1.21)
Drinking group	$\chi^2(2)=149; <.0001$			
Race	$\chi^2(1)=1.11; .29$			
Family type	$\chi^2(2)=20.4; <.0001$			
Gender	$\chi^2(1)=5.30; .02$			
Income	$\chi^2(1)=7.57; .006$			
Age	$\chi^2(1)=13.7; .0002$			
Early behaviors				
Early cigarette smoking		.004; 3.74 (1.51–9.26)	.58; .85 (0.48–1.5)	.0003; .23 (0.10–0.50)
Drinking group	$\chi^2(2)=13.3; .001$			
Race	$\chi^2(1)=0.17; .68$			
Family type	$\chi^2(2)=6.67; .04$			
Age	$\chi^2(1)=27.1; <.0001$			
Early sexual intercourse ^b		NA	NA	NA
Drinking group	$\chi^2(2)=2.80; .25$			
Race	$\chi^2(1)=4.91; .03$			
Family type	$\chi^2(2)=1.25; .54$			
Gender	$\chi^2(1)=8.92; .003$			
Age	$\chi^2(1)=67.0; <.0001$			

Note. NA = not applicable; OR = odds ratio; 95% CI = 95% confidence interval; GEE = generalized estimation equation.

^a Chi-square statistics compare the presence of the risky behavior across drinking onset groups by GEE. Statistics are reported for each covariate included in the final GEE model, after adjusting for all variables in the model. Within the context of the overall GEE model and when the group effect was significant ($p < 0.05$), statistical contrasts were used to assess pairwise comparisons between drinking groups. p Values (p) and adjusted odds ratios (ORs) with 95% confidence intervals are reported for each pairwise comparison. ORs reflect the increased odds of the presence of the risky behavior as compared to the referent drinking group. Nondrinkers are used as the reference group for nondrinkers versus early-onset and for nondrinkers versus late-onset drinkers, and early drinkers are the referent group for early-onset versus late-onset.

^b. Includes respondents 15 years old or older.

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