Estimated Blood Alcohol Levels Reached by "Binge" and "Nonbinge" Drinkers: A Survey of Young Adults in Montana

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The authors examined estimated blood alcohol concentrations (BACs) reached by so-called "binge drinkers" and "nonbinge drinkers" using a survey of young adults (age 18–24 years) in Montana. One third of drinkers were classified as "binge drinkers" the last time they consumed alcohol, using a gender-specific definition commonly applied to young adults: for men, having 5 or more drinks in a row, and for women, having 4 or more drinks. BAC levels were estimated on the basis of length of drinking episode, gender, weight, and typical alcohol consumption level. Among "binge drinkers," 63% did not reach .10% BAC or higher, 48% did not reach .08% BAC or higher, and 30% did not reach .06% BAC or higher. Of the "nonbinge drinkers," 7% reached .06% BAC or higher and 4% reached .08% BAC or higher. These findings underscore the potential problem of using binge drinking as a description and shorthand measure of drinking to intoxication.

"Binge drinking" has become a widely used term in popular media to describe a pattern of abusive alcohol consumption by America's college students, largely due to Harvard's College Alcohol Study, a national survey on college student drinking (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). For men, the study defined "binge drinking" as having five or more drinks in a row within the previous 2 weeks and for women as having four or more drinks in a row. Other researchers have also adopted this term, but with the 5-drink standard applied to both genders (Johnston, O'Malley, & Bachman, 1997; Presley, Meilman, & Cashin, 1996). Several researchers and prevention experts have objected to using binge drinking to describe this level of alcohol consumption. Beyond question, researchers should continue asking whether people have consumed 5/4+ drinks in a row in the previous 2 weeks, as this measure has been used for several decades, but calling this level of consumption "binge drinking" is another matter altogether (DeJong, 1998).

One reason is that 5/4 drinks "in a row" does not conform to the more traditional notion of a drinking binge or to the standard clinical definition, which typically refers to an acute but extended episode of abusive drinking (Schuckit, 1998). Prevention experts have asserted that, with the public equating "binge" with "bender," newspaper headlines proclaiming that "nearly half" of college students are "binge drinkers" reinforces an exaggerated view of student drinking, which may in turn increase perceived normative pressure toward alcohol abuse (DeJong & Linkenbach, 1999).

In defending their definition, the Harvard research team correctly pointed out that students who report "binge drinking" at least once in the previous 2 weeks are far more likely to report a wide range of problems due to alcohol consumption (Wechsler, Molnar, Davenport, & Baer, 1999). Consider, however, that beyond very low consumption levels, risk-function analyses generally show the relationship between alcohol consumption and risk of serious alcohol-related problems to be a monotonically increasing function (Edwards et al., 1994). Thus, no matter what cutoff point is selected, people who have had that number of drinks or higher will on average report more alcohol-related problems than those who have had fewer drinks. In fact, the research literature does not provide a justification for a singular focus on a cutoff point of 5/4+ drinks.

This newer definition of "binge drinking" may also serve to distort the nature and scope of the alcohol problem on college campuses. Specifically, the "binge drinking" definition does not specify a time period over which the alcohol is consumed "in a row," neither does it take into account the drinker's body weight. These are critical shortcomings, if the essential concern is not that college students are consuming a certain number of drinks but that some of them are doing so at a rate that elevates their blood alcohol level, leading to a dangerous level of impairment.

In this study we examined the empirical relationship between so-called "binge drinking" and estimated levels of intoxication. Using a survey of young adults in Montana, we calculated the percentage of "binge drinkers" who reached an estimated BAC that stayed below .08% or .10%. These are the standard *per se* limits that legally define alcohol-impaired driving in the United States (DeJong & Hingson, 1998). Next, we calculated the percentage of "nonbinge drinkers" who nevertheless reached an estimated BAC at or above these levels. For comparison, we did these same sets of calculations using a .06% BAC cutoff. Inexperienced drinkers at relatively low BAC levels (.02%–.05% BAC) generally experience euphoria and reduced anxiety. As BAC reaches higher levels, however, judgment and motor coordination become impaired; this becomes more severe as BAC rises from .06% to .10% (U.S. Department of Health and Human Services, 1993).

Method

Sample Description

In 1998, the Montana Social Norms Project, based at Montana State University, contracted with a market research company to conduct a telephone survey of 500 young adults (ages 18–24 years) living in Montana. Researchers drew the sample at random from a database of residence telephone numbers, with proportional sampling by county. Montana State University based staff later recontacted a random subsample of 10% to verify their survey participation. Three respondents were eliminated from the study sample because of insufficient or unreliable data, leaving a total sample size of 497. All respondents were between 18 and 24 years of age; about half (46%) were under the legal drinking age of 21. More than half (58%) were female. Fully 90% were Caucasian, whereas 5% were Native American and 5% were of other races or ethnic groups. About one third (32%) were living with a spouse, whereas 42% were living with parents, and 27% had children living with them. One third (33%) of these young adults were attending college.

Measures

The survey protocol included questions on personal alcohol consumption patterns, perceived drinking norms, and related issues. Specific questions of interest were (a) "Think back to the last time you used alcohol. How many alcoholic drinks did you consume? Approximately how many hours did you drink?" (b) "When you consume alcohol, what is the typical number of drinks you consume at one time?" (c) "Generally speaking, during a typical drinking occasion, what is the length of time you spend drinking?"

The interviewer also recorded the respondent's gender and approximate body weight. With this information we could apply a standard formula for estimating maximum BAC, which incorporates the average amount of alcohol by volume in a typical drink, the average proportion of water in the bloodstream, average differences in fat-to-water ratios between men and women, and the average metabolism rate for the dissipation of alcohol in the blood (U.S. Department of Transportation, National Highway Traffic Safety Administration, 1994). Further refinement to this calculation was made possible by the inclusion of two additional questions: (a) "On how many days in a typical month do you consume alcoholic beverages?" and (b) "When you consume alcohol, what is the typical number of drinks you consume at one time?" On average, heavier drinkers (those who typically drink 60 or more drinks per month) metabolize alcohol at a somewhat faster rate, and the BAC calculation for these drinkers can be adjusted slightly to take that fact into account (U.S. Department of Transportation, National Highway Traffic Safety Administration, 1994).

Results

"Binge Drinking" Levels

Just over half (52%) of the respondents reported drinking alcohol. Among drinkers, 33% would be classified as a "binge drinker" on their last drinking occasion using the gender-specific definition. Regarding their "typical" drinking occasion, 50% would be classified as "binge drinkers." Fully 86% of the respondents classified as "binge drinkers" the last time they consumed alcohol reported that this was a typical level of drinking for them. Likewise, 56% of respondents classified as "binge drinkers" on the basis of their typical level of alcohol consumption also reported this level of drinking the last time they drank.

Estimated BACs

We calculated an estimated maximum BAC for each respondent who drank alcohol. On their last drinking occasion, 72% of drinkers stayed below .06% BAC, whereas 28% were at or above that level; 20% reached .08% BAC or higher, and 12% reached .10% BAC or higher. Regarding a typical drinking occasion, 55% of the drinkers reached an estimated BAC below .06%, whereas 45% were at or above that level; 34% reached a .08% BAC or higher, and 23% reached a .10% BAC or higher.

BAC Estimates for "Binge" and "Nonbinge Drinkers"

Maximum BAC estimates for "binge drinkers" on their last drinking occasion were as follows: (a) 37% reached .10% BAC or higher, 63% remained below that level; (b) 52% reached .08% BAC or higher, 48% remained below that level; and (c) 70% reached .06% BAC or higher, 30% remained below that level. Regarding a typical drinking occasion, maximum BAC estimates for "binge drinkers" were somewhat higher: (a) 46% reached .10% BAC or higher, 55% remained below that level; (b) 63% reached .08% BAC or higher, 37% remained below that level; and (c) 81% reached .06% BAC or higher; 20% remained below that level.

Regarding their most recent drinking occasion, none of the "nonbinge drinkers" reached an estimated .10% BAC or higher; 4% reached .08% BAC or higher, and 7% reached .06% BAC or higher. In regard to a typical drinking occasion, none of the "nonbinge drinkers" reached .10% BAC or higher; 6% reached .08% BAC or higher, and 20% reached .06% BAC or higher.

In Figure 1 the percentage of "binge drinkers" whose BAC estimates did not reach an intoxicated level as well as the percentage of "nonbinge drinkers" whose estimated BACs were indicative of intoxication are displayed. For both genders the clear majority of "binge drinkers" did not reach a .10% BAC, and a sizable minority did not reach even .06% BAC. Among those labeled as "binge drinkers," the percentage not intoxicated at each of the three BAC cutoff points was higher for men than for women. The small percentages of "nonbinge drinkers" who reached the .06% and even the .08% BAC levels were more notable among women.

We further examined characteristics of the 38 respondents who were classified as "binge drinkers" on their last drinking occasion but did not reach an estimated maximum BAC of .08% or higher. Of these so-called "binge drinkers," 21 were men who averaged 196 lbs (89 kg) and consumed an average of 6.9 drinks in 4.7 hr, and 17 were women who averaged 157 lbs (71 kg) and consumed
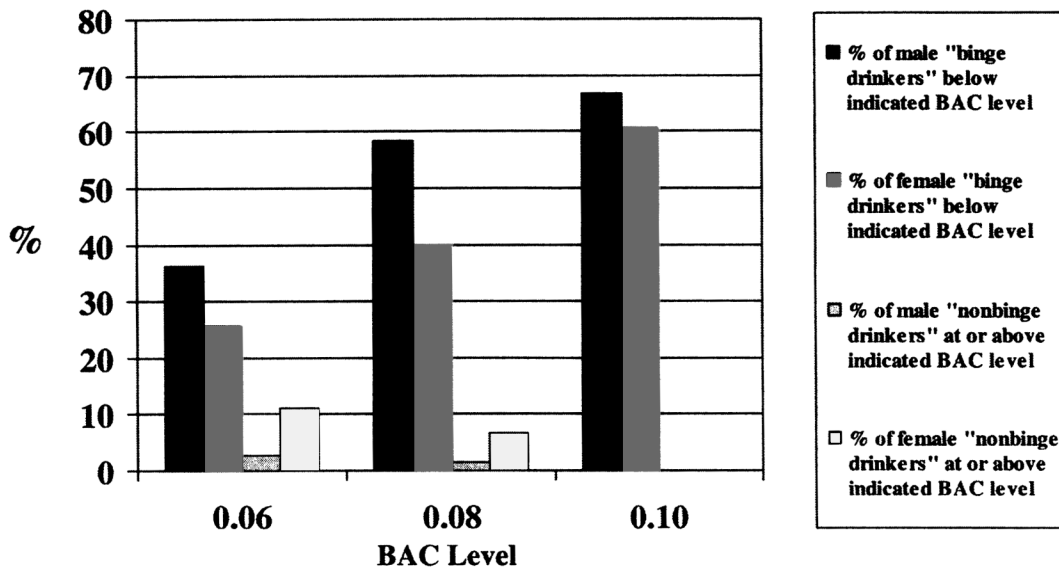
Figure 1. Percentage of "binge drinkers" who are not intoxicated and percentage of "nonbinge drinkers" who are intoxicated at estimated blood alcohol concentration (BAC) levels for young adult drinkers in Montana by gender. *Binge drinking* is defined for men as having five or more drinks and for women as having four or more drinks.

an average of 4.2 drinks in 4.6 hr. Seven respondents classified as "nonbinge drinkers" on their last drinking occasion still reached an estimated BAC of .08% or higher. Six were women, who averaged 117 lbs (53 kg) and consumed an average of 3.0 drinks in 1.8 hr. We found similar profiles of these two types of drinkers when we looked at alcohol consumption during a typical drinking occasion.

Discussion

This study underscores the potential problem of using the term *binge drinking,* as measured by 5/4+ drinks consumed in a row, as shorthand for drinking to intoxication. A sizable percentage of young adults in Montana who would be labeled as "binge drinkers" by this definition actually do not reach estimated maximum BAC levels that public health experts associate with high-risk impairment (U.S. Department of Health and Human Services, 1993). This is not to say that these drinkers are at no greater risk, as even slightly elevated BAC levels increase somewhat the risk of serious accidental injury (Zador, 1991). At issue here, however, is how to communicate effectively and credibly with young adults in order to motivate them to reduce risky drinking and support policy changes that can reduce alcohol problems.

Research has firmly established that U.S. teens and young adults have a greatly exaggerated view of how many of their peers engage in heavy drinking (Perkins, Meilman, Leichliter, Cashin, & Presley, 1999). This misperception exists as a false norm that produces greater pressure toward high-risk drinking than when the norm is accurately perceived (Perkins, 1997). Use of the term "binge drinking," meaning 5/4+ drinks in a row, is likely to feed this misperception. For example, using the gender-specific definition, the 1999 Harvard survey found that 44% of students at U.S. 4-year colleges could be classified as "binge drinkers" (Wechsler, Lee, Kuo, & Lee, 2000). Given the connotations of the term *binge drinking,* these findings could be easily misconstrued to reinforce

the misperception that nearly half of college students drink to the point of intoxication. An alternative focus on alcohol impairment or intoxication levels would make clearer that the vast majority of young adults, including college students, either abstain or consume alcohol in a manner that avoids high-risk BAC levels.

There are several limitations to this study. First, the data are unvalidated self-reports. Estimates of the number of drinks consumed, the number of hours spent drinking, and body weight have unknown accuracy. This same criticism can be leveled against any self-report survey on alcohol consumption. Second, for this telephone survey, the term *drink* was not defined, as is the case with many written surveys. Third, the BAC calculation assumes that the alcohol was consumed at a steady rate during the entire drinking episode, which may not be warranted in some cases. Future studies should include more detailed questioning about the exact time course of the most recent drinking episode, including food and nonalcoholic beverages consumed. Finally, we have reported an analysis from only one statewide survey; additional research is needed, both in other states and nationally, to replicate these findings. In general, future survey research on drinking patterns should include questions about the time course, body weight and height (to calculate body mass index), and typical alcohol consumption patterns in order to facilitate the calculation of BAC estimates.

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