BACs of University Students Returning Home at Night

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Abstract

To study alcohol use and transportation choices by university students, we interviewed a random sample of university students as they returned to their residences late at night (10 p.m. to 3 a.m.). Interviews were conducted on all nights of the week. As part of the interview, a breath alcohol measurement was obtained using a portable breath test device. Of 1,846 persons interviewed, 1,790 provided a breath measurement. Seventy-two percent had zero BACs and only 2% of students had very high BACs ($\geq$ 0.15%). BACs were highest on Thursday, Friday and Saturday nights. The majority of students interviewed were pedestrians (68%); the remainder were drivers (19%) and passengers (13%). Drivers were least likely to have BACs exceeding 80 mg/dL (2%), followed by passengers (10%) then pedestrians (17%). Among those below the legal drinking age (for whom the BAC limit when driving is zero), 7% of drivers, 20% of passengers and 27% of pedestrians had a non-zero BAC ($\geq$ 0.02%). Persons who identified themselves as designated drivers were somewhat less likely to have BACs above 20 mg/dL and 80 mg/dL than those who were not designated drivers, but these differences were small. About a quarter of designated drivers had BACs of 20 mg/dL or higher.

Introduction

Excessive consumption of alcohol by college students exposes them to a wide range of risks associated with negotiating the physical and social world while one=s cognitive functioning is impaired. In addition to the well-known risks of driving after excessive drinking, students also experience increased risk of injury as pedestrians, bicyclists, in falls and fires. Excessive use increases the likelihood of violence, including rape, and of unprotected sex. The purpose of this study was to develop a more complete understanding of student alcohol use on one campus, in

preparation for a program to reduce excessive or dangerous use. This paper focuses on findings that pertain to alcohol use and students= transportation home late in the evening.

Without an accurate measure of actual drinking by individuals who provide self-reports about their drinking behaviors, it is difficult to determine the degree to which we can take self-reports from this age group as accurate. In the same way that actual measures of drinking and driving (in roadside surveys) paints a somewhat different picture than do measures of alcohol involvement in crashes, or self-reported drinking-driving, direct measurement of BAC promises additional insight into issues surrounding college student drinking. For example, this sort of research holds the prospect of relating BAC to most recent drinking location, to day of week, or to social circumstances. In addition it can help to shed additional light on transportation choices (e.g., use of designated drivers) as they relate to blood alcohol content.

Methods

Interview procedure. Data were collected on 20 nights in October and November 1997, between 10 pm and 3 am on all nights of the week. Randomly selected groups of individuals were approached by a single member of a four person interview team and asked if they would participate. Once consent was obtained, all members of two- or three-person groups were interviewed. For larger groups three individuals were randomly selected for interview. The interview took approximately 4 minutes and requested information about activities during the night, drinking (where, when, what, how much), perceptions about alcohol use among students, mode of transportation and ways used to avoid drinking-driving. Drinkers were asked whether they felt any effects and to estimate their blood alcohol concentration (BAC).

Sample. The sampling procedure was designed to obtain a representative sample of students at a large public university who were returning home in the evening. The campus was divided into five geographically distinct routes along which interview teams walked. These routes passed by every dormitory, fraternity, sorority, and private dormitory on or near campus. The sampling plan was developed such that every residential location was visited at least six times: once both before and after midnight on week nights (Sunday through Wednesday), Thursdays and weekends (Friday & Saturday). On each night that data were collected, three interview teams worked, covering separate routes. Respondents were sampled in the vicinity of student residences. To avoid attracting too much attention, interview teams moved continuously between residences, typically collecting data at a single location for no more than 10 minutes on a single visit. As teams approached a residence they randomly sampled individuals who were either approaching the residence or standing in front and obviously associated with the residence.

Approximately half the undergraduate student body lives on campus. In order to obtain information about those who live in private residences we also conducted interviews at five large apartment complexes that, according to university records, housed a large concentration of university students. At these locations, the interview procedure resembled that typically used in roadside surveys (Foss, Beirness & Sprattler, 1993). Individuals were interviewed at entrances to the apartment complex while they remained in their vehicles. An initial screening question was used to avoid interviewing occupants of vehicles with no students.

Results

Of the 2,530 persons contacted 2,186 (86.4%) cooperated. 2,023 (80%) completed the interview and provided a breath measurement; 109 (4.3%) declined the interview, but did provide a breath sample, and 54 (2.1%) did the interview but would not provide a breath sample.

Although persons sampled on campus were interviewed regardless of their student status, results presented here represent only those 1,846 individuals explicitly identified as students enrolled at the university where the interviews were conducted. A breath alcohol measurement was obtained for 1,790 (96.9%) of these individuals. Data presented here are *not* weighted to account for differential probability of selection. Accordingly, estimates of overall use for the campus must be considered tentative. Subgroup comparisons are likely to be less sensitive to varying likelihood of selection. Table 1 shows the full BAC distribution for the three times of the week studied.

Table 1: Blood Alcohol Concentration by time of week

BAC (mg/dL)	Week night	Thursday night	Weekend night	Overall
Zero	86.0	67.5	64.4	72.5
6 - 19	1.5	3.0	6.3	4.0
20 - 49	2.4	5.7	7.2	5.3
50 - 79	3.3	7.9	6.2	5.5
80 - 99	1.0	3.8	4.1	3.0
100 - 149	4.7	10.0	9.2	7.8
150 - 199	.5	1.4	1.6	1.2
200 +	.7	.8	1.0	.8
Total N	615	369	806	1,790

Any drinking

Overall 28% of respondents reported drinking and 28% registered a non-zero BAC. These were mostly, but not always, the same individuals. Among those who reported drinking during the evening, 12% registered a zero BAC and another 10% were below 20 mg/dL. Conversely, 2.3% reported not drinking but registered a positive BAC value; half of these (1.1%) were below 20 mg/dL. As Table 1 shows, drinking on Thursdays was similar to that on weekends; on weeknights, any drinking was less common. However, among those who did drink, BACs reached similarly high levels.

Heavy drinking

Heavy drinking among college students has typically been measured as self-reported consumption of five or more drinks on an occasion at least once during the past two weeks. Using this criterion, 49% of respondents were heavy drinkers (five or more drinks on three or more occasions in the past 14 days). On the evening of the interview, however, only 11% qualified as heavy drinkers based on self-reported consumption of five or more drinks. The median BAC of those individuals who qualify as heavy drinkers on the evening they were interviewed was 103 mg/dL.

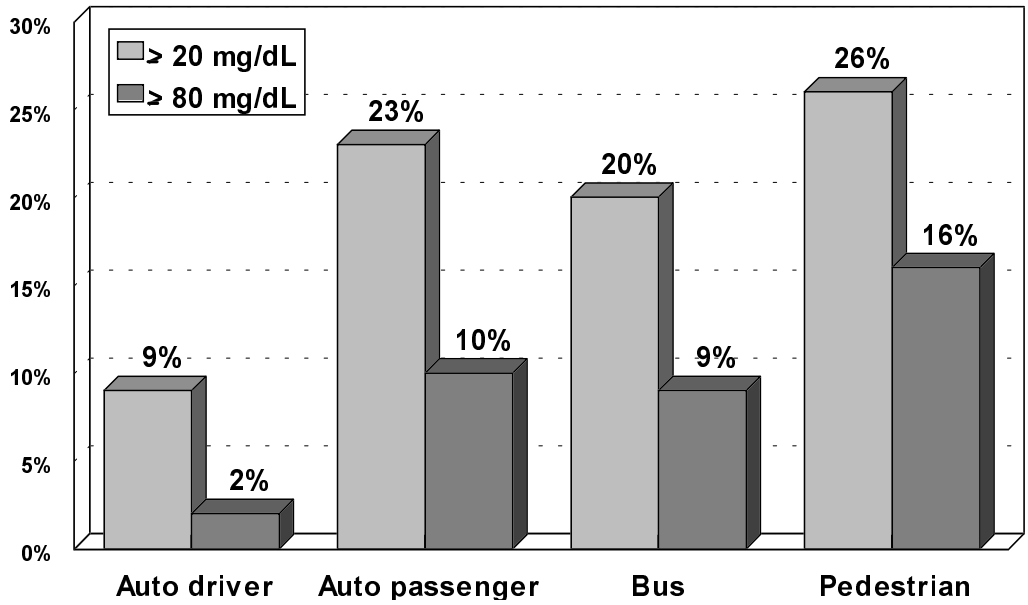
Demographic characteristics

Fifty-one percent of respondents were female; 84% were white; 77% were younger than 21. Any drinking, as well as BACs above 80 and 150 mg/dL were equally common for persons below and above the legal drinking age (21). Males were more likely than females to have positive BACs as well as BACs above 80 mg/dL, but there was no difference in the percent with very high BACs.

Transportation Home

A slight majority of students arrived at their destination (home) on foot (51%). Thirty-eight percent arrived in a car and 10% rode a bus (campus shuttle). Fifty-nine percent of those who arrived in a car were the driver. Figure 1 shows the percent of persons with a BAC above 20 and 80 mg/dL by mode of arrival. Only 2% of drivers had a BAC above 80 mg/dL; 10% of passengers, 9% of bus riders and 16% of pedestrians had BACs that high. Among underage persons, for whom the legal BAC limit to drive is zero, 8% of drivers had a non-zero BAC.

Figure 1. BAC of Students by Mode of Arrival



Members of those groups who indicated they had been drinking and had arrived in a car were asked whether they had a designated driver. Sixty-seven percent indicated that they had used a designated driver. Among those drivers who indicated that they had been a designated driver, 34% registered a non-zero BAC, 27% were above 20 mg/dL and 7% were above 80 mg/dL. The median BAC of self-identified designated drivers was 24 mg/dL, which is essentially identical to that of drivers in groups that had been drinking who indicated that they were not a designated driver (30 mg/dL).

Discussion

In addition to the general finding that students on the studied campus do not appear to drink nearly so much as is generally believed, it appears that in general students do a good job reducing their exposure to alcohol-related crashes as drivers and passengers. A very small proportion of drivers exhibited BACs above 80 mg/dL. In fact, the proportion (2%) is identical to that found in a statewide roadside survey of North Carolina drivers a few years earlier (Foss et al., 1997). BACs of passengers were substantially higher than those for drivers, suggesting that individuals who have had a substantial amount to drink either planned not to drive or decided on an alternative mode of transportation to avoid driving while impaired. These alternative choices in the present case were to walk, to ride public transportation or to ride as a passenger in a car.

The finding that a substantial proportion of so-called designated drivers did not refrain from drinking is consistent with other recent studies which suggest that the designated driver concept is not implemented the way it was originally envisioned (Fell, 1997). Rather than a person refraining from drinking in order to ensure he/she has no risk of impairment, individuals tend to pick the person they believe has had the least to drink or who is in the best condition to drive. Although this is not a judgment that impaired individuals are well-equipped to make, according to a study of BACs among drivers and passengers in British Columbia, it does seem to be the case that in a vehicle with more than one occupant, the driver is generally the one with the lower BAC (Foss & Beirness, 1996).

The low rate of drinking drivers in this population S one where it is widely believed that drinking and risky drinking is rampant S is encouraging. However, the finding that one in six persons who arrived on foot had a BAC in excess of 80 mg/dL is cause for concern. It has long been feared by public health experts that an exclusive focus on preventing only driving after drinking, rather than seeking to curb excessive drinking, might produce secondary risks to individuals. The notion that discouraging an impaired person from driving will only mean we have an impaired pedestrian (or bicyclists) is overly simplistic. Nonetheless it is clear that, at least in the population studied here, individuals have gotten and acted upon the message that drinking-driving is unwise but have not yet recognized that merely avoiding driving when impaired does not eliminate the risk of harm.

It is important not to generalize findings of this study to other settings without due caution. The campus where data were collected is largely self-contained and is located in a small community (population 40,000). Students can easily walk to many activities; indeed, because of limited parking it is often easier to walk than to drive to activities on or near campus. There are other limitations to the present study that should be kept in mind. We were only able to interview

those persons who were outside at some point between 10 p.m. and 3 a.m. Those who remained indoors were ineligible for sampling. We suspect this means that our sample somewhat overrepresents drinkers. Even though some persons may have begun and ended drinking inside their residence, this is inconsistent with typical student drinking behavior, which is a social activity. In addition, those who are out of their rooms later in the evening are more likely to be out specifically to drink than would be the case earlier in the evening.

A more serious limitation is that students who live off campus were not well-represented in our sample. Although we did conduct interviews with 276 individuals who live off campus, these were in large apartment complexes whose residents may differ from those who live at with parents, in smaller complexes, or in freestanding dwelling units. It is also more likely that those who live off campus did not venture out of their residences during an evening to the point that they would have been eligible for sampling (which, in several locations, would have required leaving the apartment complex in a vehicle, not merely stepping outdoors, as was the case on campus). We are confident, however, that our sample is highly representative of students who live on or adjacent to campus who had occasion to transport themselves home between the hours of 10 pm and 3 am.

References

Fell, J., Voas, R.B., Lange, J.E. (1997) Designated driver concept: Extent of use in the USA. In: 41st Annual Proceedings: Association for the Advancement of Automotive Medicine, Des Plaines, IL: Association for the Advancement of Automotive Medicine, pp. 1-10.

Foss, R.D., Beirness, D.J., & Sprattler, K. (1994). Seat belt use among drinking drivers in Minnesota. *American Journal of Public Health*, 88(11), 1732-1737.

Foss, R.D, & Beirness, D.J. (1996) Drinking passengers and their drivers: Roadside Survey Results. In *40th Annual Proceedings, Association for the Advancement of Automotive Medicine*. DesPlaines, IL: Association for the Advancement of Automotive Medicine, pp. 263-274**.**

Foss, R,D, Beirness, DJ, Tolbert, WG, Wells, JK & Williams, AF (1997) Effect of an intensive sobriety checkpoint program on drinking-driving in North Carolina. In C. Mercier-Guyon (Ed.) *Alcohol, Drugs and Traffic Safety: Proceedings of the 14th International Conference*. Vol 2.; 943-948. Centre d=Etudes et de Recherches en Médecine du Trafic: Annecy, France.

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