# Patterns of Alcohol Consumption and Alcohol-Impaired Driving in the United States

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**Background:** Alcohol-related motor vehicle crashes kill approximately 17,000 Americans annually and were associated with more than $51 billion in total costs in 2000. Relatively little is known about the drinking patterns of alcohol-impaired (AI) drivers in the United States.

**Methods:** 2006 Behavioral Risk Factor Surveillance System (BRFSS) was analyzed for alcohol consumption and self-reported AI driving among U.S. adults aged ≥18 years for all states. Alcohol consumption was divided into 4 categories: binge/heavy, binge/nonheavy, nonbinge/heavy, and nonbinge/nonheavy. Binge drinking was defined as ≥5 drinks for men or ≥4 drinks for women on one or more occasions in the past month, and heavy drinking was defined as average daily consumption of >2 drinks/day (men) or >1 drink/day (women). The prevalence of AI driving was examined by drinking pattern and by demographic characteristics. Logistic regression analysis was used to assess the association between drinking patterns and AI driving.

**Results:** Five percent of drinkers were engaged in AI driving during the past 30 days. Overall, 84% of AI drivers were binge drinkers and 88% of AI driving episodes involved binge drinkers. By drinking category, binge/nonheavy drinkers accounted for the largest percentage of AI drivers (49.4%), while binge/heavy drinkers accounted for the most episodes of AI driving (51.3%). The adjusted odds of AI driving were 20.1 (95% CI: 16.7, 24.3) for binge/heavy, 8.2 (6.9, 9.7) for binge/nonheavy, and 3.9 (2.4, 6.3) for nonbinge/heavy drinkers, respectively.

**Conclusions:** There is a strong association between binge drinking and AI driving. Most AI drivers and almost half of all AI driving episodes involve persons who are not heavy drinkers (based on average daily consumption). Implementing effective interventions to prevent binge drinking could substantially reduce AI driving.

**Key Words:** Binge Drinking, National Estimates, Impaired Driving, Alcohol Consumption Patterns, Epidemiology.

INJURY FROM MOTOR vehicle crashes is the leading cause of death in the United States among people aged 1–34 years (CDC 2000). Approximately 40% of all traffic-related deaths involve alcohol, and alcohol-related crashes caused 16,694 deaths and an estimated 258,000 injuries in 2004 (National Highway Traffic Safety Administration 2004). The estimated economic cost of alcohol-related crashes in 2000 was $51 billion (Blincoe et al., 2002).

Most strategies for preventing alcohol-impaired (AI) driving have focused on discouraging people from operating a vehicle while intoxicated. Many of these strategies, including administrative revocation of licenses, establishing a minimum legal drinking age, passing laws limiting blood alcohol concentration (BAC) to 0.08 g/dl, and setting up sobriety checkpoints, have been associated with significant reductions in deaths from alcohol-related crashes of motor vehicles (CDC 2001, McArthur and Kraus, 1999; National Highway Traffic Safety Administration 2004, Shults et al. 2001, Villaveces et al., 2003; Voas et al., 2000). Even so, a recent study reported that episodes of AI driving (from self-reports) among U.S. adults increased significantly in the late 1990s, most of them among binge drinkers (Quinlan et al. 2005). This increase coincides with an increase in episodes of binge drinking (consuming 5 or more drinks on a single occasion) among U.S. adults (Naimi et al., 2003a). As reported by Midanik, "binge" levels of alcohol consumption typically result in BAC high enough to reach or exceed the legal limit of 0.08 g/dl or greater (Midanik, 1999).

Although various studies have assessed the drinking patterns of persons who have been convicted of driving while intoxicated (Baker et al., 2002; Brewer et al., 1994; Midanik

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1999, Miller et al., 1986), most drinking and driving episodes go undetected. In 2005, nearly 1.4 million drivers were arrested for driving under the influence of alcohol or narcotics (Department of Justice (US) 2007), which represents less than 1% of the 159 million self-reported episodes of alcohol-impaired driving among U.S. adults each year (Quinlan et al., 2005). Relatively little is known about the drinking patterns of the much larger population of persons who engage in AI driving but who may not have been arrested or convicted for this offense.

Furthermore, while the association between binge drinking and AI driving has been described, it is not clear whether persons who drive while impaired also tend to drink frequently or have high average daily alcohol consumption. It is also unclear how the prevalence of AI driving across drinking patterns varies by factors known to be important predictors of AI driving (e.g., age, gender, race, and ethnicity). Knowledge of these drinking patterns could improve the design of programs and policies to prevent excessive consumption of alcohol and ultimately reduce AI driving and its consequences.

## METHODS

Behavioral Risk Factor Surveillance System (BRFSS) 2006 was used to examine patterns of alcohol consumption among U.S. adults and the relationship between drinking patterns and AI driving. The BRFSS is a state-based, cross-sectional telephone survey of the U.S. adults conducted by state health departments and coordinated by the Centers for Disease Control and Prevention (CDC). The survey uses a multistage cluster design based on random-digit dialing to select a representative sample of noninstitutionalized civilians aged 18 years or older in each state. Data from the states are combined and weighted for age, sex, and race/ethnicity to produce nationally representative estimates. A detailed description of the survey methods is available elsewhere (Gentry et al., 1985; Remington et al., 1988).

In 2006, there were 355,710 completed interviews; the BRFSS CASRO (Council of American Survey Research Organizations) response rate was 51.4% (Centers for Disease Control and Prevention 2006). The study population was limited to persons that reported being current drinkers living in the 50 states of the U.S. and the District of Columbia who answered all of the questions pertaining to alcohol consumption in the 2006 survey; nondrinkers, participants who did not answer all of these questions and those who gave inconsistent responses were excluded from the study. The final study population consisted of 157,914 current drinkers.

Three core questions on alcohol were used to assess consumption and a separate question on AI driving was used to assess impaired driving behavior. The first of these core questions asks about frequency: "During the past 30 days, how many days per week or per month did you have at least 1 drink of any alcoholic beverage?" The second question is on quantity: "On the days when you drank, about how many drinks did you drink on average?" The third question covers the frequency of binge drinking: "Considering all types of alcoholic beverages, how many times during the past 30 days did you have 5 or more drinks on an occasion?" The separate question on AI driving asks respondents how many times they drove during the past 30 days after having had "perhaps too much to drink."

Current drinking was defined as consuming alcohol on one or more of the past 30 days. Excessive intake of alcohol was defined on the basis of either heavy drinking (high average consumption), binge drinking (high per occasion consumption), or both. Binge drinking was defined as consuming 5 or more drinks (men) or 4 or more drinks (women) on one or more occasions in the past 30 days (in previous years of BRFSS a 5-drink threshold was used for both women and men). Heavy drinking was defined as an average consumption of more than 2 drinks per day during the past 30 days (i.e., $>60$ drinks/month) among men and more than 1 drink per day during the past 30 days among women ($>30$ drinks/month). Drinks consumed during the past month were determined by multiplying the frequency of alcohol consumption by the usual average quantity of alcohol consumption. This is the standard method to calculate average consumption in BRFSS, and therefore we did not "index" binge drinks in the calculation of average consumption as we did in a recent publication (Stahre et al., 2006). AI driving was defined as a nonzero response to the question on AI driving.

The binge drinking and heavy drinking measures were combined to create 4 mutually exclusive drinking categories based on per-occasion and average alcohol consumption: binge/heavy, binge/nonheavy, nonbinge/heavy, and nonbinge/nonheavy. The prevalence of AI driving was then estimated by dividing the weighted number of persons reporting AI driving in each of the drinking categories by the weighted number of people in that category. Annual episodes of AI driving were calculated by multiplying the monthly estimates by 12. Logistic regression was used to calculate adjusted odds ratios (ORs). The variables used in the modeling (age, race or ethnicity, gender, marital status, education, and income) were based on the findings in the literature that these variables have been associated with drinking or AI driving. To account for the complex sampling strategy used in the BRFSS, SUDAAN version 8.0 was used to calculate prevalence estimates with 95% confidence intervals (CI s) and to perform a logistic regression analysis.

## RESULTS

Most current drinkers (69.0%) did not drink excessively (i.e., they were nonbinge, nonheavy drinkers) (Table 1). However, among excessive drinkers, over 90% reported binge drinking, either with or without high average daily alcohol consumption. In decreasing order, the prevalence of the various patterns of drinking among current drinkers was binge/nonheavy (21.8%), binge/heavy (7.6%), and nonbinge/heavy drinkers (1.7%). In all, 29.4% of all drinkers reported 1 or more binge drinking episodes in the past 30 days.

The socio-demographic characteristics of drinkers varied with drinking pattern (Table 1). The prevalence of binge/heavy drinking was highest among persons aged 18–24 years, men, the never married, those with low incomes ($<\$20{,}000$), and those who did not complete high school. The prevalence of binge/nonheavy drinking was highest among those aged $<40$ years (35.9%, 18–24; 29.5%, 25–39), decreasing gradually with increasing age thereafter. Binge/nonheavy drinking was also more prevalent among Hispanics, men, and persons who had never married. In contrast, the nonbinge/heavy pattern was most common among those aged 55 years or more, white people, women, and those previously married, but varied little by education or income. The use of seatbelts "all the time" differed by alcohol consumption pattern and was reported by 70.8% of heavy/binge drinkers, 74.1% of nonheavy/binge drinkers, 85.6% of heavy/nonbinge drinkers, and 84% of nonheavy/nonbinge drinkers (data not shown).

Overall, 5.0% of current drinkers reported at least 1 episode of AI driving in the past 30 days (Table 2). The highest

**Table 1.** Prevalence of Alcohol Consumption Patterns Among Current Drinkers by Selected Characteristics, BRFSS 2006

| | Binge[a]/heavy[b] % (95% CI) | Binge/nonheavy % (95% CI) | Nonbinge/heavy % (95% CI) | Nonbinge/nonheavy % (95% CI) |
|---|---|---|---|---|
| Total ($n$ = 157,914) | 7.6 (7.3–7.9) | 21.8 (21.3–22.3) | 1.7 (1.6–1.8) | 69.0 (68.4–69.5) |
| Age (years) | | | | |
| 18–24 | 15.0 (13.5–16.7) | 35.9 (33.7–38.2) | 0.3 (0.2–0.6) | 48.8 (46.4–51.1) |
| 25–39 | 7.6 (7.1–8.2) | 29.5 (28.5–30.4) | 0.6 (0.5–0.8) | 62.2 (61.2–63.2) |
| 40–54 | 7.4 (6.9–7.8) | 19.3 (18.6–20.0) | 1.6 (1.4–1.8) | 71.8 (71.0–72.5) |
| 55+ | 4.2 (3.9–4.5) | 9.1 (8.6–9.7) | 3.5 (3.2–3.8) | 83.1 (82.5–83.8) |
| Race or ethnicity | | | | |
| White | 7.7 (7.4–8.1) | 20.9 (20.4–21.4) | 1.9 (1.8–2.0) | 69.5 (69.0–70.1) |
| Black | 5.7 (4.7–6.8) | 19.9 (18.1–21.7) | 1.3 (0.9–1.8) | 73.1 (71.1–75.0) |
| Hispanic | 8.5 (7.2–10.0) | 29.7 (27.3–32.2) | 0.5 (0.3–0.8) | 61.3 (58.8–63.8) |
| Other | 5.7 (4.4–7.2) | 22.3 (19.4–25.5) | 0.7 (0.4–1.3) | 71.3 (68.0–74.4) |
| Gender | | | | |
| Male | 8.4 (7.9–8.8) | 27.2 (26.4–27.9) | 0.8 (0.7–0.9) | 63.7 (62.8–64.5) |
| Female | 6.7 (6.3–7.1) | 15.5 (14.9–16.0) | 2.6 (2.4–2.8) | 75.2 (74.6–75.9) |
| Marital status | | | | |
| Married | 5.5 (5.2–5.8) | 18.8 (18.3–19.3) | 1.6 (1.5–1.8) | 74.1 (73.5–74.6) |
| Previously married | 8.6 (7.8–9.3) | 17.8 (16.9–18.8) | 2.8 (2.5–3.2) | 70.8 (69.7–71.9) |
| Never married | 12.5 (11.6–13.5) | 32.4 (31.0–33.8) | 0.9 (0.7–1.1) | 54.2 (52.8–55.7) |
| Education | | | | |
| <High school | 13.0 (11.2–15.0) | 31.7 (29.1–34.4) | 1.0 (0.7–1.4) | 54.4 (51.6–57.1) |
| High school graduate | 9.2 (8.6–9.9) | 25.4 (24.3–26.4) | 1.4 (1.2–1.6) | 64.0 (62.8–65.1) |
| Some college | 8.4 (7.7–9.0) | 22.3 (21.4–23.3) | 1.4 (1.3–1.6) | 67.9 (66.8–68.9) |
| College graduate | 5.3 (5.0–5.7) | 18.0 (17.3–18.7) | 2.0 (1.8–2.2) | 74.7 (74.0–75.4) |
| Income, $ | | | | |
| <20,000 | 10.3 (9.1–11.6) | 27.3 (25.3–29.4) | 1.4 (1.0–1.7) | 61.0 (58.9–63.1) |
| 20,000–34,999 | 8.8 (7.9–9.8) | 23.2 (21.9–24.7) | 1.5 (1.3–1.8) | 66.4 (64.9–67.9) |
| 35,000–49,999 | 7.8 (7.1–8.6) | 22.7 (21.5–24.0) | 1.8 (1.5–2.1) | 67.7 (66.3–69.0) |
| 50,000–75,000 | 6.9 (6.2–7.5) | 22.0 (20.9–23.0) | 1.4 (1.2–1.6) | 69.8 (68.7–71.0) |
| >75,000 | 7.0 (6.5–7.6) | 19.9 (19.1–20.7) | 1.8 (1.6–2.0) | 71.2 (70.4– 72.1) |

CI, confidence interval.
[a]Binge drinking was defined as consuming ≥5 drinks on an occasion for a man and ≥4 drinks for a woman.
[b]Heavy drinking was defined as consuming on average more than 2 drinks per day (man) or more than 1 drink per day (woman).

prevalence of AI driving was among binge/heavy drinkers (22.2%), followed by the binge/nonheavy category (11.3%). Among binge/heavy drinkers, the highest rates of AI were in those aged <40 years, men, the previously married or never married, and those who had at least some postsecondary education (includes college graduates). Differences by income and race/ethnicity were not significant. Among binge/nonheavy drinkers, the prevalence of AI driving varied little by age or race/ethnicity but was still higher among men than women and among those who were married than among the never married. Neither income nor education was a significant factor in the binge/nonheavy category. In contrast to the high prevalence of AI driving among binge drinkers, the prevalence of AI driving did not exceed 6.2% among those who did not binge drink.

The distribution of drinking days and the average number of drinks consumed on drinking days among AI drivers was analyzed (data not shown). Overall, 58.6% of these drivers drank on fewer than 15 days of the month, and 25.2% drank on fewer than 5 days per month. On their drinking days, however, 36.6% of AI drivers consumed 5 or more drinks on average. Among binge/nonheavy drinking AI drivers, 82.3% drank 14 or fewer days of the month, and 34.4% of the group drank on fewer than 5 days. Among binge/heavy drinking AI drivers 1.7% drank fewer than 5 days and 32.2% drank 14 or fewer days per month.

The adjusted ORs of AI driving (using nonbinge/nonheavy drinkers as the referent category), the weighted number of AI drivers nationally in 2006, the average frequency of AI driving, and the weighted number of AI driving episodes in 2006 are shown in Table 3 by drinking category. The adjusted ORs of AI driving among persons in the binge/heavy and binge/nonheavy groups were 20.1 and 8.2, respectively, while for nonbinge/heavy drinkers they were 3.9.

Overall, 84.3% of the AI drivers were binge drinkers, and 88.6% of AI driving episodes involved binge drinkers (Table 3). By category, 49.4% of AI drivers were binge/nonheavy drinkers, and these drinkers contributed 37.3% of the total AI driving episodes per year. Binge/heavy drinkers accounted for just over half (51.3%) of the AI driving episodes in 2006, reflecting the difference in average episodes per month between binge/heavy and binge/nonheavy drinkers (3.6 vs. 1.8 respectively). A much smaller proportion of the AI drivers were either nonbinge/heavy or nonbinge/nonheavy drinkers (1.0% and 15.7% respectively), and together these 2 groups combined for only 11.5% of the total AI driving episodes.

## DISCUSSION

This is the largest population-based assessment of the drinking patterns of AI drivers in the U.S. Excessive per-occasion

**Table 2.** Prevalence of Alcohol-Impaired Driving[a] Among Current Drinkers, by Alcohol Consumption Pattern and Selected Characteristics, BRFSS, 2006

| | Binge[b]/heavy[c] % (95% CI) | Binge/nonheavy % (95% CI) | Nonbinge/heavy % (95% CI) | Nonbinge/nonheavy % (95% CI) |
|---|---|---|---|---|
| Total | 22.2 (20.4–24.5) | 11.3 (10.5–12.1) | 3.2 (2.1–4.9) | 1.1 (1.0–1.3) |
| Age (years) | | | | |
| 18–24 | 30.8 (25.5–36.6) | 12.5 (10.4–15.0) | 0.0 | 2.4 (1.5–3.7) |
| 25–39 | 24.9 (21.7–28.5) | 11.8 (10.5–13.2) | 4.1 (1.2–12.7) | 1.3 (1.1–1.7) |
| 40–54 | 17.8 (15.6–20.3) | 11.0 (9.9–12.3) | 3.4 (2.2–5.3) | 1.1 (0.9–1.3) |
| 55+ | 11.0 (9.2–13.1) | 7.7 (6.4–9.1) | 2.0 (1.3–3.2) | 0.6 (0.5–0.8) |
| Race or ethnicity | | | | |
| White | 21.7 (19.8–23.8) | 11.5 (10.7–12.5) | 3.3 (2.1–5.2) | 1.0 (0.9–1.2) |
| Black | 18.7 (11.5–28.8) | 9.3 (7.0–12.2) | 2.4 (0.3–12.9) | 1.9 (1.3–2.7) |
| Hispanic | 28.4 (21.0–37.2) | 11.1 (8.2–14.7) | 2.1 (0.3–12.9) | 1.9 (1.3–2.7) |
| Other | 18.8 (9.7–33.2) | 9.0 (6.0–13.2) | 0.4 (0.1–2.8) | 0.9 (0.5–1.7) |
| Gender | | | | |
| Male | 25.9 (23.2–28.8) | 13.5 (12.4–14.6) | 3.6 (1.8–7.2) | 1.5 (1.2–1.8) |
| Female | 16.8 (14.6–19.3) | 6.7 (5.8–7.7) | 3.0 (1.8–5.1) | 0.8 (0.6–1.0) |
| Marital status | | | | |
| Married | 16.8 (14.8–19.1) | 9.2 (8.4–10.1) | 1.6 (1.0–2.4) | 0.8 (0.7–1.0) |
| previously married | 23.4 (19.2–28.1) | 12.9 (11.0–15.0) | 3.3 (2.0–5.4) | 1.1 (0.9–1.3) |
| Never married | 27.8 (24.2–31.8) | 14.0 (12.2–15.9) | 4.7 (2.5–8.6) | 2.3 (1.8–3.0) |
| Education | | | | |
| <High school | 15.7 (10.8–22.2) | 8.3 (6.3–10.8) | 0.1 (0.0–0.8) | 1.1 (0.6–1.9) |
| High school graduate | 23.8 (20.2–27.7) | 10.7 (9.1–12.5) | 3.1 (1.2–7.4) | 0.8 (0.6–1.0) |
| Some college | 22.7 (19.4–26.5) | 10.6 (9.2–12.1) | 4.1 (1.4–11.1) | 1.4 (1.1–1.8) |
| College graduate | 22.6 (19.5–26.0) | 13.2 (11.8–14.7) | 3.0 (2.0–4.5) | 1.2 (1.0–1.4) |
| Income ($) | | | | |
| <20,000 | 22.7 (17.6–28.8) | 11.0 (8.1–14.6) | 0.4 (0.1–1.4) | 0.8 (0.5–1.5) |
| 20,000–34,999 | 18.9 (15.4–23.1) | 10.9 (8.9–13.2) | 5.0 (2.2–11.2) | 1.3. (0.9–1.9) |
| 35,000–49,999 | 27.8 (22.8–33.5) | 9.8 (8.3–11.5) | 6.2 (2.0–17.6) | 0.9 (0.7–1.2) |
| 50,000–75,000 | 24.0 (19.8–28.8) | 11.1 (9.4–13.0) | 3.8 (1.9–7.6) | 1.3 (1.0–1.8) |
| >75,000 | 22.3 (18.7–26.3) | 12.8 (11.4–14.3) | 2.2 (1.3–3.7) | 1.2 (1.0–1.6) |

CI, confidence interval.
[a]Alcohol-impaired driving was defined as driving in the past 30 days after having "perhaps too much to drink."
[b]Binge drinking was defined as consuming ≥5drinks on an occasion for a man and ≥4 drinks for a woman.
[c]Heavy drinking was defined as consuming on average more than 2 drinks per day (man) or more than 1 drink per day (woman).

**Table 3.** Odds Ratios for Alcohol-Impaired Driving, Weighted Number of AI Drivers Nationally, Average AI Episodes per Month, and Weighted AI Driving Episodes Nationally, BRFSS 2006

| Alcohol consumption pattern | Adjusted[a] OR for AI driving (95% CI) | Weighted no. (%) of AI drivers | AI driving episodes/month | Weighted no. (%) of AI driving episodes |
|---|---|---|---|---|
| Binge/heavy | 20.1 (16.7, 24.3) | 1,790,000 (33.9%) | 3.6 | 77,100,000 (51.3%) |
| Binge/nonheavy | 8.2 (6.9, 9.7) | 2,610,000 (49.4%) | 1.8 | 56,100,000 (37.3%) |
| Nonbinge/heavy | 3.9 (2.4, 6.3) | 55,000 (1.0%) | 2.0 | 1,290,000 (0.9%) |
| Nonbinge/nonheavy | 1.0 (referent) | 830,000 (15.7%) | 1.6 | 15,900,000 (10.6%) |

AI, alcohol impaired; CI, confidence interval.
[a]Adjusted for age, gender, marital status, education, and income.

alcohol consumption (i.e., binge drinking) was more strongly associated with AI driving than was excessive average consumption (i.e., heavy drinking). Specifically, binge drinkers accounted for 84% of AI drivers and for 89% of AI driving episodes. By contrast, heavy drinkers accounted for 35% of AI drivers and 52% of all AI driving episodes. Among the binge drinkers, the binge/heavy drinkers were responsible for more than half of AI driving episodes and had more than twice the odds of AI driving as the binge/nonheavy category. However, more than half of the AI drivers who binge drank were *not* classified as heavy drinkers based on their average daily alcohol consumption. In fact, binge/nonheavy drinkers had more than twice the odds of AI driving as nonbinge/heavy drinkers, after adjusting for age, gender, martial status, education, and income. Similar to these findings, Dawson (1999) found that drinkers characterized by high per-occasion consumption contributed more to AI driving than did those with high average consumption.

As in other studies by Caetano &McGrath (2005) and Chou et al. (2006), this study found that the prevalence of AI driving was high for binge drinkers across educational and income categories, including among those who attended college and who had high annual incomes (i.e., > $75,000). This finding differs from the inverse relationship between income/education and other important health risk behaviors (e.g., smoking, unprotected sex). This

educated group could have been exposed to widespread messages about AI driving, and yet they continue to engage in this risky behavior. It is widely known, however, that binge drinking is common among students at America's colleges and universities (Chou et al., 2006) and high rates of binge drinking have been reported in persons with more than high school education and middle to high incomes in another study (Curry et al., 2000). In planning for effective interventions, we should consider that both binge drinking and AI driving extend across socioeconomic levels and through multiple age groups.

Although BRFSS does not collect information about alcohol dependence, most AI drivers drank during fewer than half the days in the preceding month, and binge drank less than once per week on average. Other studies that have assessed alcohol dependence among AI drivers demonstrate that only 10–15% of binge drinkers are alcohol dependent (Buhler et al., 2004; Dawson, 1999; Hasin et al., 2001; Slutske, 2005). As such, our findings are consistent with the notion that most AI drivers are not alcohol dependent, and therefore should be responsive to broad-based environmental alcohol control policies (e.g., increased alcohol excise taxes) and from brief counseling interventions by health care providers (US Preventive Services Task Force 1996; Wechsler et al., 2003).

There are several limitations to this study. First, BRFSS is a telephone survey that excludes institutionalized adults (e.g., college students living in dormitories); in addition, a telephone-based survey may have less coverage of high-risk drinkers (Nelson et al., 2004). Second, there may be reporting bias because self-perceived impairment is subjective and different people can have different standards regarding how many drinks might constitute "perhaps too much to drink." Third, the prevalence estimates of drinking and AI driving may be conservative. Given the 51.4% response rate, there may be underreporting and nonresponse biases. Efforts are made to minimize bias by weighting of the data based on age, gender, and race to ensure the data are representative of the U.S. adult population. Our distributions and proportions were similar those tabulated when BRFSS had a higher response rate (Quinlan et al., 2005). It is unclear how nonresponse bias may have affected the relationship between reported drinking patterns and AI driving. Finally, there may be underreporting of both excessive drinking and AI driving because these behaviors carry a social stigma and possible legal consequences. On the other hand, studies suggest that questions on consumption of alcohol are valid when responses are perceived to be confidential (Cooper et al., 1981; Maisto et al., 1982; Nelson et al., 2001).

This study found that the binge drinkers were less likely to be consistent seatbelt wearers than nonbinge drinkers and the finding is consistent with the fact that binge drinkers engage in other high risk behaviors (Naimi et al., 2003b). Seatbelt use mitigates injury and prevents fatalities. Binge drinkers compound their risk of injury by not wearing seatbelts along with the fact that alcohol itself can potentiate the risk of serious injury and death in a crash. This potential effect modification among binge drinkers supports the importance of addressing drinking and driving behaviors to maximally reduce motor vehicle crashes.

Screening and brief counseling interventions in primary care settings have also been shown to be effective at reducing excessive drinking and its medical consequences (Fleming et al., 1997; Grossberg et al., 2004). Clinicians should provide prevention services in accordance with the recommendations of the US Preventive Services Task Force (1996) and the NIAAA (Coben and Larkin 1999, Wechsler et al. 2003). In the long term, efforts to reduce excessive drinking also offer the opportunity to alter the drinking trajectories of those otherwise destined to become dependent on alcohol. This is critical, because alcohol dependent persons may be less responsive to countermeasures for AI driving than those who are not dependent and they are more likely to be habitual AI drivers (Speiglman, 1997).

Our findings are in accordance with at least one other study (Howat et al., 2004) indicating that successful efforts to prevent or reduce AI driving should include aggressive interventions to reduce excessive drinking in conjunction with interventions to reduce driving by those who are already impaired. Examples of effective population-based interventions to reduce excessive consumption include increasing alcohol excise taxes, enforcing the minimum legal drinking age, reducing the density of alcohol outlets and their business hours, restricting happy hours and discounts for buying a large volumes of drinks, and enforcement of laws that prohibit sales to already intoxicated persons (Babor, 2003; Forster et al., 1995; McKnight and Streff, 1994; Saffer and Grossman, 1987; Shults et al., 2001; Stout et al., 2000; Wechsler and Nelson, 2001; Wechsler et al. 2003). Examples of effective interventions to reduce AI driving include lowering legal BACs, promptly suspending the licenses of people arrested for driving while impaired, sobriety checkpoints, alcohol ignition interlock programs for convicted AI driving offenders, and sustained public education and enforcement (Chaloupka et al., 1993; Coben and Larkin, 1999; Elder et al., 2004; Shults et al. 2001). In conclusion, efforts to reduce AI driving should focus on preventing excessive drinking behaviors—particularly binge drinking—that are so strongly associated with AI driving.

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