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Associations between binge and heavy drinking and health behaviors in a nationally representative sample

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Abstract

Background—Binge and heavy drinking are noted in the literature for their relatively high prevalence and adverse health-related effects.

Design and participants—We used data from the 2006 Behavioral Risk Factor Surveillance Survey (BRFSS) to determine the associations between binge and heavy drinking and a wide range of health-related variables, including positive and negative health behaviors, preventive care practices, and quality of life indices in a nationally representative sample of 344,793 adults.

Results—Rates of binge and heavy drinking in the current sample were 15% and 5%, respectively. Binge and heavy drinking were more common among men, younger adults, and individuals with higher incomes and at least some college education. After controlling for relevant demographic variables, binge and heavy drinking were associated with a number of adverse health-related and preventive care behaviors (e.g., smoking, failing to receive a mammogram), as well as less life satisfaction and a greater number of poor mental health days than those who did not engage in these drinking behaviors. Interestingly, binge and heavy drinking were also associated with some positive health-related variables (e.g., recent physical activity, positive perceptions of one's own health).

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Contributors

All authors contributed to the development of this manuscript and have approved the final version. Drs. Grubaugh and Paul contributed to the design, write-up of first draft, and lit search for this manuscript. Drs. Egede, Ellis, and Grubaugh contributed to the statistical analyses for the manuscript. Dr. Frueh assisted in the write-up of subsequent versions of the manuscript.

Conflict of interest

There are no known conflicts of interest with regard to this manuscript.

Conclusions—The current study findings provide additional information regarding the relations between health-related attitudes and behaviors and binge and heavy drinking in the U.S. population. Implications of study findings are discussed.

Keywords

Binge drinking; Heavy drinking; Health behaviors; Preventive care; BRFSS

1. Introduction

Binge drinking and heavy drinking are noted in the literature with regard to their high prevalence and associations with a number of adverse health-related outcomes. Binge drinking is generally defined as the consumption of four or more drinks on one occasion for women and five or more drinks on one occasion for men (Courtney & Polich, 2009; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). Heavy drinking is generally defined as a daily average of more than one drink per day for women and more than two drinks per day for men (USDA & DHHS, 2005). In recent large nationally representative studies, approximately 20% of adults reported binge drinking at least once in the previous year (SAMHSA, 2007, 2008; Schoenborn & Adams, 2010), and these figures are consistent with prevalence rates from 2000 to 2001 (SAMHSA, 2002). Rates of heavy drinking in the U. S. are also notable, stabilizing around 6.9% in 2007 (SAMHSA, 2008) after an increase from approximately 5.6% in 2000–2001 to 6.7% in 2002 (SAMHSA, 2002).

1.1. Correlates of binge and heavy drinking

A number of correlates of binge and heavy drinking have been identified. Binge and heavy drinkers are more likely to be White or Hispanic, male, single, younger, and have higher incomes than individuals who do not report these drinking behaviors (Dawson, Li, & Grant, 2008; Miller, Mahler, & Gold, 1991; Mojtabei, 2005; Naimi, Brewer, Mokdad, Denny, Serdula & Marks, 2003; NIAAA, 2010; Schoenborn & Adams, 2010; Serdula, Brewer, Gillespie, Denny, & Mokdad, 2004; Tsai, Floyd, Green, & Boyle, 2007). Binge and heavy drinking are also associated with negative health behaviors, including smoking (Dawson et al., 2008; Rosal, Ockene, Hurley, & Reiff, 2000) and decreased engagement in physical activity (Rosal et al., 2000; Smothers & Bertolucci, 2001); increased physical health problems, including hepatitis (Bradley et al., 2001), hypertension (Dawson et al., 2008; Green & Polen, 2001), gastrointestinal problems (Theobald, Johansson, Bygren, & Engfeldt, 2001), and heart problems (Chen et al., 2006; Dawson et al., 2008; USDA & DHHS, 2005); and mental health difficulties (Chen et al., 2006; Dawson et al., 2008; Green & Polen, 2001; Miller et al., 1991).

Taken together, research shows that binge and heavy drinking are associated with a number of negative physical and mental health outcomes, as well as some maladaptive health behaviors. While informative, questions remain regarding our understanding of the health outcomes related to these drinking behaviors, as the majority of extant studies assess only one form of risky drinking (e.g., binge drinking; Dawson et al., 2008) or health outcome (e.g., suicide; Miller et al., 1991). Additionally, while current research is fairly consistent, it is often based on highly restricted study samples [e.g., female veterans from a single Veterans Affairs Medical Center (Bradley et al., 2001); women over 50 from a single state (Fredman et al., 1999)], limiting the generalizability of these findings to the broader U.S. population. Finally, there are few studies assessing the relations between binge and heavy drinking and preventive care practices, and those that exist also primarily focus on circumscribed variables and study samples [e.g., members of a single health plan service (Green et al., 2010); Medicare recipients (Merrick et al., 2008)].

1.2. Aims of the current study

The purpose of the current study was to examine the relations between binge and heavy drinking and health-related variables in a large nationally representative sample. This study extends current research by examining the associations between binge and heavy drinking and a wide range of health-related variables, including both positive and negative health behaviors, engagement in preventive care practices, and quality of life indices that have not been previously examined. These data are particularly useful as they can generalize to the broader U.S. population, and thus, can be used to inform current research and practice.

2. Method

We analyzed Behavioral Risk Factor Surveillance Survey (BRFSS) data from 2006 (CDC, 2006). The BRFSS is a state-based, random-digit-dialing telephone survey of the United States adult population sponsored by the CDC, used to measure health conditions and related behaviors to track risk factors and inform related programs and interventions (CDC, 2008). In 2006, 355,710 interviews were completed and data were collected from all 20 states, DC, Puerto Rico, and the U.S. Virgin Islands. Trained interviewers administered the BRFSS using a computer-assisted telephone interviewing (CATI) system. Data were collected monthly by each state and territory. The median response rate for participating areas in 2006 was 51.4%. This estimate, developed by the Council of the American Survey of Research Organizations (CASRO), includes cooperation elements such as refusals, early terminations, unavailability of participants, as well as sampling efficiency elements such as no answers, busy signals, and language barriers. The median cooperation rate in 2006 was 74.5%.

The BRFSS employs a multistage cluster design based on random-digit-dialing methods to select a representative sample of the adult U.S. civilian, non-institutionalized population. In 2006, fifty-one sites used a disproportionate stratified sample (DSS) design and Puerto Rico and the U.S. Virgin Islands used a simple random sample design. The DSS design typically involves dividing telephone numbers into two groups or strata (high-density and low-density). The two strata are then sampled disproportionately to obtain a probability sample of all households with telephones. In most cases, each state constitutes a single stratum. The BRFSS survey design, sampling methods, and weights have been described elsewhere (Mokdad, Stroup, & Giles, 2003), and BRFSS data have yielded valid and reliable estimates when compared to other national U.S. household surveys (CDC, 2006; Mokdad, Stroup, & Giles, 2003; Nelson, Powell-Griner, Town & Kovar, 2003).

2.1. Drinking and individual difference variables

2.1.1. Socio-demographic characteristics—The BRFSS provides information on a wide range of socio-demographic and background characteristics. For the current study, we combined race/ethnicity to create four groups: non-Hispanic White (White), Non-Hispanic Blacks (Blacks), Hispanics, and non-Hispanic/Other. We created four age categories: 18–34, 35–49, 50–64 and 65+ years; four education categories: those who did not graduate high school, high school graduates, those who did not graduate college and college graduates; and four income categories: less than \$25,000, \$25,000–\$49,999, \$50,000–\$74,999 and \$75,000 or more. We defined marital status as married versus not married; employment status as employed versus unemployed; and insurance status as insured versus uninsured. Finally, respondents were asked (yes/no) if they considered a single person their healthcare provider.

2.1.2. Heavy and binge drinking—Respondents were asked if they drank alcohol in the last month, and if so, how many days per week or month they drank and the average number of drinks consumed per drinking day. Consistent with BRFSS guidelines, past month binge

drinking was defined as five or more drinks in one sitting for men and four or more drinks in one sitting for women, and heavy drinking was defined as more than two drinks per day for men and one drink per day for women (CDC, 2008). These two categories of drinking behavior were not mutually exclusive.

2.1.3. Health behaviors—Respondents were asked about their smoking status (i.e., current, former, never) and classified as a current smoker or former smoker/never smoked. Those who reported any past-month physical activity or exercise aside from their regular job in the past month (yes/no) were categorized separately from those who did not report recent leisure time physical activity, and respondents who reported always wearing a seatbelt were categorized separately from those who did not always wear a seatbelt.

2.2. Preventive care

2.2.1. Female-specific behaviors—Women aged 18 or older were asked whether they ever received a pap test (test for cancer of the cervix), as well as how long it had been since their last test. Receipt of a pap test within the last three years, per recommended guidelines, was considered a positive response. Women aged 40 or older were asked similar questions regarding mammograms, with receipt of a mammogram within the past two years considered a positive response. Mammogram analyses were conducted separately for women over the age of 40 and women over the age of 50.

2.2.2. Male-specific behaviors—Men aged 40 or older were asked if they ever received a Prostate-Specific Antigen (PSA) test (test for prostate cancer), as well as how long it had been since their last test. Receipt of a PSA test within the past two years was considered a positive response. Due to alternate conventions regarding PSA testing, we also examined receipt of a PSA selecting for men age 50 or older.

2.2.3. General behaviors—All respondents aged 50 or older were asked whether they ever used a home blood stool test, as well as how long it had been since they last used such a test. Use of this test within the past two years was considered a positive response. Respondents aged 50 and older were also asked if they ever received a sigmoidoscopy (test for colon and rectal cancer) and receipt of this test at any point was considered a positive response.

2.3. Mental and physical health and quality of life variables

2.3.1. Perceived health—Respondents were asked to self-report their health status on a scale from excellent to poor and were categorized as having “excellent/very good/good” versus “fair/poor” health status. They also reported their number of poor physical health days in the past month and were categorized as having either no poor physical health days in the past month, or one or more such days. Poor mental health was defined in a similar manner.

2.3.2. Activity limitation—Respondents were asked (yes/no) if their activities were limited in any way because of physical, mental, or emotional problems.

2.3.3. Life satisfaction—Respondents were asked how satisfied they were with their lives on a scale from very satisfied to very dissatisfied and were categorized as “very satisfied/satisfied” versus “dissatisfied/very dissatisfied.”

2.3.4. Social support—Respondents were asked how often, on a scale from always to never, they received the social and emotional support they needed and were categorized as “always/usually/sometimes” versus “rarely/never.”

2.4. Data analysis plan

STATA Version 10.1 was used for all statistical analyses and to generate population weighted estimates accounting for the complex sample design of the BRFSS. First, rates of binge and heavy drinking were compared by socio-demographic variables using chi square tests. Second, health behaviors, including the receipt of preventive care services, activity limitation, and quality of life variables were compared by binge and heavy drinking status using chi square tests. Finally, multiple logistic regression models were used to assess the independent associations between binge and heavy drinking and each health behavior, mental and physical health functioning, and quality of life variable. For all models, health behaviors, mental and physical health functioning, and quality of life indices served as the dependent variables, binge and heavy drinking (yes/no) as the primary independent variables, and relevant socio-demographic variables as covariates (i.e., gender, race/ethnicity, age, education, income, marital status, employment status, insurance status, health provider status). All variables were included in the multiple logistic regression models based on clinical significance. A two-tailed alpha of 0.05 was used to assess significance.

3. Results

A total of 355,710 individuals participated in the 2006 BRFSS. For the purpose of this study, 344,793 respondents with available binge and heavy drinking data were included in the analyses. Of this sample, 15.2% met criteria for binge drinking and 5.0% met criteria for heavy drinking. Twenty-six percent (25.9%) met criteria for both binge and heavy drinking. Approximately 69.8% were White, 9.2% were Black, and 14.7% Hispanic; 48.4% were men. With respect to age, 31.2% were 18–34, 28.7% were 35–49, 23.3% were 50–64, and 16.9% were older than 65. Approximately 32.6% were college graduates, 61.2% were employed, 28.5% had household incomes greater than \$75,000, and 59.7% were married. Finally, 83.7% reported their health as good, very good, or excellent, 84.4% had health insurance, and 80.1% had a regular healthcare provider.

3.1. Associations between socio-demographic variables and drinking behaviors

Table 1 shows the relations between socio-demographic variables by binge and heavy drinking status. There were significant differences for all demographic variables by drinking status. The highest rates of binge and heavy drinking were reported among respondents who were White, male, single, aged 18–34, employed, in the highest income bracket, started, but did not complete, a college degree, were uninsured, and did not have a routine healthcare provider.

3.2. Associations between health-related and preventive care behaviors and drinking behaviors

Table 2 displays the unadjusted relations between health-related and preventive care behaviors, activity limitation, and quality of life variables by binge and heavy drinking status. All but one variable (i.e., mammogram age 50+) was statistically significant with respect to binge drinking. Binge drinkers were more likely to be current smokers and report one or more poor mental health days in the past 30 days; they were also less likely to use a seatbelt. Binge drinkers were less likely to have received a recent mammogram (among those 40+), PSA test, blood stool test, or sigmoidoscopy. They also reported less life satisfaction. Interestingly, binge drinkers were more likely to report recent physical activity and receipt of a recent pap smear. They also reported greater perceived health, more social

support, fewer poor physical health days and less activity limitations. Associations between heavy drinking and health-related and preventive care behaviors, activity limitation and quality of life variables generally mirrored those for binge drinking. The exceptions included receipt of a mammogram in past two years (age 40+), one or more poor physical health days in past 30 days, and perceived social support—all of which were non-significant, and having received a mammogram (age 50+), which was significant.

3.3. Adjusted odds of health-related and preventive care behaviors and quality of life variables by binge and heavy drinking status

Table 3 displays the adjusted odds ratios of health-related and preventive care behaviors, activity limitation, and quality of life variables by binge and heavy drinking status, using heavy or binge drinkers as the comparison group and controlling for clinically relevant socio-demographic variables. After adjusting for these covariates, all statistically significant univariate results for binge drinking remained other than one: the relation between binge drinking and social support became non-significant (OR=1.05, 95% CI .94–1.17). With regards to heavy drinking, all statistically significant univariate associations remained other than participation in recent physical activity (OR=1.05, CI .69–1.16), receipt of a recent pap smear (OR=1.13, CI .95–1.34), positive perception of one's health (OR=1.01, CI .88–1.15), and social support (OR=.83, .72–.97).

4. Discussion

Using a nationally representative sample of 344,793 respondents, we examined the relations between binge and heavy drinking across a number of positive and negative health-related variables, including receipt of preventive care services and quality of life indices. Rates of binge and heavy drinking were 15% and 5%, respectively, which is relatively consistent with previous studies (SAMHSA, 2002, 2007, 2008; Schoenborn & Adams, 2010). Socio-demographic findings were also in line with previous studies in that binge and heavy drinking were more prevalent among respondents who were White, male, single, younger, and had higher incomes (Dawson et al., 2008; Mojtabai, 2005; Naimi et al., 2003; NIAAA, 2010; Schoenborn & Adams, 2010; Serdula et al., 2004; Tsai et al., 2007).

After adjusting for relevant socio-demographic and other background variables, the current study findings indicate strong relations between binge and heavy drinking and a wide number of health-related variables, the majority of which are risky or negative behaviors and quality of life indices. These negative associations were particularly pronounced for smoking, inconsistent seatbelt use, failure to receive certain recommended preventive cancer screenings (i.e., blood stool test, sigmoidoscopy), poorer mental health, and lower life satisfaction. The associations between binge and heavy drinking and these negative and/or adverse behaviors and quality of life indices are largely consistent with previous research (Chen et al., 2006; Green & Polen, 2001; Merrick et al., 2008). Given that causal relations cannot be determined, and these behaviors are all likely highly interrelated, future research can more clearly determine which behaviors tend to precede the others and campaigns can be used to target these problems more comprehensively.

Contrary to what might be expected, individuals who reported binge drinking also reported some positive health behaviors and quality of life indices, including higher levels of recent physical activity, increased social support, positive perceptions of their own health, fewer activity limitations and greater receipt of guideline concordant pap smears. With respect to health status variables, which were most robust in analyses, it is possible that these individuals may be accurately assessing their health at this time, given that binge and heavy drinking were associated with some positive health behaviors in this study. However, they may also not be fully aware of their own health status, including the risks and possible long-

term effects of binge and heavy drinking and assume that they are healthier than they are. Interestingly, previous research by Slater and colleagues showed that heavy and episodic drinkers perceived less health risk related to drinking than individuals who drank less than them (Slater, Basil, Maibach, 1999). Finally, it is also possible that the health risks of binge and heavy drinkers in this sample actually are low, depending upon the length of time that these individuals have been drinking in this manner and whether the one month estimates used in this study accurately capture the broader drinking patterns of these individuals. Assessing these relations in populations of more severe drinkers is an important task for future research.

4.1. Limitations

Some study limitations must be noted when interpreting the current findings. First, the BRFSS relies on respondents' self-report of previous behaviors. While research has demonstrated the robustness of the BRFSS despite this factor (Shea, Stein, Lantigua, & Basch, 1991), the manner in which binge and heavy drinking were assessed may further affect these results. Second, the data presented are cross-sectional in nature, which limits causal interpretations. Additionally, it should be noted that there are alternate definitions of binge and heavy drinking, although the definitions used in this study are commonly used and reported (e.g., Dufour, 1999; International Center for Alcohol Policies, 1997; Midanik, 2003). Finally, respondents were asked general questions regarding the number of days that they drank (i.e., frequency) and number of drinks per drinking day (i.e., quantity). Previous research has demonstrated that such inquiries may underestimate the prevalence of heavy drinking, as individuals often do not factor their binge drinking into such estimates (Stahre, Naimi, Brewer, & Holt, 2006). However, this error further emphasizes the importance of the current study findings.

4.2. Implications for future research and practice

Despite these limitations, the current findings have important implications. Given the surprising findings regarding binge and heavy drinking and positive health-related variables, it seems that we do not yet have a comprehensive understanding of the effect of these drinking behaviors on health. Future research in this area should continue to contribute to this understanding and allow for the development of interventions to best address drinking patterns across the lifespan, as the risk for certain positive or negative health consequences may change over time. Such efforts may be optimized if it is found that certain variables interact to produce more adverse associations between binge and heavy drinking behaviors on health (e.g., more adverse associations among young people who are not in college, and thus, may not have a more readily accessible social support network or comparable access to health care). Addressing specific at-risk groups with information relevant to them is likely to be all the more effective when considering that their perceptions of their own health risks may not be accurate, and certain techniques (e.g., motivational interviewing) may be useful in reaching out to populations who may or may not perceive themselves as needing such intervention.

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References

- Bradley KA, Bush KR, Davis TM, Dobie DJ, Burman ML, et al. Binge drinking among female veteran affairs patients: Prevalence and associated risks. *Psychology of Addictive Behaviors*. 2001; 15:297–305. [PubMed: 11767260]
- Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey. Atlanta, GA: US Department of Health and Human Services; 2006.
- Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey. Atlanta, GA: US Department of Health and Human Services; 2008.
- Chen, CM.; Yi, H.; Falk, DE.; Stinson, FS.; Dawson, DA., et al. US Alcohol Epidemiologic Data Reference Manual. Vol. 8. Bethesda, MD: National Institute of Health; 2006. Alcohol use and alcohol use disorder in the United States: Main findings from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions.
- Courtney KE, Polich J. Binge drinking in young adults. Data, definitions, and determinants. *Psychological Bulletin*. 2009; 135:142–156. [PubMed: 19210057]
- Dawson DA, Li T, Grant BF. A prospective study of risk drinking: At risk for what? *Drug and Alcohol Dependence*. 2008; 95:62–72. [PubMed: 18243584]
- Dufour ME. What is moderate drinking?: Defining “drinks” and drinking levels. *Alcohol Research & Treatment*. 1999; 23:5–14.
- Fredman L, Sexton M, Cui Y, Althuis M, Wehren L, Hornbeck P, Kanarek N. Cigarette smoking, alcohol consumption, and screening mammography among women ages 0 and older. *Preventive Medicine*. 1999; 28:407–417. [PubMed: 10090870]
- Green CA, Polen MR. The health and health behaviors of people who do and do not drink alcohol. *American Journal of Preventive Medicine*. 2001; 21:298–305. [PubMed: 11701301]
- Green CA, Polen MR, Leo MC, Perrin NA, Anderson BM, et al. Drinking patterns, gender, and health II: Predictors of preventive service use. *Addiction Research and Theory*. 2010; 18:143–159.
- International Center for Alcohol Policies (ICAP). The limits of binge drinking. Washington, DC: Author; 1997. (Report No. 2) Retrieved from. <http://www.icap.org/LinkClick.aspx?fileticket=3PH1f9c98w%3D&tabid=75>
- Merrick EL, Hodgkin D, Garnick DW, Horgan CM, Panas L, et al. Unhealthy drinking patterns and receipt of preventive medical services by older adults. *Journal of General Internal Medicine*. 2008; 23:1741–1748. [PubMed: 18716847]
- Midanik LT. Definitions of drunkenness. *Substance Use & Misuse*. 2003; 38:1285–1303. [PubMed: 12908812]
- Miller NS, Mahler JC, Gold MS. Suicide risk associated with drug and alcohol dependence. *Journal of Addictive Diseases*. 1991; 10:49–61. [PubMed: 1932152]
- Mojtabai R. Use of specialty substance abuse and mental health services in adults with substance use disorders in the community. *Drug and Alcohol Dependence*. 2005; 78:345–354. [PubMed: 15893166]
- Mokdad AH, Stroup DF, Giles WH. Public health surveillance for behavioural risk factors in a changing environment. Recommendations from the Behavioural Risk Factor Surveillance Team. *MMWR Recommendation Reports*. 2003; 52:1–12.
- Naimi TS, Brewer RD, Mokdad A, Denny C, Serdula MK, Marks JS. Binge drinking among US adults. *Journal of the American Medical Association*. 2003; 289:70–75. [PubMed: 12503979]
- National Institute on Alcohol Abuse & Alcoholism (NIAAA). FAQs for the general public. 2010. Retrieved from. http://www.niaaa.nih.gov/FAQs/General-English/default.htm#safe_level
- Nelson DE, Powell-Griner E, Town M, Kovar MG. A comparison of national estimates from the National Health Interview Survey and the Behavioural Risk Factor Surveillance System. *American Journal of Public Health*. 2003; 93:1335–1341. [PubMed: 12893624]
- Rosal MC, Ockene JK, Hurley TG, Reiff S. Prevalence and co-occurrence of health risk behaviors among high-risk drinkers in a primary care population. *Preventive Medicine*. 2000; 31:140–147. [PubMed: 10938214]
- Schoenborn, CA.; Adams, PF. Vital and Health Statistics. Vol. 10. Washington, DC: US Department of Health and Human Services; 2010. Health behaviors of adults: United States, 2005–2007.

- Serdula MK, Brewer RD, Gillespie C, Denny CH, Mokdad A. Trends in alcohol use and binge drinking, 1985–1999: Results of a multi-state survey. *American Journal of Preventive Medicine*. 2004; 26:294–298. [PubMed: 15110055]
- Shea S, Stein AD, Lantigua R, Basch CE. Reliability of the Behavioral Risk Factor Survey in a triethnic population. *American Journal of Epidemiology*. 1991; 133:489–500. [PubMed: 2000859]
- Slater MD, Basil MD, Maibach EW. A cluster analysis of alcohol-related attitudes and behaviors in the general population. *Journal of Studies on Alcohol and Drugs*. 1999; 60:667–674.
- Smothers B, Bertolucci D. Alcohol consumption and health-promoting behavior in a U.S. household sample: Leisure-time physical activity. *Journal of Studies on Alcohol and Drugs*. 2001; 62:467–476.
- Stahre M, Naimi T, Brewer R, Holt J. Measuring average alcohol consumption: The impact of including binge drinks in quantity–frequency calculations. *Addiction*. 2006; 101:1711–1718. [PubMed: 17156170]
- Substance Abuse and Mental Health Services Administration (SAMHSA). Summary of National Findings NHSDA Series H-17, DHHS Publication No SMA 02–3758. Vol. 1. Office of Applied Studies, SAMHSA; Rockville, MD: United States Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS); 2002. Results from the 2001 National Survey on Drug Abuse.
- Substance Abuse and Mental Health Services Administration (SAMHSA). NSDUH Series H-32, DHHS Publication No SMA 07–4293 Office of Applied Studies, SAMHSA. Rockville, MD: United States Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS); 2007. Results from the 2006 National Survey on Drug Use and Health: National findings.
- Substance Abuse and Mental Health Services Administration (SAMHSA). NSDUH Series H-34, DHHS Publication No SMA 08–4343 Office of Applied Studies, SAMHSA. Rockville MD: United States Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS); 2008. Results from the 2007 National Survey on Drug Use & Health: National Findings.
- Theobald H, Johansson S, Bygren L, Engfeldt P. The effects of alcohol consumption on mortality and morbidity: A 26-year follow-up study. *Journal of Studies on Alcohol and Drugs*. 2001; 62:783–789.
- Tsai J, Floyd RF, Green PP, Boyle CA. Patterns of average volume of alcohol use among women of childbearing age. *Maternal and Child Health Journal*. 2007; 11:437–445. [PubMed: 17333387]
- U.S. Department of Agriculture (USDA), & U.S. Department of Health and Human Services (DHHS). Home and Garden Bulletin No 232. 5. US Government Printing Office; Washington, DC: United States Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS); 2005. Dietary guidelines for Americans.
- Wechsler H, Davenport A, Dowdall G, Moeykens B, Castillo S. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *Journal of the American Medical Association*. 1994; 272:1672–1677. [PubMed: 7966895]

Table 1

Binge and heavy drinking status by socio-demographic variables.

	Binge drinker		Heavy drinker	
	% Yes	p-value	% Yes	p-value
Gender		<0.001		<0.001
Female	9.97		4.33	
Male	20.68		5.65	
Race/ethnicity		<0.001		<0.001
White	15.99		5.57	
Black	10.21		2.93	
Hispanic	13.40		3.50	
Other	15.35		4.11	
Age		<0.001		<0.001
18–34	23.79		6.29	
35–49	16.80		5.01	
50–64	10.12		4.62	
65+	3.33		2.92	
Education		<0.001		0.006
<High school	12.88		4.48	
High school	15.18		4.78	
<College	16.45		5.51	
College	14.97		4.89	
Income		<0.001		<0.001
<\$25,000	12.32		4.25	
<\$50,000	15.29		4.88	
<\$75,000	17.28		5.19	
\$75,000+	18.82		6.40	
Marital status		<0.001		<0.001
Married	12.97		4.02	
Not married	18.41		6.37	
Employment status	<0.001		<0.001	
Employed	18.87		5.61	
Unemployed	9.34		3.96	
Insurance status		<0.001		<0.001
Insured	14.44		4.76	
Uninsured	19.05		6.07	
Health provider		<0.001		<0.001
Yes	13.52		4.59	
No	21.74		6.50	

Table 2

Binge and heavy drinking status by health-related and preventive care behaviors and quality of life variables.

	Binge drinker			Heavy drinker		
	% Yes	%No	p-value	% Yes	%No	p-value
Health-related and preventive care variables						
Recent physical activity	81.95	74.86	<0.001	79.17	75.73	<0.001
Current smoker	37.04	16.42	<0.001	42.51	18.28	<0.001
Regular seat belt use	73.22	84.09	<0.001	74.25	82.92	<0.001
Mammogram (40+)	72.46	76.88	<0.001	75.26	75.59	0.23
Mammogram (50+)	80.17	80.13	0.92	82.60	79.88	0.02
Pap smear	87.99	83.41	<0.001	86.92	83.75	0.001
PSA test (40+)	41.48	55.21	<0.001	43.34	53.75	<0.001
PSA test (50+)	37.96	62.04	<0.001	39.21	60.73	<0.001
Blood stool test	19.16	24.78	<0.001	22.08	24.45	0.02
Sigmoidoscopy	51.81	59.45	<0.001	56.75	58.94	0.05
Quality of life variables						
Perceived health E/VG/G	89.03	82.69	<0.001	86.50	83.48	<0.001
1+ poor physical health days	34.25	35.95	0.00	35.19	35.79	0.51
1+ poor mental health days	42.90	32.87	<0.001	44.36	33.96	<0.001
Activity limitation	14.13	21.18	<0.001	18.77	20.21	0.05
VS/S with life	93.87	95.21	<0.001	92.02	95.16	<0.001
A/U/S receive social support	92.15	91.28	0.02	90.75	91.46	0.19

Note. E/VG/G=excellent, very good, good; VS/S=very satisfied/satisfied; A/U/S=always, usually, sometimes.

Table 3

Adjusted odds of health-related and preventive care behaviors and quality of life variables by binge and heavy drinking status.

	Binge drinking			Heavy drinking		
	% Yes	t-value	OR	% Yes	t-value	OR
Health-related and preventive care variables						
Recent physical activity	16.36	5.59	1.21 ** [1.13, 1.29]	5.18	1.12	1.05 [.69, 1.16]
Current smoker	28.73	32.53	2.64 *** [2.49, 2.80]	10.85	25.23	3.09 *** [2.83, 3.37]
Regular seat belt use	13.47	-12.75	.68 *** [.64, .72]	4.47	-8.22	.68 *** [.62, .74]
Mammogram (40+)	6.13 *	-2.21	.89 * [.80, .99]	3.95	-2.22	.87 * [.76, .98]
Mammogram (50+)	4.39	-.80	.93 [.78, 1.11]	4.23	0.44	1.04 [.88, 1.22]
Pap smear	11.93	3.62	1.30 *** [1.13, 1.49]	3.15	1.34	1.13 [.95, 1.34]
PSA test	11.17	-4.02	.84 *** [.76, .91]	3.87	-3.57	.78 *** [.68, .89]
Blood stool test	5.78	-4.70	.79 *** [.71, .87]	3.58	-2.18	.87 * [.77, .99]
Sigmoidoscopy	6.43	-3.56	.86 *** [.79, .93]	3.78	-2.13	.90 * [.81, .99]
Quality of life variables						
Perceived health E/VG/G	16.15	2.27	1.11 * [1.01, 1.22]	5.14	.08	1.01 [.88, 1.15]
1+ poor physical health days	15.62	2.30	1.07 * [1.01, 1.13]	5.05	.70	1.03 [.95, 1.12]
1+ poor mental health days	13.26	12.96	1.42 *** [1.35, 1.50]	4.24	8.76	1.44 *** [1.33, 1.56]
Activity limitation	16.29	-3.26	.89 *** [.83, .95]	5.06	.80	1.04 [.94, 1.16]
VS/S with life	15.02	-4.55	.78 *** [.70, .87]	4.84	-6.96	.57 *** [.49, .67]
A/U/S receive social support	15.41	.88	1.05 [.94, 1.17]	4.97	-2.36	.83 * [.72, .97]

Note. Adjusted for age, sex, race, education, income, marital status, employment status, and insurance status. Reference group: Binge drinking=yes; and heavy drinking=yes.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

E/VG/G=excellent, very good, good; VS/S=very satisfied/satisfied; A/U/S=always, usually, sometimes.