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## Drinking Patterns, Gender and Health I: Attitudes and Health Practices

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### Abstract

**Background**—Despite considerable research, relationships among gender, alcohol consumption, and health remain controversial, due to potential confounding by health-related attitudes and practices associated with drinking, measurement challenges, and marked gender differences in drinking. We examined gender/alcohol consumption differences in health-related attitudes and practices, and evaluated how these factors affected relationships among gender, alcohol consumption, and health status.

**Methods**—A stratified random sample of adult health-plan members completed a mail survey, yielding 7884 respondents (2995 male/4889 female). Using MANCOVAs and adjusting for health-related attitudes, values, and practices, we examined gender differences in relationships between alcohol consumption and health.

**Results**—More frequent heavy drinking was associated with worse health-related attitudes and values, worse feelings about visiting the doctor, and worse health-related practices. Relationships between health-related practices and alcohol use differed by gender, and daily or almost daily heavy drinking was associated with significantly lower physical and mental health for women compared to men. Drinking status (lifelong abstainers, former drinkers, and level of regular alcohol consumption) was related to health status and vitality, even after adjusting for health-related attitudes, values, and practices. Relationships did not differ by gender. Former drinkers reported lower physical and mental health status than either lifelong abstainers or current drinkers.

**Conclusions**—Drinking status is independently related to physical health, mental health, and vitality, even after controlling for the health-related attitudes, values, and practices expected to confound these relationships. Among current drinkers, women who engage in very frequent heavy drinking have worse physical and mental health than their male counterparts.

### Keywords

Alcohol Drinking; Gender; Health Status; Health Behaviors; Health-related Attitudes

## INTRODUCTION

Numerous studies have explored the relationship between alcohol consumption and health, particularly for mortality outcomes (Anderson, 1995; Boffetta & Garfinkel, 1990; Camacho et al., 1987; Dawson & Archer, 1992; Fillmore et al., 1998a; Fillmore et al., 1998b; Klatsky et al., 1992; Leino et al., 1998; Poikolainen, 1995; Rehm & Sempos, 1995; Serdula et al., 1995; Shaper, 1990). Although these studies vary on specific thresholds of average alcohol consumption and patterns of associations with all-cause and cause-specific mortality, the results are generally consistent with the image of a U-shaped curve, in which mortality risk is lower in light- to- moderate drinkers than in either abstainers or heavier drinkers.

The apparent benefit of light-to-moderate drinking is often attributed to reduced risk of coronary heart disease, but other explanations have also been hypothesized to account for these effects and patterns (Andreasson, 1998): the physiological effects of different doses of alcohol (Agarwal, 2002; Corrao et al., 2000), the health benefits of different types of alcohol (such as wine and beer vs. spirits) (Klatsky et al., 1997; Malarcher et al., 2001), constellations of health-related practices or attitudes that covary with different patterns of alcohol consumption and affect health (Cherpitel, 1999; Cooper et al., 1992; Holahan et al., 2001; Kelly et al., 2005; Koppes et al., 2005; Naimi et al., 2005; Smothers & Bertolucci, 2001), and the “sick quitter” hypothesis—that is, that abstainer groups include individuals who quit drinking because of poor health or negative effects of alcohol. These latter explanations suggest that moderate drinking is more beneficial for health than abstaining, when this may not be the correct (Shaper, 1995).

Probing these hypotheses, researchers have begun to explore differences between lifelong abstainers and former drinkers, as well as patterns in health-related practices and attitudes, the physiological effects of alcohol consumption, and gender differences across these areas. Their results illuminate what appears to be a complicated picture. Several of the studies separated lifelong abstainers and former drinkers yet still found a lower mortality risk in light-to-moderate drinkers than in either former drinkers or lifelong abstainers (Boffetta & Garfinkel, 1990; Klatsky et al., 1990; Rimm et al., 1991). In addition, individuals in the US tend to cluster according to their favorable and less favorable health-related practices (Berrigan et al., 2003; Green & Polen, 2001; Liang et al., 1999; Patterson et al., 1994; Slater et al., 1999). In general, moderate drinkers tend to have healthier lifestyles than people with other drinking statuses (including non-drinking), raising the possibility that the apparent protective association of moderate drinking with mortality, especially CVD mortality, could be explained in part by these other health practices (Slater et al., 1999). Other researchers, however, contend that there is little evidence that unknown confounders are affecting these relationships (Poikolainen et al., 2005).

Researchers examining gender differences in these relationships have found that the protective association between light-to-moderate drinking and mortality occurs at different thresholds of alcohol consumption for women and men (Liao et al., 2000), and that some patterns in causes of death differ among men and women. Compared to moderate drinkers, lighter- and heavier-drinking men have increased risks of dying from cardiovascular diseases, accidents or poisoning, and gastrointestinal diseases, whereas among women, lighter drinkers have increased risk of mortality from cardiovascular diseases. Heavier-drinking women, like men, are more likely to die from accidents, poisoning, and gastrointestinal diseases (Theobald et al., 2001). In addition, gender differences may be more or less apparent depending on the type of alcohol-consumption measures that researchers employ (Green et al., 2004).

Making these issues more difficult to sort through are gender differences among possible confounders of the relationships between alcohol consumption and health. For example, although both male and female former drinkers are more likely than lifetime abstainers to be heavier smokers, male former drinkers are more likely to be depressed, to be unemployed, to have lower socioeconomic status, and to have used marijuana in the past, while female former drinkers are more likely than female lifetime abstainers to have poorer health, to be less religious, and to be unmarried (Fillmore et al., 1998a). Women also drink less frequently than men, are more likely to abstain completely from alcohol, and tend to consume less alcohol when they drink (Fillmore et al., 1997). Women also drink with different people and at different times of day (Dawson et al., 1995). Men and women differ as well in the distributions of socio-demographic characteristics that affect patterns of alcohol consumption. Such differences include rates of employment, income level, marital and socioeconomic status (Ames & Rebhun, 1996; Wilsnack et al., 1991; Wilsnack et al., 1994), self-reported health status (Jackson et al., 1995; Verbrugge, 1985), and the prevalence of psychiatric comorbidities (Callahan et al., 1994; Hesselbrock & Hesselbrock, 1997). Women also tend to have healthier lifestyles than men (Patterson et al., 1994) and may be less likely to cope with stress by using alcohol (Cooper et al., 1992), while men perceive lower drinking-related risks than women (Agostinelli & Miller, 1994) and young men are more likely to engage in health-related risky behaviors than young women (Liang et al., 1999).

These complicated and sometimes contradictory findings indicate the importance of further explorations that simultaneously examine how attitudes, health-related practices, and gender interact in the relationships between drinking patterns and health. In this paper, we report analyses of gender differences in health-related attitudes and health practices, and then examine how these factors, taken together, affect the relationships between alcohol consumption and health status. Based on evidence of alcohol-related dose-response differences between men and women (described above) and gender differences in body water and alcohol metabolism (Bradley et al., 1998; Ely et al., 1999; Graham et al., 1998), we hypothesized that alcohol consumption would have an independent effect on health, for both men and women, after accounting for a comprehensive set of sociodemographic measures and health-related attitudes and practices, including feelings about seeing the doctor, concerns about disapproval of health care providers, health care self-efficacy, skepticism toward medical care, health- and risk-related values, smoking status, seatbelt use, diet and exercise, usual hours of sleep, and stress-related coping strategies. In the two companion papers, we explore how all these factors, taken together, affect the relationships between alcohol consumption and use of preventive and other health care services for men and women.

## METHODS

### Setting

The study was conducted within Kaiser Permanente Northwest (KPNW), a not-for-profit prepaid group-practice-model HMO serving about 480,000 members in northwest Oregon and southwest Washington State, USA. KPNW uses an electronic medical record comprising several databases, with data linked for each member by a unique health record number. The study was approved and monitored by the KPNW Institutional Review Board.

### Sample and survey

Study participants were 2995 male and 4889 female (7884 total) HMO members aged 18–64 who responded to a Health & Health Practices survey conducted from October 2002 through mid-April 2003. Surveys were sent to 15,000 HMO members (8500 women and 6500 men)

who had at least 12 months of health plan membership prior to sample extraction. Women were oversampled to obtain adequate numbers of heavier drinkers to support analyses. Three survey mailings were sent—the first by first-class mail followed by a reminder postcard, the second using priority mail, and the third via first-class mail. We telephoned non-responders and left messages encouraging return of the questionnaire or, when we reached a potential participant, attempted to complete it by telephone. The overall response rate for the survey was 54% (individuals who died were removed from the denominator, as were those who did not speak English and those for whom we were unable to locate a current address—e.g., those whose questionnaires were returned undeliverable).

Survey respondents differed significantly from non-respondents on the following characteristics: They were older (mean  $46.5 \pm 11.5$  vs.  $40.9 \pm 11.5$  years), less likely to have Medicaid coverage (3.5% vs 4.8%), more likely to have been health plan members for longer periods (averaging  $155.9 \pm 113$  months vs.  $123.7 \pm 98$  months), had more prior-year outpatient visits (mean  $6.5 \pm 8.0$  vs.  $5.0 \pm 6.9$ ), had slightly fewer months of dental plan membership (mean  $5.2 \pm 6.3$  vs.  $5.0 \pm 6.2$ ), and were more likely to be female (58% responded) than male (46% responded). 7523 respondents (95.4%) reported their racial/ethnic status. Of these, 88.9% were White, 2.3% reported being Black or African American, 4.6% Asian or Pacific Islander, 1.1% American Indian or Alaska Native, and 3.0% reported being of mixed racial heritage. Across all racial categories, 3.6% reported Hispanic ethnicity. This racial/ethnic breakdown is very similar to US Census information for the area KPNW serves.

## Measures

**Sociodemographic characteristics—Age** was measured in years as of sample identification, August 1, 2002. We obtained gender and age from health plan records and remaining variables from the questionnaire.

**Gender** was coded as Female = 1 and Male = 0.

**Adjusted income** was computed by taking the mid-point of each total household income category (less than \$10,000, 10,000–19,999, ... 80,000 or more; the latter was coded as 80,000) and dividing it by the number of people in the household depending at least in part on the income (from 1–8 or more people, with 8 or more coded 8).

**Education level** was classified as high school graduate/GED or less, some college or technical school, or college graduate.

**Marital status** was coded as currently married or living with partner = 1, all others = 0.

**Racial background** was coded white race = 1, all others = 0; **Hispanic ethnicity** was coded 1, all other = 0.

**Employment** status was coded 1 for employed or students, all others were coded =0.

**Health-related attitudes and values—Feelings about seeing the doctor** were measured by responses to the question “In general, how do you feel about going to see the doctor?,” which included “I enjoy going to the doctor,” “I don’t care one way or another,” and “I don’t like going to the doctor.”

**Concern about disapproval of health care providers** was assessed by the question, “How concerned are you that your doctor or health care provider might disapprove of your health-

related practices (such as diet, exercise, smoking, drinking)?” with response options “not at all,” “somewhat,” and “very” concerned.

**Health care self-efficacy:** We asked respondents “How confident are you that you can:” a) “ask your doctor/provider things about your health that concern you?;” b) “tell the doctor/provider when you disagree with his/her advice;” c) “help yourself once you get sick?;” and d) “talk to the doctor about your health-related practices (such as diet, exercise, smoking, drinking)?” Responses were “not at all confident,” “somewhat confident,” and “totally confident.” A factor analysis indicated that these questions were closely related to a question assessing satisfaction with “the personal interest and attention your health care providers give you?”—with responses “very dissatisfied,” “dissatisfied,” “somewhat satisfied,” “satisfied,” and “very satisfied.” For this reason, we standardized these 5 variables and summed them to create a *health care self-efficacy* measure, with higher values indicating greater self-efficacy. Cronbach’s alpha for the scale = .73.

**Skepticism toward medical care:** We asked respondents the extent to which they agreed with the following statements (from Fiscella et al., 1998): 1) “If I get sick, it is my own behavior that determines how soon I get well again,” 2) “It is almost always better to seek professional help than to try to treat yourself,” and 3) “Good health is largely a matter of good fortune.” Responses ranged from disagree to agree on a 5-point scale.

**Health-related risks and values** measures came from Wallston’s health values scales (Smith & Wallston, 1992; Wallston & Wallston, 1978) and were used as indicators of the risk taking and types of affiliation known to affect drinking practices and health. Participants were asked to rate the importance of these values, as follow: “In general, how important to you are the following: a comfortable life, an exciting life, the respect and admiration of others, religious or spiritual beliefs. Responses were “not at all important,” “somewhat important,” or “very important.”

**Health-related practices—**We created two measures of alcohol consumption, **drinking status** and **frequency of heavy drinking days**. A “drink” was defined on the questionnaire as a 12-ounce beer, 5-ounce glass of wine, or 1.5 ounces of liquor, and consumption pattern was assessed for the past year. Lifelong abstainers were those who had drunk fewer than 12 drinks in their lifetimes. Former drinkers were those who used to drink but no longer drank. Frequency of drinking in the past year was categorized as less than monthly, monthly, 2–4 times/month, 2–3 times/week, 4–5 times/week, or 6–7 times per week, using the frequency item from the Alcohol Use Disorders Identification Test (AUDIT) screening questionnaire (“How often did you have a drink containing alcohol?”) (Babor et al., 2001). Quantity of drinking was obtained from another AUDIT item, “How many drinks containing alcohol did you have on a typical day when you were drinking?” Response categories were expanded, however, to encourage more precise reporting and to expand the ceiling of the original AUDIT responses. Responses ranged from 1 or less, to 2, 3, up to 12, 13–14, 15 or more. Frequency of drinking was multiplied by typical quantity per drinking day to estimate usual drinks per month among current drinkers, which was then categorized as 0.5–29, 30–59, 60–89, or 90 drinks. The *drinking status* variable included categories for lifelong abstainers, former drinkers, and the 4 levels of consumption among current drinkers. The second alcohol variable, *frequency of heavy drinking days* ( 5 drinks/occasion for men, 4 drinks/occasion for women (Dawson et al., 2008; US Department of Health and Human Services & National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2005), was categorized as never, less than monthly, monthly, weekly, or daily/almost daily during the past year. It was derived from the AUDIT item, “How often did you have 6 or more drinks on one occasion?,” which we separated into 2 questions: “How often did you have 5 or more drinks

...” and “How often did you have 4 or more drinks ...” Responses to the 5 or more item were analyzed for men; responses to the 4 or more item were analyzed for women.

**Current smokers** were defined as those who had smoked at least 100 cigarettes in their lifetimes and “currently smoke every day or some days” coded 1 and others coded 0.

**Frequency of seatbelt use** was measured by the question, “How often do you use seatbelts when you drive or ride in a car?” with 4 responses ranging from “never” to “always” coded 1–4.

**Body mass index (BMI)** was obtained from survey responses and calculated using the Centers for Disease Control and Prevention’s equation: weight (in pounds)/height (in inches)<sup>2</sup>\*703 (Centers for Disease Control and Prevention, 2005). We used BMI as a proxy for dietary health practices.

**Frequency of eating breakfast** was assessed with the question, “How often do you eat breakfast?” with responses grouped as “rarely or never,” “sometimes,” or “every day or almost every day” coded 1–3.

**Five-plus fruit and vegetable consumption:** Respondents reported how often they ate “Fruit (not juice),” and “Vegetables (not french fries),” with categories for “less than monthly,” “monthly,” “weekly,” “once a day,” “2–3 times a day,” “4–5 times a day,” and “more than 5 times a day.” Values were recoded to daily servings for each variable: <monthly = 0, monthly = 1/30 days = 0.033, weekly = 4/30 days = 0.133, once a day = 1.0, 2–3 per day = 2.5, 4–5 per day = 4.5, and >5 per day = 5.5. Based on recommendations from the National Cancer Institute that individuals consume at least 5 servings of fruits and vegetables each day (<http://www.5aday.gov/>), the 2 recoded variables were then used to create an indicator variable, *five-a-day fruit and vegetable consumption*, coded 1 when the sum of daily servings of fruit and vegetables was 5 or more and 0 when the sum was lower.

**Days of exercise** was measured by the question “How many days in the past week did you exercise or participate in sports activities for at least 20 minutes,” with responses ranging from 1–7 days.

**Usual hours of sleep** was assessed by asking “About how many hours of sleep do you usually get at night?” with responses of “fewer than 7 hours,” “7–8 hours,” “more than 8 hours” coded 1–3.

**Coping with stress:** Coping strategies were measured with 3 indicator variables. Survey respondents indicated how frequently (never, seldom, sometimes, usually) they coped with stressful events by using each of 8 methods: seeking help/support from others, eating, using the TV or computer, drinking alcohol, sleeping, exercising, smoking, relaxing or meditating. Exploratory factor analyses (principle components extraction, varimax rotation) of these 8 items suggested 3 factors: a) passive coping (eating, watching TV/using the computer more, sleeping more); b) active coping (seeking help or support from others, increased exercise, increased relaxation); and c) coping by smoking or drinking more. Because we were interested in whether participants used any of these forms of coping, we created 3 coping indicators based on endorsement of a “usually cope this way” response for any of the indicator variables that comprised the three factors. Respondents could have positive indicators on more than one subscale. *Passive Coping* was defined as 1 = usually cope with stress by eating, watching TV/using the computer more often, or sleeping more. *Active Coping* was defined as 1 = usually cope with stress by seeking help or support from others, increasing exercise, increasing relaxation/meditation. *Coping by Drinking/Smoking* was

defined as 1 = usually cope with stress by drinking or smoking more. Each indicator was coded 0 when respondents answered that they sometimes, seldom, or never cope this way.

**Health and functional status**—Health status was assessed by the SF-36 measures for *General Health*, *Mental Health*, and *Vitality* (normed on the 1998 US population, mean  $\pm$  *sd* = 50  $\pm$  10) (McDowell & Newell, 1996; Ware & Sherbourne, 1992). Higher scores on these scales indicate better health or functioning.

**Missing data**—Item-level missing data were evaluated for patterns in missingness using the SPSS missing data module. None was found, and item-missing data were replaced using maximum-likelihood single imputation for all except the alcohol consumption variables (the primary focus of the study). Those who did not respond to the alcohol questions were excluded from analyses.

**Analyses**—We conducted multivariate analyses of covariance (MANCOVA) for 3 sets of dependent measures of 1) health-related attitudes and values, 2) health-related practices, and 3) health status and functioning. Gender interactions with the two drinking variables—frequency of heavy drinking days (among current drinkers) and drinking status—were examined in separate models for each set of dependent variables. All MANCOVAs included covariates for age, race/ethnicity, education level, and adjusted household income; the health-related practices and health status MANCOVAs were also adjusted for marital status. The third model included as covariates all of the dependent variables from models 1 and 2.

## RESULTS

Men and women respondents were similar with regard to age and race/ethnicity (see Table 1). Men were more likely than women to be married and to have college graduate or higher educational levels. Women were less likely than men to be in the highest adjusted income category (>\$37,500 per person), more likely than men to be in the lowest and the highest BMI categories, and more likely than men to have never smoked cigarettes. Women were nearly twice as likely as men to be lifelong abstainers from alcohol, and were much less likely than men to report drinking at levels of 30 or more drinks per month. Similarly, among current drinkers, women were twice as likely as men to report “never” engaging in heavy drinking episodes, and were much less likely than men to report heavy drinking at any frequency level.

### Health-related attitudes and values

Multivariate tests of associations between health-related attitudes and values and frequency of heavy drinking days and gender were significant; the gender-by-drinking interaction term, however, was not (Table 2). Among current drinkers, more frequent heavy drinking days was, in general, negatively associated with better health-related attitudes and values. The most frequent heavy drinkers reported less collaborative relationships with their doctors and were more likely to dislike going to the doctor, less confident they could change health practices, more concerned about their doctor’s disapproval of their health practices, more likely to think that good health was a matter of good fortune, less likely to value an exciting life, less likely to value the respect and admiration of others, and they attached less importance to religious/spiritual beliefs. Compared to men, women were more concerned about their doctor’s disapproval of their health practices, placed less value on an exciting life, placed more value on the respect and admiration of others, and attached more importance to religious/spiritual beliefs.

When examining drinking status, the gender-by-drinking interaction term was only marginally significant ( $p = .055$ , Table 2), so only main effects are discussed. Individuals drinking 60 or more drinks per month reported greater dislike of going to the doctor than either non-drinkers or lighter drinkers. Lifelong abstainers and individuals drinking 30 or more drinks per month reported lower health care self-efficacy. Confidence in one's ability to change one's health practices and the importance of religious and spiritual beliefs both declined linearly from lifelong abstainers at the high end to drinkers of 90 or more drinks per month at the low end. Concern about their doctor's disapproval of their health practices was lowest among the lightest drinkers. Compared to heavier drinkers, non-drinkers and the lightest drinkers preferred seeking professional help over self-treatment. The heaviest drinkers were most likely to think good health was a matter of good fortune. Lifelong abstainers and former drinkers placed lower value on the importance of a comfortable life than did all levels of current drinkers. Men and women generally did not differ on these health-related attitudes and values.

### Health-related practices

In both MANCOVAs examining health-related practices, the multivariate tests for the drinking measure, gender, and interaction terms were significant (Table 3). Gender-by-frequency of heavy drinking days interactions were significant for three health practices: among the most frequent heavy drinkers, women were more likely than men to get less sleep, to smoke, and to cope with stress by smoking or drinking. Among the remaining health practices *without* significant interaction terms, frequency of heavy drinking days was inversely related to frequency of seat belt use and frequency of eating 5 or more daily servings of fruit and vegetables, but was not related to days of exercise, BMI, or active or passive strategies of coping with stress. Gender differences were found on 4 health practices: compared to men, women used seat belts more often, ate 5 or more daily servings of fruit and vegetables more often, and were more likely to cope with stress with both active and passive strategies.

When drinking *status* was the drinking measure (Table 3), gender-by-drinking interactions were significant for 5 variables. Women drinking 90 drinks per month were more likely than men in this category to use seat belts, and heavier drinking among women compared with men was more strongly associated with lower fruit and vegetable consumption. BMI was higher among female than among male former drinkers. BMI was lower, however, among female than among male current drinkers of 30–59 and 60–89 drinks per month. As alcohol consumption increased, women were more likely than men to be current smokers and to cope with stress by smoking or drinking. Among the health practices without significant interaction terms, the number of drinks per month was inversely related to frequency of eating breakfast, and to both actively and passively coping with stress, but was positively related to usual hours of sleep. Individuals drinking fewer than 60 drinks per month exercised more than other drinkers or non-drinkers. Former drinkers ate breakfast less frequently than lifelong abstainers. Women got more sleep than men, and were more likely to cope with stress with both active and passive strategies.

### Health status

MANCOVA results for the 3 health status variables showed that after adjusting for the health-related attitudes, values, and practices examined in the previous analyses, the multivariate association between frequency of heavy drinking days and health differed between men and women (Table 4). The gender-by-frequency of heavy drinking days interaction term was significant for General Health and Mental Health, but not for Vitality. Compared to less frequent heavy drinkers, daily or almost daily heavy drinking was associated with significantly worse scores on both the General Health and Mental Health



scales for women compared to men (45.9 vs. 50.9 and 44.0 vs. 51.0, respectively). Vitality was not associated with frequency of heavy drinking days, but men reported significantly higher levels than women on this measure.

In contrast, although the multivariate interaction term was significant in the MANCOVA with drinking *status* (Table 4), none of the interactions for specific health status indicators was more than marginally significant. We therefore discuss only the main effects of drinking status and gender, after removing the gender-by-drinking status interaction term (data not shown, but results are very similar to those in Table 4). In these analyses, drinking status was independently associated with all three SF-36 measures. Post-hoc tests ( $p < 0.05$ ) indicated that former drinkers had poorer General Health and lower Vitality than both lifelong abstainers and all categories of current drinkers. Former drinkers' Mental Health scores were significantly worse than those of lifelong abstainers and those of the lightest current drinkers, but did not differ from those of moderate or heavier drinkers. Lifelong abstainers reported the best Mental Health scores. There was no gender difference in General Health, but men reported better Mental Health and higher Vitality than women.

## DISCUSSION

Our results suggest that drinking status is independently related to health status, even after accounting for health-related attitudes, values, health-practices and gender: Despite controlling for these factors, we replicated the inverted U-shaped relationship between drinking status and health status found by others (Gunzerath et al., 2004). It is noteworthy, however, that, consistent with the suggestions of other researchers (Koppes et al., 2005; Naimi et al., 2005), differences in health status were small in magnitude once these other factors were controlled. This suggests that health-related attitudes, values, and practices present significant confounds in the relationships between alcohol consumption and health.

We also found that, when considering drinking status (lifelong abstainers, vs. former drinkers, light and moderate drinkers, and heavier drinkers), gender differences in the relationship between alcohol consumption and general health disappear when controlling for health-related attitudes, values, and practices, while the relationships between gender and mental health and gender and vitality, remain significant. These results suggest that previous research showing gender differences in the relationship between patterns of alcohol consumption and health (Green et al., 2003) may have been a function of other, unmeasured confounders. Conversely, because gender differences remained between frequency of heavy drinking days and 1) mental health, and 2) vitality, additional research should address whether other confounders account for these relationships as well. The fact that the majority of our control measures were more directly relevant to physical health supports the need to search for factors that might affect the relationship between drinking pattern and vitality and mental health measures.

Among current drinkers, gender differences in health and health-related practices were greatest among the heaviest, most at-risk, drinkers. Women engaging in very frequent heavy drinking reported significantly worse general and mental health status than did men with similar heavy drinking patterns, although men were more likely than women to drink at the heaviest levels. These results are consistent with the notion that women tend to be more vulnerable than men to the negative effects of high usual alcohol consumption and greater frequency of heavy drinking (Greenfield et al., 2003), even when heavy consumption is defined at lower levels for women than for men. In addition, our results suggest that these gender differences are *not* a result of confounding attitudes, values, and health practices, as these measures effectively negated gender differences in analyses of drinking status and health but did not do so among these heavier drinkers.

We also found that the heaviest drinkers, whether male or female and, whether measured by usual number of drinks per month or frequency of heavy drinking episodes, appear to have a constellation of attitudes, values, and health-related practices that affect their propensity and ability to seek needed medical care.

Lastly, our findings point again to important issues of measurement in the relationships between alcohol consumption and health. We confirmed that gender differences in these relationships vary depending on the measure of alcohol consumption (Green et al., 2004), with gender differences more apparent when respondents' frequency of heavy drinking is evaluated. Our findings also underscore the need to separate subgroups of "non-drinkers" by their different drinking histories. In particular, consistent with previous research (Green & Polen, 2001), former drinkers—whether male or female—report worse general and mental health and lower vitality than lifelong abstainers, even controlling for health-related beliefs, attitudes and practices.

### Limitations

Our response rate was less than expected, raising concerns about generalizability of our findings. We are able to describe non-respondents on key variables, however, providing information about possible biases in the sample. The sample was drawn from members of a privately financed health plan, rather than the general population, although the demographic composition of the health plan is very similar to that of the surrounding metropolitan area.

### CONCLUSIONS

Drinking status is independently related to physical health, mental health, and vitality, even after controlling for the health-related attitudes, values, and practices expected to confound these relationships. In addition, these potential confounders appear to explain previous research that showed gender differences in these relationships. Despite these findings, however, gender differences remained when considering frequency of heavy or at-risk drinking: Women who engaged in very frequent heavy drinking reported significantly worse physical and mental health than men with equivalent drinking patterns. Finally, our results indicate that the heaviest, at-risk drinkers, male and female, report attitudes, values and health-related practices that could negatively affect their health and keep them from seeking medical care.

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**Table 1**

Sample Characteristics by Gender, N = 7884.

Characteristic	Men n=2995	Women n=4889
Age in years, mean (sd)	46.8 (11.2)	46.3 (11.6)
White race/ethnicity, %	85.5	86.9
Married or living as married %	73.4	67.1 ***
Educational level, %		
Less than High School graduate	4.3	4.2 **
High School grad or equivalent	18.1	19.1
Some college/technical	38.5	41.7
College graduate	23.4	21.1
Postgraduate	15.8	14.0
Household income, adjusted for number of persons supported, %		
\$12,500 or under	18.0	23.1 ***
\$12,501 to \$18,750	19.2	20.7
\$18,751 to \$27,500	24.8	23.8
\$27,501 to \$37,500	16.9	16.5
Over \$37,500	21.2	15.8
Body Mass Index, %		
under 25.0	26.5	38.6 ***
25.0 to 29.9	42.9	27.4
30 or over	30.6	34.0
Smoking status, %		
Current smoker	20.9	17.7 ***
Former smoker	32.7	27.9
Never smoked	46.4	54.4
Drinking status, % <sup>1</sup>	(n=2933)	(n=4773)
Lifelong abstainer	8.9	16.6 ***
Former drinker	18.8	16.2
Current drinkers:		
0.5–29 drinks/month	50.3	58.4
30–59 drinks/month	13.3	6.5
60–89 drinks/month	3.7	1.2
90 drinks/month	5.1	1.2
Frequency of heavy drinking among current drinkers, % <sup>2</sup>	(n=2127)	(n=3225)
Never	41.8	80.6 ***
Less than monthly	30.8	13.9
Monthly	12.2	3.4
Weekly	10.9	1.6
Daily or almost daily	4.3	0.6

<sup>1</sup>Drinking status was missing for 178 persons.

<sup>2</sup> 5 drinks/occasion for men, 4drinks/occasion for women

\*  
p<0.05,

\*\*  
p<0.01,

\*\*\*  
p<0.001

Table 2

OVA Results for Health-related Attitudes and Values, for Two Drinking Measures.

	Dislike visiting doctor (male) (female) (both)	Self-efficacy in health care settings (male) (female) (both)	How confident can change health practices (male) (female) (both)	Concerned Dr. might disapprove of health practices (male) (female) (both)	If sick, one's own behavior determines getting well (male) (female) (both)	Better to seek professional help than treat oneself (male) (female) (both)	Good health a matter of good fortune (male) (female) (both)	Comfortable life important (male) (female) (both)	Exciting life important (male) (female) (both)	Respect & admiration of others important (male) (female) (both)	Religious & spiritual beliefs important (male) (female) (both)
	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)	Mean(se)
Frequency of heavy drinking days/											
	2.2 (.02)	.03 (.11)	2.4 (.02)	1.4 (.02)	3.8 (.04)	3.4 (.04)	2.2 (.04)	2.7 (.01)	2.1 (.02)	2.3 (.02)	2.2 (.02)
	2.2 (.01)	.20 (.07)	2.3 (.01)	1.4 (.01)	3.8 (.02)	3.2 (.02)	2.2 (.02)	2.8 (.01)	2.0 (.01)	2.4 (.01)	2.4 (.01)
	2.2 (.01)	.11 (.07)	2.3 (.01)	1.4 (.01)	3.8 (.02)	3.3 (.02)	2.2 (.02)	2.8 (.01)	2.1 (.01)	2.3 (.01)	2.3 (.01)
Less than monthly	2.2 (.02)	-.12 (.13)	2.3 (.03)	1.5 (.02)	3.7 (.04)	3.3 (.04)	2.3 (.05)	2.8 (.02)	2.2 (.02)	2.3 (.02)	2.1 (.03)
	2.1 (.03)	.22 (.16)	2.3 (.03)	1.5 (.03)	3.9 (.05)	3.2 (.06)	2.2 (.06)	2.8 (.02)	2.2 (.03)	2.4 (.03)	2.3 (.03)
	2.2 (.02)	.05 (.10)	2.3 (.03)	1.5 (.02)	3.8 (.03)	3.3 (.04)	2.3 (.04)	2.8 (.01)	2.2 (.02)	2.4 (.02)	2.2 (.02)
Monthly	2.2 (.04)	-.30 (.21)	2.2 (.04)	1.5 (.04)	3.8 (.06)	3.4 (.07)	2.2 (.08)	2.7 (.03)	2.2 (.04)	2.3 (.04)	2.0 (.04)
	2.2 (.06)	-.52 (.32)	2.2 (.06)	1.6 (.06)	3.8 (.10)	3.2 (.11)	2.3 (.12)	2.8 (.04)	2.1 (.06)	2.5 (.06)	2.2 (.07)
	2.2 (.04)	-.41 (.19)	2.2 (.04)	1.5 (.03)	3.8 (.06)	3.3 (.06)	2.3 (.07)	2.8 (.02)	2.2 (.04)	2.4 (.03)	2.1 (.04)
Weekly	2.3 (.04)	-.27 (.22)	2.1 (.04)	1.5 (.04)	3.8 (.07)	3.4 (.08)	2.3 (.08)	2.8 (.03)	2.2 (.04)	2.3 (.04)	2.0 (.04)
	2.2 (.09)	-.01 (.47)	2.2 (.09)	1.7 (.08)	3.8 (.15)	3.2 (.16)	2.5 (.17)	2.8 (.06)	2.1 (.09)	2.5 (.08)	2.1 (.10)
	2.3 (.05)	-.14 (.26)	2.2 (.05)	1.6 (.05)	3.8 (.08)	3.3 (.09)	2.4 (.09)	2.8 (.03)	2.2 (.05)	2.4 (.04)	2.1 (.05)
Two or almost daily	2.4 (.07)	-1.07 (.35)	1.9 (.07)	1.8 (.06)	3.5 (.11)	3.0 (.12)	2.6 (.13)	2.8 (.04)	2.1 (.06)	2.2 (.06)	1.9 (.07)
	2.2 (.14)	-1.67 (.77)	1.8 (.15)	2.0 (.14)	3.9 (.24)	3.2 (.26)	3.0 (.28)	2.8 (.10)	1.9 (.14)	2.2 (.13)	2.1 (.06)
	2.3 (.08)	-1.37 (.42)	1.8 (.08)	1.9 (.08)	3.7 (.13)	3.1 (.14)	2.8 (.15)	2.8 (.05)	2.0 (.08)	2.2 (.07)	1.9 (.09)
Very heavy drinking days	.03	.00	.00	.00	.92	.58	.00	.16	.00	.01	.00
Under	.24	.97	.60	.00	.15	.36	.12	.21	.03	.00	.00



	Dislike visiting doctor (male) (female) (both)	Self-efficacy in health care settings (male) (female) (both)	How confident can change health practices (male) (female) (both)	Concerned Dr. might disapprove of health practices (male) (female) (both)	If sick, one's own behavior determines getting well (male) (female) (both)	Better to seek professional help than treat oneself (male) (female) (both)	Good health a matter of good fortune (male) (female) (both)	Comfortable life important (male) (female) (both)	Exciting life important (male) (female) (both)	Respect & admiration of others important (male) (female) (both)	Religious & spiritual beliefs important (male) (female) (both)
<b>x heavy drinking</b>	$F(4,5338) = .68, p = .68$	$F(4,5338) = .65, p = .63$	$F(4,5338) = .71, p = .59$	$F(4,5338) = 2.4, p = .05$	$F(4,5338) = .74, p = .56$	$F(4,5338) = .42, p = .79$	$F(4,5338) = 1.1, p = .35$	$F(4,5338) = .06, p = .99$	$F(4,5338) = .66, p = .62$	$F(4,5338) = .86, p = .49$	$F(4,5338) = .78, p = .54$
$\eta^2 R^2$	.011	.032	.020	.038	.004	.058	.017	.016	.060	.016	.060
<b>g Status<sup>2</sup></b>	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)
ng abstainer	2.1 (.04)	-.19 (.21)	2.4 (.04)	1.4 (.04)	3.7 (.07)	3.5 (.07)	2.4 (.08)	2.7 (.03)	2.1 (.04)	2.4 (.04)	2.5 (.04)
	2.2 (.02)	-.16 (.12)	2.4 (.02)	1.5 (.02)	3.7 (.04)	3.4 (.04)	2.3 (.04)	2.7 (.02)	2.0 (.02)	2.3 (.02)	2.6 (.02)
	2.2 (.02)	-.18 (.12)	2.4 (.02)	1.5 (.02)	3.7 (.04)	3.4 (.04)	2.3 (.04)	2.7 (.02)	2.0 (.02)	2.4 (.02)	2.6 (.02)
or drinker	2.1 (.03)	-.04 (.15)	2.3 (.03)	1.5 (.03)	3.7 (.05)	3.5 (.05)	2.3 (.05)	2.7 (.02)	2.2 (.03)	2.3 (.02)	2.4 (.03)
	2.2 (.02)	.12 (.12)	2.3 (.02)	1.5 (.02)	3.8 (.04)	3.4 (.04)	2.1 (.04)	2.7 (.02)	1.9 (.02)	2.3 (.02)	2.5 (.02)
	2.1 (.02)	.04 (.10)	2.3 (.02)	1.5 (.02)	3.7 (.03)	3.4 (.03)	2.2 (.04)	2.7 (.01)	2.0 (.02)	2.3 (.02)	2.4 (.02)
s .5-29 drinks/month	2.2 (.02)	-.04 (.09)	2.3 (.02)	1.5 (.02)	3.8 (.03)	3.4 (.03)	2.3 (.03)	2.7 (.01)	2.1 (.02)	2.3 (.02)	2.2 (.02)
	2.2 (.01)	.22 (.06)	2.3 (.01)	1.4 (.01)	3.8 (.02)	3.3 (.02)	2.2 (.02)	2.8 (.01)	2.0 (.01)	2.4 (.01)	2.4 (.01)
	2.2 (.01)	.09 (.06)	2.3 (.01)	1.4 (.01)	3.8 (.02)	3.4 (.02)	2.3 (.02)	2.8 (.01)	2.1 (.01)	2.3 (.01)	2.3 (.01)
s 30-59 drinks/month	2.2 (.03)	-.26 (.17)	2.3 (.03)	1.4 (.03)	3.7 (.06)	3.3 (.06)	2.3 (.06)	2.8 (.02)	2.2 (.03)	2.3 (.03)	2.0 (.03)
	2.1 (.04)	-.08 (.19)	2.3 (.04)	1.5 (.04)	3.8 (.06)	3.2 (.07)	2.4 (.07)	2.8 (.02)	2.1 (.04)	2.4 (.03)	2.3 (.04)
	2.2 (.02)	-.17 (.13)	2.3 (.02)	1.5 (.02)	3.8 (.04)	3.2 (.04)	2.3 (.05)	2.8 (.02)	2.1 (.02)	2.3 (.02)	2.2 (.03)
s 60-89 drinks/month	2.3 (.06)	-.12 (.33)	2.2 (.06)	1.6 (.06)	3.8 (.10)	3.5 (.11)	2.3 (.12)	2.8 (.04)	2.2 (.06)	2.3 (.06)	2.0 (.06)
	2.3 (.09)	-.42 (.45)	2.0 (.09)	1.8 (.08)	3.8 (.14)	3.0 (.15)	2.1 (.16)	2.8 (.06)	2.1 (.08)	2.5 (.08)	2.1 (.09)
	2.3 (.05)	-.27 (.28)	2.1 (.05)	1.7 (.05)	3.8 (.10)	3.2 (.09)	2.2 (.10)	2.8 (.04)	2.2 (.05)	2.4 (.05)	2.0 (.06)
s 90 or more drinks/	2.3 (.05)	-.82 (.28)	1.9 (.05)	1.7 (.05)	3.7 (.09)	3.2 (.09)	2.4 (.10)	2.8 (.04)	2.1 (.05)	2.3 (.05)	2.0 (.06)
	2.2 (.09)	-.14 (.46)	1.9 (.09)	1.8 (.08)	3.9 (.14)	3.3 (.15)	2.7 (.16)	2.8 (.06)	1.9 (.08)	2.3 (.08)	2.1 (.09)
	2.3 (.05)	-.11 (.27)	1.9 (.05)	1.8 (.05)	3.8 (.08)	3.2 (.09)	2.6 (.10)	2.8 (.04)	2.0 (.05)	2.3 (.04)	2.0 (.05)
inking status	.00	.00	.00	.00	.20	.00	.00	.00	.00	.26	.00

	Dislike visiting doctor (male) (female) (both)	Self-efficacy in health care settings (male) (female) (both)	How confident can change health practices (male) (female) (both)	Concerned Dr. might disapprove of health practices (male) (female) (both)	If sick, one's own behavior determines getting well (male) (female) (both)	Better to seek professional help than treat oneself (male) (female) (both)	Good health a matter of good fortune (male) (female) (both)	Comfortable life important (male) (female) (both)	Exciting life important (male) (female) (both)	Respect & admiration of others important (male) (female) (both)	Religious & spiritual beliefs important (male) (female) (both)
Gender	2.2 (.02)	-.24 (.09)	2.2 (.02)	1.5 (.02)	3.7 (.03)	3.4 (.03)	2.3 (.03)	2.7 (.01)	2.1 (.02)	2.3 (.02)	2.2 (.02)
Age	2.2 (.02)	-.28 (.12)	2.2 (.02)	1.6 (.02)	3.8 (.04)	3.2 (.04)	2.3 (.04)	2.8 (.02)	2.0 (.02)	2.4 (.02)	2.3 (.02)
Gender	.62	.78	.33	.00	.03	.00	.70	.25	.00	.01	.00
<b>Sex x drinking status interaction</b>	$F(5,7690)=1.66, p=.14$	$F(5,7690)=.72, p=.61$	$F(5,7690)=.78, p=.56$	$F(5,7690)=2.17, p=.05$	$F(5,7690)=.86, p=.50$	$F(5,7690)=1.09, p=.36$	$F(5,7690)=1.23, p=.29$	$F(5,7690)=.46, p=.80$	$F(5,7690)=2.80, p=.02$	$F(5,7690)=1.77, p=.12$	$F(5,7690)=1.70, p=.13$
Adjusted R <sup>2</sup>	.01	.03	.02	.04	.00	.06	.03	.02	.06	.02	.09
Partial $\eta^2$											
Drinking status	.00	.00	.06	.00	.00	.00	.00	.00	.00	.00	.00
Gender-by-drinking interaction	.06										

Drinking status= .00, Gender= .00, Gender-by-drinking interaction= .06

Current drinkers, n=5352.

Drinking status missing for 178 individuals.

Models are adjusted for age, race/ethnicity, educational level, and adjusted household income.

**Table 3**

MANCOVA Results for Health-related Practices, for Two Drinking Measures.

	How often use seat belts (male) (female) (both)	Consumes 5 or more fruits/vegetables per day (male) (female) (both)	How often eat breakfast (male) (female) (both)	Number of days exercised past 7 days (male) (female) (both)	Usual hours of sleep (3 levels) (male) (female) (both)	Current smoker (male) (female) (both)	BMI (male) (female) (both)	Copes with stress actively (male) (female) (both)	Copes with stress passively (male) (female) (both)	Copes with stress by drinking or smoking (male) (female) (both)
	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)
<b>Frequency of heavy drinking days<sup>a</sup></b>										
Never	3.8 (.02)	.16 (.01)	2.5 (.02)	2.2 (.07)	1.6 (.02)	.16 (.01)	28.5 (.21)	.28 (.02)	.13 (.01)	.04 (.01)
	3.9 (.01)	.29 (.01)	2.5 (.01)	2.3 (.04)	1.7 (.01)	.14 (.01)	28.1 (.12)	.37 (.01)	.21 (.01)	.04 (.004)
	3.9 (.01)	.22 (.01)	2.5 (.01)	2.2 (.04)	1.7 (.01)	.15 (.01)	28.3 (.12)	.33 (.01)	.17 (.01)	.04 (.004)
Less than monthly	3.8 (.02)	.14 (.02)	2.3 (.03)	2.2 (.08)	1.6 (.02)	.21 (.02)	28.4 (.24)	.25 (.02)	.14 (.02)	.04 (.01)
	3.9 (.02)	.24 (.02)	2.4 (.04)	2.3 (.10)	1.8 (.03)	.29 (.02)	27.6 (.30)	.36 (.02)	.19 (.02)	.08 (.01)
	3.8 (.01)	.19 (.01)	2.4 (.02)	2.2 (.06)	1.7 (.02)	.25 (.01)	28.0 (.20)	.31 (.01)	.17 (.01)	.06 (.01)
Monthly	3.8 (.03)	.17 (.02)	2.3 (.04)	2.4 (.13)	1.7 (.04)	.27 (.02)	27.3 (.39)	.25 (.03)	.09 (.02)	.07 (.01)
	3.8 (.04)	.22 (.04)	2.2 (.07)	2.4 (.20)	1.8 (.06)	.35 (.04)	28.2 (.60)	.35 (.04)	.19 (.04)	.15 (.02)
	3.8 (.02)	.19 (.02)	2.2 (.04)	2.4 (.12)	1.7 (.04)	.31 (.02)	27.7 (.36)	.30 (.03)	.14 (.02)	.11 (.01)
Weekly	3.7 (.03)	.12 (.03)	2.2 (.05)	2.4 (.14)	1.7 (.04)	.34 (.02)	28.1 (.41)	.22 (.03)	.09 (.02)	.11 (.02)
	3.8 (.06)	.10 (.06)	2.3 (.10)	2.5 (.29)	1.9 (.08)	.60 (.05)	27.6 (.88)	.36 (.06)	.08 (.05)	.16 (.03)
	3.7 (.03)	.11 (.03)	2.3 (.06)	2.4 (.16)	1.8 (.05)	.47 (.03)	27.9 (.49)	.29 (.04)	.08 (.03)	.13 (.02)
Daily or almost daily	3.6 (.05)	.09 (.04)	2.2 (.08)	2.0 (.22)	1.8 (.06)	.41 (.04)	26.6 (.66)	.23 (.05)	.12 (.04)	.21 (.02)
	4.0 (.10)	.14 (.09)	2.0 (.16)	2.8 (.47)	1.5 (.14)	.57 (.09)	27.1 (1.4)	.39 (.11)	.25 (.09)	.45 (.05)
	3.8 (.06)	.12 (.05)	2.1 (.09)	2.4 (.26)	1.6 (.08)	.49 (.05)	26.9 (.79)	.31 (.06)	.19 (.05)	.33 (.03)
<i>p</i> for heavy drinking days	.00	.00	.00	.52	.02	.00	.19	.59	.06	.00
<b>Gender</b>										
Male	3.7 (.01)	.14 (.01)	2.3 (.02)	2.2 (.06)	1.7 (.02)	.28 (.01)	27.8 (.18)	.25 (.01)	.12 (.01)	.09 (.01)
Female	3.9 (.02)	.20 (.02)	2.3 (.04)	2.4 (.12)	1.7 (.04)	.39 (.02)	27.7 (.36)	.37 (.03)	.18 (.02)	.18 (.01)
<i>p</i> for gender	.00	.02	.71	.13	.20	.00	.84	.00	.00	.00

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	How often use seat belts (male) (female) (both)	Consumes 5 or more fruits/vegetables per day (male) (female) (both)	How often eat breakfast (male) (female) (both)	Number of days exercised past 7 days (male) (female) (both)	Usual hours of sleep (3 levels) (male) (female) (both)	Current smoker (male) (female) (both)	BMI (male) (female) (both)	Copes with stress actively (male) (female) (both)	Copes with stress passively (male) (female) (both)	Copes with stress by drinking or smoking (male) (female) (both)
<b>Gender x heavy drinking days interaction</b>	F(4, 5337)= 2.03, <i>p</i> =.09	F(4, 5337)= 2.06, <i>p</i> =.08	F(4, 5337)= 1.36, <i>p</i> =.24	F(4, 5337)= 0.56, <i>p</i> =.69	F(4, 5337)= 2.81, <i>p</i> =.02	F(4, 5337)= 7.60, <i>p</i> =.00	1 F(4, 5337)= 0.23, <i>p</i> =.30	F(4, 5337)= 0.25, <i>p</i> =.91	F(4, 5337)= 0.80, <i>p</i> =.52	F(4, 5337)= 7.32, <i>p</i> =.00
Adjusted <sup>2</sup> R <sup>2</sup>	.03	.06	.08	.03	.02	.10	.03	.03	.02	.06
Multivariate <i>p</i> :	Drinking status = .00, Gender = .00, Gender-by-drinking interaction = .00									
<b>Drinking status<sup>2</sup></b>	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)	Mean (se)
Lifelong abstainer	3.8 (.03)	.20 (.03)	2.6 (.04)	2.1 (.13)	1.6 (.04)	.07 (.02)	28.6 (.41)	.32 (.03)	.14 (.02)	.04 (.01)
	3.9 (.02)	.35 (.02)	2.6 (.03)	2.2 (.08)	1.7 (.02)	.05 (.01)	28.9 (.24)	.39 (.02)	.21 (.01)	.02 (.01)
	3.9 (.02)	.28 (.02)	2.6 (.03)	2.1 (.08)	1.7 (.02)	.06 (.01)	28.7 (.24)	.36 (.02)	.18 (.01)	.03 (.01)
Former drinker	3.8 (.02)	.15 (.02)	2.4 (.03)	2.1 (.09)	1.7 (.03)	.25 (.02)	28.8 (.28)	.30 (.02)	.17 (.02)	.09 (.01)
	3.9 (.02)	.27 (.02)	2.5 (.03)	2.1 (.08)	1.7 (.02)	.23 (.01)	29.9 (.24)	.40 (.02)	.25 (.01)	.09 (.01)
	3.8 (.01)	.21 (.01)	2.4 (.02)	2.1 (.06)	1.7 (.02)	.24 (.01)	29.4 (.19)	.35 (.01)	.21 (.01)	.09 (.01)
Drinks <29 drinks/month	3.8 (.01)	.14 (.01)	2.4 (.02)	2.1 (.05)	1.6 (.02)	.20 (.01)	28.6 (.17)	.26 (.01)	.14 (.01)	.04 (.01)
	3.9 (.01)	.20 (.01)	2.5 (.01)	2.2 (.04)	1.7 (.01)	.17 (.01)	28.3 (.12)	.36 (.01)	.21 (.01)	.05 (.004)
	3.9 (.01)	.21 (.01)	2.4 (.01)	2.2 (.03)	1.7 (.01)	.18 (.01)	28.5 (.11)	.31 (.01)	.28 (.01)	.05 (.004)
Drinks 30–59 drinks/month	3.8 (.02)	.17 (.02)	2.3 (.04)	2.4 (.10)	1.7 (.03)	.23 (.02)	27.4 (.34)	.26 (.02)	.08 (.02)	.06 (.01)
	3.9 (.02)	.26 (.02)	2.4 (.04)	2.5 (.12)	1.8 (.04)	.27 (.02)	26.1 (.38)	.45 (.03)	.13 (.02)	.09 (.01)
	3.8 (.02)	.22 (.02)	2.3 (.03)	2.4 (.08)	1.7 (.02)	.25 (.01)	26.8 (.25)	.35 (.02)	.11 (.02)	.08 (.01)
Drinks 60–89 drinks/month	3.8 (.04)	.10 (.04)	2.3 (.07)	2.1 (.20)	1.6 (.06)	.32 (.04)	27.8 (.63)	.26 (.04)	.09 (.04)	.01 (.02)
	3.8 (.06)	.06 (.05)	2.3 (.10)	2.1 (.28)	1.8 (.08)	.48 (.05)	26.5 (.87)	.27 (.06)	.13 (.05)	.22 (.03)
	3.8 (.04)	.08 (.03)	2.3 (.06)	2.1 (.17)	1.7 (.05)	.40 (.03)	27.2 (.54)	.26 (.04)	.11 (.03)	.13 (.02)
Drinks 90 or more drinks/month	3.6 (.04)	.10 (.03)	2.2 (.06)	2.1 (.17)	1.7 (.05)	.44 (.03)	27.6 (.54)	.21 (.04)	.08 (.03)	.19 (.02)
	3.9 (.06)	.13 (.06)	2.2 (.10)	2.0 (.28)	1.8 (.08)	.51 (.05)	27.8 (.88)	.34 (.06)	.23 (.05)	.31 (.03)
	3.8 (.04)	.12 (.03)	2.2 (.06)	2.1 (.16)	1.8 (.05)	.47 (.03)	27.7 (.52)	.28 (.04)	.15 (.03)	.25 (.02)
<i>p</i> for drinking status	.26	.00	.00	.02	.02	.00	.00	.00	.00	.00

	How often use seat belts (male) (female) (both)	Consumes 5 or more fruits/vegetables per day (male) (female) (both)	How often eat breakfast (male) (female) (both)	Number of days exercised past 7 days (male) (female) (both)	Usual hours of sleep (3 levels) (male) (female) (both)	Current smoker (male) (female) (both)	BMI (male) (female) (both)	Copes with stress actively (male) (female) (both)	Copes with stress passively (male) (female) (both)	Copes with stress by drinking or smoking (male) (female) (both)
<b>Gender</b>										
Male	3.8 (.01)	.14 (.01)	2.3 (.02)	2.2 (.05)	1.6 (.02)	.25 (.01)	28.2 (.17)	.27 (.01)	.12 (.01)	.08 (.01)
Female	3.9 (.02)	.23 (.01)	2.4 (.02)	2.2 (.07)	1.7 (.02)	.28 (.01)	27.9 (.22)	.37 (.02)	.19 (.01)	.13 (.01)
<i>p</i> for gender	.00	.00	.06	.81	.00	.04	.39	.00	.00	.00
<b>Gender x drinking status interaction</b>	F(5,7689)= 3.34, <i>p</i> =.01	F(5,7689)= 2.28, <i>p</i> =.04	F(5,7689)= 0.67, <i>p</i> =.65	F(5,7689)= 0.18, <i>p</i> =.97	F(5,7689)= 0.56, <i>p</i> =.73	F(5,7689)= 3.18, <i>p</i> =.01	F(5,7689)= 3.63, <i>p</i> =.00	F(5,7689)= 1.70, <i>p</i> =.13	F(5,7689)= 0.61, <i>p</i> =.69	F(5,7689)= 6.32, <i>p</i> =.00
Adjusted R <sup>2</sup>	.03	.06	.06	.03	.01	.09	.05	.03	.02	.05
Multivariate <i>p</i> :	Drinking status = .00, Gender = .00, Gender-by-drinking interaction = .00									

<sup>1</sup> Among current drinkers, n=5352.

<sup>2</sup> N=7706 (drinking status missing for 178 individuals).

<sup>3</sup> Both models adjusted for age, race/ethnicity, education, adjusted income, and marital status.

Table 4

MANCOVA results for Health Status, for Two Drinking Measures, Adjusting for Health Practices, Attitudes, and Values.

	SF-36 General Health (male) (female) (both)	SF-36 Mental Health (male) (female) (both)	SF-36 Vitality (male) (female) (both)
<b>Frequency of heavy drinking days<sup>1</sup></b>	Adjusted Mean (se)	Adjusted Mean (se)	Adjusted Mean (se)
Never	50.1 (.28)	50.6 (.31)	51.1 (.30)
	50.6 (.16)	49.4 (.18)	49.2 (.18)
	50.4 (.16)	50.0 (.18)	50.2 (.18)
Less than monthly	51.5 (.32)	50.2 (.36)	51.2 (.35)
	50.4 (.39)	48.4 (.44)	49.2 (.43)
	51.0 (.25)	49.3 (.28)	50.2 (.28)
Monthly	51.3 (.51)	51.2 (.57)	52.2 (.56)
	50.3 (.78)	47.5 (.87)	48.2 (.86)
	50.8 (.47)	49.3 (.52)	50.2 (.51)
Weekly	50.2 (.54)	50.3 (.60)	51.5 (.59)
	50.4 (1.14)	48.6 (1.28)	50.1 (1.25)
	50.3 (.63)	49.5 (.71)	50.8 (.70)
Daily or almost daily	50.9 (.86)	51.0 (.96)	52.2 (.95)
	45.9 (1.87)	44.0 (2.09)	51.2 (2.05)
	48.4 (1.03)	47.5 (1.16)	51.7 (1.14)
<i>p</i> for heavy drinking days	.07	.07	.67
<b>Gender</b>			
Male	50.8 (.25)	50.6 (.28)	51.6 (.27)
Female	49.5 (.48)	47.6 (.53)	49.6 (.52)
<i>p</i> for gender	<b>.02</b>	<b>.00</b>	<b>.00</b>
<b>Gender x heavy drinking days interaction</b>	$F(4,5315)= 3.50, p=.01$	$F(4,5315)=2.71, p=.03$	$F(4,5315)= 1.08, p=.36$
Adjusted <sup>3</sup> R <sup>2</sup>	.24	.18	.24
Multivariate <i>p</i>	Heavy drinking = <b>.00</b> , Gender = <b>.00</b> , Gender-by-drinking interaction = <b>.00</b>		
<b>Drinking Status<sup>2</sup></b>	Adjusted Mean (se)	Adjusted Mean (se)	Adjusted Mean (se)
Lifelong abstainer	51.3 (.53)	51.1 (.59)	52.5 (.57)
	49.1 (.32)	50.1 (.35)	49.2 (.34)
	50.2 (.31)	50.6 (.35)	50.9 (.34)

	SF-36 General Health (male) (female) (both)	SF-36 Mental Health (male) (female) (both)	SF-36 Vitality (male) (female) (both)
Former drinker	47.4 (.37)	49.2 (.41)	49.4 (.39)
	47.3 (.31)	47.9 (.35)	47.0 (.34)
	47.3 (.24)	48.5 (.27)	48.2 (.26)
Drinks .5–29 drinks/month	50.2 (.22)	50.3 (.25)	50.7 (.24)
	50.0 (.16)	49.0 (.18)	48.8 (.17)
	50.1 (.14)	49.6 (.15)	49.8 (.15)
Drinks 30–59 drinks/month	51.0 (.44)	50.6 (.48)	52.3 (.47)
	51.0 (.49)	48.1 (.54)	49.4 (.52)
	51.0 (.33)	49.4 (.37)	50.9 (.35)
Drinks 60–89 drinks/month	51.7 (.82)	50.8 (.91)	51.5 (.88)
	52.1 (1.13)	49.0 (1.25)	50.6 (1.21)
	51.9 (.70)	49.9 (.78)	51.1 (.75)
Drinks 90 or more drinks/month	49.9 (.70)	51.2 (.78)	51.5 (.75)
	48.9 (1.14)	47.6 (1.26)	50.6 (1.22)
	49.4 (.67)	49.4 (.75)	51.1 (.72)
<i>p</i> for drinking status	<b>.00</b>	<b>.00</b>	<b>.00</b>
<b>Gender</b>			
Male	50.2 (.23)	50.5 (.25)	51.3 (.24)
Female	49.8 (.29)	48.6 (.32)	49.3 (.31)
<i>p</i> for gender	.20	<b>.00</b>	<b>.00</b>
<b>Gender x drinking status interaction</b>	$F(5,7667)= 2.16, p=.06$	$F(5,7667)= 1.04, p=.39$	$F(5,7667)= 1.39, p=.22$
Adjusted <sup>2</sup> R <sup>2</sup>	.27	.18	.25
Multivariate <i>p</i>	Drinking status = <b>.00</b> , Gender = <b>.00</b> , Gender-by-drinking interaction = <b>.01</b>		

<sup>1</sup> Among current drinkers, n=5352.

<sup>2</sup> N=7706 (drinking status was missing for 178 individuals)

<sup>3</sup> Both models are adjusted for age, race/ethnicity, educational level, adjusted household income, marital status, and all of the dependent variables in Tables 2 and 3.