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Heavy/binge drinking and depressive symptoms in older adults: gender differences

Namkee G. Choi¹ and Diana M. DiNitto²

¹Professor School of Social Work, University of Texas at Austin, Austin, TX, USA

²Cullen Trust Centennial Professor in Alcohol Studies and Education, School of Social Work, University of Texas at Austin, Austin, TX, USA

Abstract

Objectives—The purpose of this study was to examine gender similarity/difference in the association between depressive symptoms (11-item Center for Epidemiologic Scale for Depression (CES-D) scores), on the one hand, and frequency and amount of alcohol use, on the other, among older adults.

Methods—Data came from the National Social Life, Health, and Aging Project (NSHAP), Wave 1, which included a nationally representative probability sample ($n=2924$) of community-dwelling individuals aged 57–85. Heavy/binge drinking was defined as the consumption of 4+ drinks for men and 3+ drinks for women per drinking day. The relationship between CES-D scores and the frequency and amount of alcohol consumption was tested using gender-separate, 2-step ordinary least squares (OLS) regression analyses.

Results—A significant proportion of both men (67.7%) and women (52.2%) had consumed alcohol in the preceding 3 months, and 12.3% of male and 8.4% of female drinkers were heavy/binge drinkers. Substantial differences between male and female heavy drinkers were found in sociodemographics, health status, and social support and social engagement. Regression results show that both frequency of drinking and heavy/binge drinking, as opposed to abstinence, were significantly positively associated with men's CES-D scores, but not with women's.

Conclusion—Heavy/binge-drinking older men may use alcohol to cope with depressive mood, and heavy drinking might also contribute to their social isolation and depressive symptoms. Depression screening and treatment for older men should be accompanied by alcohol screening and treatment and *vice versa*.

Keywords

depressive symptoms; heavy/binge drinking; gender differences

Introduction

Heavy alcohol use or alcohol misuse and major depressive disorder or depressive symptoms commonly co-occur in late life (Grant and Harford, 1995; Friedmann *et al.*, 1999; Graham and Schmidt, 1999; Merrick *et al.*, 2008; Sacco *et al.*, 2009). A few studies also report a

relationship between alcohol misuse and major depression or depressive symptoms in older adults of both genders (Grant, 1997; Brennan *et al.*, 2001; St. John *et al.*, 2009). In general, depressive symptoms are more prevalent among older women than older men (see Blazer, 2003, 2009). On the other hand, epidemiologic studies find that older women are more likely to abstain from alcohol use and generally to drink less than older men when they do drink (Moore *et al.*, 2006; Lang *et al.*, 2007; Merrick *et al.*, 2008). Given these gender differences in the prevalence rates of depressive symptoms and alcohol use patterns, gender differences in the relationship between depressive symptoms and alcohol use require further examination.

Previous studies that include people of all ages point to the possibility of gender difference in the relationship. In a study based on the Epidemiologic Catchment Area Survey, baseline depressive symptom severity was significantly positively associated with the risk of developing alcohol dependence in women but only marginally so in men; and baseline alcoholic symptom severity was significantly positively associated with greater odds of developing major depression in women than in men after a year of follow-up (Gilman and Abraham, 2001; see also Kessler *et al.*, 1997 for similar findings on gender differences from the National Comorbidity Survey). In another study of adults of all age groups, depressed men, regardless of age, were more likely than depressed women to transit to problem drinking (Crum *et al.*, 2001). Crum *et al.* also found a general decreased likelihood of transitioning to higher-level drinking across most cut points of an alcohol consumption scale among depressed women as compared to women who were not depressed (p. 770).

In previous studies, alcohol consumption has been examined in terms of both the frequency of drinking and the quantity of drinks consumed per drinking occasion. The findings suggest that frequency and quantity may not be equally significantly associated with depressive symptoms. Graham and Schmidt (1998, 1999) found that frequency of drinking was not associated with older adults' (aged 65+) depressive symptoms, but that amount was, although gender similarities/differences were not specified. With respect to the relationship between the amount of alcohol consumption, on the one hand, and physical and mental health, on the other, previous studies tended to present a linear pattern, with low-to-moderate drinking (e.g., 1–2 drinks per day) associated with better health indicators for both genders and heavy drinking associated with worse health indicators; this pattern was more prevalent among men than among women (Friedmann *et al.*, 1999; Blow *et al.*, 2000; Wang *et al.*, 2002; Mukamel *et al.*, 2003; Byles *et al.*, 2006; Moore *et al.*, 2006; Lang *et al.*, 2007).

The purposes of this study were to (1) examine gender similarity/difference in the association between depressive symptoms and alcohol use—frequency and amount—among a representative community sample of older adults, controlling for other depression risk/protective factors (sociodemographics, health status, social support and social engagement, and other health-related behaviors); and (2) explore possible factors that may contribute to such similarity/difference.

Methods

Data source and sample

The data for this study came from the National Social Life, Health, and Aging Project (NSHAP), Wave 1, which included a nationally representative probability sample of community-dwelling individuals aged 57–85 across the United States. In-home, in-person interviews were conducted in English and Spanish with a total of 3005 respondents (1455 men and 1550 women) in 2005 and 2006. In addition to a face-to-face interview that included a brief self-administered questionnaire, an in-home collection of a broad panel of biomeasures and a leave-behind questionnaire were administered (Inter-University

Consortium for Political and Social Research, 2008). In the present study, we used data from the face-to-face interviews with 2924 respondents. We excluded four respondents for whom we lacked data on depressive symptoms and 77 respondents whose race/ethnicity was other than non-Hispanic White, non-Hispanic Black, or Hispanic.

Measures

Depressive symptoms—These were measured by the 11-item, 4-point (0–3) Center for Epidemiologic Scale for Depression (CES-D; Kohout *et al.*, 1993). The score ranged from 0 to 32 for the study sample, and the Cronbach's α was 0.80. Estimation of the prevalence of clinically significant depressive symptoms was done by calibrating the caseness score of the 11-item scale to match that of the 20-item CES-D. Given that a score of 16 or higher is commonly accepted as representing clinically significant symptoms in the 20-item scale, a score of 9 or higher was regarded as representing clinically significant symptoms in the 11-item scale.

Alcohol consumption—Frequency was measured by the average number of days per week in the preceding 3 months when the respondent had consumed any alcohol (e.g., beer, wine, or any drink containing liquor). The values ranged from 0 (none or less than once per week) to 7 (every day). Quantity/amount was measured by the average number of drinks the respondent had had on the days when he or she drank: none (abstainer/nondrinker), 1 drink, 2 drinks, 3 drinks, and 4+ drinks for men; and none (abstainer/nondrinker), 1 drink, 2 drinks, and 3+ drinks for women. There were two reasons for using the 3+, rather than 4+, category for women: (1) the sample included only a total of 41 women and 26 women who drank, on average, 3 drinks and 4+ drinks, respectively, on a drinking day; and (2) since women are more susceptible than men to the effects of alcohol, lower limits are normally used to indicate heavy drinking in them. The number of total weekly drinks was calculated by multiplying the average number of drinking days per week by the average number of drinks per drinking day. The frequency of drinking and the number of drinks, as categorized, were moderately correlated ($r=0.56$ for men and $r=0.59$ for women, with both groups at $p<0.000$), indicating that some of the heavy drinkers were binge drinkers. Thus, we defined 4+ drinks for men and 3+ drinks for women as heavy/binge drinking.

Sociodemographics—These included age, gender, race/ethnicity, marital status, level of education, level of annual household income, and employment status.

Health status—This was measured with the total number of diagnosed chronic medical conditions (arthritis; emphysema, chronic bronchitis, or chronic obstructive lung disease; stroke; high blood pressure or hypertension; diabetes; any heart disease; any cancer other than skin cancer; and kidney disease: range 0–8) and the number of ADLs (activities of daily living) with at least some difficulty (walking across a room; dressing; bathing/showering; eating; getting into or out of bed; and using the toilet: range 0–6).

Social support and social engagement—These were measured with two variables: (1) the combined score from the family (excluding one's spouse/partner) support scale and the friend support scale; and (2) the frequency of religious service attendance in the preceding 12 months on a 7-point scale (never=0, several times per week=6). The original family and friend support/strain scales—5 items each for family and friends—were developed by Schuster *et al.* (1990). The NSHAP used the following four items each to measure family support and friend support: How often (1) can you open up to members of your family (friends) if you need to talk about your worries? (2) Can you rely on them for help if you have a problem? (3) Do members of your family (friends) make too many demands on you? and (4) Do they criticize you? The response categories were hardly ever or

never (1); some of the time (2); and often (3). The Cronbach's α for the combined family and friend scales was 0.56. The low level of the α coefficient is likely to be due to the abbreviation of the items and their heterogeneous content, and warrants caution in interpretation of the results. Because religious organizations and groups can be important sources of social support and social engagement (e.g., through volunteer opportunities), we included the frequency of service attendance as an indicator of social support and social engagement.

Other health-related behaviors—These included current tobacco use status (cigarettes, pipes, snuff, chewing tobacco, or any other forms of tobacco: yes=1; no=0), and the frequency of participation in physical activity such as walking, dancing, gardening, exercise, or sports (never=0; <1 time per month=1; 1–3 times per month=2; 1–2 times per week=3; 3+ times per week=4; treated as a continuous variable).

Statistical analysis

We conducted bivariate analyses to test for any gender similarities and differences in the study variables of interest, and to examine the question of whether heavy/binge drinkers differed from nondrinkers and the other drinkers within the same gender and between genders. Then, with the continuous CES-D score as the dependent variable, we used 2-step ordinary least squares (OLS) regression analysis for each gender group separately. In the first step (Model 1), we entered sociodemographic characteristics, health status, social support, and other health-related behavior variables. In the second step, we entered the alcohol consumption variable—the number of drinking days per week (frequency; Model 2a) or the number of drinks per drinking day (quantity; Model 2b). Because 150 respondents (88 men and 62 women) did not return their leave-behind questionnaires, which included the family and friend support variables, the values of these respondents' combined family and friend support were imputed using an iterative Markov Chain Monte Carlo method. The comparison between the regression results with the imputed values and those with the original data with listwise deletion of the missing data showed no statistical or substantive difference. Thus, we report the results of the regression models with the original data (i.e., with a listwise deletion of missing data). All statistics were weighted by the individual respondent-level weights, incorporating a nonresponse adjustment based on age and urbanicity.

Results

Sample characteristics by gender

As expected, women's mean CES-D score was significantly higher than men's (5.79 (SD=5.25) vs. 4.89 (SD=4.99), $p<0.000$), and 25.8% of women, as compared to 19.2% of men, may have had clinically significant depressive symptoms (Table 1). In terms of alcohol use, 52.2% of women and 67.7% of men reported that they had drunk any alcohol in the preceding 3 months. On average, male drinkers drank 2.86 days per week, and female drinkers drank 2.06 days per week ($p<0.000$), and 19.7% of men, as compared to 13.8% of women, reported that they regularly consumed alcohol 7 days per week (Table 2). On average, male drinkers consumed 2.20 drinks and female drinkers consumed 1.55 drinks per drinking day, and 12.3% of male drinkers consumed 4+ drinks and 8.4% of female drinkers consumed 3+ drinks. The total weekly number of drinks for men was more than two times that for women (7.36 (SD=12.26) vs. 3.45 (SD=4.88), $p<0.000$).

Characteristics of heavy/binge drinkers

For both genders, data in Table 3 indicates substantial differences between those who were and those who were not heavy/binge drinkers. Heavy/binge-drinking men had more

disadvantages than men who abstained or were low/moderate drinkers. They were more likely to be divorced/separated; to have less education, income, and family/friend support; and to engage in physical activities less often. Heavy/binge-drinking women were healthier and more likely to be employed than women who abstained or were low to moderate drinkers. Given their higher employment rate (49.3%), higher perceived level of social support, and equal levels of participation in physical activities and religious services, it appears that women who were heavy/binge drinkers were more socially active than their abstaining or low-/moderate-drinking peers. Further analyses also showed that heavy/binge-drinking women had significantly ($p<0.01$) higher income, social support, and religious service participation, and lower CES-D scores than heavy/binge-drinking men, although they were not significantly different in age and number of ADL impairments.

Multivariate regression analysis results

The OLS regression Model 1 in Table 4 shows that among men, higher CES-D scores were associated with being divorced/separated or widowed; having a household income less than \$25 000, between \$25 000 and \$49 999, or missing income data; and more chronic medical conditions and ADL impairments, while lower CES-D scores were associated with being employed; having greater family/friend support; higher frequency of attending religious services; and higher frequency of engaging in physical activity. Age group, education, race/ethnicity, and smoking were not significant predictors of men's CES-D scores.

Among women, higher CES-D scores were associated with older age (75–85, as opposed to 57–64), household income less than \$25 000 or missing income data, and more chronic medical conditions and ADL impairments, while lower CES-D scores were associated with being Black, having greater family/friend support, smoking, and higher frequency of engaging in physical activity. Marital status, level of education, employment status, and frequency of religious service attendance were not significant predictors of women's CES-D scores.

In Model 2a, the frequency of drinking variable was positively associated with men's CES-D scores, but it explained only an additional 1% of the variance in those scores. The frequency of drinking was not significantly associated with women's CES-D scores. With the addition of the frequency of drinking variable, the only change was that the frequency of religious service attendance was no longer significant for men. In Model 2b, the variable 4+ drinks per drinking day, as opposed to abstinence, was significantly positively associated with men's CES-D scores, explaining an additional 2% of the variance in them. However, the quantity of drinks was not significantly associated with women's CES-D scores at all. We further tested the predictive power of the total number of drinks consumed per week (not reported in Table 4). The results were the same as those of models 2a and 3b, in that the total number of drinks consumed weekly was significantly correlated with men's CES-D scores only, explaining an additional 4% of the variance of those scores.

Discussion

As health problems and medication use increase in late life, alcohol consumption and drinking problems tend to decline for both older men and older women (Moos *et al.*, 2010). The findings of this study indeed show that frequency and/or amount of alcohol consumption were significantly, albeit weakly, negatively associated with age and the number of diagnosed medical conditions and ADL impairments. Almost one half of women and one third of men aged 57 and older abstained from alcohol. However, the findings also show that nearly 20% of drinking men and 14% of drinking women drank alcohol every day of the week. Moreover, about 14% of drinking men and 5% of drinking women averaged three drinks per drinking day, and 12% of drinking men and 3% of drinking women

averaged four or more drinks per drinking day. The alcohol consumption data in itself shows that a significant proportion of older drinking men are engaged in unhealthy drinking patterns. Contrary to previous studies, we did not find any positive effect of a low-to-moderate amount of drinking on older adults' mental health. When other risk and protective factors for depressive symptoms are controlled for, low-frequency or -quantity drinking, compared to abstinence, was not correlated with lower depressive symptoms, but heavy/binge drinking was significantly associated with higher depressive symptoms in older men.

Although a causal relationship between alcohol consumption and depressive symptoms cannot be established with cross-sectional data, the finding that heavy/binge drinking was significantly associated with higher depressive symptoms in older men but not in older women points to a higher likelihood of depressive symptoms having preceded alcohol consumption in older men. Alcohol intake among some older men may have been a coping mechanism directed at regulating and controlling negative emotions and self-medicating depressive mood (Khantzian, 1985; MacAndrew, 1982). Community-based studies support the self-medication theory of alcohol use for mood symptoms, and suggest that depressive symptoms may precede alcohol problems (Dupree and Schonfeld, 1998; Kessler *et al.*, 1997; Schutte *et al.*, 1998). Given that a higher proportion of heavy/bingedrinking older men than other older men who were divorced/separated, had lower perceived family/friend support, and were less likely to be socially engaged, it is likely that older men who lack social support from family and/or friends may have also resorted to alcohol to cope with their depressive symptoms.

In the absence of data on the history of drinking behaviors, we cannot rule out the possibility that for some men, heavy drinking might also contribute to their social isolation and depressive symptoms. The accumulated, irreversible toxic effects of alcohol on the thyroid gland can potentially lead to hypothyroidism, which is associated with depression and the production of cognitive impairment (Hermann *et al.*, 2002). The aging process also presents many stressors that may contribute to both depression and alcohol abuse/misuse and may worsen outcomes when both are present. An increase in both depressive symptoms and alcohol consumption may be a response to psychosocial stress created by the deaths of loved ones, decreased social support, increased loneliness and social isolation, and the onset and increase of physical and functional health problems and/or financial woes (Musick *et al.*, 2000; Pinquart and Sorensen, 2001; Cole and Dendukuri, 2003; Cacioppo *et al.*, 2006; Blazer, 2009). In sum, the causal order of alcohol consumption and depression in late life is difficult to establish, but it is likely that depression is a significant factor in alcohol misuse and that increased alcohol consumption may lead to worsening depressive symptoms (Atkinson, 1999).

The lack of a significant relationship between depressive symptoms and alcohol consumption among older women may be attributed to the lower prevalence rates of alcohol use and heavy drinking among older women than older men. There is an age-related decrease in lean body mass versus total volume of fat in both genders, but heavy drinking puts older women at greater risk than older men because women of all ages have less lean muscle mass than their male counterparts, making them more susceptible to alcohol's effects (Blow and Barry, 2002). For older women who have chronic medical conditions, heavy drinking, mixed with intake of multiple medications, is especially likely to create serious negative effects. The limited variation in drinking patterns among the older women in this study (i.e., almost 90% of the drinking women consumed 2 or fewer drinks per drinking day) may also be responsible for the nonsignificant relationship between their depressive symptoms and alcohol consumption. However, the findings that heavy/binge-drinking older women had significantly fewer ADL impairments than their female peers who were not heavy/binge drinkers and that almost half of them were working for pay also suggest that

heavy/binge drinking among women is more likely to happen in situations where they are in the company of others, including social occasions. The finding that heavy/binge-drinking women reported higher social support than did the other women or the heavy/binge-drinking men provides support to such a possibility. Older women in general tend to have a larger social support network and higher perceived social support than older men, and they are also more likely than older men to seek help for their depression and alcohol problems (Antonucci and Akiyama, 1987; Brennan *et al.*, 2001; Glynn *et al.*, 1999). For depressed older women, social support and help seeking may protect them against use of alcohol to self-medicate and cope. Thus, despite their prevalence of depressive symptoms that is higher than in older men, it is possible that their greater physiological reactions to alcohol (which may cause them to limit their drinking), their higher levels of social support (which indicate a higher level of social engagement and a lower level of social isolation), and their greater help-seeking tendencies may weaken the relationship between their depression and alcohol use.

The limitations of this study are the cross-sectional data set and the lack of information on the contexts of drinking—where and with whom older drinkers drank. Future research should examine the contexts of drinking to better determine the effect of alcohol use on the older drinkers' physical and mental health. Despite these limitations, the findings of this study show significant gender difference in the relationship between depressive symptoms and alcohol consumption. The following major clinical implications emerge from the findings: (1) Given the high prevalence of daily and/or heavy/binge alcohol use and depressive symptomatology among older adults, health and social service providers need to better understand the possible connection between the two. (2) Depression screening for older adults, especially older men, should be accompanied by alcohol screening and *vice versa*. (3) Men who are heavy/binge drinkers may benefit from alcohol treatment and depression treatment offered concurrently. (4) Alcohol treatment for older men should include the teaching of different skills for coping with stressors and depressive moods. (5) Given that heavy drinking puts older women at greater risk than older men, heavy/binge-drinking older women, though a small proportion of the older female population, need to be assessed for possible serious health effects of heavy/binge drinking.

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Key Points

- Self-reported frequency of drinking was significantly associated with depressive symptoms in older men, but not in older women.
- Heavy/binge drinking (4+ drinks for men and 3+ drinks for women per drinking day), as opposed to no drinking, was significantly positively associated with depressive symptoms in older men, but not in older women.
- A low-to-moderate level of drinking (up to 3 drinks for men and up to 2 drinks for women per drinking day), as opposed to no drinking, was not significantly associated with depressive symptoms among either older men or older women.
- Depression screening and treatment for older men should be accompanied by alcohol screening and treatment and *vice versa*.

Table 1

Sample characteristics

Variable	All	Men	Women	p
N	2924	1410	1514	
Age (year)	68.07 (7.70)	67.59 (7.59)	68.53 (7.78)	0.001
Age group (%)				0.006
57–64	40.9	43.2	38.8	
65–74	35.0	35.1	34.9	
75–85	24.1	21.6	26.3	
Marital status (%)				0.000
Married/cohabiting	68.8	80.3	58.1	
Divorced/separated	11.3	9.0	13.4	
Widowed	16.6	7.7	25.0	
Never married	3.3	3.0	3.5	
Race/ethnicity (%)				0.355
Non-Hispanic White	82.7	83.3	82.2	
Non-Hispanic Black	10.3	9.4	11.0	
Hispanic	7.0	7.2	6.8	
Level of education (%)				0.000
Less than high school	18.6	16.9	20.2	
High school or equivalent	26.9	24.3	29.4	
Voc. certificate/some college/associate degree	30.1	27.5	32.5	
Bachelor's degree or higher	24.4	31.3	17.8	
Household income (%)				0.000
<\$25 000	26.0	21.1	30.7	
\$25 000–\$49 999	27.9	28.6	27.2	
\$50 000–\$99 999	22.8	28.1	17.8	
\$100 000	12.7	16.1	9.5	
Missing	10.6	6.1	14.9	
Employment status (%)				0.000
Currently working for pay	34.7	40.7	29.2	
Not working for pay	65.3	59.3	70.8	
No. of diagnosed chronic medical conditions	1.86 (1.39)	1.81 (1.40)	1.91 (1.37)	0.054
No. of ADL impairments	0.59 (1.27)	0.50 (1.17)	0.68 (1.36)	0.000
Family/friend support	19.67 (3.45)	19.30 (3.43)	20.01 (3.43)	0.000
Frequency of religious service attendance	3.27 (2.13)	3.02 (2.17)	3.49 (2.06)	0.000
Smoking (%)				0.000
Currently smoking	46.1	56.6	36.4	
Not currently smoking	53.9	43.4	63.6	
Frequency of physical activity ^a	3.18 (1.30)	3.35 (1.16)	3.02 (1.40)	0.000
Mean CES-D score	5.35 (5.15)	4.89 (4.99)	5.79 (5.25)	0.000
CES-D score (%)				0.000

Variable	All	Men	Women	<i>p</i>
<i>N</i>	2924	1410	1514	
0–8	77.4	80.8	74.2	
9	22.6	19.2	25.8	
Have drunk in the past 3 months (%)				0.000
Yes (drinker)	59.7	67.7	52.2	
No (nondrinker)	40.3	32.3	47.8	

(*s*): Standard deviation of the mean.

p: Denotes gender similarities/differences.

^aRange of the value: 0 (never) to 4 (3+ times a week).

Table 2

Frequency and amount of alcohol consumption

N	All 2924	Drinkers only 1746	All men 1410	Drinking men only 955	All women 1514	Drinking women only 791
No. of drinking days per week		2.50 (2.56)		2.86 (2.62)***		2.06 (2.42)***
N/A (nondrinkers, %)	40.3	—	32.3	—	47.8	—
1 (%)	29.5	49.5	28.9	42.7	30.0	57.4
2 (%)	6.6	11.0	7.2	10.6	6.0	11.5
3 (%)	6.2	10.4	8.3	12.2	4.4	8.3
4 (%)	2.5	4.3	3.3	4.8	1.9	3.6
5 (%)	3.1	5.2	4.3	6.3	2.1	3.9
6 (%)	1.4	2.4	2.4	3.6	0.5	0.9
7 (%)	10.2	17.0	13.4	19.7	7.2	13.8
Missing (%)	0.2	0.3	0.1	0.1	0.2	0.5
No. of drinks on drinking days		1.91 (1.70)		2.20 (1.98)***		1.55 (1.18)***
N/A (nondrinkers, %)	40.3	—	32.3	—	47.8	—
1 (%)	30.7	51.5	29.6	43.7	31.7	60.8
2 (%)	17.2	28.9	19.7	29.2	14.9	28.6
3 (%)	5.9	9.8	9.3	13.7	2.7	5.1
4+ (%)	4.9	8.2	8.3	12.3	1.7	3.3
Missing (9%)	1.0	1.6	0.8	1.1	1.2	2.2
No. of total drinks weekly		5.60 (6.84)		7.36 (12.26)***		3.45 (4.88)***
Median No. of drinks weekly		2		4		2

() Standard deviation of the mean.

p<0.001; denote gender differences.

Table 3

Characteristics of heavy/binge drinkers compared to abstainers and other drinkers

<i>N</i>	Men		Women	
	Not H/B drinker	H/B drinker	Not H/B drinker	H/B drinker
	1293	117	1448	67
Age (year)	67.81 (7.68)	65.14 (6.06) ***	68.67 (7.79)	65.46 (6.76) ***
Marital status (%)				
Married/cohabiting	81.5	67.2 ***	57.7	65.2
Divorced/separated	7.8	21.6 ***	13.6	9.1
Widowed	7.6	8.6	25.2	22.7
Never married	3.1	2.6	3.5	3.0
Level of education (%)				
Less than high school	16.1	25.4 *	20.6	12.1
High school or equivalent	24.3	23.7	29.3	33.3
Voc. certificate/some college/associate degree	27.2	30.5	32.4	34.8
Bachelor's degree or higher	32.4	20.3 ***	17.8	19.7
Household income (%)				
<\$25 000	19.8	34.5 ***	31.5	13.4 ***
\$25 000–\$49 999	28.9	25.9	26.3	44.8 **
\$50 000–\$99 999	28.5	23.3	17.6	22.4
\$100 000	16.3	13.8	9.3	13.4
Missing	6.4	2.6	15.3	6.0 *
Employment status (%)				
Currently working for pay	41.0	36.8	28.3	49.3 ***
No. of ADL impairments	0.50 (1.18)	0.48 (1.01)	0.70 (1.38)	0.27 (0.74) **
Family/friend support	19.37 (3.24)	18.47 (5.09) **	19.97 (3.45)	20.83 (2.07) *
Frequency of religious service attendance	3.12 (2.17)	2.00 (1.96) ***	3.51 (2.06)	3.19 (1.94)
Frequency of physical activity	3.37 (1.14)	3.16 (1.28) †	3.01 (1.16)	3.17 (1.40)
CES-D				
Mean	4.63 (4.62)	7.72 (7.75) ***	5.82 (5.25)	5.25 (5.15)
9 (%)	17.8	34.2 ***	26.0	20.9

Note. Within-gender group difference was not significant for race/ethnicity, number of medical conditions, and smoking status, and thus these variables were not included in the table.

() Standard deviation of the mean.

 $p < 0.001$;

**
 $p < 0.01$;

*
 $p < 0.05$;

†
 $p < 0.06$: denote differences between heavy/binge drinkers and non-heavy/binge drinkers within each gender.

Table 4

Hierarchical OLS regression models for the relationship between the CES-D scores and drinking frequency and amount by gender

Variable	Men (<i>n</i> = 1318)			Women (<i>n</i> = 1441)		
	Model 1 <i>B</i> (SE)	Model 2a <i>B</i> (SE)	Model 2b <i>B</i> (SE)	Model 1 <i>B</i> (SE)	Model 2a <i>B</i> (SE)	Model 2b <i>B</i> (SE)
Age group						
(57–64)						
65–74	–0.02 (0.34)	–0.04 (0.34)	–0.15 (0.34)	0.37 (0.33)	0.36 (0.33)	0.38 (0.33)
75–85	0.53 (0.37)	0.54 (0.37)	0.34 (0.37)	1.21 (0.35)***	1.19 (0.36)***	1.23 (0.36)***
Marital status						
(Married/cohabiting)						
Divorced/separated	0.93 (0.45)*	0.89 (0.45)*	0.67 (0.45)	0.01 (0.39)	0.01 (0.39)	0.03 (0.39)
Widowed	1.58 (0.49)***	1.54 (0.49)**	1.50 (0.48)**	0.56 (0.33)	0.55 (0.33)	0.57 (0.33)
Never married	–0.24 (0.74)	–0.26 (0.73)	–0.27 (0.73)	–1.07 (0.69)	–1.08 (0.69)	–1.06 (0.69)
Race/ethnicity						
(Non-Hispanic White)						
Non-Hispanic Black	–0.74 (0.44)	0.76 (0.44)	0.81 (0.44)	–0.94 (0.41)*	–0.94 (0.41)*	–0.95 (0.41)*
Hispanic	0.05 (0.51)	0.07 (0.51)	0.02 (0.50)	0.25 (0.52)	0.26 (0.52)	0.24 (0.52)
Level of education						
Less than high school	0.03 (0.44)	0.10 (0.44)	–0.08 (0.44)	0.84 (0.46)	0.80 (0.46)	0.90 (0.46)*
High school or equivalent	0.05 (0.36)	0.13 (0.36)	–0.02 (0.36)	0.31 (0.39)	0.27 (0.40)	0.33 (0.40)
Voc. certificate/some college/associate degree	0.37 (0.33)	0.44 (0.33)	0.29 (0.33)	0.21 (0.36)	0.21 (0.37)	0.25 (0.37)
(Bachelor's degree or higher)						
Household income						
>\$25 000	2.41 (0.48)***	2.55 (0.48)***	2.35 (0.48)***	1.97 (0.54)***	1.93 (0.54)***	1.97 (0.55)***
\$25 000-under \$50 000	1.79 (0.42)***	1.89 (0.42)***	1.79 (0.42)***	0.78 (0.49)	0.76 (0.49)	0.76 (0.49)
\$50 000-under \$100 000	0.72 (0.39)	0.77 (0.39)	0.70 (0.39)	0.63 (0.49)	0.61 (0.49)	0.62 (0.49)
(\$100 000+)	1.24 (0.60)*	1.34 (0.61)*	1.33 (0.60)*	1.22 (0.54)*	1.16 (0.54)*	1.21 (0.55)*
Missing						
Employment status						

Variable	Men (<i>n</i> = 1318)			Women (<i>n</i> = 1441)		
	Model 1 <i>B</i> (SE)	Model 2a <i>B</i> (SE)	Model 2b <i>B</i> (SE)	Model 1 <i>B</i> (SE)	Model 2a <i>B</i> (SE)	Model 2b <i>B</i> (SE)
Working for pay (Not working for pay)	-0.82 (0.28) **	-0.79 (0.28) **	-0.77 (0.28) **	-0.33 (0.29)	-0.35 (.29)	-0.34 (0.29)
No. of diagnosed chronic medical conditions	0.21 (0.09) *	0.23 (0.10) *	0.23 (0.09) *	0.41 (0.10) ***	0.40 (0.10) ***	0.41 (0.10) ***
No. of ADL impairments	0.74 (.12) ***	0.74 (0.12) ***	0.76 (0.12) ***	0.80 (0.10) ***	0.81 (0.10) ***	0.81 (0.10) ***
Family/friend support	-0.26 (0.04) ***	-0.26 (0.04) ***	-0.25 (0.04) ***	-0.28 (0.04) ***	-0.28 (0.04) ***	-0.28 (0.04) ***
Frequency of religious service attendance	-0.13 (0.06) *	-0.11 (0.06)	-0.10 (0.06)	-0.08 (0.06)	-0.09 (0.06)	-0.08 (0.06)
Smoking						
Currently smoking (Not currently smoking)	-0.22 (0.25)	-0.26 (0.25)	-0.23 (0.25)	-0.74 (0.25) **	-0.74 (0.26) **	-0.72 (0.26) **
Frequency of physical activity	-0.44 (0.12) ***	-0.44 (0.12) ***	-0.41 (0.12) ***	-0.60 (0.10) ***	-0.59 (0.10) ***	-0.60 (0.10) ***
No. of drinking days per week	0.11 (0.05) *				-0.03 (0.06)	
No. of drinks on a drinking day (non-drinker)						
1			0.08 (0.32)			0.20 (0.30)
2			-0.10 (0.36)			-0.19 (0.39)
3			0.45 (0.46)			0.40 (0.62)
3+			N/A			N/A
4+			2.39 (0.49) ***			
<i>R</i> ²	0.21	0.21	0.22	0.26	0.26	0.26
Adjusted <i>R</i> ²	0.19	0.20	0.21	0.25	0.25	0.25
SE	4.41	4.40	4.37	4.56	4.56	4.56
<i>F</i> Change		5.27 ***	6.80 ***		0.28	0.50

N/A: The specific category of the quantity of alcohol consumption was not applicable in the model.

p<0.001;

**
p<0.01;

*
p<0.05.