Binge Drinking and Axis I Psychiatric Disorders in Community-Dwelling Middle-Aged and Older Adults: Results From the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)

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Objective: The aims of this study were to document the sociodemographic correlates of binge drinking in middle-aged and older adults and to test the association of binge drinking with the occurrence of *DSM-IV* mood, anxiety, and alcohol use disorders; smoking; and the use of illicit drugs independently of sociodemographic variables and lifetime diagnosis of the disorder in question.

Method: We conducted secondary data analyses based on a subsample of a 3-year prospective, population-based study, the National Epidemiologic Survey on Alcohol and Related Conditions, which consisted of a nationally representative sample of 13,489 American community-dwelling adults aged 50 years and above, interviewed in both 2001–2002 and 2004–2005. This survey assessed the occurrence of 11 *DSM-IV* mood, anxiety, and alcohol use disorders; nicotine dependence; and the use of illicit drugs during the 3-year follow-up period by using the National Institute on Alcohol Abuse and Alcoholism's Alcohol Use Disorder and Associated Disabilities Interview Schedule–*DSM-IV* Version.

Results: We found that, among persons aged 50 years and above, 15.6% of men and 5.7% of women reported binge drinking in the year prior to baseline assessment in 2001–2002. After adjustment was made for covariates, both men who were occasional binge drinkers and men who were frequent binge drinkers were significantly more likely than current male drinkers without binge drinking to have alcohol abuse disorder (adjusted odds ratio [AOR] = 2.90 [95% CI, 1.82–4.62] and AOR = 5.68 [95% CI, 3.79–8.51], respectively) and alcohol dependence disorder (AOR = 3.69 [95% CI, 1.75–7.75] and AOR = 9.21 [95% CI, 5.59–15.18], respectively). Similarly, after adjustment was made for covariates, both women who were occasional binge drinkers and women who were frequent binge drinkers were significantly more likely than current female drinkers without binge drinking to have alcohol abuse disorder (AOR = 4.43 [95% CI, 1.85–10.60] and AOR = 3.49 [95% CI, 1.64–7.43], respectively) and alcohol dependence disorder (AOR = 5.20 [95% CI, 1.56–17.33] and AOR = 19.47 [95% CI, 7.59–49.98], respectively). In addition, in female subjects, occasional binge drinking was associated with an increased risk of panic disorder without agoraphobia (AOR = 2.23; 95% CI, 1.01–4.91) and post-traumatic stress disorder (AOR = 2.67; 95% CI, 1.05–6.84).

Conclusions: Binge drinking is strongly associated with a higher risk of alcohol use disorder in middle-aged and older adults in the United States. Results provide valuable information on the risks associated with binge drinking and suggest targets for prevention strategies for mental health in middle and old age.

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Several recent US[1–5] and international[6–9] studies have demonstrated an increase in the prevalence of alcohol use among older adults in the past few decades, suggesting that alcohol disorders are a growing public health concern in later life. One indicator of problematic alcohol use that has adverse health consequences is binge drinking, which refers to the consumption of 5 or more drinks on a single occasion for men and 4 or more drinks for women in younger adults, and more than 3 drinks per occasion in older individuals.[10] In the 2005 and 2006 National Survey on Drug Use and Health, binge drinking was identified in 14% of men and 3% of women aged 50 years and above.[2] Investigations of the relationship between binge drinking and health among middle-aged and older adults have found that binge drinking may affect health by increasing the risk of functional impairment,[11] stroke,[12] poor self-rated health,[13] smoking,[2] the use of illicit drugs,[2] and mortality.[14,15] Moreover, the negative association between binge drinking and psychological well-being has also been reported.[16,17] However, the impact of binge drinking on a wide range of psychiatric disorders in middle-aged and older adults has not been extensively investigated.[18]

A biological mechanism underlying the association between alcohol use and smoking has been proposed.[19] In addition, although some recent studies have examined the impact of binge drinking on a wide range of Axis I disorders[20,21] or depressive symptoms,[22] the focus of these previous studies has been the general population. Therefore, their results may not generalize to older individuals who are especially sensitive to the influence of alcohol as a consequence of the physiologic changes associated with the aging process and the high prevalence of medical conditions in middle-aged adulthood and old age.[23–25] Until now, a comprehensive study of binge drinking and Axis I disorders among middle-aged and older adults has been lacking.

The objectives of this study were to (1) identify the sociodemographic correlates of binge drinking status in the year preceding the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) among adults aged 50 years and above, and (2) provide estimates of the risks posed by the status of binge drinking in the year prior to

2001–2002 NESARC for subsequent occurrence of specific Axis I psychiatric disorders and use of illicit drugs 3 years later at Wave 2 of the NESARC in 2004–2005.

METHOD

Sample

In this study, we examined a subsample of middle-aged and older adults (aged 50 years and above [N = 13,489]) who participated in both Waves 1 and 2 of the NESARC. The design of Waves 1 and 2 of the NESARC has been described previously.[1,26,27] The research protocol received ethical approval from the US Census Bureau and the US Office of Management and Budget, and informed consent was obtained for all participants. In Wave 1, a nationally representative sample of 43,093 adults aged 18 years and above were interviewed face-to-face, with a response rate of 81.0%. Three years later, 86.7% of respondents in Wave 1 (after excluding those who were deceased [n = 1,403], those who were deported or who were mentally or physically impaired [n = 781], or those who were on active duty in the armed forces throughout the follow-up period [n = 950]) were reinterviewed in Wave 2 of the NESARC. Wave 2 NESARC data were weighted to reflect design characteristics of the NESARC, accounting for oversampling, adjustments for nonresponse, and the presence of any lifetime Wave 1 NESARC psychiatric disorders.[27] Weighted data were then adjusted to be representative of the civilian population of the United States on socioeconomic variables based on the 2000 Decennial Census. Attrition analyses indicated no significant differences between Wave 2 respondents and the general population on demographic variables or the presence of any lifetime Axis I disorders.[28] However, attrition analyses for middle-aged and older respondents, on whom we focused in this study, were not available.

Psychiatric Disorders

The National Institute on Alcohol Abuse and Alcoholism's Alcohol Use Disorder and Associated Disabilities Interview Schedule–*DSM-IV* Version (AUDADIS-IV),[29] Wave 2 version,[30] developed for use by trained lay interviewers, assessed *DSM-IV* psychiatric disorders. The same Axis I disorders were examined in Waves 1 and 2; we used lifetime diagnoses of disorders at Wave 1 and the occurrence of disorders during the 3-year follow-up period between Waves 1 and 2. The only diagnostic hierarchy rules applied in either wave were for major depressive disorder and bipolar disorder.

In Waves 1 and 2, *DSM-IV* mood and anxiety disorders included major depressive disorder, dysthymic disorder, bipolar I and II disorders, panic disorder with and without agoraphobia, social and specific phobias, generalized anxiety disorder, and posttraumatic stress disorder. The AUDADIS-IV methods to diagnose these disorders are described in detail elsewhere.[31–37] In addition, the diagnosis of posttraumatic stress disorder was assessed only at Wave 2. Test–retest reliabilities for AUDADIS-IV mood and anxiety diagnoses in the general population and in clinical samples were fair to good ($\kappa = 0.40–0.77$),[38–40] while convergent validity ranged from good to excellent for all mood and anxiety diagnoses.[32–38]

The AUDADIS-IV assessed *DSM-IV* criteria for nicotine dependence, alcohol abuse and dependence, and drug-specific abuse and dependence for 10 classes of substances. The reliability and validity of AUDADIS-IV substance use disorder diagnoses have been demonstrated in previous studies.[38–54] Because of the low prevalence of any illicit drug use disorder in middle-aged and older adults (1.1% and 0.2%, respectively), we created a composite reflecting the use of any illicit drug use during the 3-year follow-up period.

Alcohol Use Behavior

At Wave 1 assessment, the status of binge drinking was assessed by 3 items related to alcohol use. The first alcohol-related question asked about "whether the respondent drank at least 1 alcoholic drink in the past 12 months?" On the basis of the thresholds for risk drinking recommended in *Helping Patients With Alcohol Problems: A Health Practitioner's Guide*,[55] binge drinking is defined for men as having 5 or more drinks of any alcohol on 1 occasion and for women as having 4 or more drinks on 1 occasion. Frequency of binge drinking in the past year was assessed separately for men and women by asking respondents "How often did you drink 5+ (or 4+ for women) drinks of any alcohol in the last 12 months?" The threshold of binge drinking for older adults was not assessed in NESARC. On the basis of the responses to these 3 items, we categorized respondents into 4 groups: (1) alcohol nonusers, including lifetime alcohol abstainers and former drinkers who did not drink in the past year (nondrinkers); (2) current drinkers without binge drinking, including those who drank at least 1 alcoholic drink but did not engage in binge drinking in the past 12 months (current drinkers but no past-year binge drinking); (3) binge drinkers who reported binge drinking less than monthly in the past year (occasional binge drinkers); and (4) binge drinkers who engaged in binge drinking at least once per month in the past year (frequent binge drinkers). This classification was used in a previous study.[56]

Covariates

Sociodemographic variables assessed at Wave 1 included age, marital status, education level, race/ethnicity, household income, and employment status.

Statistical Analyses

Due to sex differences in rates of binge drinking[2] and because of potential sex-related biological and psychosocial differences in the risk and consequences for alcohol use,[57] we conducted all analyses separately for men and women. First, multinomial logistic regression examined the associations between binge drinking and sociodemographic characteristics. As in previous research,[21] we used the group of current drinkers with no past-year binge drinking as the reference group. Second, we used logistic regression to assess the relationship between binge drinking status and the occurrence

Table 1. Prevalences and Multinomial Logistic Regression Analyses of Binge Drinking Status by Selected Demographic Characteristics in Middle-Aged and Older Men (N = 5,461)[a]

Characteristic	Nondrinkers (n = 1,987)		Current Drinkers but No Past-Year Binge Drinking (n = 2,616)		Past-Year Binge Drinking Less Than Once Per Month (n = 310)		Past-Year Binge Drinking at Least Once Per Month (n = 548)	
	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b,c]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b,c]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b,c]
Overall prevalence	34.6 (1.1)		50.4 (1.2)		5.8 (0.4)		9.2 (0.5)	
Age, y								
50–64	30.2 (1.2)	1	49.6 (1.4)	1	7.8 (0.6)	1	12.4 (0.7)	1
65–79	39.2 (1.6)	0.88 (0.73–1.06)	52.1 (1.6)	1	3.3 (0.5)	**0.43 (0.29–0.64)**	5.4 (0.6)	**0.35 (0.26–0.47)**
≥ 80	49.5 (3.0)	1.04 (0.78–1.39)	48.8 (3.0)	1	1.0 (0.6)	**0.15 (0.05–0.48)**	0.7 (0.4)	**0.04 (0.01–0.12)**
Marital status								
Married	33.5 (1.2)	1	52.4 (1.4)	1	5.9 (0.4)	1	8.3 (0.5)	1
Widowed	45.6 (3.0)	1.13 (0.84–1.53)	43.4 (3.1)	1	2.7 (0.7)	1.01 (0.55–1.87)	8.2 (1.8)	**1.95 (1.14–3.32)**
Separated/divorced	30.5 (1.9)	0.89 (0.71–1.11)	45.8 (2.0)	1	7.6 (1.1)	1.30 (0.89–1.88)	16.2 (1.4)	**1.74 (1.34–2.26)**
Single	48.4 (3.3)	**1.75 (1.33–2.30)**	36.0 (2.7)	1	4.7 (1.3)	1.07 (0.57–2.02)	11.0 (1.8)	**1.59 (1.06–2.39)**
Education level								
< High school	53.5 (1.9)	1	34.0 (1.8)	1	3.7 (0.7)	1	8.9 (1.0)	1
High school	41.3 (1.7)	**0.72 (0.58–0.91)**	43.8 (1.6)	1	5.1 (0.6)	0.96 (0.59–1.55)	9.8 (0.9)	0.87 (0.63–1.21)
≥ College	25.0 (1.2)	**0.39 (0.31–0.48)**	59.0 (1.5)	1	6.9 (0.6)	0.89 (0.56–1.41)	9.0 (0.6)	**0.60 (0.43–0.85)**
Race/ethnicity								
White	32.1 (1.2)	1	52.4 (1.3)	1	6.3 (0.4)	1	9.2 (0.5)	1
Black	49.0 (2.0)	**1.73 (1.40–2.13)**	37.8 (1.9)	1	3.6 (0.8)	0.69 (0.41–1.18)	9.6 (1.1)	1.06 (0.78–1.44)
Hispanic	41.3 (2.8)	1.18 (0.88–1.59)	40.6 (2.7)	1	6.4 (1.1)	1.13 (0.72–1.78)	11.7 (1.6)	1.16 (0.81–1.67)
Other[d]	39.6 (4.8)	1.23 (0.80–1.88)	52.0 (5.4)	1	2.6 (1.1)	**0.37 (0.14–0.94)**	5.8 (1.7)	0.53 (0.26–1.09)
Household income, annual								
< $40,000	45.0 (1.3)	1	41.7 (1.3)	1	4.1 (0.4)	1	9.1 (0.7)	1
$40,000–$69,999	30.9 (1.4)	**0.71 (0.59–0.85)**	52.4 (1.5)	1	6.7 (0.7)	1.02 (0.72–1.45)	10.0 (0.9)	0.80 (0.60–1.08)
≥ $70,000	21.9 (1.7)	**0.52 (0.42–0.66)**	61.8 (2.1)	1	7.7 (0.9)	0.89 (0.62–1.29)	8.6 (1.0)	**0.59 (0.42–0.82)**
Employment status								
Not employed	42.5 (1.3)	1	47.6 (1.4)	1	3.3 (0.5)	1	6.5 (0.6)	1
Employed	29.4 (1.3)	0.84 (0.70–1.02)	52.1 (1.5)	1	7.5 (0.5)	1.27 (0.85–1.89)	11.0 (0.7)	1.05 (0.78–1.42)

[a]Sample sizes are unweighted numbers; proportions are weighted.
[b]Adjusted odds ratios of 1 indicate reference category.
[c]Bold typeface indicates significance at $P < .05$.
[d]Other race/ethnicity included Native American, Asian, or Pacific Islander.

of each mental disorder during the 3-year follow-up period between Waves 1 and 2 of NESARC. These models adjusted for age, marital status, education level, race/ethnicity, household income, employment status, lifetime diagnoses of alcohol use disorder (including abuse and dependence), and the psychiatric disorder in question at Wave 1. For logistic regression models predicting the use of nicotine and illicit drugs, we included any lifetime illicit drug use disorder (including abuse and dependence) as a covariate. Third, we examined the interaction effect between binge drinking and age group (50–64 years vs 65+ years) with each disorder. We adjusted all standard errors and 95% confidence intervals for the design effects of the Wave 2 NESARC sample and analyzed the data using SUDAAN 9.0,[58] a software program that uses Taylor series linearization to adjust for the design effects of the complex sampling methodology of the NESARC. All significance tests were 2-sided tests evaluated at the .05 level.

RESULTS

Prevalence of Binge Drinking

We found that 15.6% of men and 5.7% of women reported binge drinking in the year prior to the 2001–2002 assessment. Among the 3,474 men who reported drinking alcohol in the past year (ie, current drinkers), 24.7% reported binge drinking, while among the 3,679 female current drinkers, 12.4% reported binge drinking. Overall, male respondents were significantly more likely to binge drink ($\chi^2_3 = 131.56$, $P < .001$). As shown in Tables 1 and 2, we observed significant associations of binge drinking status with age group, marital status, education level, race/ethnicity, household income, and employment status in one or both sexes.

Binge Drinking in Men

Table 3 displays adjusted odds ratios of the occurrences of *DSM-IV* diagnoses of any mood, anxiety, and alcohol disorders; smoking; and use of illicit drugs by the status of binge drinking in male respondents. After adjustment was made for covariates, men with binge drinking (occasional or frequent) were significantly more likely than current drinkers without binge drinking to have alcohol abuse and dependence disorders. Compared with current drinkers without binge drinking, those who did not use alcohol were less likely to report alcohol abuse disorder, alcohol dependence disorder, and the use of illicit drugs but were more likely to report major depressive disorder, dysthymic disorder, and panic disorder without agoraphobia.

Binge Drinking in Women

Table 4 provides the prevalences and adjusted odds ratios associated with binge drinking status and psychiatric

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Table 2. Prevalences and Multinomial Logistic Regression Analyses of Binge Drinking Status by Selected Demographic Characteristics in Middle-Aged and Older Women (N = 7,981)[a]

	Nondrinkers (n = 4,302)		Current Drinkers but No Past-Year Binge Drinking (n = 3,223)		Past-Year Binge Drinking Less Than Once Per Month (n = 223)		Past-Year Binge Drinking at Least Once Per Month (n = 233)	
Characteristic	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b,c]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b,c]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[b,c]
Overall prevalence	50.9 (0.9)		43.1 (0.9)		2.9 (0.3)		3.1 (0.3)	
Age, y								
50–64	43.6 (1.2)	1	47.5 (1.1)	1	4.5 (0.4)	1	4.5 (0.4)	1
65–79	57.6 (1.3)	1.05 (0.89–1.23)	39.3 (1.3)	1	1.2 (0.2)	**0.40 (0.25–0.64)**	1.9 (0.3)	**0.43 (0.28–0.67)**
≥ 80	66.7 (2.0)	1.16 (0.92–1.46)	32.8 (2.0)	1	0.2 (0.1)	**0.08 (0.02–0.30)**	0.3 (0.2)	**0.07 (0.01–0.36)**
Marital status								
Married	47.5 (1.1)	1	46.2 (1.0)	1	2.9 (0.3)	1	3.4 (0.4)	1
Widowed	62.9 (1.5)	1.13 (0.98–1.31)	33.5 (1.4)	1	1.4 (0.3)	1.41 (0.80–2.48)	2.2 (0.4)	1.43 (0.86–2.36)
Separated/divorced	45.8 (1.6)	**0.81 (0.69–0.96)**	44.9 (1.6)	1	5.2 (0.7)	**1.93 (1.31–2.84)**	4.1 (0.5)	1.17 (0.77–1.79)
Single	48.3 (2.8)	0.89 (0.69–1.14)	45.5 (2.6)	1	4.5 (1.2)	**1.82 (1.08–3.04)**	1.7 (0.5)	0.52 (0.27–1.00)
Education level								
< High school	74.7 (1.4)	1	22.2 (1.3)	1	1.5 (0.4)	1	1.6 (0.4)	1
High school	53.9 (1.3)	**0.51 (0.42–0.61)**	41.0 (1.3)	1	2.3 (0.4)	0.63 (0.33–1.20)	2.8 (0.4)	0.83 (0.45–1.54)
≥ College	38.4 (1.1)	**0.33 (0.27–0.39)**	53.7 (1.1)	1	3.9 (0.4)	0.63 (0.35–1.12)	4.0 (0.4)	0.89 (0.48–1.64)
Race/ethnicity								
White	46.2 (1.0)	1	47.2 (1.0)	1	3.2 (0.3)	1	3.4 (0.3)	1
Black	69.5 (1.7)	**2.64 (2.17–3.22)**	26.8 (1.7)	1	1.8 (0.4)	0.71 (0.41–1.23)	2.0 (0.4)	0.88 (0.53–1.46)
Hispanic	63.3 (2.1)	**1.39 (1.12–1.72)**	32.6 (2.0)	1	2.0 (0.6)	0.70 (0.36–1.37)	2.2 (0.6)	0.78 (0.42–1.44)
Other[d]	70.7 (3.4)	**3.02 (2.12–4.29)**	25.7 (3.3)	1	1.6 (0.7)	0.77 (0.31–1.93)	2.0 (1.0)	0.96 (0.32–2.84)
Household income, annual								
< $40,000	59.9 (1.0)	1	35.8 (1.0)	1	1.9 (0.2)	1	2.5 (0.3)	1
$40,000–$69,999	41.9 (1.7)	**0.71 (0.60–0.83)**	50.7 (1.6)	1	3.6 (0.6)	1.10 (0.75–1.63)	3.8 (0.6)	0.91 (0.61–1.37)
≥ $70,000	33.0 (1.8)	**0.55 (0.46–0.67)**	57.4 (1.9)	1	5.3 (0.8)	1.48 (0.92–2.39)	4.3 (0.8)	0.88 (0.54–1.43)
Employment status								
Not employed	59.8 (1.1)	1	36.6 (1.0)	1	1.3 (0.2)	1	2.3 (0.3)	1
Employed	39.8 (1.2)	**0.67 (0.58–0.78)**	51.1 (1.2)	1	4.9 (0.5)	**1.51 (1.02–2.24)**	4.2 (0.4)	0.89 (0.63–1.25)

[a]Sample sizes are unweighted numbers; proportions are weighted.
[b]Adjusted odds ratios of 1 indicate reference category.
[c]Bold typeface indicates significance at $P < .05$.
[d]Other race/ethnicity included Native American, Asian, or Pacific Islander.

Table 3. Three-Year Prevalences and Odds Ratios of *DSM-IV* Axis I Psychiatric Disorders by Binge Drinking Status in Middle-Aged and Older Men (N = 5,461)

	Nondrinkers (n = 1,987)		Current Drinkers but No Past-Year Binge Drinking (n = 2,616)		Past-Year Binge Drinking Less Than Once Per Month (n = 310)		Past-Year Binge Drinking at Least Once Per Month (n = 548)	
Psychiatric Disorder	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,b]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,c]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,b]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,b]
Any Axis I disorder	21.7 (1.1)	0.84 (0.69–1.01)	24.3 (1.0)	1	35.4 (2.9)	**1.39 (1.03–1.89)**	57.4 (2.5)	**2.78 (2.10–3.69)**
Any mood disorder	7.0 (0.7)	**1.54 (1.07–2.21)**	4.3 (0.5)	1	5.8 (1.7)	1.34 (0.68–2.66)	6.2 (1.1)	1.23 (0.65–2.33)
Major depressive disorder	5.8 (0.6)	**1.61 (1.09–2.38)**	3.4 (0.4)	1	4.4 (1.4)	1.27 (0.56–2.86)	4.6 (1.0)	0.94 (0.44–2.03)
Dysthymic disorder	1.4 (0.3)	**3.41 (1.51–7.70)**	0.3 (0.1)	1	0.6 (0.4)	…[d]	1.0 (0.4)	2.80 (1.00–7.86)
Bipolar disorder	1.7 (0.4)	1.16 (0.58–2.32)	1.4 (0.3)	1	3.1 (1.2)	2.05 (0.83–5.03)	2.2 (0.8)	1.80 (0.67–4.86)
Any anxiety disorder	10.2 (0.9)	1.27 (0.93–1.72)	8.1 (0.6)	1	9.3 (1.9)	1.12 (0.64–1.96)	11.2 (1.7)	1.03 (0.60–1.76)
Panic without agoraphobia	1.5 (0.4)	**2.19 (1.10–4.35)**	0.7 (0.2)	1	1.3 (0.7)	…[d]	1.0 (0.4)	1.19 (0.36–3.94)
Panic with agoraphobia	0.3 (0.1)	0.73 (0.14–3.73)	0.3 (0.2)	1	0.0 (0.0)	NA	0.4 (0.3)	…[d]
Social phobia	1.9 (0.4)	1.61 (0.81–3.20)	1.3 (0.3)	1[d]	1.6 (1.0)	…[d]	2.5 (0.8)	1.86 (0.72–4.79)
Specific phobia	4.6 (0.6)	1.24 (0.83–1.84)	3.8 (0.4)	1	5.2 (1.5)	1.25 (0.61–2.56)	4.2 (1.0)	0.58 (0.25–1.37)
Generalized anxiety disorder	1.6 (0.3)	0.85 (0.49–1.48)	1.4 (0.2)	1	3.5 (1.3)	2.25 (0.87–5.80)	1.8 (0.6)	0.88 (0.32–2.42)
Posttraumatic stress disorder	2.8 (0.4)	0.89 (0.49–1.62)	2.8 (0.4)	1	2.3 (0.9)	0.63 (0.13–2.99)	4.0 (0.9)	1.36 (0.61–3.04)
Any substance use disorder	11.9 (0.9)	**0.62 (0.49–0.79)**	17.2 (0.9)	1	31.2 (2.7)	**1.75 (1.27–2.40)**	53.7 (2.4)	**3.55 (2.65–4.75)**
Alcohol use disorder	1.1 (0.2)	**0.19 (0.12–0.30)**	6.1 (0.5)	1	20.1 (2.5)	**3.40 (2.25–5.15)**	40.8 (2.4)	**7.86 (5.57–11.08)**
Alcohol abuse disorder	0.7 (0.2)	**0.18 (0.10–0.30)**	4.7 (0.4)	1	15.1 (2.1)	**2.90 (1.82–4.62)**	24.9 (2.2)	**5.68 (3.79–8.51)**
Alcohol dependence disorder	0.4 (0.1)	**0.28 (0.13–0.61)**	1.3 (0.2)	1	5.0 (1.5)	**3.69 (1.75–7.75)**	15.9 (1.9)	**9.21 (5.59–15.18)**
Nicotine dependence	10.9 (0.9)	0.90 (0.67–1.21)	11.4 (0.8)	1	13.6 (1.9)	0.71 (0.44–1.15)	22.1 (2.3)	1.23 (0.76–1.99)
Drug user	2.3 (0.4)	**0.56 (0.37–0.85)**	4.7 (0.5)	1	6.9 (1.6)	1.10 (0.57–2.13)	7.3 (1.3)	1.05 (0.60–1.86)

[a]Odds ratios adjusted for age, marital status, education, race, household income, employment status, lifetime history of row-defined psychiatric disorder prior to Wave 1 assessment, and lifetime history of alcohol use disorder prior to Wave 1 assessment.
[b]Bold typeface indicates significance at $P < .05$.
[c]Adjusted odds ratios of 1 indicate reference category.
[d]Not reported due to fewer than 5 positive responses.
Abbreviation: NA = not applicable.

Table 4. Three-Year Prevalences and Odds Ratios of *DSM-IV* Axis I Psychiatric Disorders by Binge Drinking Status in Middle-Aged and Older Women (N = 7,981)

	Nondrinkers (n = 4,302)		Current Drinkers but No Past-Year Binge Drinking (n = 3,223)		Past-Year Binge Drinking Less Than Once Per Month (n = 223)		Past-Year Binge Drinking at Least Once Per Month (n = 233)	
Psychiatric Disorder	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,b]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,c]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,b]	Prevalence, % (SE)	Adjusted Odds Ratio (95% CI)[a,b]
Any Axis I disorder	25.6 (0.9)	0.91 (0.79–1.05)	28.1 (1.0)	1	41.1 (5.0)	1.48 (0.92–2.38)	48.2 (4.0)	**1.63 (1.11–2.40)**
Any mood disorder	10.7 (0.6)	1.08 (0.88–1.32)	10.7 (0.6)	1	12.5 (2.5)	0.85 (0.49–1.47)	11.3 (2.4)	0.83 (0.45–1.54)
Major depressive disorder	9.1 (0.5)	1.07 (0.86–1.33)	9.5 (0.6)	1	11.0 (2.2)	0.89 (0.52–1.51)	8.4 (2.1)	0.79 (0.40–1.55)
Dysthymic disorder	1.7 (0.2)	1.48 (0.89–2.44)	1.1 (0.2)	1	0.7 (0.7)	…[d]	1.1 (0.5)	…[d]
Bipolar disorder	2.2 (0.3)	1.22 (0.78–1.91)	1.6 (0.2)	1	2.2 (1.0)	0.78 (0.25–2.44)	4.3 (1.6)	1.69 (0.60–4.74)
Any anxiety disorder	16.1 (0.8)	1.09 (0.90–1.32)	15.8 (0.8)	1	19.0 (3.2)	0.95 (0.60–1.50)	16.9 (2.8)	0.71 (0.42–1.19)
Panic without agoraphobia	1.6 (0.3)	0.82 (0.53–1.26)	1.8 (0.3)	1	3.7 (1.3)	**2.23 (1.01–4.91)**	1.9 (0.8)	0.76 (0.23–2.54)
Panic with agoraphobia	0.7 (0.1)	0.71 (0.31–1.64)	0.7 (0.2)	1	0.3 (0.3)	…[d]	0.6 (0.6)	…[d]
Social phobia	2.1 (0.3)	1.34 (0.93–1.93)	1.6 (0.2)	1	1.5 (0.9)	0.71 (0.15–3.35)	4.9 (1.7)	2.30 (0.91–5.82)
Specific phobia	8.1 (0.6)	0.98 (0.78–1.24)	8.3 (0.6)	1	7.2 (1.9)	0.62 (0.35–1.10)	9.0 (2.1)	0.87 (0.49–1.56)
Generalized anxiety disorder	4.6 (0.4)	1.20 (0.88–1.64)	4.0 (0.4)	1	5.7 (2.0)	1.28 (0.58–2.82)	3.3 (1.3)	0.50 (0.18–1.39)
Posttraumatic stress disorder	5.2 (0.4)	1.21 (0.80–1.85)	4.7 (0.5)	1	8.4 (2.5)	**2.67 (1.05–6.84)**	6.1 (1.9)	1.45 (0.80–2.62)
Any substance use disorder	7.7 (0.5)	0.82 (0.66–1.01)	9.9 (0.6)	1	27.3 (4.5)	**2.66 (1.58–4.46)**	35.8 (4.0)	**2.99 (1.87–4.79)**
Alcohol use disorder	0.1 (0.1)	**0.10 (0.04–0.25)**	1.8 (0.3)	1	10.2 (2.5)	**4.96 (2.46–10.01)**	19.5 (3.3)	**8.88 (4.49–17.56)**
Alcohol abuse disorder	0.1 (0.0)	**0.10 (0.03–0.33)**	1.2 (0.2)	1	6.8 (2.4)	**4.43 (1.85–10.60)**	6.5 (1.6)	**3.49 (1.64–7.43)**
Alcohol dependence disorder	0.0 (0.0)	…[d]	0.6 (0.2)	1	3.4 (1.4)	**5.20 (1.56–17.33)**	13.1 (3.0)	**19.47 (7.59–49.98)**
Nicotine dependence	7.4 (0.5)	1.04 (0.81–1.34)	8.3 (0.5)	1	20.3 (4.3)	1.66 (0.80–3.45)	23.6 (3.5)	1.28 (0.70–2.36)
Drug user	1.9 (0.2)	**0.68 (0.47–0.99)**	2.9 (0.4)	1	4.5 (1.5)	1.14 (0.48–2.71)	5.1 (1.5)	1.25 (0.52–3.03)

[a]Odds ratios adjusted for age, marital status, education, race, household income, employment status, lifetime history of row-defined psychiatric disorder prior to Wave 1 assessment, and lifetime history of alcohol use disorder prior to Wave 1 assessment.
[b]Bold typeface indicates significance at $P < .05$.
[c]Adjusted odds ratios of 1 indicate reference category.
[d]Not reported due to fewer than 5 positive responses.

disorders in women. After adjustment was made for covariates, both occasional and frequent binge drinkers were significantly more likely than current drinkers without binge drinking to report alcohol abuse or dependence disorder. In addition, occasional binge drinking was positively and significantly related to the occurrence of panic disorder without agoraphobia and posttraumatic stress disorder. Finally, alcohol nonusers were less likely than current drinkers without binge drinking to report alcohol abuse disorder or the use of illicit drugs.

Interaction Between Age Group and Binge Drinking

To examine the interaction between age group (50–64 years vs 65+ years) and binge drinking, we examined the association between the interactions of age group with binge drinking and the disorders. None of the interaction terms we examined reached statistical significance.

DISCUSSION

Overall, among individuals aged 50 years and above, the rates of binge drinking in the past year were 15.6% and 5.7% among men and women, respectively. The rates are slightly higher than the prevalence rates reported in another recent study[2] of middle-aged Americans 50 years of age and above. One likely reason for this discrepancy is the difference in the period of time for reporting alcohol consumption, which was 1 year in this study and 1 month in theirs. In our study, among men, older age, being married, and having a high socioeconomic status (college education and high income) were associated with a reduction in the likelihood of binge drinking. Similarly, among women, a reduced risk of binge drinking was found among those who were older and married. Socioeconomic status was not associated with binge drinking among women, whereas employment status had a positive relationship with it. Our findings are consistent with a previous study in which younger age was associated with binge drinking.[2] The association between marital status and binge drinking identified in this study is partially consistent with prior results that found that being separated or divorced was positively related to binge drinking in men.[2]

To our knowledge, this is the first longitudinal study to have examined whether binge drinking predicts the occurrence of a wide range of *DSM-IV* Axis I psychiatric disorders in middle-aged and older adults. In both men and women 50 years of age and older, binge drinking was most strongly associated with alcohol use disorders. This finding is consistent with previous studies in the general population,[20,59] and our contribution here is to generalize these previous findings to middle-aged and older adults in particular. Clinically, these data clearly suggest that binge drinking should be assessed not only in younger adults but also in middle-aged and older adults and that the presence of binge drinking calls for the need to carefully screen for other substance use disorders.

A second key finding from this study is that binge drinking was not associated with mood or anxiety disorders in men and was associated only with panic disorder without agoraphobia and posttraumatic stress disorder in middle-aged and older women. Although the association between posttraumatic stress disorder and binge drinking has been identified in a cross-sectional study of female Department of Veterans Affairs patients,[56] our data should

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be interpreted cautiously because posttraumatic stress disorder was assessed only at Wave 2. In addition, the association between occasional binge drinking and panic disorder without agoraphobia was marginally significant. The complete lack of associations between binge drinking and mood disorders and the evidence of inconsistent relationships between binge drinking and anxiety disorders among women are surprising considering the evidence that binge drinking is negatively related to psychological well-being in older adults.[16,17] Nevertheless, the relationship between binge drinking and specific anxiety disorders deserves more attention in future studies of middle-aged and older adults, especially in women.

Third, it is not surprising to find out that alcohol nonusers are less likely to report alcohol abuse or dependence disorder and use of illicit drugs in comparison with those who drank alcohol at least once in the past year. However, it is unexpected to find that, in men, alcohol nonusers are also more likely to report major depressive disorder, dysthymic disorder, and panic disorder without agoraphobia. Our nondrinking group included those who were lifetime abstainers of alcohol and those who were former drinkers but did not drink in the past year. To test whether these 2 subgroups differed, post hoc analyses revealed that neither former drinkers nor lifetime alcohol abstainers were more likely to report major depressive disorder, dysthymic disorder, and panic disorder without agoraphobia than were those who were current drinkers without binge drinking. These results suggest that the reason why alcohol nonusers were negatively associated with these 3 disorders is not due to the protective effect of lifetime abstinence from alcohol or being former drinkers. In other words, it is still not clear why there is a positive relationship between alcohol nonuser status and major depressive disorder, dysthymic disorder, and panic disorder without agoraphobia, and future studies are needed to clarify this issue.

Although the NESARC includes a large sample of middle-aged and older adults with a follow-up assessment, which enhances the accuracy of risk estimates for binge drinking, it also has several limitations. First, this study reports a rather small number of respondents who reported the occurrences of some psychiatric disorders during the 3-year follow-up, such as dysthymic disorder, panic disorder with or without agoraphobia, and social phobia. Although this issue reduces the stability of some of our estimates, it would be difficult to remedy this situation, given the very large sample size in the NESARC and its prospective design. Our results are therefore useful in highlighting the occurrence of some psychiatric disorders in middle adulthood and later life and the difficulties in their estimation. A second limitation is the sampling design of the NESARC, which included only community-dwelling older adults. Thus, older adults who were institutionalized in hospitals, nursing homes, or other residential treatment centers during the period of data collection were not included in the sample so that the findings of the current study are most relevant to the community-dwelling older population. Along the same line, at Wave 2, those who were mentally or physically impaired were excluded, and this fact might also introduce bias in our respondents, especially that those aged 65 years and above might be excluded due to cognitive impairment. Third, the attrition analysis of our respondents aged 50 years and above was not available. Therefore, our results may be affected by the systematic differences between those who dropped out and those who were reinterviewed in the 3-year follow-up assessment. Fourth, we used lifetime diagnoses of psychiatric disorders at baseline measurement as the major covariate in the estimation of the risk of the occurrence of that disorder during the 3-year follow-up period. However, the lifetime diagnoses were retrospectively self-reported and therefore susceptible to recall bias. We reran our analyses using psychiatric diagnoses in the year prior to Wave 1, and the results were the same as those presented except for the following: (1) occasional binge drinking was associated with generalized anxiety disorder (OR = 2.42; 95% CI, 1.03–5.57) in men and (2) occasional binge drinking was no longer associated with panic disorder without agoraphobia, posttraumatic stress disorder, and alcohol dependence in women. Finally, we acknowledge that the threshold of binge drinking (> 3 drinks per occasion) specified for older adults was not used in the study and that the application of *DSM-IV* criteria developed for younger adults may not be appropriate for older individuals, which could reduce the reliability of diagnosis for older adults.[60] There is an urgent need to replicate our findings using the threshold for older adults and to develop age-appropriate diagnostic criteria for major psychiatric disorders so as to provide more accurate prevalence and incidence estimates of binge drinking and other Axis I psychiatric disorders among older adults.

In conclusion, there have been few studies estimating the impact of binge drinking on the occurrence of individual Axis I psychiatric disorders in middle adulthood and late life. Because of the aging population and the increasing prevalence of alcohol use in old age, it is important to examine this issue in greater detail and to highlight the detrimental impact of binge drinking among middle-aged and older adults that may be overlooked by clinicians and policy makers. The findings of this study provide preliminary evidence that binge drinking is positively linked to the occurrence of alcohol use disorders and a few specific anxiety disorders. The strong and persistent relationship between binge drinking and alcohol use disorders demonstrates that binge drinking may lead to alcoholism in middle adulthood and old age. Needless to say, we must continue to work on the mechanisms underlying the harmful effect of binge drinking on individual psychiatric disorders. The identification of binge drinking as a risk factor in this study is essential not only for the successful early identification of its comorbid disorders but also for developing and improving methods targeted at preventing the occurrence of drinking-related psychiatric disorders in middle and older age.

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