

# The Epidemiology of Alcohol Use Disorders and Subthreshold Dependence in a Middle-Aged and Elderly Community Sample

Dan G. Blazer, M.D., Ph.D., Li-Tzy Wu, Sc.D.

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**Objective:** To estimate 1-year prevalence and correlates of alcohol abuse, dependence, and subthreshold dependence (diagnostic orphans) among middle-aged and elderly persons in the United States. **Design:** 2005–2007 National Surveys on Drug Use and Health. **Method:** Sample included 10,015 respondents aged 50–64 years and 6,289 respondents older than 65 years. Data were analyzed by bivariate and multinomial regression analyses. **Measurements:** Sociodemographic variables; alcohol use; Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition abuse and dependence; major depression; nicotine dependence; illicit drug use; and nonmedical use of prescription drugs. **Results:** Fifty-one percent of the sample used alcohol during the past year (56% in the 50–64 age group and 43% in the older than 65 age group). Overall, 11% (dependence 1.9%, abuse 2.3%, and subthreshold dependence 7.0%) of adults aged 50–64 and about 6.7% (dependence 0.6%, abuse 0.9%, and subthreshold dependence 5.2%) of those older than 65 reported alcohol abuse, dependence or dependence symptoms. Among past-year alcohol users, 20% (dependence 3.4%, abuse 4.0%, and subthreshold dependence 12.5%) of adults aged 50–64 and 15.4% (dependence 1.3%, abuse 2.1%, and subthreshold dependence 12.0%) of those older than 65 endorsed alcohol abuse or dependence symptoms. “Tolerance” (48%) and “time spent using” (37%) were the two symptoms most frequently endorsed by the subthreshold group. Compared with alcohol users without alcohol abuse or dependence symptoms, blacks or Hispanics and those who had nicotine dependence or used nonmedical prescription drugs had increased odds of subthreshold dependence. Diagnostic orphans also were more likely to engage in binge drinking than the asymptomatic group. **Conclusions:** Diagnostic orphans among middle-aged and elderly community adults show an elevated rate for binge drinking and nonmedical use of prescription drugs that require attention from healthcare providers. (Am J Geriatr Psychiatry 2011; 19:685–694)

**Key Words:** alcohol use disorders, illicit drug use, nonmedical drug use, nicotine dependence, older adults, subthreshold dependence

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Alcohol is the primary substance of abuse among adults aged 50 years or older entering treat-

ment for substance abuse.<sup>1,2</sup> Problematic alcohol use constitutes an elevated health risk for older adults

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Received February 17, 2010; accepted July 25, 2010. From the Department of Psychiatry and Behavioral Sciences (L-TW), Duke University Medical Center (DGB), Durham, North Carolina. Send correspondence and reprint requests to Dan G. Blazer, M.D., Ph.D., Box 3003, Duke University Medical Center, Durham, NC 27710. e-mail: blaze001@mc.duke.edu

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## Alcohol Use Disorders and Subthreshold Dependence

because of age-related physiological changes that may increase sensitivity to alcohol's effects, frequent medication use that can interact adversely with alcohol, and chronic medical or psychological conditions that can be triggered or worsened by alcohol use.<sup>3,4</sup> The American Geriatrics Society has published clinical guidelines that recommend an assessment or screening of all patients aged 65 years or older at least annually to identify possible alcohol use disorders ([AUDs] abuse and dependence)<sup>3</sup> Three levels of alcohol use recommended for medical intervention are specified in these guidelines: low-risk drinking, at-risk drinking, and AUDs.

Community-based studies have focused mainly on low-risk or at-risk drinking but not on AUDs, especially for older adults. Recent-trend data from the 1991–1992 National Longitudinal Alcohol Epidemiologic Survey and the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions show that the prevalence of 12-month alcohol abuse among older adults had increased for whites (1.5% versus 4.0% in the 45–64 age group; 0.2% versus 1.2% in the older than 65 group) and blacks (0.5% versus 2.7% in the 45–64 age group; 0% versus 0.8% in the older than 65 group).<sup>5</sup> Results from the 2008 National Survey on Drug Use and Health (NSDUH) showed that 6% of adults older than 26 years and 17% of adults aged 18–25 years met criteria for a past-year AUD; but estimates for older age groups are not available.<sup>6</sup>

Estimates of AUDs are necessarily categorical, following the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) approach to diagnosis.<sup>7</sup> One problem with DSM-IV's categorical classification<sup>7</sup> is that individuals who endorse one to two alcohol dependence criteria but do not meet criteria for alcohol abuse (endorsing one or more abuse criterion) are not given a diagnosis. Alcohol users within this category of subthreshold dependence are termed *diagnostic orphans*.<sup>8,9</sup> A limited body of research has suggested that diagnostic orphans are common compared with AUDs, and that they exhibit more psychiatric problems (e.g., depression) than those who use alcohol without AUD symptoms.<sup>9–12</sup> Longitudinal data show that binge drinking predicts chronicity of subthreshold alcohol dependence.<sup>8</sup> Subthreshold alcohol use among young adults also escalates into an AUD.<sup>13</sup> However, none of these studies specifically examined subthreshold alcohol depen-

dence among the elderly. Subthreshold alcohol use may be especially problematic for older adults because the potential for alcohol-related problems can be greater due to declining ability to metabolize alcohol and may be more likely to need treatment even if they do not meet diagnostic criteria.<sup>14</sup>

In light of the need for empirical data on AUDs and subthreshold dependence to inform the emerging DSM-V and to facilitate screening and intervention for alcohol problems in the older population, we present the prevalence, symptom presentation, and correlates of alcohol dependence, abuse, and subthreshold dependence in a nationally representative sample of people older than 50 years. To improve the accuracy of population estimates and enhance study findings' generalizability, the study sample is drawn from the 2005–2007 NSDUH. We compare the pattern of alcohol use by alcohol diagnostic status, including early onset of alcohol use and binge drinking due to their association with alcohol-related problems.<sup>14–18</sup> We also determine whether different diagnostic groups are associated with distinct profiles in key sociodemographic characteristics, major depression, nicotine dependence, and nonmedical prescription drug use to inform the profile of diagnostic orphans compared with threshold groups.

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## METHODS

### Sample

This study is drawn from the public-use files of the 2005–2007 NSDUH,<sup>19–21</sup> an annual survey providing population estimates of substance use and health status of the civilian, noninstitutionalized population aged 12 years or older in the United States. Its sampling frame covers approximately 98% of the total U.S. population aged 12 years or older, and uses multistage area probability sampling methods to select a representative sample of the civilian noninstitutionalized population (household residents; residents of shelters, rooming houses, college dormitories, migratory workers' camps, and halfway houses; and civilians residing on military bases).

Respondents were interviewed privately at their places of residence. Confidentiality was stressed in all written and oral communications with potential respondents, and respondents' names were not

collected. Data collection methods involved a combination of computer-assisted personal interviewing for demographic items and audio computer-assisted self-interviewing for sensitive items to increase the validity of responses.<sup>22</sup> The audio computer-assisted self-interviewing provided respondents with a highly private and confidential setting in which to answer substance use and mental health questions. Questions were displayed on a computer screen and read through headphones to respondents, who entered answers directly into the computer.

From 2005 to 2007, approximately 5,000 unique respondents older than 50 years completed the survey yearly (weighted response rates for interviewing: 74%–76%). The survey methods for 2005–2007 remained the same, and the analysis of pooled data for these years is appropriate.<sup>21</sup>

### Study Variables

*Sociodemographic variables.* We examined respondents' age, sex, race/ethnicity, education, current marital status, and annual family income. We also created a survey year variable to examine yearly variations in the distribution of sociodemographic variables and AUDs. *Age grouping in adults* was defined by NSDUH; due to confidentiality considerations, individual age was not available from the public-use files.

*Alcohol use.* It was defined as consuming at least one drink of any type of alcoholic beverage and excluded the use of only a sip or two from a drink during the past year.<sup>21</sup> A *drink* was explicitly described as a can or bottle of beer; a wine cooler or a glass of wine, champagne, or sherry; a shot of liquor; or a mixed drink containing liquor. Respondents were asked about their use of alcohol in the past year. Alcohol users also reported the total number of days that they drank alcohol during the past 12 months, age of first alcohol use (onset), and the number of days on which they had five or more drinks on the same occasion during the past 30 days. *Occasion* was defined as at the same time or within a couple of hours of each other. *Binge drinking* was defined as drinking five or more drinks on the same occasion on at least 1 day within the past 30 days.<sup>21</sup>

*Alcohol use disorders.* Past-year AUDs were specified by DSM-IV AUD criteria.<sup>7,21</sup> According to NSDUH protocol, respondents who reported alcohol use

on six or more days during the past 12 months were assessed for alcohol abuse and dependence. Criteria for alcohol dependence require the presence of three or more alcohol-specific dependence criteria (tolerance, withdrawal, taking larger amounts/longer, inability to cut down, increased time spent in alcohol use, giving up important activities, and continued use despite resulted psychological/medical problems); criteria for alcohol abuse require the presence of one or more alcohol-specific abuse criteria (role interference, problems with the law, hazardous use, and relationship problems).<sup>7</sup>

*Subthreshold dependence (diagnostic orphans).* This included alcohol users who met one to two alcohol dependence criteria and who did not qualify for alcohol dependence or abuse.<sup>8,23</sup>

We created a variable to reflect four mutually exclusive groups of alcohol users (use alcohol on six or more days in the past year): dependence, abuse, subthreshold dependence, and use only (without endorsing any AUD criterion).

*Other substance use and mental health variables.* We distinguished respondents' past-year drug use by creating two binary variables: illicit drug use (use of marijuana/hashish, cocaine/crack, hallucinogens, or heroin) and nonmedical drug use. *Nonmedical drug use* was defined as any self-reported use of prescription pain relievers, sedatives, tranquilizers, or stimulants that was not prescribed for the respondent, or that the respondent took only for the experience or feeling they caused.<sup>21,24</sup> Detailed results on nonmedical drug use among older adults aged 50 years or older are reported elsewhere.<sup>24</sup> *Nicotine dependence* was defined by Nicotine Dependence Syndrome Scale<sup>25</sup> and Fagerstrom Test of Nicotine Dependence,<sup>26</sup> and it was considered present if respondents met the Nicotine Dependence Syndrome Scale or Fagerstrom Test of Nicotine Dependence criteria for dependence in the past month.<sup>21</sup> Past-year DSM-IV major depressive episodes were assessed by questions adapted from the National Comorbidity Survey-Replication.<sup>27</sup> Other DSM-IV mental disorders are not assessed.

### Data Analysis

We examined the frequency of key demographic and alcohol use variables by survey year and found no yearly differences. In the combined sample

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(N = 16,304), the prevalence of AUDs and subthreshold dependence was determined among those who reported alcohol use in the past year (six or more days per NSDUH protocol). Next,  $\chi^2$  (categorical variables) and *F* (continuous variables) tests were used to compare alcohol use patterns (days of use, early age of first use, and binge drinking) by diagnostic category.

Among alcohol users, multinomial logistic regression procedures examined correlates of dependence, abuse, and subthreshold dependence as compared with alcohol use only (without AUD symptoms). To better understand whether dependence and abuse were distinct from subthreshold dependence, we also reported their estimated associations in correlates. To mitigate the chance of Type I errors, results from bivariate analyses of correlates by alcohol diagnostic status are used to guide the adjusted analyses. Only variables with p values  $\leq 0.05$  are included in the adjusted logistic regression model to determine their associations with alcohol diagnostic status while controlling for their potentially confounding influences on odds ratio estimates. Analyses were conducted with SUDAAN to take into account

NSDUH's complex survey features (e.g., weighting and clustering).<sup>28</sup> All estimates presented here are weighted except for sample sizes (unweighted).

**RESULTS**

**Prevalence of AUDs among All Adult Respondents**

As shown in Table 1, of all adults aged 50 years or older (N = 16,304), 9.3% reported some DSM-IV AUD symptoms in the past year (dependence: 1.4%; abuse: 1.7%; subthreshold dependence: 6.3%). Adults aged 50–64 years had a higher prevalence of AUDs than those aged 65 years or older (4.2% versus 1.5%), and men had a higher prevalence than women (5.0% versus 1.4%). In addition, subthreshold dependence was found in 8.4% of men, 4.4% of women, 7.0% the 50–64 age group, and 5.2% of the older than 65 age group.

**Prevalence of AUDs among Alcohol Users**

As shown in Table 2, among past-year alcohol users (N = 8,190, 51% of all respondents), 6.1%

**TABLE 1. Twelve-Month Prevalence of Alcohol Use Disorders and Subthreshold Dependence Among Adult Respondents Aged 50 years and older: 2005–2007 National Surveys on Drug Use and Health (N = 16,304)**

Prevalence, % (SE)	Sample Size	Alcohol Dependence	Alcohol Abuse	Subthreshold Alcohol Dependence	Alcohol Use Without Abuse or Dependence Symptoms	No Alcohol Use	$\chi^2$ (df) p value
Overall	16,304	1.4 (0.12)	1.7 (0.12)	6.3 (0.26)	41.3 (0.47)	49.4 (0.46)	
Age, years							
50–64	10,015	1.9 (0.18)	2.3 (0.19)	7.0 (0.36)	44.7 (0.58)	44.1 (0.60)	228.5 (4)
$\geq 65$	6,289	0.6 (0.12)	0.9 (0.16)	5.2 (0.36)	36.4 (0.77)	57.0 (0.73)	<0.001
Sex							
Male	7,376	2.1 (0.21)	2.9 (0.23)	8.4 (0.45)	45.0 (0.75)	41.0 (0.76)	302.5 (4)
Female	8,928	0.7 (0.70)	0.7 (0.10)	4.4 (0.26)	38.2 (0.61)	56.0 (0.62)	<0.001
Race/ethnicity							
White	12,781	1.3 (0.14)	1.8 (0.13)	6.2 (0.28)	45.2 (0.47)	45.6 (0.52)	219.0 (12)
Black	1,480	2.1 (0.51)	0.9 (0.24)	7.1 (0.85)	26.2 (1.62)	63.8 (1.68)	<0.001
Hispanic	1,158	1.7 (0.43)	1.8 (0.60)	7.1 (1.10)	30.5 (1.68)	58.9 (1.94)	
Other	885	1.1 (0.36)	1.4 (0.56)	5.0 (1.04)	27.0 (24.3)	65.5 (2.74)	
Education							
>High school	2,981	1.4 (0.30)	1.2 (0.20)	5.5 (0.66)	21.9 (0.94)	70.1 (1.04)	710.4 (8)
High school	5,511	1.3 (0.20)	1.4 (0.21)	5.8 (0.39)	36.5 (0.77)	55.0 (0.82)	<0.001
$\geq$ College	7,812	1.4 (0.13)	2.1 (0.21)	6.8 (0.38)	51.6 (0.67)	38.1 (0.63)	
Survey year							
2005	5,123	1.2 (0.17)	1.7 (0.20)	6.1 (0.43)	41.7 (0.82)	49.3 (0.90)	4.4 (8)
2006	5,830	1.4 (0.20)	1.6 (0.22)	6.0 (0.38)	41.0 (0.89)	50.0 (0.90)	0.810
2007	5,351	1.4 (0.21)	1.7 (0.20)	6.7 (0.43)	41.2 (0.84)	48.9 (0.87)	

Notes: Past-year alcohol use referred as alcohol use on six or more days in the past year. Sample sizes are unweighted numbers; proportions are weighted figures. SE: standard error.

**TABLE 2. Twelve-Month Prevalence of Alcohol Use Disorders and Subthreshold Dependence Among Past-Year Alcohol Users: 2005–2007 National Surveys on Drug Use and Health (N = 8,190)**

Prevalence, % (SE)	Sample Size	Alcohol Dependence	Alcohol Abuse	Subthreshold Dependence	Alcohol Use Only <sup>a</sup>	$\chi^2(df)$ p value
Overall	8,190	2.7 (0.24)	3.4 (0.24)	12.4 (0.50)	81.6 (0.57)	
Age, years						
50–64	5,548	3.4 (0.32)	4.0 (0.33)	12.5 (0.62)	80.1 (0.67)	38.4 (3)
≥65	3,478	1.3 (0.28)	2.1 (0.37)	12.1 (0.82)	84.5 (1.06)	<0.001
Sex						
Male	4,271	3.6 (0.35)	5.0 (0.39)	14.4 (0.74)	77.0 (0.88)	139.8 (3)
Female	3,919	1.6 (0.23)	1.5 (0.23)	10.5 (0.59)	86.9 (0.61)	<0.001
Race/ethnicity						
White	6,838	2.3 (0.26)	3.4 (0.25)	11.3 (0.49)	83.1 (0.53)	35.9 (9)
Black	561	5.8 (1.38)	4.9 (0.68)	10.9 (2.26)	72.3 (2.54)	<0.001
Hispanic	469	4.1 (1.01)	4.5 (1.38)	17.4 (2.50)	74.2 (2.95)	
Other	322	3.2 (1.09)	4.0 (1.43)	14.5 (2.95)	78.4 (33.0)	
Education						
>High school	881	4.7 (0.95)	3.9 (0.68)	18.4 (2.08)	73.0 (2.41)	23.8 (6)
High school	2,545	3.0 (0.45)	3.1 (0.45)	12.9 (0.84)	81.1 (0.97)	0.002
≥College	4,764	2.2 (0.21)	3.4 (0.34)	11.1 (0.61)	83.4 (0.71)	
Marital status						
Married	5,429	2.0 (0.23)	3.1 (0.27)	11.9 (0.52)	83.1 (0.69)	29.6 (6)
Separated/divorced/widowed	2,260	3.9 (0.52)	4.2 (0.59)	13.0 (0.90)	78.9 (0.52)	<0.001
Never married	501	5.3 (1.09)	3.6 (0.74)	14.7 (1.97)	76.5 (2.47)	
Family income						
<\$40,000	2,794	2.7 (0.24)	3.7 (0.45)	15.1 (0.89)	81.6 (0.57)	54.6 (6)
\$40,000–\$74,999	2,631	4.4 (0.58)	2.7 (0.41)	11.5 (0.90)	78.8 (1.07)	<0.001
≥\$75,000	2,765	1.7 (0.27)	3.6 (0.39)	10.4 (0.75)	84.4 (0.82)	
Major depression						
Yes	403	12.6 (2.32)	4.1 (1.25)	12.8 (2.12)	70.6 (2.77)	23.3 (3)
No	7,787	2.2 (0.22)	3.3 (0.26)	12.3 (0.53)	82.2 (0.59)	<0.001
Nicotine dependence						
Yes	1,122	8.1 (1.23)	5.7 (0.88)	15.9 (1.28)	70.3 (1.60)	55.3 (3)
No	7,068	1.9 (0.21)	3.0 (0.25)	11.9 (0.55)	83.2 (0.63)	<0.001
Illicit drug use						
Yes	386	22.9 (2.54)	8.0 (1.71)	17.7 (2.57)	61.3 (3.76)	26.8 (3)
No	7,804	2.2 (0.22)	3.1 (0.25)	12.1 (0.50)	82.6 (0.58)	<0.001
Nonmedical drug use						
Yes	206	12.7 (2.69)	6.5 (1.80)	23.2 (3.90)	57.6 (4.16)	28.3 (3)
No	7,984	2.4 (0.23)	3.3 (0.24)	12.1 (0.49)	82.2 (0.59)	<0.001
Survey year						
2005	2,559	2.4 (0.32)	3.4 (0.37)	12.0 (0.80)	82.2 (0.96)	3.7 (6)
2006	2,943	2.8 (0.38)	3.3 (0.44)	11.9 (0.74)	82.0 (1.03)	0.719
2007	2,688	2.9 (0.40)	3.4 (0.39)	13.1 (0.83)	80.6 (0.92)	

Note: SE: standard error.

<sup>a</sup>Including alcohol users who had no DSM-IV alcohol abuse and dependence symptoms in the past year. Sample sizes are unweighted numbers; proportions are weighted figures.

met criteria for an AUD (dependence: 2.7%; abuse: 3.4%), and another 12.4% had subthreshold dependence. The prevalence of AUDs among alcohol users was associated with all sociodemographic variables examined, major depression, nicotine dependence, illicit drug use, and nonmedical drug use. Alcohol users who had major depression (12.6%) or who also used illicit (22.9%) or nonmedical (12.7%) drugs in the past year had a particularly high rate of alcohol dependence. Alcohol-using illicit (8.0%, 17.7%, respectively) or nonmedical (6.5%, 23.3%, respectively)

drug users also had elevated rates of alcohol abuse and subthreshold dependence. In addition, alcohol users who were Hispanic (17.4%) or had not completed high school (18.4%) had a high rate of subthreshold dependence.

#### Patterns of Alcohol Use by AUD Status

As shown in Table 3, the dependence group on average reported 5.1 AUD criteria as compared with 1.9 criteria in the abuse group. Both groups were similar

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**TABLE 3. Pattern of Alcohol Use by Diagnostic Category Among Past-Year Alcohol Users Aged 50 Years and Older 2005–2007 National Surveys on Drug Use and Health (N = 8,190)**

Estimate (95% Confidence Interval)	Alcohol Dependence	Alcohol Abuse	Subthreshold Alcohol Dependence	Alcohol Use Without Abuse or Dependence Symptoms	Bivariate Test
Sample size, N	255	273	1,004	6,658	
Number of alcohol abuse or dependence criteria met, mean	5.1 (4.84–5.42)	1.9 (1.72–2.04)	1.2 (1.18–1.25)	0	Wald $F = 357.4$ (2) $p < 0.001$
Number of days of using alcohol in past year, mean	215.2 (196.92–233.46)	203.6 (179.41–227.71)	170.8 (159.66–182.00)	106.7 (102.54–110.84)	Wald $F = 83.5$ (3) $p < 0.001$
Onset of first alcohol use before age 18 years, %	73.4 (66.17–79.85)	69.0 (62.64–74.77)	55.0 (51.37–58.51)	45.8 (44.01–47.67)	$\chi^2 = 259.3$ (3) $p < 0.001$
Binge drinking in the past 30 days, %	70.3 (62.58–76.90)	61.6 (53.38–69.12)	48.2 (44.04–52.30)	17.9 (16.79–19.08)	$\chi^2 = 86.7$ (3) $p < 0.001$

Note: There are significant differences in the estimate between groups in a same row when their 95% confidence intervals do not overlap.

in the total number of days using alcohol (215 days/year, dependence; 204 days/year, abuse), and the majority initiated alcohol use in adolescence and reported binge drinking in the past month (70% in the dependence group; 62% in the abuse group). Compared with alcohol users without AUD symptoms, the subthreshold group reported more binge drinking (48% versus 18%) and early onset of alcohol use (55% versus 46%), and a greater number of days using alcohol (171 days/year versus 107 days/year).

**Patterns of AUD Symptoms**

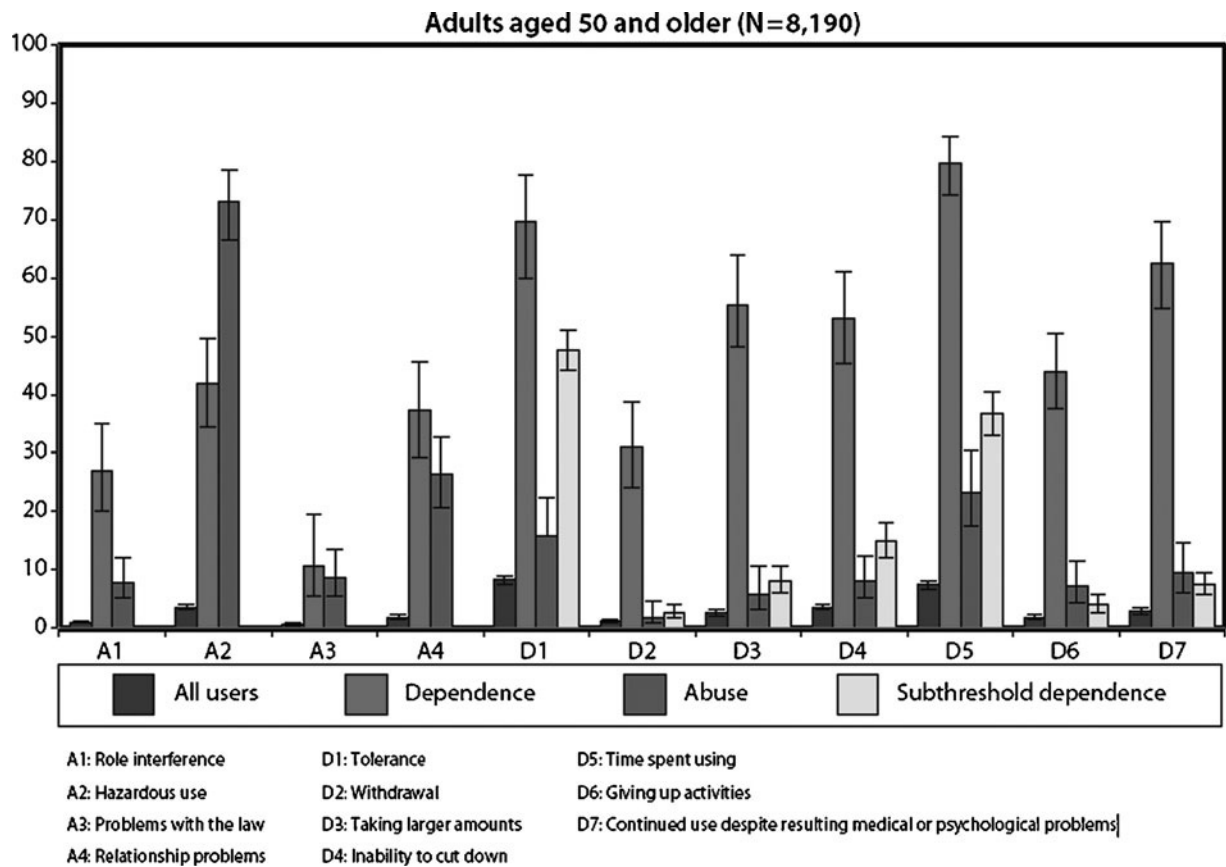
As shown in Figure 1, the abuse group was most likely to endorse *hazardous use* (73% in the abuse group). The dependence group reported a higher prevalence of all dependence criteria and was more likely to endorse *role interference* than the abuse group. Physical dependence symptoms also were common in the dependence group (*tolerance*, 70%; *withdrawal*, 31%). Tolerance (48%) and *time spent* (37%) were the most frequent symptoms among subthreshold users.

**Adjusted Odds Ratios of AUDs among Alcohol Users**

Relative to alcohol use only, ages 50–64, male gender, black race, low family income (<\$40,000), major depression, nicotine dependence, illicit drug use, nonmedical drug use, and early onset of alcohol use (<18 years) increased the odds of dependence (Table 4). Ages 50–64, male gender, being separated/divorced/widowed, nicotine dependence, nonmedical drug use, and early onset of alcohol use increased the odds of abuse, while male gender, black or Hispanic race, low family income, nicotine dependence, nonmedical drug use, and early onset of alcohol use increased the odds of subthreshold dependence.

*AUD versus subthreshold dependence.* Compared with subthreshold dependence, ages 50–64, male gender, major depression, nicotine dependence, and early onset of alcohol use increased the odds of dependence; and ages 50–64, male gender, white race (relative to black race), and being separated/divorced/widowed increased the odds of abuse.

**FIGURE 1.** Twelve-month prevalence (percentage) of DSM-IV alcohol abuse and dependence symptoms among past-year alcohol users aged 50 years and older (2005–2007 National Surveys on Drug Use and Health): Lines extended from bars indicate 95% confidence intervals of the estimates.



## DISCUSSION

Overall, 59% of male respondents and 44% of female respondents reported alcohol use during the past year. Approximately 6% of past-year alcohol users aged  $\geq 50$  years had an AUD, and AUDs were more frequent in respondents aged 50–64 and among men. Symptoms of *tolerance* (requiring more alcohol to get “high”) and *time spent* (a lot of time spent in activities necessary to use or recover from alcohol’s effects) were the most frequent AUD symptoms. This national study also identified several subsets of alcohol users who had greater odds of exhibiting alcohol dependence, including adults who had a lower income, major depression or nicotine dependence, or who used illicit or nonmedical drugs in the past year.

Although major depression and nicotine dependence were more likely to be associated with al-

cohol dependence compared with subthreshold dependence, there were no significant differences in major depression, nicotine dependence, and use of illicit or nonmedical drugs between the subthreshold and abuse groups. These diagnostic orphans were much more likely to report binge drinking during the past 30 days and to drink more days during the preceding year. Thus, diagnostic orphans of alcohol users among middle-aged and elderly adults have significant health risks compared with those who use alcohol without AUD symptoms. Binge drinking is associated with many health problems or consequences, including falls and automobile accidents.<sup>15–18,29</sup> Given that physicians and other healthcare professionals are often reticent to ask older adults about their use of alcohol, at-risk subthreshold alcohol use may go undetected. The problem may be even more an

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**TABLE 4. Multinomial Logistic Regression Analyses of Alcohol Use Disorders Among Past-Year Alcohol Users Aged 50 Years and Older 2005–2007 National Surveys on Drug Use and Health (N = 8,190)**

Adjusted Odds Ratios (95% Confidence Intervals) <sup>a</sup>	Dependence Versus Alcohol Use Only	Abuse Versus Alcohol Use Only	Subthreshold Dependence Versus Alcohol Use Only	Dependence Versus Subthreshold Dependence	Abuse Versus Subthreshold Dependence
Age, years (versus older than 65) 50–64	1.9 (1.11–3.22) <sup>b</sup>	1.8 (1.14–2.79) <sup>c</sup>	1.0 (0.84–1.123)	1.8 (1.04–3.16) <sup>b</sup>	1.7 (1.11–2.63) <sup>b</sup>
Sex (versus female) Male	2.4 (1.69–3.41) <sup>c</sup>	3.5 (2.42–5.10) <sup>c</sup>	1.5 (1.26–1.78) <sup>c</sup>	1.6 (1.07–2.39) <sup>b</sup>	2.3 (1.60–3.37) <sup>c</sup>
Race/ethnicity (versus white)					
Black	2.0 (1.08–3.55) <sup>b</sup>	0.6 (0.35–1.16)	1.7 (1.28–2.31) <sup>c</sup>	1.1 (0.59–2.19)	0.40 (0.20–0.69) <sup>c</sup>
Hispanic	1.5 (0.80–2.95)	1.4 (0.70–2.85)	1.5 (1.05–2.23) <sup>b</sup>	1.0 (0.51–1.99)	0.92 (0.44–1.95)
Other	1.6 (0.66–3.75)	1.3 (0.60–2.64)	1.4 (0.86–2.28)	1.1 (0.48–2.62)	0.90 (0.38–2.15)
Education (versus ≥college)					
<High school	1.2 (0.73–1.97)	1.0 (0.61–1.58)	1.3 (0.90–1.85)	0.9 (0.57–1.52)	0.8 (0.44–1.30)
High school graduate	1.5 (0.83–1.59)	0.9 (0.62–1.36)	1.1 (0.88–1.33)	1.1 (0.74–1.51)	0.8 (0.56–1.28)
Marital status (versus married)					
Separated/divorced/widowed	1.4 (0.95–2.06)	1.6 (1.05–2.52) <sup>b</sup>	1.0 (0.87–1.23)	1.4 (0.92–1.98)	1.6 (1.02–2.40) <sup>b</sup>
Never married	1.1 (0.66–1.89)	1.0 (0.58–1.63)	1.0 (0.70–1.46)	1.0 (0.54–1.87)	0.7 (0.48–1.13)
Family income (versus \$75K+)					
<\$40,000	2.3 (1.33–1.80) <sup>c</sup>	1.3 (0.87–1.93)	1.5 (1.11–1.91) <sup>c</sup>	1.5 (0.90–2.64)	0.9 (0.57–1.37)
\$40,000–\$74,999	1.2 (0.64–2.09)	0.8 (0.57–1.24)	1.1 (0.86–1.52)	1.0 (0.52–1.80)	0.7 (0.50–1.13)
Major depression (versus no)					
Yes	4.5 (2.74–7.51) <sup>c</sup>	1.2 (0.57–2.60)	1.1 (0.73–1.71)	4.0 (2.17–7.53) <sup>c</sup>	1.1 (0.46–2.59)
Nicotine dependence (versus no)					
Yes	2.4 (1.56–3.64) <sup>c</sup>	1.6 (1.07–2.40) <sup>b</sup>	1.3 (1.02–1.64) <sup>b</sup>	1.8 (1.15–2.93) <sup>c</sup>	1.2 (0.82–1.88)
Illicit drug use (versus no)					
Yes	2.4 (1.25–4.77) <sup>c</sup>	1.7 (0.95–3.14)	1.3 (0.88–1.91)	1.9 (0.94–3.74)	1.3 (0.69–2.55)
Nonmedical drug use (versus no)					
Yes	3.6 (1.90–6.88) <sup>c</sup>	2.0 (1.06–3.70) <sup>b</sup>	2.4 (1.51–3.73) <sup>c</sup>	1.5 (0.75–3.07)	0.8 (0.39–1.75)
Age of first alcohol use (versus older than 18) <18 years	2.3 (1.48–3.59) <sup>c</sup>	1.9 (1.36–2.57) <sup>c</sup>	1.4 (1.13–1.61) <sup>c</sup>	1.7 (1.06–2.71) <sup>b</sup>	1.4 (0.97–1.96)

<sup>a</sup>The model included all variables listed in the first column; p values are based on Wald tests; degree of freedom (*df*) is 9 for race/ethnicity; *df* is 6 for educational level, marital status, and family income; *df* is 3 for the remaining variables in the first column.

<sup>b</sup>p < 0.05.

<sup>c</sup>p ≤ 0.01.

issue for females as the cut off of five or more may be unduly conservative. We as yet do not know how the developers of DSM-V will manage subthreshold symptoms across a number of domain; yet, these data should be of value in assisting that management.

These findings should be interpreted with some caution.<sup>21,29</sup> First, the cross-sectional nature of the data precludes drawing causal inference related to the associations we have reported. Second, substance use behaviors are obtained from respondents' self-reports, which are subject to biases associated with memory errors and underreporting.<sup>30</sup> In addition, individuals who were institutionalized (in jails or long-term hospitals) or homeless on the date of the survey are not included in NSDUH; and these groups often have higher rates of alcohol problems than the general population. Finally, individuals who suffer from severe health or psychiatric problems from sub-

stance abuse are unlikely to participate in a household survey. In addition, as age increases so does the risk for cognitive impairment and dementia. This might affect self-report data in several ways; for example, by excluding cognitively impaired people who anecdotally tend to drink less hence producing overestimates, or by providing inaccurate recalled responses.

Despite these limitations, the NSDUH design has noteworthy strengths. The large number of respondents provides one of the largest samples of alcohol users aged 50 years or older living in the community. National Survey on Drug Use and Health has a high response rate, and the probes assessing substance use are quite detailed. In addition, the survey used advanced audio computer-assisted self-interviewing technology to assess respondents' substance use behaviors, provided incentive payments of \$30 to each



respondent, implemented data collection quality control procedures, and improved sample weight calibration by using the 2000 decennial census. These design features have improved the quality of the data and increased respondents' responses.<sup>21,31</sup>

Little is presently known about whether older adults with subthreshold dependence had AUDs in the past or whether they will abuse alcohol or become dependent in the future. Nevertheless, subthreshold alcohol dependence is prevalent among middle-aged and elderly adults nationally and the potential adverse consequences of subthreshold dependence are important as they age and are, hence, more susceptible to health problems, which may often be overlooked by clinicians. Therefore, screening of middle-aged and older adults for alcohol problems should include questions about dependence symptoms. Finally, these national findings suggest the need to screen for binge drinking, nicotine dependence, and

nonmedical prescription drug use among adults with subthreshold alcohol use.

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