

# The Co-occurrence of *DSM-IV* Alcohol Abuse in *DSM-IV* Alcohol Dependence

## Results of the National Epidemiologic Survey on Alcohol and Related Conditions on Heterogeneity That Differ by Population Subgroup

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**Background:** In *DSM-IV*, an alcohol abuse diagnosis is preempts by dependence, although the symptoms of each disorder are different. Consequently, little is known about the extent to which dependence occurs with or without abuse. The distinction is important because of potential heterogeneity in dependence as a phenotype in genetic research, as well as potential underestimation of alcohol dependence when surveys cover dependence symptoms only among those who screen positive for alcohol abuse.

**Objective:** To present the prevalence of *DSM-IV* alcohol dependence with and without alcohol abuse in national and population subgroups.

**Design:** Face-to-face interviews.

**Setting:** The United States, including Alaska, Hawaii, and the District of Columbia.

**Participants:** Household and group-quarters residents, 18 years and older, in the National Epidemiologic Survey on Alcohol and Related Conditions (N=42392).

**Main Outcome Measures:** *DSM-IV* alcohol dependence with and without *DSM-IV* alcohol abuse, assessed

with the Alcohol Use Disorder and Associated Disabilities Interview Schedule.

**Results:** Among respondents with current alcohol dependence, 33.7% did not additionally meet criteria for abuse (29.0% among men and 46.1% among women). Current dependence without abuse was especially common among minority women (48.5% among African Americans, 55.2% among Hispanics). Among respondents with lifetime diagnoses of dependence, 13.9% did not additionally meet criteria for abuse (10.1% among men, 22.1% among women): proportions were highest among minorities, eg, 29.1% among Hispanic women and 19.2% among Hispanic men.

**Conclusions:** Alcohol abuse does not always accompany alcohol dependence in the general population, especially among women and minorities. Dependence with and without abuse may represent heterogeneous phenotypes for genetic research. Use of alcohol abuse as a screening method for alcohol dependence in large epidemiologic studies will differentially underestimate the prevalence of dependence by subgroup, affecting time trend and comorbidity research. Such underestimation may also perpetuate a lack of services for traditionally underserved groups.

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**W**HEN THE SIGNS AND symptoms of 2 mental disorders seem related, questions often arise about their relationship to each other. This has been the case for alcohol abuse and alcohol dependence since *DSM-III* introduced the division of alcoholism into these 2 disorders. Previous questions about alcohol abuse and dependence have included whether abuse should be dropped from the nomenclature,<sup>1</sup> whether abuse usually develops into dependence,<sup>2-6</sup> and whether abuse and dependence are interchangeable.<sup>7-9</sup> These questions have largely been answered in the negative. However,

a question not yet addressed is the degree to which alcohol dependence occurs with or without abuse. This question is important for several reasons. First, in genetics research, the presence or absence of alcohol abuse among individuals with dependence may introduce unrecognized heterogeneity into the diagnostic phenotype of alcohol dependence. Second, the occurrence of alcohol dependence with and without abuse may affect prevalence estimates of dependence in surveys that use assessment of alcohol abuse as a screening method for alcohol dependence. This has been done in several recent surveys, including the National Institute of Mental Health National Comorbidity Survey

Replication, its follow-up survey, the adolescent version of the survey, and the World Mental Health comorbidity surveys.<sup>10,11</sup> In all of these studies, symptoms of alcohol dependence are not covered among individuals who screen negative for *DSM-IV* alcohol abuse, potentially leading to underestimation of dependence if it occurs commonly without abuse. Third, case recognition in clinical practice may be affected by use of alcohol abuse as a screening method for alcohol dependence, the method found in a widely used screening procedure for mental disorders in primary care and other medical settings.<sup>12,13</sup> In this screening procedure, patients who do not report symptoms of alcohol abuse are not asked about alcohol dependence, potentially leading to unrecognized cases of dependence if patients (or subgroups of patients) experience alcohol dependence without symptoms of abuse.

The conceptual background of the definitions of *DSM-IV* alcohol abuse and dependence supports examination of this issue because it is inconsistent with the final structure of abuse and dependence in *DSM-IV*. The *DSM-IV* division between alcohol abuse and dependence<sup>14</sup> was based<sup>15</sup> on the theoretical formulation of the alcohol dependence syndrome (ADS) of Edwards and Gross.<sup>16</sup> The ADS was described as a combination of physiologic and psychological processes reflecting impaired control over drinking, constituting what is now considered a “complex” disorder. Consistent with this, *DSM-IV* alcohol dependence criteria reflect both physiologic and psychological symptoms. The ADS was defined as one “axis” of alcohol problems, differentiated from another axis consisting of problems such as alcohol-related injuries or social or legal problems.<sup>17</sup> This second axis corresponds to *DSM-IV* alcohol abuse. Importantly, the 2 axes in the “biaxial” ADS distinction were not considered “orthogonal.”<sup>17</sup> Instead, they were defined as different types of alcohol-related problems that would co-occur in some but not all cases. The biaxial<sup>17</sup> distinction provided the basis for separating the dependence and abuse criteria in *DSM-III-R* and *DSM-IV*. However, *DSM-III-R* and *DSM-IV* departed from the ADS concept by creating a hierarchical structure between alcohol dependence and abuse, leaving alcohol abuse undiagnosed in individuals meeting criteria for alcohol dependence. Because of this, little is known about the extent to which alcohol abuse and dependence co-occur, or whether knowledge about dependence is lost by failing to note the co-occurrence of abuse. Given current interest in better phenotypes for etiologic research, addressing a potentially common form of heterogeneity is important. Furthermore, a clear understanding of the relationship between abuse and dependence is needed if one disorder is to be used as a screening method for the other.

Many clinicians consider abuse an expected prodromal stage of dependence. If this were an accurate concept, there would be little reason for a separate *DSM-IV* alcohol abuse category at all. Furthermore, dependence would seldom occur without abuse, and abuse would therefore be a reasonable screening method for dependence. While this clinical view was supported by a retrospective study of patients and volunteers,<sup>18</sup> such a study is vulnerable to problems of recall and nonrepresenta-

tiveness.<sup>19</sup> In contrast, prospective studies of representative samples that eliminate these problems consistently show that most untreated individuals initially diagnosed as having alcohol abuse (*DSM-III-R* or *DSM-IV*) do not progress to alcohol dependence 1 to 15 years later.<sup>2,3,5,20,21</sup> These studies, while important, do not address the extent to which dependence occurs with or without abuse, and whether this produces meaningful heterogeneity in dependence. If *DSM-IV* alcohol dependence occurs without abuse in an appreciable proportion of cases, then attention to the implications is warranted.

Earlier national data suggested that a substantial minority of individuals with current *DSM-IV* alcohol dependence did not also have abuse.<sup>22</sup> However, these earlier data are now 10 years old, and the earlier report was not focused on this question, attracting little attention. Therefore, using new national data, we addressed these questions: (1) What is the prevalence of *DSM-IV* alcohol dependence with and without *DSM-IV* alcohol abuse in the general population, and what proportion of *DSM-IV* alcohol dependence cases are not accompanied by abuse? (2) Does the co-occurrence of abuse with dependence differ in sex-, race-, and age-specific subgroups of the population?

## METHODS

### SAMPLE

Subjects were participants in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a nationally representative face-to-face survey of 43 093 respondents 18 years and older conducted by the National Institute on Alcohol Abuse and Alcoholism in 2001 to 2002. For this analysis, we included all NESARC respondents except American Indians, who constituted a distinct group too small to analyze, leaving the present sample of 42 392. The target population of the NESARC was the civilian noninstitutionalized population residing in the United States, including Alaska, Hawaii, and the District of Columbia. African Americans and Hispanics were oversampled, as were young adults. The NESARC also included a group-quarters sampling frame. Details of the sampling frame are provided elsewhere.<sup>23,24</sup> The overall survey response rate was 81%. The NESARC sample was weighted to adjust for probabilities of selection of a sample housing unit or housing unit equivalent, nonresponse at the household and person levels, the selection of 1 person per household, and oversampling of young adults. Once weighted, the data were adjusted to be representative of the US population on a variety of sociodemographic variables, including region, age, sex, race, and ethnicity based on the 2000 decennial census. Of the subjects in this report, 47.9% were male. White subjects composed 72.4% of the sample, while 11.3% were African American, 11.8% Hispanic, and 4.5% Asian. By age, 21.9% were aged 18 to 29 years, 30.9% 30 to 44 years, 31.0% 45 to 64 years, and 16.3% 65 years or older.

### MEASURES

The presence of *DSM-IV* alcohol abuse and dependence was assessed with the Alcohol Use Disorder and Associated Disabilities Interview Schedule—*DSM-IV* Version (AUDADIS-IV) from the National Institute on Alcohol Abuse and Alcoholism,<sup>25</sup> a fully structured diagnostic interview for nonclinician interviewers. The AUDADIS-IV includes an extensive list of symp-

**Table 1. US Prevalence of Current (Last 12 Months) *DSM-IV* Alcohol Dependence With and Without Abuse and Percentage of Total Dependence Cases Without Abuse**

Age, y	Dependence			Dependence			Dependence			Dependence			Dependence		
	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*
<b>Men</b>															
	White (n = 10 845)			African American (n = 3041)			Asian (n = 596)			Hispanic (n = 3722)			Total (N = 18 204)		
18-29	11.58	3.52	23.3	5.46	3.29	37.6	8.52	1.71	16.7	6.36	3.22	33.6	9.63	3.32	25.6
30-44	3.48	1.65	32.2	2.36	2.04	46.4	0.28	0.00	0.0	2.72	2.61	49.0	3.09	1.75	36.2
45-64	1.98	0.58	22.7	1.91	2.07	52.0	1.42	0.00	0.0	1.32	0.74	35.9	1.90	0.71	27.2
≥65	0.22	0.10	31.3	0.89	0.22	19.8	0.00	0.00	NA	0.00	0.85	0.0	0.25	0.15	37.5
Total	4.01	1.39	25.7	2.90	2.19	43.0	3.04	0.52	14.6	3.57	2.33	39.5	3.80	1.55	29.0
<b>Women</b>															
	White (n = 13 662)			African American (n = 5204)			Asian (n = 736)			Hispanic (n = 4586)			Total (N = 24 188)		
18-29	3.86	2.70	42.3	2.00	1.80	47.4	1.35	2.92	68.4	2.07	1.78	46.2	3.03	2.42	44.4
30-44	1.56	1.29	45.3	1.21	1.32	52.2	0.59	0.00	0.0	0.33	1.32	80.0	1.30	1.23	48.6
45-64	0.61	0.55	47.4	0.97	0.78	44.6	0.00	0.15	100.0	0.34	0.12	26.1	0.60	0.52	46.4
≥65	0.06	0.02	25.0	0.35	0.36	50.7	0.00	0.00	NA	0.00	0.00	NA	0.08	0.05	38.5
Total	1.33	1.04	43.9	1.23	1.16	48.5	0.55	0.79	59.0	0.87	1.07	55.2	1.23	1.05	46.1

Abbreviation: NA, not applicable.

\*Percentage of total cases of dependence without abuse (prevalence of cases without abuse divided by total prevalence of cases).

tom questions that operationalize *DSM-IV* criteria for alcohol abuse and dependence. The *DSM-IV* alcohol abuse criteria were rated independently of whether dependence was present, allowing identification of alcohol-dependent individuals with and without abuse. The high reliability and validity of the AUDADIS alcohol dependence diagnosis has been demonstrated in numerous clinical and general population studies in the United States and abroad.<sup>8,9,26-36</sup> The reliability of *DSM-IV* alcohol abuse diagnosis is also adequate when determined nonhierarchically (independently of dependence),<sup>26,27,37</sup> as done herein.

In this study, we addressed both current (last 12 months) and lifetime dependence. A variable was also created to indicate whether participants had been in treatment for alcohol problems in the previous 12 months. This provided parallel information about abuse among individuals treated in a variety of settings, including alcohol and drug inpatient and outpatient settings, mental health settings, offices of outpatient physicians, offices of other health care practitioners, and human service agencies.

#### INTERVIEWERS, TRAINING, AND FIELD QUALITY CONTROL

Approximately 1800 professional interviewers from the US Bureau of the Census administered the AUDADIS-IV by means of laptop computer-assisted software with built-in skip logic and consistency checks.<sup>38</sup> The interviewers had an average of 5 years' experience on census and other health-related national surveys. All interviewers completed 10 days of training. This training was standardized across the Census Bureau's 12 regional offices through centralized training sessions under the direction of the National Institute on Alcohol Abuse and Alcoholism and the census headquarters staff. For quality control purposes, regional supervisors recontacted a random 10% of all respondents and asked a subset of the interview questions to verify the accuracy of the interviewer's performance. This careful process showed that the interviewers performed at a high level, as indicated by the high reliability of the instrument.<sup>29</sup> In the very few cases when the accuracy of the interviews was uncertain, the interview data were

discarded and the interview was repeated by a supervising interviewer.

#### STATISTICAL ANALYSIS

The prevalence of *DSM-IV* alcohol dependence with and without abuse is shown in percentages weighted for characteristics of the sample design. Thus, the figures are representative of the US general population. In addition, the percentage of dependence cases without abuse is presented for the total sample and by sex-, race-, and age-specific subgroups of the population.

### RESULTS

#### CURRENT DEPENDENCE

For the full sample, the total prevalence of current (last 12 months) *DSM-IV* alcohol dependence was 3.80%. When broken down by the presence of abuse, the prevalence of alcohol dependence with abuse was 2.52% and the prevalence of dependence without abuse was 1.28%. Thus, about one third (1.28/3.80) of those with current diagnoses of alcohol dependence did not also have alcohol abuse.

The results for current disorders by race/ethnicity and age groups are presented separately for men and women in **Table 1**. Among all men (Table 1), the prevalence of dependence cases with and without abuse was 3.80 and 1.55, respectively; thus, 29.0% of *DSM-IV* alcohol dependence cases among men did not also have abuse. Among white men, the prevalence of dependence cases with and without abuse was 4.01 and 1.39, respectively, indicating that 25.7% of *DSM-IV* alcohol dependence cases did not have abuse. When minorities were examined, the proportion of alcohol dependence without abuse was much higher. Among all African Ameri-

**Table 2. US Prevalence of Lifetime DSM-IV Alcohol Dependence With and Without Abuse and Percentage of Total Dependence Cases Without Abuse**

Age, y	Dependence			Dependence			Dependence			Dependence			Dependence		
	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*	With Abuse	Without Abuse	%*
<b>Men</b>															
	White (n = 10 845)			African American (n = 3041)			Asian (n = 596)			Hispanic (n = 3722)			Total (N = 18 204)		
18-29	23.93	3.55	12.9	8.90	2.97	25.0	12.22	3.20	20.8	11.36	3.53	23.7	18.92	3.46	15.5
30-44	21.35	1.69	7.3	12.65	2.71	17.6	5.42	1.35	19.9	11.62	2.17	15.7	18.19	1.85	9.2
45-64	15.87	0.83	5.0	11.92	0.99	7.7	4.70	2.64	36.0	9.21	1.69	15.5	14.52	0.99	6.4
≥65	6.00	0.33	5.2	5.33	0.46	7.9	6.83	0.00	0.0	3.62	1.18	24.6	5.84	0.38	6.1
Total	17.47	1.54	8.1	10.66	2.04	16.1	7.42	2.12	22.2	10.52	2.50	19.2	15.44	1.74	10.1
<b>Women</b>															
	White (n = 13 662)			African American (n = 5204)			Asian (n = 736)			Hispanic (n = 4586)			Total (N = 24 188)		
18-29	11.17	3.92	26.0	2.74	2.43	47.0	2.11	4.65	68.8	5.74	2.70	32.0	8.52	3.53	29.3
30-44	10.57	2.04	16.2	4.17	1.76	29.7	0.00	1.98	100.0	4.85	1.79	28.1	8.49	1.87	18.1
45-64	5.79	1.40	19.5	4.57	0.44	8.8	0.97	0.15	13.4	2.71	0.78	22.3	5.18	1.18	18.6
≥65	0.95	0.33	25.8	1.61	0.80	33.2	0.00	0.00	NA	0.64	0.29	31.2	0.96	0.36	27.3
Total	7.12	1.82	20.4	3.60	1.43	24.8	1.50	1.23	45.1	4.17	1.71	29.1	6.11	1.73	22.1

Abbreviation: NA, not applicable.

\*Percentage of total cases of dependence without abuse (prevalence of cases without abuse divided by total prevalence of cases).

can men, 43.0% of those with alcohol dependence did not have abuse, with the highest proportion (52.0%) occurring among those aged 45 to 64 years. Among Hispanic men, 39.5% of those diagnosed as having DSM-IV alcohol dependence did not have abuse. Estimates became unstable in the oldest groups, especially among minorities, because of the small proportion of dependent subjects in the oldest groups.

The overall prevalence of dependence among women was 2.28%. The prevalence of DSM-IV alcohol dependence with and without abuse was 1.23% and 1.05%, respectively (Table 1). Thus, among women, 46.1% of current DSM-IV alcohol dependence cases did not also have abuse. Among white women, the prevalence of dependence cases with and without abuse was very similar to the total: 1.33 and 1.04, respectively. Among female minorities, alcohol dependence without abuse was somewhat more common. Among African American women, 48.5% of cases of dependence did not have abuse, whereas among Hispanic women, 55.2% of those diagnosed as having DSM-IV alcohol dependence did not have abuse. The numbers among female Asians were very small but suggested a similar pattern. Again, estimates were unstable in the oldest groups because of the small number of dependent subjects.

Among the 231 subjects in the sample who had received any treatment for alcohol problems in the previous 12 months, the results were different. Of these, 69.0% met full criteria for current DSM-IV alcohol dependence with abuse, whereas only 6.1% met criteria for current DSM-IV alcohol dependence without abuse, and thus, only 8.1% had current dependence without abuse. Specific population subgroups are not shown because of small numbers. These numbers are consistent with a clinical concept that alcohol dependence rarely occurs without abuse, but they differ from the results presented in the more representa-

tive groups. The small proportion of individuals with current dependence who were in treatment is consistent with the previous epidemiologic literature.

## LIFETIME DEPENDENCE

When lifetime DSM-IV dependence was considered, the prevalence for the full sample was 12.48%, consisting of 1.73% without abuse and 10.75% with abuse. Thus, 13.86% of the lifetime cases of DSM-IV alcohol dependence did not have accompanying DSM-IV alcohol abuse. **Table 2** gives the results for lifetime disorders for men and women, respectively.

For lifetime DSM-IV alcohol dependence diagnoses among men (Table 2), the prevalence of dependence cases with and without abuse was very similar to that in the total sample: 15.44% and 1.74%, respectively. Thus, 10.1% of DSM-IV alcohol dependence cases among men did not also have abuse. This proportion was lower among white men, among whom only 8.1% of lifetime DSM-IV alcohol dependence cases did not have abuse. Among minorities, the proportion of lifetime dependence cases without abuse was higher. Among all African American men, 16.1% of dependence cases did not have abuse, with the highest proportion (25.0%) occurring among those aged 18 to 29 years. Among Hispanic males, 19.2% of those diagnosed as having lifetime DSM-IV alcohol dependence did not have abuse, with a similar proportion (22.2%) noted for Asian men.

The proportion of lifetime cases of dependence without abuse was higher among women than men (Table 2). Among all women, 22.1% of all DSM-IV alcohol dependence cases did not have accompanying abuse. The proportion was lowest among white women (20.4%) and somewhat higher among African American (24.8%) and Hispanic women (29.1%).



This is the first study, to our knowledge, to focus on the general population prevalence of current and lifetime DSM-IV alcohol dependence with or without alcohol abuse. The large, nationally representative sample and careful measurement in the NESARC made it possible to examine an important potential source of heterogeneity in DSM-IV alcohol dependence, namely, the presence or absence of DSM-IV alcohol abuse. The results of this study clearly demonstrate that a substantial proportion of current DSM-IV alcohol dependence cases occur without accompanying abuse. Furthermore, this phenomenon occurs much more commonly in the population groups typically understudied and underserved for alcohol use disorders: women and disadvantaged race/ethnicity minority populations. Results for the subset of subjects in treatment contrasted with the full sample, illustrating the risks inherent in generalizing about common disorders from samples of clinical cases. When lifetime disorders were considered, about 14% of the dependence cases did not have accompanying abuse. The proportion was higher among women in all race/ethnicity groups and among male minorities.

The study findings are consistent with the original biaxial conceptualization of alcohol use disorders that served as the basis for the DSM-IV distinction between dependence and abuse symptoms. This conception placed alcohol dependence on one axis and related problems or consequences of drinking on another.<sup>17</sup> The findings support the idea that conditions on these 2 axes co-occur in some but not all cases, information that is lost with DSM-IV because of the exclusion of abuse when dependence is present. The findings are also consistent with those from a large national survey conducted 10 years earlier<sup>22</sup> and thus seem robust to time trends or sampling differences.

Different biopsychosocial processes may give rise to the symptoms of alcohol dependence and alcohol abuse. For example, genes affecting alcohol reward, craving, or withdrawal (characterizing dependence) may differ from genes affecting novelty-seeking or behavioral undercontrol (characterizing abuse). Given that a meaningful subset of dependence cases did not have accompanying abuse, this type of heterogeneity should be explored. Furthermore, the heterogeneity was not evenly distributed across major subgroups of the population. Rather, it was higher among women than men and among minorities. Thus, if between-study results differ on the relationship of candidate genes to alcohol dependence, sample differences in sex or ethnic composition leading to variability in the prevalence of abuse among dependent cases could be examined as one potential explanation of the inconsistencies.

With advances in genetics research, the need to improve the level of information offered by phenotypes has become increasingly clear. Biological "endophenotypes" are increasingly seen as offering promise.<sup>39,40</sup> However, identification of useful endophenotypes requires that their links with clinical disease be well established.<sup>41</sup> Reduced heterogeneity in disease indicators should facilitate the search for endophenotypes of alcohol dependence as well as for the genes underlying disease. The

presence or absence of abuse symptoms among individuals with alcohol dependence may be one such source of heterogeneity in the clinical phenotype.

In general population surveys of DSM-IV alcohol dependence, use of DSM-IV alcohol abuse as a screening tool for dependence might be advantageous if it were effective. However, because a sizable proportion of alcohol dependence cases do not also have symptoms of abuse, the use of DSM-IV alcohol abuse as a screening method will result in missed cases and an underestimation of the prevalence of DSM-IV alcohol dependence. Because the underestimation will vary by sex and by race/ethnicity, inferences about the relationship of dependence to important characteristics such as comorbidity (eg, major depression, which is more common among women) are likely to be altered. These issues are also likely to affect time trend data and longitudinal studies, especially when time trends in prevalence, age at onset, or longitudinal course differ by sex or race/ethnicity. Statistical modeling cannot be counted on to adjust for loss of information on alcohol dependence due to this method of screening in such studies. Furthermore, as the underestimation falls most heavily on women and minorities, decision makers may be misled about the need for treatment and prevention programs for these already underserved groups. Future general population studies that involve assessment of alcohol use disorders should test screening techniques in appropriate samples<sup>42</sup> before applying the techniques in full-scale surveys.

A widely used screening instrument for mental disorder in primary care<sup>12</sup> and its variants<sup>13</sup> uses the DSM-IV alcohol abuse criteria as a method to screen for DSM-IV alcohol dependence. Any increase in screening for alcohol use disorders in medical settings represents important progress in the potential for disease prevention. However, our results indicate that use of abuse symptoms to screen for dependence will result in failure to detect female and minority patients with alcohol dependence, perpetuating an ongoing oversight in primary medical settings.<sup>43-46</sup> Given that women and minorities are at increased risk of liver damage from heavy drinking<sup>47</sup> and cirrhosis,<sup>48</sup> detection and intervention for alcohol problems in these groups in medical settings are especially important.

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