



## Diagnosing alcohol abuse in alcohol dependent individuals: Diagnostic and clinical implications

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### ABSTRACT

In DMS-IV, the diagnosis of alcohol abuse is precluded by the diagnosis of alcohol dependence. The goal of this study was to examine the diagnostic and clinical implications of diagnosing alcohol abuse among alcohol dependent individuals. Treatment-seeking psychiatric outpatients with a lifetime history of alcohol dependence ( $n = 544$ ), some of whom ( $n = 45$ ) did not meet lifetime criteria for alcohol abuse completed in-depth, face-to-face, semi-structured clinical assessments of DSM-IV axis I and axis II psychopathology. Alcohol dependent patients who did not meet criteria for alcohol abuse were significantly more likely to be female, have a later age of onset for alcohol dependence, have fewer dependence symptoms, and have a lower rate of positive family history for alcoholism, and were less likely to report a lifetime history of DSM-IV drug use disorders and PTSD. These findings suggest that diagnosing alcohol abuse among alcohol dependent patients may be clinically useful as an index of severity and higher likelihood of comorbid drug abuse and dependence. Future studies are needed to establish whether these differences are clinically significant in terms of the course of the disorder and response to treatment.

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### 1. Introduction

Alcohol abuse and dependence represent two frequently occurring psychiatric conditions. Recent findings from the National Epidemiological Survey on Alcohol and Related Conditions (NESARC) (Dawson et al., 2005) revealed that the 12-month prevalence of alcohol dependence according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) in the adult population in the U.S. was 3.8%, while the prevalence of alcohol abuse, without dependence, was 4.7% (Grant et al., 2004). These results indicate that 8.5% of the adult population in the U.S. suffers from an alcohol use disorder in a one year period, which translates into 17.6 million adults affected yearly by alcohol abuse or dependence (Grant et al., 2004).

In DMS-IV, the diagnosis of alcohol abuse is precluded by the diagnosis of alcohol dependence, such that the abuse diagnosis is not given if the patient has ever met criteria for alcohol dependence. Analyses from NESARC revealed that among individuals with a lifetime diagnosis of alcohol dependence, 13.9% of them did not additionally meet lifetime criteria for alcohol abuse (10.1% for men,

22.1% for women) (Hasin & Grant, 2004). The proportion of alcohol dependent individuals assessed by NESARC who did not meet criteria for alcohol abuse was highest among women and minorities (Hasin & Grant, 2004). The aforementioned study by Hasin and Grant (2004) was the first and only to examine the prevalence of alcohol dependence with and without abuse in the general population. The current study seeks to extend those findings by examining the prevalence, demographic characteristics, and clinical profile of individuals diagnosed with lifetime alcohol dependence with and without alcohol abuse in a treatment-seeking clinical sample. This is relevant as seeking treatment is related to a number of clinical, social, and demographic factors, such as income (Alegria, Bijl, Lin, Walters, & Kessler, 2000) and personality (Goodwin, Hoven, Lyons, & Stein, 2002), suggesting that the prevalence and correlates of alcohol use disorders in the general population should be replicated in clinical populations to provide the practicing clinician with information of more direct clinical utility as treatment-seekers differ from the general population.

Examining the relationship between alcohol dependence and abuse relates to the theoretical conceptualization of alcohol use disorders, which is influenced by the Alcohol Dependence Syndrome and the bi-axial distinction between alcohol dependence and its consequences (Edwards & Gross, 1976). Specifically, Edwards and Gross (1976) argued that one may experience “drink-related disabilities” (e.g., loss of a job,

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car accident, relationship difficulties), without suffering from alcohol dependence, which is consistent with the current distinction between alcohol dependence and alcohol abuse, with the later focusing primarily on alcohol-related adverse consequences and both disorders having non-overlapping criteria sets. Recently, there has been much debate about the reliability and validity of the DSM-IV diagnostic criteria for alcohol abuse and dependence. Studies of the alcohol abuse diagnosis have shown that its reliability is lower than expected (Chatterji et al., 1997), is less concordant across diagnostic systems (Grant et al., 2007; Hasin, Van Rossem, McCloud, & Endicott, 1997; Langenbucher, Morgenstern, Labouvie, & Nathan, 1994a,b), and is less distinct from non-problematic use than originally thought (Hasin, Paykin, Endicott, & Grant, 1999; Pollock & Martin, 1999). Alcohol abuse is thought to be less well defined conceptually than dependence, as the later more clearly reflects personal and social consequences of drinking (Gross, Kierszenbaum, Lewis, & Lee, 1976). Recent studies, however, suggested that the reliability of the alcohol abuse diagnosis improves considerably when abuse is not ruled out by dependence (Canino et al., 1999; Hasin et al., 2006).

In light of the preparations for the fifth edition of the DSM, the field is currently considering alternative approaches to the classification of substance use disorders in DSM-V (Li, Hewitt, & Grant, 2007). To that end, it is important to establish the clinical and diagnostic implications of diagnosing alcohol abuse among alcohol dependent patients. Refining diagnostic phenotypes has also become increasingly important given the recognition that the heterogeneity of diagnostic phenotypes hinders the study of genetic and neurobiological bases of alcohol use disorders (Hines, Ray, Hutchison, & Tabakoff, 2005). Recently, Schuckit and Saunders (2006) have presented a series of research recommendations to inform the preparation of the substance use disorders section of DSM-V. The authors have divided their recommendations into several categories, including research items that could be addressed immediately through secondary analyses of existing datasets, which includes the following: "What are the cross-sectional and longitudinal implications of encouraging researchers and clinicians to diagnose substance abuse when it is present, even when there is coexisting dependence on the same drug?" (p. 171).

This report from the Rhode Island Methods to Improve Diagnostic Assessment and Service (MIDAS) seeks to address the question above, in the context of alcohol use disorders, by examining cross-sectional diagnostic and clinical data in a sample of treatment-seeking psychiatric outpatients. The first study goal is to examine the prevalence of lifetime alcohol dependence in the absence of alcohol abuse among psychiatric outpatients. Based on the population-based study by Hasin and Grant (2004) we expect that approximately 10–15% of the patients who meet lifetime criteria for alcohol dependence would not receive the additional diagnosis of alcohol abuse. A secondary and exploratory study goal is to compare individuals with a lifetime history of alcohol dependence with and without the additional diagnosis of alcohol abuse on demographic, diagnostic, and clinical variables. This study will allow us to (1) evaluate the significance of diagnosing alcohol abuse among alcohol dependent individuals by better understanding the contribution of the additional diagnosis of abuse to the alcohol dependence phenotype; (2) better understand potential sources of heterogeneity into the diagnostic phenotype of alcohol dependence; and (3) consider case recognition in clinical and research settings where alcohol abuse symptoms may be used to screen for dependence.

## 2. Method

### 2.1. Participants and procedures

Participants were recruited from the Rhode Island Hospital Department of Psychiatry's outpatient practice (Zimmerman, 1997). The MIDAS Project is a large clinical study using semi-structured

interviews assessing a wide range of psychiatric disorders conducted in a general clinical outpatient practice (Zimmerman, 1997). This private practice group predominantly treats individuals with medical insurance (including Medicare but not Medicaid) on a fee-for-service basis. The primary referral sources to the practice are primary care physicians and psychotherapists, though data on referral source were not systematically recorded. Patients are offered the opportunity to have a more comprehensive evaluation as part of the research program, though they are not required to undergo this evaluation. Not all patients who presented for treatment participated in the study and rates of agreement to participation were not systematically recorded. All interviews were carried out in the clinic setting.

The current study started with a sample of 2500 (60.6% female) participants who completed the diagnostic evaluation, 1502 (60.1%) of whom did not meet criteria for an alcohol use disorder, 454 (18.2%) of whom met criteria for a lifetime history of DSM-IV alcohol abuse without dependence, and 544 (21.7%) met criteria for a lifetime history of DSM-IV alcohol dependence. The following were the principal diagnoses, defined as the diagnosis which led to treatment seeking by the patient: 45.8% depressive disorders, 16.2% anxiety disorders, 9.6% bipolar disorder, 8.6% alcohol use disorders, 3.7% impulse control disorders, and 16.1% other.

For the purpose of this investigation, we examined those 544 (254 women) participants who met criteria for a lifetime history of alcohol dependence, 128 of whom met criteria for current (i.e., present in the past six months) alcohol dependence. Of the 544 participants, 499 (91.7%) also met criteria for lifetime alcohol abuse, and 45 (8.3%) met criteria for alcohol dependence without receiving the additional lifetime diagnosis of alcohol abuse in this diagnostic battery. The Rhode Island Hospital institutional review board approved the research protocol and after complete description of the study to the participants, written informed consent was obtained. Demographic information is presented in Table 1.

### 2.2. Assessment

Participants were interviewed using the Structured Clinical Interview for DSM-IV Disorders (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1995) to diagnose DSM-IV axis I psychiatric disorders. The Structured Interview for DSM-IV Personality (SIDP-IV; Pfohl et al., 1997) assessed DSM-IV axis II disorders. Clinical Global Impression—Severity of depression (CGI-S; Guy, 1976) and Global Assessment of Functioning (GAF) ratings were also obtained for each patient by the diagnostic rater. The Family History Research Diagnostic Criteria (FH-RDC; Andreasen, Endicott, Spitzer, & Winokur, 1977) interview assessed family history of psychiatric disorders among first degree relatives. The inter-rater reliability of psychiatric diagnoses obtained in the MIDAS study is adequate (Zimmerman & Mattia, 1999;

**Table 1**

Demographic characteristics by the presence of alcohol abuse in psychiatric outpatients with a lifetime history of alcohol dependence.

|                               | ALC without abuse (n = 45) | ALC with abuse (n = 499) | t / $\chi^2$ | p     |
|-------------------------------|----------------------------|--------------------------|--------------|-------|
| Age, M (SD)                   | 40.7 (12.1)                | 38.0 (10.8)              | 1.20         | .23   |
| Gender: female, %             | 73.3                       | 44.3                     | 13.99        | <.001 |
| Ethnicity: Caucasian, %       | 80.0                       | 88.0                     | 2.37         | .12   |
| Marital status, %             |                            |                          | 1.64         | .65   |
| Single                        | 37.8                       | 33.3                     |              |       |
| Married/living together       | 42.2                       | 39.3                     |              |       |
| Divorced/separated            | 17.8                       | 26.0                     |              |       |
| Widowed                       | 2.2                        | 1.4                      |              |       |
| Education, %                  |                            |                          | 4.62         | .20   |
| Less than high school diploma | 17.8                       | 12.0                     |              |       |
| High school graduate          | 15.5                       | 26.3                     |              |       |
| Some college                  | 35.6                       | 39.7                     |              |       |
| College degree or higher      | 31.1                       | 22.0                     |              |       |

Zimmerman, Rothschild, & Chelminski, 2005) with a previously reported Kappa coefficient of 0.64 for alcohol use disorders (Zimmerman, McGlinchey, Chelminski, & Young, 2008).

In addition to diagnostic variables, the following clinical variables were examined: (1) current alcohol dependence diagnosis; (2) desire for treatment for alcohol dependence, which consisted of asking patients whether they would like to receive treatment for alcohol dependence at this time, with the following three possible clinician codes: yes = 1, no = 0, and unsure = 0; the last two codes were combined as a negative answer; (3) history of suicide attempts was comprised of two questions regarding number of previous suicide attempts, the responses to which were transformed into a dichotomous variable: 0 = no suicide attempt, and 1 = one or more suicide attempts; (4) family history of alcoholism was based on the FH-RDC clinical interview for alcohol problems among first degree relatives; (5) age of onset of alcohol dependence based on clinical data indicating the earliest age at which three or more symptoms of alcohol dependence occurred together in a 12-month period; (6) history of treatment for alcoholism was assessed with the following question: “Did you ever talk to a professional or receive treatment for alcohol problems in the past?” and answers were dichotomized into yes = 1 and no = 0; (7) history of hospitalizations was assessed by the following question: “Have you ever been a patient in a psychiatric hospital?” Valid answers included inpatient rehabilitation/detoxification and were dichotomized into no = 0, and yes = 1.

For the purpose of this investigation, some diagnostic categories were combined, when appropriate, in order to increase overall base rates (i.e., cell sizes), thereby increasing statistical power to detect group differences and minimizing the chances of type I error due to multiple comparisons. The *psychotic disorders* category included the following DSM-IV diagnoses: schizophrenia, schizophreniform disorder, schizoaffective disorder, delusional disorder, and psychosis not otherwise specified. *Other drug abuse/dependence* comprised all substance use disorders other than cannabis and stimulant/cocaine use disorders (each presented separately) and nicotine dependence. *Personality disorders* were combined based on the three DSM-IV clusters, A, B, and C. Antisocial personality disorder was examined separately from the other cluster B disorders given its known unique association with substance use disorders.

2.3. Statistical analyses

The primary analytic approach involved comparing alcohol dependent patients with and without alcohol abuse on demographic characteristics, Axis I and Axis II diagnoses, clinical variables, and each of the DSM-IV seven alcohol dependence criteria. Student *t*-tests and Chi-square tests were used for tests of continuous and categorical variables, respectively. Student *t*-tests were used as they account for potential violations of the assumption of the homogeneity of variance, an important issue when comparing two groups with an unequal number of participants (*n*). Specifically, for variables in which the homogeneity of variance assumption was held, results of *t*-test using pooled variance are reported, whereas for variables that violated the homocedasticity assumption in our sample, the individual sample standard deviation was used to calculate the *t*-test. Corrections for Type I error were considered but ultimately rejected on the basis of the argument that Type I error needs to be considered for each hypothesis separately, not for the number of variables in the whole set of analyses reported (Dar, Serlin, & Omer, 1994). Moreover, the small sample of individuals with alcohol dependence without lifetime alcohol abuse (*n* = 45) limited the statistical power to detect group differences and argued against a more stringent *p*-value. Finally, efforts to combine diagnostic categories were in place to reduce the number of comparisons. Analyses were performed using SAS Statistical Software. For all comparisons, statistical significance was set at *p* < .05, and all tests were 2-tailed.

3. Results

Examination of demographic characteristics by group indicated that alcohol dependent patients without alcohol abuse were significantly more likely to be female, such that 13% of women met alcohol dependence criteria without abuse, compared to 4% of men. Results of group comparisons on lifetime prevalence of DSM-IV diagnoses revealed that alcohol dependent patients without lifetime alcohol abuse were significantly less likely to meet DSM-IV criteria for abuse and dependence on cannabis, stimulants/cocaine, and other substances. Regarding clinical characteristics, alcohol dependent individuals without alcohol abuse reported a later age of onset of alcohol dependence, a lower likelihood of a family history positive for alcoholism, and were less likely to have been hospitalized for psychiatric/substance abuse problems (Table 2).

Specific DSM-IV symptoms for alcohol dependence were coded for the first 1800 patients assessed in the MIDAS Project, therefore specific symptom data are available for a majority of patients (*n* = 401) in this study. Patients for whom we had symptom-level data (*n* = 401) did not differ significantly from those for whom symptom data were not available (*n* = 143) on the demographic or clinical variables examined in this study. Comparison of alcohol dependent patients with (*n* = 363) and without (*n* = 38) alcohol abuse indicated that four dependence criteria were endorsed less often by patients without alcohol abuse (Table 3).

Follow-up multivariate logistic regression analyses were conducted to determine if group differences in (Gross et al., 1976) clinical

Table 2  
Diagnostic and clinical characteristics by the presence of alcohol abuse in psychiatric outpatients with a lifetime history of alcohol dependence.

|   | ALC without abuse (n = 45) | ALC with abuse (n = 499) | t / $\chi^2$ | p      |
|---|----------------------------|--------------------------|--------------|--------|
| <i>Diagnostic characteristics</i>         |                            |                          |              |        |
| Axis I disorders, lifetime history, %     |                            |                          |              |        |
| Major depressive disorder                 | 66.7                       | 71.7                     | 0.52         | .47    |
| Bipolar disorder (I or II)                | 11.1                       | 11.6                     | 0.01         | .92    |
| Dysthymia                                 | 6.7                        | 11.6                     | 1.02         | .31    |
| Any anxiety disorder                      | 64.4                       | 74.6                     | 2.18         | .14    |
| Panic disorder                            | 22.2                       | 30.9                     | 1.46         | .23    |
| Social anxiety disorder                   | 42.2                       | 37.1                     | 0.47         | .49    |
| Generalized anxiety disorder              | 13.3                       | 21.0                     | 1.51         | .22    |
| PTSD                                      | 20.0                       | 34.7                     | 3.99         | <.05   |
| Any psychotic disorder                    | 4.4                        | 3.2                      | 0.20         | .66    |
| Any impulse control disorder              | 24.4                       | 28.5                     | 0.33         | .57    |
| Any substance use disorder                | 20.0                       | 58.5                     | 24.78        | <.0001 |
| Stimulant/cocaine abuse                   | 2.2                        | 25.9                     | 12.67        | <.001  |
| Stimulant/cocaine dependence              | 4.4                        | 19.6                     | 6.35         | <.05   |
| Cannabis abuse                            | 6.7                        | 31.5                     | 12.23        | <.001  |
| Cannabis dependence                       | 4.4                        | 17.0                     | 4.87         | <.05   |
| Any other drug abuse                      | 4.4                        | 28.5                     | 12.23        | <.001  |
| Any other drug dependence                 | 8.9                        | 19.0                     | 2.86         | .09    |
| Axis II disorders, %                      |                            |                          |              |        |
| Antisocial personality disorder           | 7.1                        | 13.3                     | 1.29         | .26    |
| Cluster A                                 | 7.7                        | 8.8                      | 0.04         | .85    |
| Cluster B                                 | 17.5                       | 22.4                     | 0.51         | .47    |
| Cluster C                                 | 24.0                       | 27.3                     | 0.13         | .72    |
| <i>Clinical characteristics</i>           |                            |                          |              |        |
| Current alcohol dependence, %             | 28.9                       | 23.1                     | 0.78         | .38    |
| Desire for treatment for ALC, %           | 22.2                       | 20.2                     | 0.10         | .75    |
| History of suicide attempt, %             | 31.1                       | 32.7                     | 0.05         | .83    |
| Family history positive for alcoholism, % | 37.8                       | 58.2                     | 6.99         | <.01   |
| History of treatment for ALC, %           | 36.7                       | 54.9                     | 3.62         | .06    |
| History of hospitalization, %             | 28.9                       | 40.9                     | 2.40         | .12    |
| Age of onset of ALC, M (SD)               | 30.4 (14.4)                | 23.0 (8.6)               | 3.38         | <.01   |
| GAF rating, M (SD)                        | 50.5 (12.2)                | 50.0 (9.9)               | 0.29         | .77    |
| CGI-S rating, M (SD)                      | 2.7 (1.3)                  | 2.5 (1.2)                | -0.40        | .69    |

**Table 3**  
DSM-IV substance dependence symptoms by the presence of alcohol abuse.

|   | ALC without abuse (n = 38) | ALC with abuse (n = 363) | t / $\chi^2$ | p      |
|---|----------------------------|--------------------------|--------------|--------|
| <i>Alcohol dependence symptoms, % met</i> |                            |                          |              |        |
| 1. Tolerance                              | 81.6                       | 81.0                     | 0.00         | .93    |
| 2. Withdrawal                             | 23.7                       | 45.7                     | 6.78         | <.01   |
| 3. Drinking more than intended            | 79.0                       | 78.8                     | 0.00         | .98    |
| 4. Unsuccessful efforts to cut down       | 47.4                       | 57.3                     | 1.38         | .24    |
| 5. Spend a great deal of time drinking    | 60.5                       | 84.9                     | 14.1         | <.001  |
| 6. Important activities are reduced       | 10.5                       | 60.1                     | 34.2         | <.0001 |
| 7. Continued use despite problems         | 50.0                       | 75.2                     | 11.0         | <.001  |
| Symptom count, M (SD)                     | 3.5 (0.9)                  | 4.8 (1.4)                | −7.79        | <.0001 |

and diagnostic characteristics remained significant after controlling for gender. Specifically, we re-tested each significant clinical and diagnostic predictor of alcohol dependence with or without abuse and controlled for the effects of gender in the logistic regression model. All results remained significant thereby supporting the robustness of the findings reported above. The same was true when controlling for psychiatric distress (CGI-S) and global functioning (GAF).

#### 4. Discussion

According to the DSM-IV, the diagnosis of alcohol dependence precludes the diagnosis of alcohol abuse. This distinction has important implications as we approach the fifth edition of the DSM (Schuckit & Saunders, 2006) and begin to evaluate the current diagnostic system. The NESARC study found that a substantial minority of individuals with alcohol dependence were not also diagnosed with alcohol abuse, and that there were important differences between alcohol dependent individuals with and without alcohol abuse (Hasin & Grant, 2004). The goals of this study were (1) to determine how many patients with a lifetime history of alcohol dependence did not also have alcohol abuse, and (2) to examine the demographic and clinical correlates of diagnosing alcohol abuse in alcohol dependent patients (Schuckit & Saunders, 2006). The observed frequency of alcohol dependent patients who did not meet criteria for alcohol abuse in this clinical sample was 8.3%. These findings are generally consistent with those of NESARC (Gotsman et al., 1999; Hasin et al., 1999), which found that 13.9% of individuals with a lifetime diagnosis of alcohol dependence did not additionally meet criteria for alcohol abuse. This prevalence rate was somewhat inconsistent with the disease progression model, which would predict that all patients diagnosed with alcohol dependence should also meet criteria for alcohol abuse in their lifetime. To the extent that this single-session diagnostic assessment successfully captured lifetime alcohol abuse and dependence, this study suggests that approximately 1 in 12 cases in this sample did not experience such a diagnostic pattern.

These findings suggest that the absence of alcohol abuse may not warrant skipping the assessment of alcohol dependence criteria in clinical samples, as is often recommended in the context of structured diagnostic interviews (e.g., First et al., 1995) and may also occur in unstructured clinical interviews. Doing so raises the possibility of missing approximately 8% of cases that would meet criteria for alcohol dependence without additionally meeting the alcohol abuse criteria. This may be especially relevant among women, a group that has experienced substantial secular increases in drinking and alcohol dependence (Gruzca, Bucholz, Rice, & Bierut, 2008), as results from this study indicated they are more likely to receive an alcohol dependence diagnosis without meeting criteria for alcohol abuse.

Results from NESARC using a general population sample found that higher proportions of females (22.1%) than males (10.1%) have a lifetime history of alcohol dependence without alcohol abuse (Hasin & Grant, 2004). In the current study, 13% of women met alcohol dependence criteria without abuse, compared to 4% of men. In short, the use of alcohol abuse criteria as screening items for alcohol dependence does not seem appropriate in clinical settings as it may lead to false negatives, especially among female patients, an argument that has been raised recently in the context of epidemiological research (e.g., Grant et al., 2007). These results extend findings from an epidemiological sample (Hasin & Grant, 2004) into a treatment-seeking clinical sample.

Conversely, if an alcohol dependence diagnosis is made, should researchers and clinicians consider the presence of alcohol abuse? This is an important question as the current and future diagnostic systems clearly aspire to be clinically useful (Hasin et al., 2003). Results of this study indicated that individuals who meet alcohol dependence criteria without ever meeting criteria for alcohol abuse represent a potentially phenotypically distinct group of alcohol dependent patients. Alcohol dependent patients without lifetime abuse are significantly more likely to be female, to have an older age of onset of alcohol dependence, and are less likely to have a family history positive for alcoholism, to meet criteria for abuse or dependence on another substance, and to have a lifetime diagnosis of PTSD. The two groups differed on specific DSM-IV symptoms of alcohol dependence and overall, patients with an additional alcohol abuse diagnosis reported a higher number of alcohol dependence symptoms than those without alcohol abuse. These results remained robust even after controlling for the effects of gender, clinical distress, and global functioning. These results suggest that the presence of abuse among alcohol dependent patients may serve as a clinical indicator of greater severity, particularly with regards to a higher likelihood of lifetime diagnoses of drug abuse and/or dependence.

These findings are also consistent with recent studies using Item Response Theory (IRT), in which alcohol abuse symptoms were found to have higher relative severity estimates than dependence symptoms (Kahler & Strong, 2006; Ray, Kahler, Young, Chelminski, & Zimmerman, 2008; Saha, Chou, & Grant, 2006). From a harm-reduction perspective, clinical knowledge about the presence of recurrent hazardous use of alcohol, captured in part by the abuse diagnostic criteria, may be critical to clinical interventions for alcohol dependent patients. The cross-sectional nature of the study design precludes inferences about the clinical course of the alcohol use disorder or treatment response. Nevertheless, previous studies have shown that the presence of comorbid drug abuse and dependence among alcohol dependent patients is associated with more drinking days and more alcohol-related symptoms three years after inpatient treatment for alcoholism (Kranzler, Moore, & Hesselbrock, 1996). Future studies are needed to ascertain the longitudinal implications of the research question we have sought to address at the cross-sectional level herein.

These findings have implications to the understanding of potential sources of heterogeneity in the diagnostic phenotype of alcohol dependence, which in turn represents an important issue in behavioral genetics of psychiatric disorders (Gottesman & Gould, 2003), including alcoholism (Hasin & Grant, 2004; Hines et al., 2005). These results suggest that the presence or absence of alcohol abuse may in fact represent a source of heterogeneity to the alcohol dependence phenotype. Alternatively, these findings may simply reflect greater clinical severity among individuals with alcohol dependence plus abuse as a function of increased number of symptoms and based on previous findings that certain abuse symptoms (e.g., legal problems) may index higher severity levels than many dependence symptoms (Kahler & Strong, 2006; Ray et al., 2008; Saha et al., 2006). Importantly, the clinical heterogeneity was not evenly distributed across males and females, which poses problems to genetic association studies. The finding that alcohol

dependent patients with a history of alcohol abuse were significantly more likely to report a family history positive for alcoholism suggests that this subset of patients may have a greater genetic loading for alcoholism.

Ultimately, genetic linkage and association studies are needed to adequately assess whether the presence of alcohol abuse may be useful in efforts to further parse out the alcohol dependence phenotype. To that end, a dimensional approach to alcoholism diagnosis may provide more adequate quantitative-trait-loci (QTL) for advancing the knowledge base on the neurobiology of this disorder. The development of translational phenotypes that are more closely related to the neurobiology of addiction, may ultimately help us identify its underpinnings (Ducci & Goldman, 2008; Hutchison, 2008).

These results are relevant to the extent to which alcohol abuse and dependence are kept as distinct diagnostic categories in future revisions of the DSM-IV. IRT analyses have indicated that the severity ordering of the DSM-IV abuse and dependence symptoms was not consistent with the hierarchical structure suggested by the DSM-IV and that instead, abuse items were found to be spread across a full range of the AUD continuum and were not consistently in the lower ranges of severity (Kahler & Strong, 2006; Ray et al., 2008). Those findings underscore the unidimensional nature of AUD symptoms and suggest that abuse and dependence should not be treated as distinct disorders but rather as a continuum of alcohol problems. In such case, the distinction between alcohol dependence with or without alcohol abuse would become obsolete.

These results must be interpreted in the context of the study's strengths and limitations. First, this study is limited by the cross-sectional and retrospective design which is vulnerable to recall biases. Nevertheless, recent research has suggested that lifetime and current diagnostic assessments yield comparable results (Kahler & Strong, 2006; O'Neill, Sher, Jackson, & Wood, 2003). Second, the treatment-seeking nature of the sample may in turn lead to a greater recognition of problems which may not generalize to non-treatment seeking samples. In other words, the clinical correlates of alcohol dependence with and without abuse may be different in the general population or in other types of clinical settings. Third, the relatively small number of individuals who met criteria for alcohol dependence without abuse reduces the statistical power to detect significant group differences. Fourth, these findings do not address the underlying factor structure of alcohol use disorders and whether abuse and dependence constitute a continuum of the addictive process. Instead, the present study is based on the current diagnostic system proposed in DSM-IV and addresses the question of whether the additional diagnosis of alcohol abuse should be considered when alcohol dependence has been established. It should be noted that the current diagnostic system is currently under review and that the distinction between abuse and dependence may be reconsidered (Li et al., 2007). Fifth, the MIDAS dataset does not contain information on age of substance use disorder onset; therefore, it was not possible to elucidate the course of alcohol use disorders in the sample, which may be an important factor in determining the clinical utility of diagnosing alcohol abuse among alcohol dependent patients. Analyses of age of onset for alcohol abuse and dependence among individuals with both lifetime diagnoses indicated that 96.2% of patients reported an earlier or concurrent age of onset for alcohol abuse relative to dependence. A recent study suggested that comorbidity estimates based on lifetime prevalence with mixed-age samples, as is the case in this study, and in Hasin and Grant (2004), may be inflated such that the number of individuals meeting criteria for alcohol dependence without the additional diagnosis of alcohol abuse may be higher than what has been estimated (Kraemer, Wilson, & Hayward, 2006). Study strengths include data culled from a large sample that is representative of psychiatric outpatients and the in-depth and reliable diagnostic battery conducted for both axis I and axis II disorders.

In conclusion, these findings suggest the need to assess alcohol dependence even if alcohol abuse criteria are not met, particularly among women. Amongst individuals with alcohol dependence diagnosing alcohol abuse may serve as an index of clinical severity and higher likelihood of lifetime drug use disorders, although further studies are needed before clinical recommendations can be made. From a research standpoint, the subset of patients who skip alcohol abuse into dependence may represent a phenotypically different group of patients. Additional studies are required to further ascertain the underlying sources of this observed phenotypic heterogeneity and importantly, to determine their clinical and research significance.

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