



Comparison of categorical alcohol dependence versus a dimensional measure for predicting weekly alcohol use in heavy drinkers



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ABSTRACT

Background: The DSM specifies categorical criteria for psychiatric disorders. In contrast, a dimensional approach considers variability in symptom severity and can significantly improve statistical power. The current study tested whether a categorical, DSM-defined diagnosis of Alcohol Dependence (AD) was a better fit than a dimensional dependence measure for predicting change in alcohol consumption among heavy drinkers following a brief alcohol intervention (BI). DSM-IV and DSM-5 alcohol use disorder (AUD) measures were also evaluated.

Methods: Participants ($N = 246$) underwent a diagnostic interview after receiving a BI, then reported daily alcohol consumption using an Interactive Voice Response system. Dimensional AD was calculated by summing the dependence criteria (mean = 4.0; $SD = 1.8$). The dimensional AUD measure was a summation of positive Alcohol Abuse plus AD criteria (mean = 5.8; $SD = 2.5$). A multi-model inference technique was used to determine whether the DSM-IV categorical diagnosis or dimensional approach would provide a more accurate prediction of first week consumption and change in weekly alcohol consumption following a BI.

Results: The Akaike information criterion (AIC) for the dimensional AD model (AIC = 7625.09) was 3.42 points lower than the categorical model (AIC = 7628.51) and weight of evidence calculations indicated there was 85% likelihood that the dimensional model was the better approximating model. Dimensional AUD models fit similarly to the dimensional AD model. All AUD models significantly predicted change in alcohol consumption (p 's = .05).

Conclusion: A dimensional AUD diagnosis was superior for detecting treatment effects that were not apparent with categorical and dimensional AD models.

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1. Introduction

Categorical diagnoses of psychiatric disorders based on explicit criteria have been utilized since the publication of the Diagnostic and Statistical Manual for Mental Disorders III (DSM-III; American Psychiatric Association, 1980). With categorical constructs, diagnostic decisions are a binary choice: an individual is deemed to either have a disorder or not. For years, this has been the *de facto* gold standard in the field of mental health (Helzer et al., 2009). However, when Edwards and Gross published their theory of alcohol dependence in 1976, they conceptualized alcohol dependence as a dimensional construct. Specifically, they proposed that alcohol dependence occurs to varying degrees of severity in individuals

and that such variability should be considered diagnostically and clinically (Edwards and Gross, 1976).

A dimensional measure of alcohol dependence better reflects this conceptualization and has several advantages over a categorical approach. First, a dimensional diagnosis considers variability in severity of alcohol dependence. For example, a dimensional measure that counts the number of alcohol criteria an individual meets provides information about diversity in symptom presentation and is valuable for both clinical and research purposes (Hasin et al., 2006; Helzer et al., 2006a,b). In addition, since it is a quantitative measure, a dimensional diagnosis of alcohol dependence can improve statistical power; the high statistical costs of dichotomizing a quantitative variable have previously been demonstrated (Cohen, 1983; MacCallum et al., 2002). This point is particularly important in human subjects research, where achieving an adequate sample size for valid statistical analysis can be challenging. A dimensional approach is also helpful to clinicians since denoting severity can be a significant aid in communicating clinical status, evaluating research reports, and treatment planning. However, the

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two Alcohol Use Disorders (AUD) in the DSM-IV, i.e., Alcohol Abuse (AA) and Alcohol Dependence (AD), are both defined categorically (American Psychiatric Association, 1994). Since the publication of DSM-IV, several researchers have suggested using a dimensional diagnosis for both clinical and research purposes (Meyer, 2001; Hasin et al., 2006, 2003; Muthén, 2006; Helzer et al., 2006a,b) and adding a dimensional option to the fifth edition of the DSM (DSM-5; American Psychiatric Association, 2013; Tarter et al., 1992; Helzer et al., 2006a,b).

Research to date on DSM-IV provides support for a dimensional diagnostic approach. Dawson et al. (2010) constructed a dimensional measure of AUD that includes criteria for both AA and AD, and demonstrated its validity for predicting alcohol consumption in a cross sectional sample. In addition, a dimensional AUD measure, compared to the standard categorical AD diagnosis has been found to have a stronger correlation with risk factors for AUDs, including family history of alcoholism and early drinking onset (Hasin and Beseler, 2009). Further, Dawson et al. (2010) determined that a simple count of DSM-IV abuse and dependence criteria endorsed is as proficient a predictor of alcohol use as weighted criteria based on symptom severity.

The DSM-5 has combined the DSM-IV AA and AD criteria, removed the legal criterion, and added a craving criterion, as suggested by research. However, in spite of evidence supporting the dimensional diagnostic approach, the recently published DSM-5 has retained a categorical AUD diagnosis of dependent/not dependent. Two or more symptoms constitute a diagnosis of dependence. The DSM-5 now offers a quasi-dimensional severity scale based on tri-categorization of the positive symptom count; 2–3 symptoms are considered mild dependence, 4–5 symptoms are considered moderate, and 6 or more are considered severe (American Psychiatric Association, 2013). Thus, categorical distinctions have been retained for both AUD diagnosis and the dependence severity measure. Although not advocated in DSM-5, a fully dimensional approach could be constructed using a simple count of the number of symptoms endorsed.

In this report, we compare a fully dimensional AD measure to the dichotomous dependence diagnosis. To our knowledge, a direct comparison of this type has not previously been reported. Specifically, we tested whether a dimensional or a categorical AD diagnosis was a better fit to the data for predicting alcohol consumption the first week following a BI and change in weekly alcohol consumption over the subsequent four weeks. We also evaluated a dimensional AUD scale that incorporated both AA and AD DSM-IV criteria. We included this measure because in the DSM-5, AA and AD criteria were combined to constitute an AUD (however the diagnostic determination is still made categorically, in contrast to our dimensional model). Additionally, this dimensional measure has been previously evaluated in the literature (Dawson et al., 2010; Hasin and Beseler, 2009). As a secondary analysis we evaluated the predictive ability of three dimensional AUD models that were constructed using DSM-5 criteria. We included the DSM-5 criteria to evaluate model fit within the current DSM-5 diagnostic system.

2. Methods

Data for the current manuscript were obtained from a study that evaluated the use of Interactive Voice Response (IVR) as a self-monitoring tool for 6 months following a BI for alcohol use in primary care (Helzer et al., 2008). The main objective of the original study was to determine if six months of IVR self-monitoring with or without monthly feedback about alcohol use would produce a greater reduction in alcohol consumption compared to no self-monitoring.

2.1. Participants

Participants were recruited from 15 primary care offices in the Burlington, Vermont metropolitan area. Primary care providers screened their patients for heavy alcohol use and conducted a BI when appropriate. Patients who received a BI and were willing to participate in the study were referred to the research staff. Participants were included in the study if they reported recent (past 3 month) alcohol consumption beyond the NIAAA guidelines for low risk drinking: 1) average daily or weekly alcohol use exceeding 2 drinks per day/14 per week for men or 1 per day/7 per week for women, or 2) 5 or more drinks in a day for men or 4 for women (National Institute on Alcohol Abuse and Alcoholism, 2005). Both dependent and non-dependent individuals as defined by DSM-IV categorical criteria were included. Exclusion criteria were current (past year) DSM-IV diagnosis of substance dependence other than alcohol, nicotine, or marijuana; a current diagnosis of psychosis; or a recent initiation or change in antidepressant medication.

2.2. Procedure

Research personnel contacted each study referral by telephone and scheduled an in-person informed consent and assessment at our research office. Detailed study procedures and the full assessment battery were presented previously (Helzer et al., 2008). Briefly, consenting participants received a 20 min training session during which they were instructed on reporting standard drink volumes and oriented to using the IVR. Participants were provided a toll-free, 24 h access phone number to contact the IVR and were asked to call daily for 6 months (180 days). The IVR call was a 2-min questionnaire that assessed alcohol consumption (number of standard servings of beer, liquor, and wine assessed separately), craving intensity, reasons for drinking/abstaining, and questions about psychological and physical health. All questions inquired about the previous 24 h (“yesterday”) to ensure a consistent reporting period.

2.3. Predictor variables

Symptoms of AD were assessed with the Composite International Diagnostic Interview-Substance Abuse Module for DSM-IV (CIDI-SAM; Cottler et al., 1989). A categorical AD diagnosis was based on DSM-IV diagnostic criteria (American Psychiatric Association, 1994).

The DSM-IV dimensional AD diagnosis was determined by counting the number of dependence criteria (0–7) met in the past 12 months. DSM-IV defined dependence symptoms included: (1) tolerance, (2) withdrawal, (3) substance taken in larger amounts/longer period than intended, (4) persistent desire or unsuccessful attempts to decrease/control use, (5) great deal of time spent obtaining, using or recovering from effects of alcohol, (6) social, occupational, or recreational activities given up or reduced because of use, (7) use despite knowledge of physical or psychological problems caused or exacerbated by use. The DSM-IV dimensional AUD diagnosis was determined by counting the number of abuse criteria (0–4; (1) recurrent failure to fulfill major role obligations, (2) recurrent use in hazardous situations, (3) recurrent legal problems due to use, (4) continued use despite social/interpersonal problems) and dependence criteria (0–7) participants endorsed within the past 12 months, with a possible range between 0 and 11.

The 11 AUD symptoms specified in the DSM-5 consist of the aforementioned DSM-IV abuse and dependence symptoms, without the legal problems criterion and with an added craving/strong urge to drink criterion. The craving criterion was approximated because the CIDI-SAM version used in the study did not assess

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