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The Factor Structure and Severity of DSM-IV Alcohol Abuse and Dependence Symptoms in Psychiatric Outpatients

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Abstract

The goal of the present study was to examine the factor structure and estimated severity of alcohol use disorder (AUD) symptoms in a sample of treatment-seeking psychiatric outpatients. Participants (n = 1027, 51.2% women) met the screening criteria for the lifetime assessment of alcohol use disorders according to the Structured Clinical Interview for DSM-IV Disorders (SCID-I/P; First et al., 1995) and as a result completed an assessment of alcohol abuse and dependence symptoms. The average age of the sample was 36.6 (SD = 11.4) and 71% of participants met lifetime DSM-IV criteria for an alcohol use disorder. Exploratory factor analysis of the tetrachoric correlation matrix of alcohol abuse and dependence criteria revealed that a single factor best accounted for the data in this sample. Results of Rasch model analyses 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. 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. This study extends the literature by examining a treatment-seeking psychiatric outpatient sample and using a semi-structured diagnostic interview administered by mental health professionals. Methodological considerations and implications for the conceptualization of AUD are discussed.

Keywords

DSM-IV; alcohol abuse; alcohol dependence; factor structure; SCID; Rasch model

Alcohol use disorders (AUD) are currently classified by the Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (DSM-IV; American Psychiatric Association, 1994) according to a bi-axial approach in which alcohol abuse represents one axis and alcohol dependence represents another (Edwards and Gross, 1976). The two axes are not considered independent and instead tend to co-occur in some, but not all, cases (Hasin and Grant, 2004). The DSM-IV is largely based in the alcohol dependence syndrome (ADS; Edwards and Gross, 1976), although the ADS is dimensional in nature, whereas the DSM-IV is categorical. A number of studies to date have examined the underlying dimensionality of AUD symptoms with somewhat mixed results.

Some studies have found support for a one-factor solution indicating that a single factor best fits the data on AUD criteria (e.g., Caetano and Schafer, 1996; Morgenstern et al., 1994; Proudfoot et al., 2006), while other studies have suggested that additional factors may

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improve the model fit and therefore be required to capture the variability in AUD symptomatology (e.g., Grant et al., 2007; Harford and Muthen, 2001; Muthen et al., 1993; Muthen, 1995; Nelson et al., 1999; O'Neill et al., 2003). The aforementioned studies vary with regard to important methodological aspects, such as sample characteristics (e.g., general population, community, alcohol/drug treatment samples) and assessment methods (e.g., structured diagnostic interviews, semi-structured interviews; use of single or multiple items to assess each symptom). Differences in assessment method are important as a recent study by Kahler and Strong (2006) found that the prevalence and the meaning of AUD criteria can differ markedly depending on the wording of the assessment instrument.

Although previous studies have examined the factor structure of AUD criteria in alcohol/drug treatment samples (e.g., Caetano and Schafer, 1996; Morgenstern et al., 1994), no studies have examined psychiatric outpatients. Additionally, most studies to date have relied on structured diagnostic batteries administered by lay interviewers, as opposed to semi-structured clinical interviews conducted by mental health professionals. In summary, a number of questions about the factor structure of AUD have been raised and examined in previous research, yet given the inconsistency in the results to date and the importance of considering assessment methods (Kahler and Strong, 2006), further work with psychiatric outpatients and focusing on semi-structured clinical interviews, such as the Structured Clinical Interview for DSM-IV Disorders (SCID-I/P; First et al., 1995), seems warranted. To that end, the goals of the present report from the Rhode Island Methods to Improve Diagnostic Assessment and Service (MIDAS) Project are to: (1) examine the factor structure of DSM-IV AUD symptoms in a sample of treatment seeking psychiatric outpatients who met the SCID's screening criteria for the lifetime assessment of alcohol use disorders; and (2) examine the relative severity and ordering of the SCID items used to assess AUD symptoms by conducting item response analyses using the Rasch model.

Method

Participants were recruited from the Rhode Island Hospital Department of Psychiatry's outpatient practice (Zimmerman, 2003). To the best of our knowledge, the MIDAS Project is the largest clinical epidemiological study conducting semi-structured interviews in a general clinical outpatient practice. In an initial telephone screen, patients were invited to participate in a face-to-face diagnostic evaluation prior to meeting with their treating clinician. The current report is based on 1027 (51.2% women) patients who met the SCID's screening criteria for the lifetime assessment of alcohol use disorders and for whom AUD symptom-level data were available. DSM-IV axis I diagnoses were obtained using the SCID-I/P (First et al., 1995) and single items, followed by standard probes, were used to assess each AUD criterion. The MIDAS project purposefully did not follow the traditional skip rules recommended in the SCID in order to more fully evaluate all AUD symptoms. Therefore, every individual who met the SCID's screening criteria for lifetime alcohol use disorders were asked about all 11 possible AUD symptoms. The inter-rater reliability of the diagnoses in the MIDAS study is adequate (Zimmerman and Mattia, 1999; Zimmerman et al., 2005), with a previously reported Kappa coefficient, $K = 0.64$ for AUD (Zimmerman et al., in press). The Rhode Island Hospital institutional review board approved the research protocol and after complete description of the study written informed consent was obtained from each participant.

In order to address the first study objective regarding the factor structure of AUD symptoms assessed by the SCID, the tetrachoric correlation matrix was analyzed, as recommended for dichotomous symptom data (see Muthen, 1989). Exploratory factor analysis (EFA) and weighted least squares estimation were used. Initial values for the factor loading matrix in EFA were based on a principal iterated common factor analysis solution for the tetrachoric

correlation matrix and oblique (Promax) rotation was subsequently used in order to obtain factor structures that would be interpretable. Individual items (i.e., AUD symptoms assessed by the SCID) were retained if their factor loading was ≥ 0.40 and examination of factor loadings and the Scree plot were used to determine the dimensionality of the factor structure. Analyses were performed using SAS Statistical Software (SAS Institute, 2003). The second study objective was tested by fitting AUD criteria to a unidimensional additive Rasch model (Rasch, 1960) and obtaining severity estimates and infit statistics. Rasch model analyses were conducted using BIGSTEPS (Linacre and Wright, 1998). Items are said to fit the model well when infit statistics fall within the range of 0.60 to 1.40 (Linacre and Wright, 1994), and item severity is an indication of the degree of AUD that is needed before a particular symptom is likely to be present. Item severity estimates are standardized so that the average severity of items has a value of 0 (*SD* = 1.4). The logit values for severity provide an equal interval metric for assessing the severity of each item relative to the other items.

Results

Of the initial MIDAS sample of 1800 patients, 1027 (57%) met the SCID's entry criteria for the assessment of lifetime alcohol use disorders and were therefore included in this study. The average age of the sample was 36.6 (*SD* = 11.4), 89% of the sample was Caucasian, and 46% of the participants were married or cohabitating, 33% divorced, and 21% widowed. Of the 1027 (51.2% women) study participants, 327 (32%) met DSM-IV criteria for lifetime alcohol abuse only, 363 (35%) met criteria for lifetime alcohol dependence plus alcohol abuse, 38 (4%) met lifetime criteria for alcohol dependence only, 169 (16%) did not meet criteria for an AUD, and 130 (13%) were considered "diagnostic orphans" (Eng et al., 2003), as they endorsed one or two symptoms of alcohol dependence and did not meet criteria for alcohol abuse. The average AUD symptom count in the sample was 3.5 (*SD* = 3.1; Range = 0 to 11). The principal diagnoses in the study sample were: 48% depressive disorder, 17% anxiety disorders, 7% bipolar disorder, 7% alcohol use disorders, and 21% other diagnoses.

Exploratory factor analysis using the tetrachoric correlation matrix supported a single factor solution for the DSM-IV alcohol abuse and dependence criteria. Examination of Scree plots and eigenvalues revealed that only one factor had an eigenvalue greater than 1.0. Specifically, the first factor had an eigenvalue of 6.3, while the second factor had an eigenvalue of 0.6, suggesting that a single factor solution was most appropriate for these data and accounted for 90.5% of the explained indicator variance. All items substantially loaded on the single factor reaching the a-priori factor loading of 0.40 (Rage = 0.57 to 0.90; see Table 1). Cronbach's alpha for the 11 AUD criteria was 0.85.

The 11 AUD criteria fit a Rasch model well, with infit values ranging from 0.8 to 1.3, which is within the target range of 0.6 to 1.4 (Linacre and Wright, 1994). Item severity ranged from −1.74 to 2.08 (*M* = 0.0; *SD* = 1.4), see Table 1. The ordering of abuse and dependence symptoms was not consistent with the hierarchical structure suggested by the DSM-IV. Instead, alcohol abuse symptom items were spread across the full range of the AUD severity continuum, and the abuse symptom of recurrent alcohol-related legal problems (AB3) had the highest severity estimate (2.08) of all symptoms.

Discussion

This study examined the factor structure and severity of DSM-IV alcohol abuse and dependence criteria, assessed by the SCID, among treatment-seeking psychiatric outpatients. Results of exploratory factor analysis indicated that a single-factor solution adequately fit of

the data in this sample. This study extends findings from epidemiological and alcohol/drug treatment samples by examining the AUD factor structure in a treatment-seeking general psychiatric outpatient sample. This is especially relevant as seeking treatment is related to a number of clinical, social, and demographic factors (Alegria et al., 2000; Goodwin et al., 2002), suggesting that studies of psychiatric disorders in the general population should be replicated in clinical populations to provide the practicing clinician with information that might have more direct clinical utility. This is the first study to use the SCID as its diagnostic instrument and one of the few to use a semi-structured diagnostic interview delivered by mental health professionals. Recent research by Kahler and Strong (2006) has found that the prevalence and the meaning of AUD criteria may differ substantially depending on the wording of the assessment instruments. To that end, it is important to evaluate the factor structure and symptom severity obtained through various diagnostic instruments, such as the widely used SCID.

Results of Rasch model analyses of the AUD symptoms suggested that the severity ordering of abuse and dependence symptoms was not consistent with the hierarchical structure suggested by the DSM-IV. If that were the case we would observe lower severity estimates for alcohol abuse relative to alcohol dependence symptoms. Instead, alcohol abuse symptoms were found to be spread across a full range of the AUD continuum and were not consistently in the lower ranges of severity. These findings were consistent with those of Kahler and Strong (2006) examining epidemiological data from the NESARC study (Grant et al., 2003). Importantly, the fact that the data fit a Rasch model well provides direct evidence that AUD symptoms can index case severity in an additive fashion across a continuum of alcohol problem severity.

One of the major implications of the unidimensional nature and estimated severity of DSM-IV alcohol abuse and dependence criteria is to inform future revisions of the DSM. Specifically, these results suggest that a single factor, or dimension, accounts for most of the variability in AUD criteria, while the current DSM-IV classification of AUD is categorical in nature. As noted by Saha and colleagues (2006), the development of dimensional measures of alcohol use disorders holds promise for research in the neurobiology and genetics of alcohol use disorders given that the current categorical diagnostic phenotypes have posed considerable challenges to those fields (Gotesman and Gould, 2003; Hines et al., 2005).

These results should be interpreted in the context of the study's strengths and limitations. Limitations include the cross-sectional retrospective design and the focus on lifetime, as opposed to current symptoms, which renders the assessments more vulnerable to recall biases. Nevertheless, recent research has suggested that lifetime and current diagnostic assessments yield comparable results (Kahler and Strong, 2006; O'Neill et al., 2003). Study strengths include the use of clinical data culled from a semi-structured interview in sample of treatment-seeking psychiatric outpatients.

In conclusion, these findings provide further support for the unidimensional nature of DSM-IV AUD criteria and suggest that symptom severity did not conform to the current DSM-IV hierarchy between alcohol abuse and dependence. These results also highlight important assessment and methodological issues such as the need to consider sample characteristics and assessment instruments for the impact on AUD symptoms. Future studies are needed to more fully capture these methodological differences and ultimately, inform future revisions of the DSM and improve the assessment of alcohol pathology.

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Table 1

DSM-IV Criteria, Rates of Lifetime Endorsement, Standardized Factor Loadings for the Single Factor Model, and Rasch Model Measurement Parameters.

DSM-IV Criteria	Description	Prevalence (S.E.)	Factor Loadings	Severity Estimate (S.E.)	Item-Total[A] (Infit)
Major Role	Failure to fulfill major role obligation (AB1)	0.37 (0.02)	0.75*	0.01 (0.08)	0.46 (1.0)
Hazard	Recurrent use in physically dangerous situations (AB2)	0.67 (0.02)	0.57	−1.74 (0.08)	0.17 (1.3)
Legal	Recurrent alcohol-related legal problem (AB3)	0.13 (0.01)	0.70*	2.08 (0.12)	0.31 (1.1)
Social	Continued use despite social or interpersonal problems (AB4)	0.36 (0.02)	0.77*	0.08 (0.08)	0.47 (1.0)
Larger	Using alcohol in larger amounts than intended (DP1)	0.50 (0.02)	0.67*	−0.76 (0.08)	0.37 (1.1)
Cut Down	Persistent desire/unsuccessful efforts to cut down (DP2)	0.31 (0.02)	0.80*	0.42 (0.09)	0.51 (0.9)
Time Spent	A great deal of time spent on alcohol use (DP3)	0.50 (0.02)	0.80*	−0.77 (0.08)	0.49 (0.9)
Give up	Giving up important activities due to alcohol use (DP4)	0.28 (0.02)	0.90*	0.64 (0.09)	0.62 (0.8)
Continue	Continued use despite physical psychological problems (DP5)	0.42 (0.02)	0.78*	−0.32 (0.08)	0.48 (1.0)
Tolerance	Tolerance (DP6)	0.50 (0.02)	0.69*	−0.77 (0.08)	0.38 (1.1)
Withdrawal	Withdrawal syndrome, or use to relieve withdrawal (DP7)	0.21 (0.01)	0.82*	1.13 (0.10)	0.51 (0.9)

*Indicates an item with factor loading ≥ 0.40, which was the a-priori cut-off.

AB = Alcohol Abuse; DP = Alcohol Dependence;

[A]Item total refers to the point biserial correlation between the item and the sum of the remaining items.