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Alcohol Use Disorders: Translational Utility of DSM-IV Liabilities to the DSM-5 System

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Abstract

Objectives—Young adults have some of the highest rates of problem drinking and alcohol use disorders (AUDs) relative to any other age. However, recent evidence suggests that the DSM-IV hierarchical classification system of AUDs does not validly represent symptoms in the population; instead, it evinces a unitary, dimensional classification scheme. The DSM-5 has been altered to fit this changing, evidence-based conceptualization. Nevertheless, little is understood about the degree to which known risk factors for DSM-IV AUD diagnoses will transfer to the new DSM-5 guidelines in this group of high-risk drinkers. The current study built a coherent model of liabilities for DSM-IV AUDs in young adults and tested for transferability to DSM-5.

Methods—N = 496 college students (51.10% male) were assessed on a variety of factors related to AUD risk, including demographics, substance use (past 90-days), and drinking motives. Liability models were created using all variables in Structural Equation Modeling to test direct and indirect effects on DSM diagnostic status. The best model under the DSM-IV was chosen based on fit and parsimony. This model was then applied to the DSM-5 system to test for transferability.

Results—The best the fitting model for DSM-IV included direct influences of drug use, quantity-frequency of alcohol consumption, and social and coping drinking motives. Improved model fit was found when the DSM-5 system was the outcome.

Conclusions—Knowledge of risk factors for AUDs appear to transfer well to the new diagnostic system.

Keywords

Alcohol Use Disorders; Drinking; DSM-IV; DSM-5; Risk Factors

In the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) [1] alcohol use disorders (AUDs) are classified hierarchically based on two separate, but related, sets of symptoms for abuse and dependence. However, a wealth of recent research

suggests that this categorical distinction is not a valid representation of AUD symptoms in the population. Instead, there has been overwhelming support for a unitary, dimensional classification of AUDs [2,3,4,5,6,7,8,9,10,11,12]. In recognition of these findings, the recently released DSM-5 [13] has changed to a continuous classification scheme.

While scientific study has confirmed the enhanced utility of a dimensional classification system, we do not know if our current knowledge of risk factors for AUDs under the DSM-IV will readily transfer to the new DSM-5 system. This is particularly important given that the DSM-5 system, released in May 2013, has been approved for use by insurance companies for diagnosis of mental disorders [13,14]. Maintaining accuracy in predicting the new DSM-5 diagnoses from current evidence-based studies has significant implications for assessment, screening, treatment planning, and future research into the causes and consequences of drinking problems.

College-aged individuals have the highest rates of binge drinking and AUDs relative to any other age group [15,16]. Consequently, study of risk factors for AUD development is most salient in this group, especially considering the fact that the median age of onset for AUDs is at college-age [17]. Previous research on the risk factors for DSM-IV AUD diagnoses and alcohol-related problems in young adult samples suggests that being younger [18], having a higher quantity and frequency (QF) of drinking [19,20,21], using drugs [21], and endorsing motives related to drinking, specifically enhancement, social, and coping motives [21] are all relevant liabilities. Thus, it is important that we examine whether these same dimensions function as adequate predictors and correlates of AUD diagnosis under the new diagnostic system.

Current Study

The current study sought to test whether previously established liabilities of DSM-IV AUDs in college-aged individuals would remain applicable to the DSM-5 classification system. We did so by building a “best-fitting” predictive model first using the DSM-IV set of outcome variables and then exploring whether these same factors would predict DSM-5 membership to the same degree. We tested several competing models. First, we examined the direct influence of known predictors on likelihood of DSM-IV AUD diagnosis type (no diagnosis, abuse, or dependence). Second, because some studies indicate that enhancement and coping motives might exert their influence on alcohol problems through increased alcohol consumption [22,23], we tested whether the relationship between drinking motives and drinking problems was mediated by alcohol consumption using a path model. Third, after determining whether the best fitting model had a direct or indirect structure, we progressively dropped parameters to find the most parsimonious one. We then fit this final model using DSM-5 diagnosis as an outcome to determine whether the established risk factors of DSM-IV diagnosis fit the DSM-5 conceptualization.

Methods

Participants and Procedure

Participants were 496 undergraduate students (48.80% female) at a large public university in the Northeast. They ranged in age from 17 to 27, with mean age 19.13. Participants self-identified their racial/ethnic backgrounds as White (54.40%), Asian/Pacific Islander (24.80%), Black/African-American (7.90%), Hispanic or Latino (7.10%), and other/mixed (4.60%). Each participant filled out a survey of questionnaires related to their drinking habits and various psychosocial variables. They were compensated with either extra credit toward a course grade or \$15. Informed consent was obtained from each participant and all procedures were approved by the university IRB.

Measures

Demographics—Information on gender, age, and race/ethnicity were collected.

Alcohol Use Disorders—13 questions were derived from the 11 DSM-IV alcohol abuse/dependence criteria to assess for DSM-IV and DSM-5 AUD diagnoses [1]. These questions were similar to the diagnostic questions from the Composite International Diagnostic Interview-Substance Abuse Module (CIDI-SAM) [24,25]. This questionnaire has been used in previously published research [6,21,26]. Participants reported on the presence or absence of each symptom, within the past year. For the DSM-IV system, participants who reported no symptoms of abuse and less than three symptoms of dependence received no diagnosis; those who reported at least one symptom of abuse, but less than three symptoms of dependence received a diagnosis of abuse; and individuals who reported at least three symptoms of dependence were given a diagnosis of dependence. For the DSM-5 classification scheme, individuals who reported less than two symptoms received no diagnosis, while individuals who reported two or more symptoms received an AUD diagnosis.

Alcohol and Drug Use—Alcohol use in the past 90 days was collected using a modified quantity/frequency index (QFI) [27]. Participants indicated the number of days per week on which they consumed hard liquor, wine, and beer (1 = *never*; 7 = *almost every day*). They also reported the typical quantity of alcohol they consumed per drinking occasion for each type of alcoholic beverage (1 = *never*; 7 = *16 or more drinks*). The total quantity/frequency (QF) of alcohol consumption was calculated by summing together responses for quantity of each beverage type and frequency, separately, and then multiplying the frequency by the quantity to obtain one measurement index—the QFI.

Participants reported the frequency (1 = *never*; 7 = *almost every day*) of using different drug classes in the prior 90 days, including crack, cocaine, marijuana, hashish, amphetamines, opiates, hallucinogens, barbiturates, and benzodiazepines. Total drug use was calculated by summing across drug categories.

Drinking Motives—The Drinking Motives Questionnaire (DMQ) [28] was used to assess social, coping, and enhancement drinking motives. This 15-item measure asks participants

to rate how often they are motivated to drink by different factors on a 4-point scale (1 - *never/almost never*; 4 - *always; almost always*). This measure validly predicts alcohol use and abuse [27]. The factor structure, internal consistency, and convergent validity of this measure has been confirmed in research [29].

Analyses and Results

We examined all variables for normality and used square root transformations on coping motives and drug use to correct for positive skew. Next, we fit two conceptually different models to the data predicting AUD classification from the DSM-IV and examined overall model fit using three different fit indices: the -2 Loglikelihood (-2LL), the Akaike Information Criterion (AIC), and the Bayesian Information Criterion (BIC). For each of these fit statistics, lower values indicate improved model fit. Assessment of model fit is accomplished by looking at patterns across the three statistics. The -2LL follows a chi-square distribution, such that significant changes (i.e., $p < .05$) in chi-square following alterations to the model indicate improvements or decrements in model fit. In other words, it allows for an assessment of whether a change in fit associated with a more constrained model is statistically significant. The AIC is a function of the chi-square and degrees of freedom, and penalizes model fit when unnecessary parameters are retained. The BIC is similar to the AIC, but imposes a greater penalty for inclusion of unnecessary parameters. When comparing models a difference of 0–2 in AIC or BIC is weak evidence of a significant model difference, a difference of 2–6 is positive evidence, a difference of 6–10 is strong evidence, and any difference over 10 is very strong evidence [30].

In Model 1, we fit a multinomial logistic regression model predicting DSM-IV AUD classification (no diagnosis, abuse, or dependence, with no diagnosis as the reference category)^a directly from all variables: age, gender, drug use, QFI, coping motives, social motives, and enhancement motives (See Table 1). We fit this model first because it is conceptually the most basic and allowed us to provide a baseline for comparison when fitting more complex models. Next, for Model 2, we performed a path analysis using the same predictors, but included the relationship of enhancement and coping motives with Abuse and Dependence occurring indirectly through the QFI of alcohol consumption. This model fit significantly worse than the direct path model, $\chi^2(5) = 2,362, p < .001$. Consequently, we sought to improve the fit and parsimony of the original direct path model by progressively dropping non-significant parameters (Table 1).

Herein, as can be seen in Table 1, we first dropped the least significant variable from the model—age ($B = -0.03, p = .825$ for dependence and $B = 0.06, p = .585$ for abuse). Removing age resulted in improved model fit based on the AIC and BIC. Next, we dropped enhancement motives from the model ($B = -0.03, p = .640$ for dependence and $B = -0.05, p = .342$ for abuse), which further improved model fit based on the AIC and BIC. We then removed gender from the model ($B = -0.24, p = .369$ for dependence and $B = -0.37, p = .184$ for abuse), resulting in another improvement in model fit based on AIC and BIC. The

^aWe also ran these models with diagnostic orphans included (i.e., individuals who report some symptoms of dependence, but not enough to receive a diagnosis). Models including the orphan classification had significantly worse model fit than those without this category.

final model only included significant predictors of abuse and/or dependence: QFI, drug use, coping motives, and social motives. Specifically, using more drugs, having a higher QFI, or endorsing social drinking motives increased the likelihood of receiving an abuse diagnosis (see Table 2 for path estimates and odds ratios). Similarly, having a higher QFI or endorsing social or coping motives significantly increased an individual's chance of being diagnosed with DSM-IV dependence.

To test if this “best fitting model” applied to the DSM-5 classification system, we refitted the final model using the DSM-5 criteria as the outcome (see Table 1). This step yielded a significant improvement in model fit, $\chi^2(5) = 162.32, p < .001$, over the model using DSM-IV as the outcome. In this model, only QFI and social motives were significant predictors of having a DSM-5 AUD (See Table 2). Consequently, we explored dropping drug use and coping motives from the model. Dropping either of these variables resulted in a significant decrement in model fit. Next, to ensure that variables dropped during DSM-IV model creation would not apply under the DSM-5 system, we explored returning gender, age, and enhancement motives to the model sequentially. Returning any of these variables to the model resulted in a significant decrement and model fit, as can be seen in Table 1. Thus, the best fitting model from DSM-IV was also the best fitting model under DSM-5.

Discussion

The purpose of this paper was to test whether our knowledge of risk factors, or liabilities, for DSM-IV AUD classification would transfer well to the new classification system of the DSM-5 using a college student population. College students are the most at risk group for AUDs, making them an ideal population for comparing risk factors under the old and new DSM systems. Knowing how previously studied liabilities for AUDs transfer to the DSM-5 classifications is extremely important if we are to continue to accurately screen for and prevent problem drinkers from developing and maintaining AUDs at a young age.

Our results suggested that the best fitting model predicting DSM-IV diagnoses was a direct path model that included social motives, coping motives, drug use, and the QFI as predictors. Of these predictors, higher reported QFI of drinking, social drinking motives, and coping drinking motives were associated with an increased likelihood of receiving an AUD diagnoses under DSM-IV. This finding is consistent with previous research in college students and community adults showing that increased alcohol consumption and endorsement of certain reasons for drinking are predictors of AUD diagnosis [31,32,33,34]. It suggests that screening for at-risk drinkers should include information on drinking quantity and frequency, as well as drinking motives because individuals who drink heavily and/or are have a tendency to want to use alcohol to manage distress or feel more comfortable or relaxed in social situations might benefit from treatment and/or prevention efforts. This finding is particularly relevant to college students because they are in a transitional period, characterized by the increased stress of independence and responsibility, in addition to pressure to form new social ties. Consequently, they may be particularly likely to use alcohol for its anxiolytic and social facilitation effects.

Although previous research suggests that age, gender, and enhancement motives are good predictors of DSM-IV AUD classification [18,19,21], we did not replicate these findings. It may be that age in a college population age is not an important factor in determining diagnosis. According to the majority of research, most college students drink at relatively similar levels. Thus, given that our study focused only on young adult drinkers, methodologically this restricted range may have led to a null finding. We had considered omitting age from our model altogether, however some previous research with college samples suggests that younger students (i.e., those in their freshman year) drink more [18]. Additionally, although one previous study by Tragesser and colleagues (2007) found that enhancement motives predict having an AUD, they did not control for the QFI of drinking, drug use, and other types of drinking motives, as we did in our model. Thus, our null finding with enhancement motives may simply be a reflection of a lack of incremental predictive utility for AUD diagnoses by enhancement motives.

When we applied our best fitting model from DSM-IV to DSM-5, we obtained a significant improvement in model fit over the fit with the DSM-IV system. Not only did predictors from DSM-IV transfer well to DSM-5, but they also appeared to be better at discriminating disordered from non-disordered individuals under the new classification system. Thus, this study provides further evidence for the validity of the DSM-5 system, as it appears to be more readily applicable to our existing knowledge of what puts a college student at risk for developing an AUD. Specifically, the QFI and social drinking motives were the most useful variables for predicting AUD diagnosis under the new system. The DSM-5 classification system appears to more finely delineate problem from nonproblem drinkers, based on known risk factors, supporting the need to move to using the new criteria.

In spite of this important finding, several limitations warrant notation. First, because this was a secondary analysis of pre-existing data, our study was limited in terms of the type of predictors used in the model. There are several predictors for which we did not have access to, but that might be important—for instance, family history of an AUD, delay discounting, and alcohol reinforcing efficacy [30,35,36]. Furthermore, although we used the DSM-5 AUD algorithm for diagnostic status, we did not have the craving criterion in this pre-existing dataset. Another limitation of this study was that it was conducted cross-sectionally; thus, interpretations regarding causality should be cautioned. Consequently, further studies using longitudinal and/or experience sampling methodologies are necessary to provide validation of AUD liabilities under the DSM-5 system.

Despite these limitations, this study was an important first step in understanding how well our knowledge of predictors of DSM-IV diagnosis transfer to the DSM-5 classification system. We first built an evidence-based model of liabilities known to correlate with problem drinking and AUDs in college-aged samples, and corrected for parsimony, under the DSM-IV guidelines. The best fitting model indicated that individuals who use drugs and engage in frequent/high volume alcohol consumption, as well as those who endorse social and coping motives are more likely to receive a DSM-IV diagnosis. This model fit even better when applied to the DSM-5 guidelines, indicating that risk factors from DSM-IV appear to transfer well to the new system. Further validation of this finding is necessary before firm conclusions can be drawn.

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Table 1

Results of Model Fitting for DSM-IV, with Application to DSM-5

Models for DSM-IV AUDs as outcome	-2 Loglikelihood	AIC	BIC	χ^2
Direct paths (all variables included)	364.11	760.23	827.47	--
Direct paths, dropping age	364.36	756.72	815.56	0.25 ^a
Direct paths dropping age and enhancement motives	365.23	754.45	804.88	0.87 ^a
<i>Direct paths dropping age, gender, and enhancement motives</i>	<i>366.22</i>	<i>752.45</i>	<i>794.47</i>	<i>0.99^a</i>
Path analysis (enhancement and coping motives via QFI)	2736.73	5493.45	5577.5	2362.92 ^{*b}
Model for DSM-5 AUD as outcome				
<i>Direct paths dropping age, gender, and enhancement motives</i>	<i>203.90</i>	<i>417.79</i>	<i>438.80</i>	<i>162.32^{*c}</i>
Direct paths dropping age, gender, enhancement motives, and drug use	239.83	487.66	504.48	35.93 ^{*d}
Direct paths dropping age, gender, enhancement motives, and coping motives	242.18	492.36	509.17	38.28 ^{*d}
Direct paths, returning enhancement motives to the model	236.98	485.97	511.97	33.08 ^{*d}
Direct paths, returning gender to the original model	238.04	488.08	513.30	34.14 ^{*d}
Direct paths, returning age to the original model	237.97	487.94	513.16	34.07 ^{*d}

Note. The best fitting model for DSM-IV and DSM-5 are italicized. DSM-IV AUD outcome included abuse, dependence, and no diagnosis (as the reference group). DSM-5 AUD outcome included AUD or no AUD.

^a χ^2 significance is measured as a difference from the preceding model.

^b χ^2 significance is measured as a difference from the original direct paths model.

^c χ^2 significance is measured as a difference from best fitting model under DSM-IV.

^d χ^2 significance is measured as a difference from the first model using the DSM-5 criteria.

* $p < .001$

Table 2

Parameter Estimates and Odds Ratios for Predicting DSM-IV and DSM-5 Diagnostic Status from the Best-Fitting Models

Category						
DSM-IV			Abuse			
			Dependence			
	B	SE (B)	OR ^a	B	SE (B)	OR ^a
Drug Use	0.38*	0.16	1.46	0.04	0.16	1.04
QFI	0.02***	0.01	1.02	0.03***	0.01	1.03
Social Motives	0.13**	0.05	1.14	0.20***	0.05	1.22
Coping Motives	-0.04	0.28	0.96	0.72**	0.26	2.05
DSM-5						
AUD						
	B	SE (B)	OR ^a	B	SE (B)	OR ^a
Drug Use	0.24	0.18	1.27	--	--	--
QFI	0.04***	0.01	1.04	--	--	--
Social Motives	0.16***	0.04	1.18	--	--	--
Coping Motives	0.24	0.27	1.27	--	--	--

Note: All comparisons are made against reference category of no diagnosis.

* $p < .05$

** $p < .01$

*** $p < .001$