

Scaling Properties of the Combined ICD-10 Dependence and Harms Criteria and Comparisons With DSM-5 Alcohol Use Disorder Criteria Among Patients in the Emergency Department

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ABSTRACT. **Objective:** The *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (DSM-IV), and the *International Statistical Classification of Diseases and Related Health Problems, 10th Edition* (ICD-10), alcohol use disorders (AUDs) classifications offer competing and somewhat overlapping diagnostic tools for assessing alcohol dependence and harms/abuse. Both systems are in active stages of development in anticipation of their next respective iterations. Although much psychometric work has been done studying DSM-IV criteria, efforts toward the ICD-11 have been less prevalent. **Method:** Data from 3,191 drinkers in seven emergency department sites in four countries (United States, Mexico, Argentina, and Poland) were used to study the psychometric properties of the combined ICD-10 dependence and harms criteria. Comparisons with the proposed set of DSM-5 criteria and diagnostic thresholds are also included. **Results:** Item response theory analyses of the combined ICD-10 dependence and harms criteria suggested a

single underlying factor, both overall and for each site separately, with only moderate differential item functioning across sites. Overall agreement between the summative combined ICD-10 dependence and harms criteria and the proposed 11-criteria DSM-5 scale was very high ($r = .97$), as was agreement between proposed diagnostic threshold levels of 0–1 (negative AUD), 2–3 (moderate AUD), and 4 or more (severe AUD) criteria endorsed ($\kappa = .84$). Although disagreement between the two three-level diagnoses was only 5.5% of the sample, a majority of these were because of differences between endorsement rates of abuse versus harms criteria. **Conclusions:** Although there is support for efforts to align the two schemes, results are consistent with other studies finding the largest differences between the two systems emanating from differences between the abuse and harms domains. More research is needed before differences between the two systems can be reconciled. (*J. Stud. Alcohol Drugs*, 73, 328–336, 2012)

OVER THE PAST FEW YEARS, SEVERAL studies have examined the psychometric properties of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 1994), toward the development of the DSM-5 (Borges et al., 2010; Cherpitel et al., 2010; Saha et al., 2006). The current recommendation by the Substance-Related Disorders Work Group (American Psychiatric Association, 2010) to inform the fifth revision of the diagnostic criteria (the DSM-5) for alcohol use disorders (AUDs) is that of (a) combining the criteria within the DSM-IV dependence and abuse domains, (b) removing the criterion assessing legal problems, and (c) adding a criterion to assess alcohol craving. Although there have been varying suggestions regarding a set of diagnostic thresholds for use as diagnostic levels (Grove et al., 2010;

Hasin and Beseler, 2009; Schmulewitz et al., 2010), several studies have voiced support for a scheme wherein the presence of 0–1 symptoms indicates a negative AUD diagnosis, 2–3 a moderate AUD diagnosis, and 4 or more a severe AUD diagnosis.

An alternative to the AUD assessments within the DSM, used extensively in international settings for diagnosing alcohol dependence and harm, is the two AUD domains within the *International Statistical Classification of Diseases and Related Health Problems, 10th Edition* (ICD-10; World Health Organization, 1992). In assessing AUDs, both the DSM-IV and the ICD-10 define two separate domains: dependence (common to both) and alcohol-related harms (ICD-10) or alcohol abuse (DSM-IV). For the DSM-IV and ICD-10 dependence domains, there is a great deal of overlap with regard to item content. Nearly all of the criteria are present in each subscale (albeit with specific items used in slightly different combinations), with only a single criterion (alcohol craving) present in the ICD-10 but not in the DSM-IV. However, DSM-IV abuse and ICD-10 harmful use contain distinct items (Rapaport et al., 1993). ICD-10 harmful use assesses physical or psychological harms because of

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alcohol use or hazardous use, whereas the DSM-IV abuse (excluding legal problems) assesses hazardous use, continued use despite work/school problems, and work or childcare affected by alcohol use.

Concordance between ICD-10 and DSM-IV classifications (as well as with prior DSM versions) has been examined in various populations, focusing on comparisons of dependence domains alone, of abuse to harms, and of the combined dependence/abuse (DSM) to dependence/harms (ICD) (Hasin et al., 1996, 2007; Pull et al., 1997; Rapa- port et al., 1993; Schuckit et al., 1994). These studies have generally found excellent concordance between DSM-IV and ICD-10 dependence. In contrast, poor agreement has typically been found between the harms and abuse (defined nonhierarchically with dependence) scales, with concordance of the combined two subscales (i.e., DSM-5 dependence and abuse vs. ICD-10 dependence and harms) intermediate in concordance between comparisons of the two dependence scales and the abuse compared with the harms subscales. Although extensive discussion of the ideological, cultural, or developmental differences between the two schemes has been carried out elsewhere (Babor, 1995; Room, 2007; Rounsaville, 2002), the psychometric properties of the combined ICD-10 dependence and harms criteria in diverse populations have not yet been studied.

With the current recommendation for the DSM-5 of combining the dependence and abuse criteria to form a single AUD classification, and with continued interest in reconciliation of the two paradigms (Saunders, 2006), the distinction between the DSM and ICD classifications may no longer be confined simply to differences between the harms and abuse domains. An analogous scheme for combining the ICD-10 dependence and harms diagnoses has not been proposed (although the World Health Organization has been mandated to publish the 11th ICD revision by 2014; Saunders, 2006); and, given debate over the present recommended DSM-5 format, it is doubtful if such a similar scheme will result. Neither have studies of differential item functioning (DIF) of the combined ICD-10 criteria been carried out, which can be informative, especially across diverse populations. This study is one of the first that attempts to examine the psychometric properties of the ICD-10 alcohol dependence and harms criteria when combined in an analogous way, as is currently proposed for the DSM-5 dependence and abuse domains. In addition, comparisons between the diagnoses produced using the proposed thresholds, when applied to both scales in the same manner, are examined for differences in rates of diagnoses and misclassifications between the two schemes.

The data analyzed here are from emergency department (ED) patients representing four countries with distinctly different drinking patterns (United States, Mexico, Argentina, and Poland); these data have been used to replicate general population studies of proposed DSM-5 criteria (Borges et al., 2010; Cherpitel et al., 2010).

Method

Sample

The ED samples used in this analysis have been extensively described in prior publications (Cherpitel et al., 2010) and include a total of 5,195 ED patients from one site in Santa Clara, CA (1995–1996; $n = 1,429$), three sites in Pachuca, Mexico (1996–1997; $n = 1,417$), one site in Mar del Plata, Argentina (2001; $n = 978$), and one site each in Warsaw and Sosnowiec, Poland (2002–2003; $n = 1,501$).

Data at each of the four sites were collected using a similar methodology and instrumentation (Cherpitel, 1989). At each site, a probability sampling design was implemented that equally represented each 8-hour shift for each day of the week. Across all of the studies, samples of injured and noninjured patients 18 years of age or older were selected from ED admission forms, including walk-in patients as well as those arriving by ambulance, and reflected consecutive arrival at the ED. Once selected and as soon as possible after admission to the ED, patients were approached with an informed consent to participate. After agreeing to participate, trained interviewers administered a 25-minute questionnaire while the patients were in the waiting room or treatment area and/or following treatment. Patients who were too severely injured or ill to be interviewed in the ED and who were subsequently hospitalized were interviewed later, after their condition had stabilized.

Only those reporting any alcohol use in the past 12 months were used for the present analysis, yielding 3,191 patients across the four sites. The proportion of drinkers across sites was 62.0% for Santa Clara, 38.6% for Pachuca, 76.4% for Argentina, and 74.1% for Poland.

Measures

Diagnostic criteria for alcohol dependence and abuse/harmful drinking were obtained from an adaptation of the Alcohol Section of the Composite International Diagnostic Interview Core (World Health Organization, 1990) covering the past 12 months. DSM-IV criteria for alcohol dependence included the following seven criteria: tolerance, withdrawal, drinking more than intended, unsuccessful efforts to cut down or stop drinking, giving up pleasures or interests to drink, spending a great deal of time in drinking activities, and continuing alcohol use despite physical or psychological problems. Criteria for DSM-IV abuse included alcohol-related consequences associated with role performance, hazardous use, social problems, and legal problems.

The international group of experts reviewing the substance use disorder definitions for the DSM-5 has proposed several changes (American Psychiatric Association, 2010). The first is the removal of the criterion assessing legal problems from the list of alcohol abuse criteria. Second, a

measure of alcohol craving was proposed to be added to the set of dependence criteria. Finally, the group recommended combining the resulting abuse and dependence criteria (after the first two changes have been implemented) into a single AUD scale. The proposed diagnostic cut points were 0–1 (negative for AUD), 2–3 (moderate AUD diagnosis), and 4 or more (severe AUD diagnosis) of a total of 11 criteria.

Analogously, the ICD-10 alcohol-dependence criteria include all of the same items across the DSM-IV dependence criteria, with the addition of the craving criterion. However, several of the individual items are combined, resulting in a total of six criteria (instead of the DSM-IV's 7 + craving = 8 dependence criteria for DSM-5). These criteria are defined as tolerance, withdrawal, continued use despite physical or psychological problems (same as DSM-IV), craving, neglecting interest in other activities (combining DSM-IV items giving up pleasures/interests to drink with spending a great deal of time in drinking activities), and impaired capacity (combining DSM-IV items drinking more than intended, unsuccessful efforts to cut down or stop, and once started difficult to stop before drunk). The ICD-10 alcohol harms scale consists of three criteria, including hazardous use and two additional criteria, defined separately by the presence of (a) any physical and (b) any mental health harms caused by alcohol use. More detail regarding the criteria for these two scales can be found in Hasin et al. (2006).

Analysis

Marginal prevalence rates of the six dependence and three harms ICD-10 criteria were estimated for each ED and overall across EDs. Before item response theory model estimation, an exploratory factor analysis was conducted for each country, wherein each of the nine ICD-10 criteria indicators were specified as dichotomous variables (and, therefore, tetrachoric correlations were estimated by Mplus [Muthén and Muthén, 2011] for exploratory factor analysis dimensional analyses [Muthén, 1989]). Several indices were used to assess dimensional behavior of the criteria, including factor (and rotated, for two-dimensional solutions) loadings, factor correlations, eigenvalues, and measures of fit, including the comparative fit index, Tucker–Lewis index, and root mean square error of approximation.

After examining exploratory factor analysis results for unidimensionality of the latent severity space, two-parameter logistic item response theory models were estimated for each country. Such models have been extensively described and used on similar items (Muthén et al., 1991) and for the same sample in prior work (Cherpitel et al., 2010). To examine DIF (Harford et al., 2009) of the ICD-10 criteria across sites, a multiple indicators multiple causes (MIMIC) model was estimated (Jöreskog and Goldberger, 1975). MIMIC modeling focuses on predicting DIF in the threshold or difficulty parameter of the two-parameter logistic model. Modification

indices larger than 3.84 (the critical value for a chi-square random variable with 1 *df*), such that the freeing of the threshold parameter (distributed as a chi-square random variable with 1 *df*) would indicate significantly improved model fit (at $p < .05$), were also estimated.

Such an analysis provides information on the degree to which endorsement of individual criteria relative to the average overall endorsement within a country varies across country. For example, for some countries, the criterion assessing withdrawal may be endorsed with much higher rates relative to the overall average rate of endorsement of all items within the country than it is in another country. Such a difference may indicate a number of potential differences in the role of the withdrawal criterion within the scale, such as differential severity of withdrawal or cultural stigma associated with admitting withdrawal. Here, the multiple indicators are the nine combined ICD-10 dependence and harms criteria; the multiple causes are the three indicators for site (Santa Clara as the reference), as well as gender and age. All exploratory factor, item response theory, and MIMIC analyses were carried out in Mplus (Muthén and Muthén, 2011), and descriptive analyses were performed in SPSS (SPSS Inc., Chicago, IL).

Results

Dimensional analyses of the combined ICD-10 dependence and harms items

Table 1 shows prevalence rates of the six ICD-10 dependence and the three ICD-10 harms criteria across the four countries, as well as overall. As has been previously found in analyses of DSM criteria, rates of endorsement for all of the items were higher in Santa Clara than in the other three sites.

Results for dimensional analyses are shown in Table 2. For each of the four sites, loadings for the single-factor solution were in excess of .7, with about 90% of the loadings larger than .8. In considering potential multidimensionality, loadings for two-factor solutions are also presented for each site. Correlations between the two factors were quite high, with a minimum of .72 in Poland, slightly higher in Mexico at .77, and more than .90 in both Santa Clara and Argentina. The second factor tended to be consistently dominated by the two physical and mental health harms criteria, as well as by the physical/psychological problems–dependence criterion. However, strong cross loading of these criteria, as indicated by the bold coefficients for the two-factor solution onto the first factor, was consistently observed across the sites. Eigenvalues for the second factor were substantially less than one for each country, and root mean square error of approximation values and fit indices indicated that a single-dimensional solution fits the data well and was therefore adopted for each country.

TABLE 1. Prevalence rates for ICD-10 dependence and harms criteria by emergency department sites

Variable	Santa Clara, CA, USA (n = 884)	Pachuca, Mexico (n = 547)	Mar del Plata, Argentina (n = 662)	Warsaw & Sosnowiec, Poland (n = 1,098)	Total combined (N = 3,191)
<i>ICD-10 dependence</i>					
D1: Tolerance	16.5	6.0	7.9	4.4	8.7
D2: Withdrawal	21.6	18.1	9.1	11.6	14.9
D3: Physical/psychological problems	23.8	13.0	11.9	10.1	14.8
D4: Activities given up/time spent	18.9	11.3	11.0	4.1	10.9
D5: Impaired capacity	28.0	20.5	16.8	12.0	18.9
D6: Craving	15.3	6.8	6.5	4.6	8.3
<i>ICD-10 harms</i>					
H1: Hazardous use	11.2	4.8	7.6	4.8	7.1
H2: Physical health problem	14.0	8.2	7.7	3.2	8.0
H3: Mental health problem	20.5	9.9	8.9	7.1	11.7

Notes: ICD-10 = *International Classification of Diseases and Related Health Problems, 10th Revision*; D = dependence; H = harm.

Results for individual item response theory models were fitted to each site (results not shown). One interesting characteristic of the harms criteria is their estimated severity parameter values relative to those for dependence criteria. Although prior analyses of DSM-5 combined dependence and abuse criteria in the same samples found hazardous use to generally provide some of the highest severity estimates (also found in the present analyses), the two other DSM-5 abuse criteria (neglect roles and social/interpersonal problems) produced severities that generally tended to be in the middle of the range of those from dependence criteria. For ICD-10 harms criteria, physical health problems—similar to the case for hazardous use—tended to represent the more severe end of the spectrum across sites, with mental health problems generally producing estimates in the same range as those for the other dependence criteria. Figure 1 graphically shows the item characteristic curves for the item response

theory model estimated with the combined data across the four sites and indicates the greater severities of the hazardous use and physical health problem criteria.

To test for measurement invariance of the threshold criteria across the four sites, a MIMIC model was estimated (results not shown). It is the relative differences between the severity of individual criterion and the average site severity across sites that are the focus of testing in the MIMIC models and that indicate potential item bias. Table 3 shows significant modification indices for each of the 10 combined ICD dependence and harms items for Poland, Argentina, and Pachuca compared with Santa Clara as the reference. Most relevant to these analyses are DIF for criteria not examined in previous DIF studies of the proposed set of DSM-5 criteria—namely the physical and mental health harms criteria—for which DIF was only found for the former criterion, and the degree of DIF was similar to or somewhat less than for

TABLE 2. Exploratory factor analyses of ICD-10 dependence and harms items by emergency department sites

ICD-10 dependence/harms criteria	Santa Clara, CA USA (n = 884)		Pachuca, Mexico (n = 547)		Mar del Plata, Argentina (n = 662)		Warsaw & Sosnowiec, Poland (N = 1,098)					
	1 factor	2 factors	1 factor	2 factors	1 factor	2 factors	1 factor	2 factors				
Tolerance (D1)	0.897	0.788	0.119	0.865	0.952	-0.074	0.790	0.406	0.404	0.741	0.766	-0.006
Withdrawal (D2)	0.920	0.666	0.270	0.805	0.392	0.474	0.791	0.060	0.747	0.805	0.825	0.008
Phys./psych. problems (D3)	0.911	-0.001	0.949	0.934	0.276	0.740	0.960	-0.015	0.991	0.951	0.002	1.139
Activities given up/time spent (D4)	0.968	0.984	-0.010	0.939	0.960	-0.005	0.899	0.983	-0.054	0.924	0.871	0.104
Impaired capacity (D5)	0.939	1.064	-0.123	0.943	0.934	0.036	0.894	0.901	0.021	0.796	0.945	-0.141
Craving (D6)	0.937	0.908	0.035	0.834	0.779	0.087	0.894	0.448	0.438	0.820	0.766	0.089
Hazardous use (H1)	0.803	0.745	0.067	0.715	0.501	0.258	0.809	0.683	0.148	0.728	0.807	-0.072
Physical health problem (H2)	0.906	0.393	0.537	0.847	-0.007	0.919	0.831	0.193	0.656	0.831	0.576	0.310
Mental health problem (H3)	0.945	0.230	0.746	0.884	0.355	0.594	0.940	0.001	0.948	0.966	0.543	0.443
Factor correlation	—	.92		—	.77		—	.91		—	.72	
Eigenvalue	7.64	8.01		6.83	7.43		6.92	7.41		7.16	7.71	
Comparative fit index	.999	1		.994	1		.998	.999		.993	.999	
Tucker–Lewis index	.999	1		.992	.999		.997	.998		.99	.999	
RMSEA	.038	.017		.055	.016		.032	.025		.049	.015	

Notes: **Bold** indicates statistical significance. ICD-10 = *International Classification of Diseases and Related Health Problems, 10th Revision*; D = dependence; Phys./psych. = physical/psychological; H = harm; RMSEA = root mean square error of approximation.

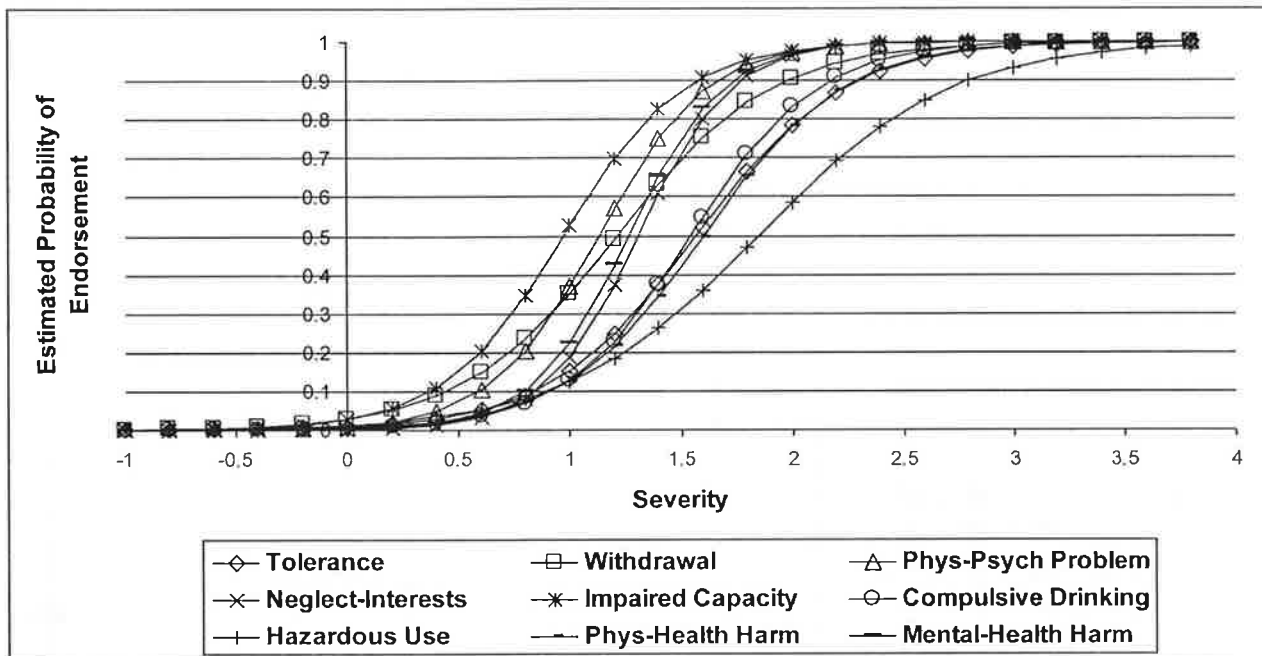


FIGURE 1. Item characteristic curves for item response theory model using data from all four emergency department sites combined. Phys = physical; Psych = psychological.

other criteria already part of the proposed DSM-5 criteria set.

Comparison of the combined ICD-10 dependence and harms items with the proposed DSM-5 scale

After we investigated the dimensional properties of the combined dependence and harms criteria from the ICD-10, we compared the two unit-weighted diagnostic schemes

(Figure 2); the figure indicates not only the position of the points but also the number of respondents occupying each point. Values are slightly shifted off the coordinate axes to allow the eye to identify values and point identity.

Two lines are shown in Figure 2: the 45° line (a slope of 1; dotted line) and a loess smooth curve (a locally averaged smoothing line; solid line). Each point along the 45° line references the set of scale points where the same numbers of symptoms, on average, are derived from both scales. The

TABLE 3. MIMIC modeling showing criteria modification indices (MIs) larger than 3.84 ($p < .05$) and associated coefficients by emergency department sites, using Santa Clara as the reference site

Variable	Pachuca, Mexico (n = 547)		Mar del Plata, Argentina (n = 662)		Warsaw & Sosnowiec, Poland (n = 1,098)	
	MI ^a	Parameter change	MI ^a	Parameter change	MI ^a	Parameter change
<i>ICD-10 dependence</i>						
D1: Tolerance	5.11	-.21	—	—	—	—
D2: Withdrawal	11.86	.26	—	—	13.29	.24
D3: Physical/psychological problems	—	—	—	—	—	—
D4: Activities given up/time spent	—	—	—	—	9.92	-.25
D5: Impaired capacity	—	—	—	—	—	—
D6: Craving	—	—	—	—	—	—
<i>ICD-10 harms</i>						
H1: Hazardous use	—	—	6.80	.16	—	—
H2: Physical health problem	—	—	6.09	-.18	7.54	-.24
H3: Mental health problem	—	—	—	—	—	—

Notes: Multiple indicators multiple causes (MIMIC) model controlled for gender and age in addition to the three country indicators above. ICD-10 = *International Classification of Diseases and Related Health Problems, 10th Revision*; D = dependence; H = harms. ^aMI indicates the decrease in model chi-square resulting from freeing the severity parameter across sites.

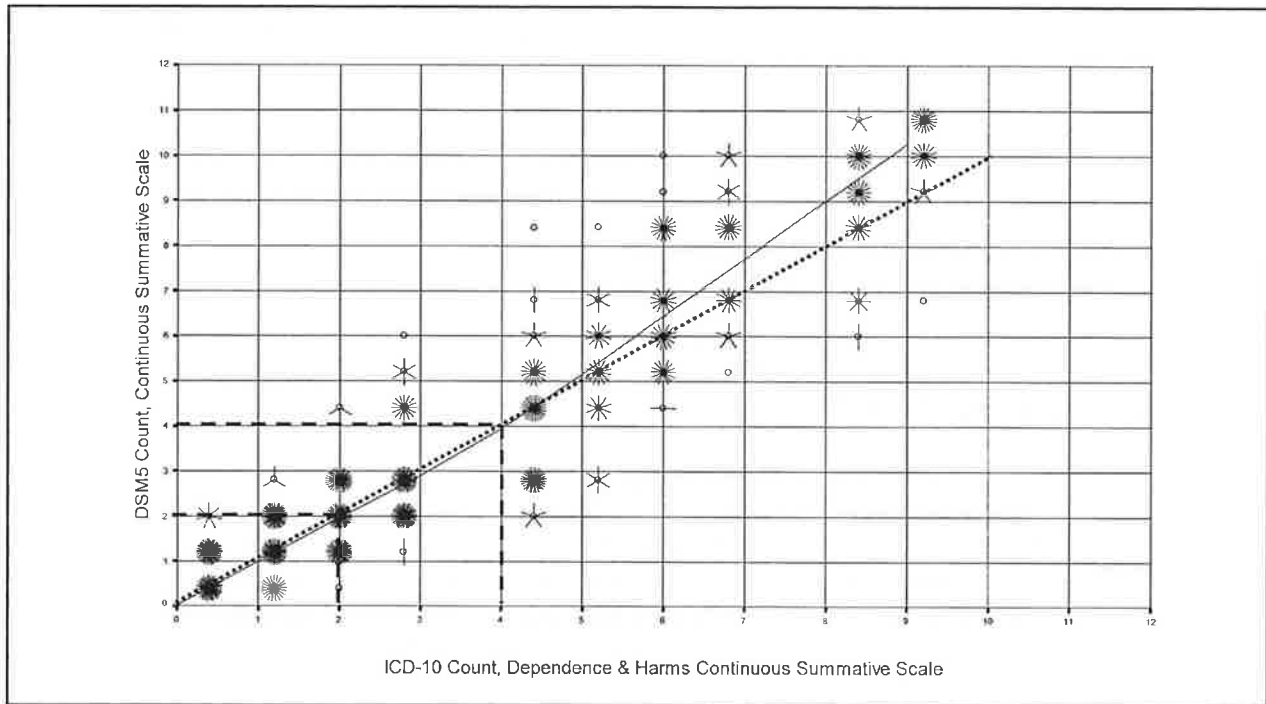


FIGURE 2. Scatterplot of *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)*, vs. *International Classification of Diseases and Related Health Problems, 10th Revision (ICD-10)*, continuous summative scales indicating point densities with lowess (solid) and 45° (dotted) lines included. Note that the distribution of the number of points is indicated by the number of lines emanating from each point.

lowess smooth curve indicates that, up to about five criteria, the proposed DSM-5 and combined ICD-10 summative scales provide, on average, the same estimate. It is only above four items where the DSM-5 summative scale tends to produce larger values, on average, than the combined ICD-10, which is expected because the DSM-5 scale has a larger possible range.

In Table 4, two different diagnostic schemes are applied to the ICD-10 and compared with the proposed DSM-5. In the top half of the table, the currently used hierarchical ICD-10 diagnostic scheme is shown (no harms and fewer than three dependence criteria, one or more harms but fewer than three dependence criteria, or three or more dependence criteria endorsed). Using this ICD-10 three-level classification, the rates of misclassification to the cells representing (a) those as negative for AUD for the DSM-5 and one or more harms only for the ICD-10; (b) those as moderate for AUD for the DSM-5 and no ICD-10 harms, and not 3+ ICD-10 dependent or those with 3+ ICD-10 dependence symptoms; and (c) those as severe for AUD for the DSM-5 and no ICD-10 harms, and not 3+ ICD-10 dependent or those with only 1+ harms are 3.1%, 6.1%, and 0.5%, respectively, of the total sample, with a Cohen's κ of .71.

In the bottom half of Table 4, an alternative ICD-10 diagnostic scheme is used and is defined using the same grouped

number of symptom counts as is proposed in the DSM-5. Analogous rates of misclassification are 1.7%, 3.0%, and 0.8%, respectively, with a Cohen's κ of .84. No other choice of symptom count thresholds results in a higher level of agreement between the two scales as that for the proposed DSM-5, and prevalence rates for diagnoses differ marginally by at most only .006.

Much of the misclassification using this second diagnostic scheme is because of the uniqueness of two harms items in the ICD and two abuse criteria in the DSM-5. For example, each of the 55 cases in the lower off-diagonal cell in the bottom half of Table 4 was positive for one or both of the ICD-10 harms criteria (18 for health harm alone, 34 for mental health harm alone, and 3 for both). Analogously, only 6 of the 56 cases with a negative diagnosis for ICD-10 and a moderate diagnosis for the DSM-5 were negative for both of the unique DSM-5 abuse criteria, as well as both of the unique ICD-10 harms criteria (indicating they were positive on some of the unique dependence criteria). The other 50 cases were all positive for one or both of the two unique DSM-5 abuse criteria (5 for social problems only, 36 for role performance problems only, and 9 for both). These 105 (55 + 50) cases represent 60% of the 176 cases misclassified into the three severity levels. Results for those differentially diagnosed from moderate to severe by the two scales were more

TABLE 4. Distribution of patients across proposed DSM-5 AUD diagnoses by two diagnostic schemes for ICD-10 diagnoses (current and using three-category symptom counts), $N = 3,191$

Variable	DSM-5 AUD diagnosis			ICD-10 prevalence ^a
	Negative (0, 1) <i>n</i>	Moderate (2, 3) <i>n</i>	Severe (4+) <i>n</i>	
ICD-10 current three-category diagnosis				
Not ≥ 3 dep., no harms	2,444	151	2	1.000
Not ≥ 3 dep., ≥ 1 harms	100	108	13	.187
≥ 3 dependence symptoms	0	44	331	.117
ICD-10 three-category grouped symptom counts diagnosis				
Negative (0, 1)	2,487	56	0	1.000
Moderate (2, 3)	55	208	26	.203
Severe (≥ 4)	0	39	321	.113
DSM-5 prevalence ^a	1.000	.204	.109	—

Notes: DSM-5 = *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition*; AUD = alcohol use disorder; ICD-10 = *International Classification of Diseases and Related Health Problems, 10th Revision*; dep. = dependence. Cohen's κ (between DSM-5 three-category diagnosis and current three-category ICD-10 diagnosis) = .71. Cohen's κ (between DSM-5 three-category diagnosis and ICD-10 three-category grouped symptom count diagnosis) = .84. ^aICD-10 prevalence and DSM-5 prevalence rates indicate rates of the specified category or higher. Cells do not always add up exactly to 3,191 cases due to rounding because of the use of case weights.

mixed, with some misclassification resulting from unique dependence criteria and some misclassification resulting from unique harms or AUD criteria (and some from both).

Discussion

Results from the present analyses generally mirror findings from prior psychometric studies examining the proposed set of DSM-5 criteria. Analogous to a number of these prior studies of the DSM-5, unidimensionality and the various measures of fit tended to indicate support for a single underlying latent severity factor for the nine combined ICD-10 criteria. A clear characteristic of the data used here is that the combined sample is from EDs from countries with very different dominant drinking patterns. Patients from the United States report more dependence and harms symptoms compared with other countries (including Mexico and Poland), which are typically seen as less moderate drinking cultures than the United States. In addition, prevalence rates for endorsing withdrawal or impaired capacity criteria for the Mexican sample were very close to those from the U.S. sample, whereas rates in the Mexican sample for endorsing craving, hazardous use, or mental health problems criteria were more similar to Poland and Argentina. This variation may also suggest that, in addition to different characteristics of the specific populations served by these EDs, cultural stigma and acceptability of specific behaviors may also play a role in explaining variability in responses across criteria.

In assessing criteria performance, the most pressing concern here is the role of the harms criteria with regard to the larger set of dependence criteria in defining the underlying severity factor. The three harms criteria are indeed correlated with the set of dependence criteria, with an average correlation of the summative dependence scale and (a) hazardous

use ($\rho = .39$), (b) physical health harm ($\rho = .47$), and (c) mental health harm ($\rho = .56$). Although there was no clear evidence for an additional unique severity dimension, the harms criteria assessing physical and mental health problems caused by alcohol use tended to load strongly on the second dimension of the solution, often along with the dependence criterion assessing continued use despite physical or psychological problems. These three harms criteria, although potentially assessing some unique characteristic of the underlying phenomena, are too correlated with other criteria and too few in number to suggest an additional unique dimension.

DIF was also found for several criteria across the four sites. Of the items unique to the ICD-10, only physical health problem exhibited DIF, but the magnitude of this DIF was less than that found in other criteria shared by both scales. Results from the dimensional analyses here are quite analogous to those found in prior studies of the proposed set of DSM-5 AUD criteria (Cherpitel et al., 2010) in terms of factor dimensionality, coherence of criteria, and DIF of individual criteria.

The effect of the application of various thresholds in such international populations has produced some of the first results from applying such diagnostic criteria. The relationship between the three-level DSM-5 diagnosis and the analogously categorized three-level ICD-10 scale indicated very strong agreement ($\kappa = .84$), with only a slightly higher rate of a severe diagnosis for the proposed DSM-5 compared with the combined ICD-10 scale (a difference between rates of .004). This relationship was stronger than that between the three-level DSM-5 diagnosis and the current ICD-10 scheme used for diagnosis. However, as suggested by results from the dimensional analyses, examination of the specific criteria leading to classification of individuals to the off-diagonal cells in the bottom half of Table 4 reveals that the harms and

abuse criteria are primarily the cause for discrepancies in diagnoses. Although this finding is consistent with prior studies examining the level of agreement between DSM-IV and ICD-10 dependence and, separately, the harms and abuses scales (Hasin et al., 2007; Schuckit et al., 1994), it indicates that harms and abuse items contribute to a majority of the burden in rates of misclassification when using two relevant sets of thresholds for the two combined summative scales.

Study limitations

The aim of this article was to assess cross-cultural differences in the application of two different diagnostic schemes to one possible method for modifying the ICD-10 harms and dependence scales in a clinical sample of heavier drinkers. However, the four countries examined here, although exhibiting distinctly different drinking cultures and drinking patterns, may not be representative of the full range of drinking cultures throughout the world and perhaps not even of those of the general population within the countries from which the samples were taken. Another limitation is that the type of ED and the system of emergency services delivered varies across the countries in the available samples, which is likely a factor in which individuals were available for inclusion in the samples. Such differences—in combination with a variation in interpretation of items, differential cultural acceptability of certain types of behaviors associated with drinking, and greatly differing patterns of drinking across cultures—may have resulted in some of the cross-culture differences found here (e.g., in reporting a physical health problem related to drinking).

Regardless of these limitations, this work represents a step toward directly addressing calls for empirical testing of whether nondependent substance use disorder criteria, as currently formulated in two widely used diagnostic systems, can be combined. Although there has been discussion that the less severe end of the substance use disorder spectrum might encompass repetition of the same criteria leading to adverse consequences and that emotional or environmental triggers may be important in perpetuating the condition (Saunders, 2006), findings here suggest that the DSM abuse and ICD harms criteria are tapping related but somewhat different characteristics and that these items, by themselves, are not sufficient or consistent enough to be considered to measure the same underlying trait. In addition, the differential relative severities of the harms—compared with the dependence criteria in the combined ICD-10 scale, seen to somewhat of a lesser extent for abuse relative to dependence criteria in the DSM-5—may be justification for additional caution. Given the nature of the ED samples analyzed, it would be important to replicate analyses in general population samples where the prevalence and severity of AUDs are lower.

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