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Concordance between the diagnostic guidelines for alcohol and cannabis use disorders in the draft ICD-11 and other classification systems: analysis of data from the WHO's World Mental Health Surveys

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ABSTRACT

Background and aims The World Health Organization's (WHO's) proposed International Classification of Diseases, 11th edition (ICD-11) includes several major revisions to substance use disorder (SUD) diagnoses. It is essential to ensure the consistency of within-subject diagnostic findings throughout countries, languages and cultures. To date, agreement analyses between different SUD diagnostic systems have largely been based in high-income countries and clinical samples rather than general population samples. We aimed to evaluate the prevalence of, and concordance between diagnoses using the ICD-11, The WHO's ICD 10th edition (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders, 4th and 5th editions (DSM-IV, DSM-5); the prevalence of disaggregated ICD-10 and ICD-11 symptoms; and variation in clinical features across diagnostic groups. **Design** Cross-sectional household surveys. **Setting** Representative surveys of the general population in 10 countries (Argentina, Australia, Brazil, Colombia, Iraq, Northern Ireland, Poland, Portugal, Romania and Spain) of the World Mental Health Survey Initiative. **Participants** Questions about SUDs were asked of 12 182 regular alcohol users and 1788 cannabis users. **Measurements** Each survey used the World Mental Health Survey Initiative version of the WHO Composite International Diagnostic Interview version 3.0 (WMH-CIDI). **Findings** Among regular alcohol users, prevalence (95% confidence interval) of life-time ICD-11 alcohol harmful use and dependence were 21.6% (20.5–22.6%) and 7.0% (6.4–7.7%), respectively. Among cannabis users, 9.3% (7.4–11.1%) met criteria for ICD-11 harmful use and 3.2% (2.3–4.0%) for dependence. For both substances, all comparisons of ICD-11 with ICD-10 and DSM-IV showed excellent concordance (all $\kappa \geq 0.9$). Concordance between ICD-11 and DSM-5 ranged from good (for SUD and comparisons of dependence and severe SUD) to poor (for comparisons of harmful use and mild SUD). Very low endorsement rates were observed for new ICD-11 feature for harmful use ('harm to others'). Minimal variation in clinical features was observed across diagnostic systems. **Conclusions** The World Health Organization's proposed International Classification of Diseases, 11th edition (ICD-11) classifications for substance use disorder diagnoses are highly consistent with the ICD 10th edition and the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV). Concordance between ICD-11 and the DSM 5th edition (DSM-5) varies, due largely to low levels of agreement for the ICD harmful use and DSM-5 mild use disorder. Diagnostic validity of self-reported 'harm to others' is questionable.

Keywords Alcohol, cannabis, diagnosis, DSM, ICD, substance use disorder, World Mental Health Surveys.

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INTRODUCTION

The diagnostic assessment of people with substance use disorders (SUDs) may produce varying results depending on the classification, definition and diagnostic guidelines used; an inherent problem of many mental health disorders, given the lack of objective biological measures. The issues facing investigations of diagnostic validity, and strategies to investigate validity, have been outlined by eminent clinicians and researchers (e.g. [1–6]). They argued that to establish validity of a syndrome, one needed: a description of the syndrome (including the profile of symptoms as well as characteristics and risk factors for the syndrome); distinction from other disorders; prognostic value of the description; family studies showing evidence of heritability; and treatment response [1–3]. Although people have debated whether these things demonstrate validity as opposed to clinical utility [2,5], the ongoing influence of definitions of SUDs arises in large part because of clinical utility, which is given a particular importance in the process of developing the International Classification of Diseases, 11th edition (ICD-11) for mental and behavioural disorders, including SUDs [7].

The nomenclature of substance-related problems has evolved over time [8]. In 1964, the World Health Organization (WHO) Expert Committee on Addiction-Producing Drugs proposed the term 'drug dependence' to replace the term 'addiction' [9] and 'drug habituation', which have been strongly associated with opioids [8]. The operationalization of a substance 'dependence syndrome' was influenced by Edwards and colleagues' work on alcohol dependence [10], whereby it was suggested that alcohol dependence could be conceptualized as a cluster of symptoms occurring in heavy drinkers that were distinguishable from alcohol-related problems [11] (i.e. separate from 'harmful use' or 'abuse'), since extended to cannabis and other drugs. The category of 'substance abuse' or 'harmful use' was developed to classify people who experienced clinically significant problems associated with their substance use that resulted in social or health harms but were not using the substance in a compulsive manner.

The International Classification of Diseases (ICD) and the Diagnostic and Statistical Manual of Mental Disorders (DSM) are the most widely used psychiatric classification systems for SUDs. The WHO's ICD 10th edition (ICD-10) distinguishes between harmful use, defined as a pattern of substance use that is causing damage to physical or mental health, and dependence, a cluster of symptoms that typically include craving, difficulties in controlling use, preoccupation with the substance, persistent use despite recurrent adverse consequences, tolerance and withdrawal [12]. The first 'beta' version of ICD-11 draft descriptions was released in July 2014 [13], with subsequent updated versions and release in October 2016 of the International Classification of Diseases for Morbidity and Mortality Statistics for Member States comments, and the release of ICD-11 is expected in 2018.

The draft proposal for ICD-11 substance dependence retains the concept of a 'dependence syndrome' but proposes that the criteria (or 'essential features') of the disorder be reduced from six to three, with an individual needing to meet at least two criteria for substance dependence. The extent to which the compounded criteria within these new features co-occur, potentially rendering some essentially redundant, has not been investigated, but is an important question.

The draft proposal for ICD-11 'harmful use' requires clinically significant harm to physical or mental health of an individual due to a pattern of use of a psychoactive substance that is typically evident during a period of at least 12 months. The diagnostic concept of 'harmful use' in the draft ICD-11 introduces a 'harm to others' criterion as substance-induced behaviour leading to clinically significant harm to the health of others. The term 'harmful use' in the draft ICD-11 was later replaced with the term 'harmful pattern of substance use'.

For international research, it is essential to ensure the consistency of within-subject diagnostic findings across countries, languages and cultures. Similarly, it is important to understand if the clinical and demographic profile of cases varies among diagnostic systems. To date, agreement analyses between different diagnostic systems for drugs and alcohol have largely been based in high-income countries [14–20] and, in some cases, clinical samples rather than general population samples (e.g. [15,20]). There exist two cross-national nosological studies of alcohol or cannabis use disorders [21,22]; however, these were conducted before efforts to revise the ICD-10 into ICD-11 had begun. This study, undertaken in the framework of WHO-led activities on testing of ICD-11, is therefore, to our knowledge, the first cross-national study to examine the proposed ICD-11 classification of people with alcohol and cannabis use disorders in the general population compared with other ICD and DSM definitions.

Using data from 10 surveys collected through the WHO's World Mental Health Survey (WMHS) Initiative, we aimed to:

1. Evaluate concordance of the proposed ICD-11 definitions and diagnostic guidelines of harmful use and dependence with ICD-10, DSM-IV and DSM-5 diagnoses.
2. Investigate what impact the addition of the concept of 'harm to others' has on the prevalence of ICD-11 harmful use, and its concordance with ICD-10 harmful use.
3. Examine the impact of condensing six ICD-10 dependence criteria into three essential diagnostic features in ICD-11.
4. Summarize demographic and clinical correlates across all classification system disorder groupings.

METHODS

Survey sample

The WMHS are a series of epidemiological surveys initiated by the WHO designed to collect and provide information on the prevalence, correlates, burden and treatment of mental disorders in countries throughout the world. The current study uses data from 10 surveys (see Table 1); one survey was carried out in a country classified by the World Bank at time of data collection as lower middle-income (a national survey in Iraq), three in countries classified as upper middle-income (a national survey in Romania, a regional survey in São Paulo, Brazil and a city survey in Medellin, Colombia) and six in countries classified as high-income (national surveys in Argentina, Australia, Northern Ireland, Portugal and Poland, and a regional survey in Murcia, Spain). Most surveys were based on a multi-stage clustered area probability sampling design of adult (aged 18 years and over) household residents. The average response rate across surveys was 65.6%, ranging from 50.4% (Poland) to 97.2% (Medellin). The total sample size of participating adults from these surveys was 48 268.

All interviews were carried out face-to-face with respondents in their homes by trained lay interviewers. Verbal or written consent was obtained prior to study participation. All procedures were reviewed and monitored by local review boards. Each survey used the WMH Survey Initiative version of the WHO Composite International Diagnostic Interview version 3.0 (WMH-CIDI), a validated fully structured diagnostic instrument [23]. The instrument has been translated into a number of languages using standardized translation procedures [24,25]. The instrument has been extensively tested and SUD diagnoses have previously been shown to be in fair to substantial agreement to diagnoses obtained through clinician-administered interviews [26]. A brief overview of the WMH-CIDI structure is provided in the Appendix Method S1. As Portugal did not assess drug use disorders (DUDs), their data were used only in the analysis of alcohol use disorders (AUDs). Person-level analysis weights incorporated probability of selection, non-response and post-stratification factors, therefore providing representative data on the target adult general population. More detailed descriptions of the survey methods, instrument development and weighting procedures are described elsewhere [27].

Substance use disorder diagnoses

The WMH-CIDI substance use modules compile symptomatic information relating to life-time alcohol and drug use disorders diagnoses. The instrument was developed to assess DSM-IV and ICD-10 SUDs derived with diagnostic algorithms [12,28]. Similar algorithms corresponding to the respective diagnostic formulations were applied to symptom information for the complete derivation of DSM-5 and ICD-11 diagnoses. The new DSM-5 criterion representing craving was captured through the same WMH-CIDI question, defined originally for use in the ICD-10 dependence algorithm. WMH-CIDI questions, represented by key phrases (KP), were mapped to the three diagnostic criteria for ICD-11 dependence [29] as follows:

- '*Impaired control over substance use*' is defined in terms of the onset (KP: used it even though promised yourself you wouldn't), level (KP: used more frequently than intended), circumstances or termination of use (KP: tried to stop and was not able to) which may be accompanied by a subjective sensation of urge or craving to use the substance (KP: not able to resist it).
- '*Substance use becomes an increasing priority in life*' such that its use takes precedence over other interests or enjoyments, daily activities, responsibilities or health or personal care (KP: reduced important activities). Substance use takes an increasingly central role in the person's life and relegates other areas of life to the periphery (KP: had little time for anything else). Substance use often continues despite the occurrence of problems (continued use despite it causing, KP1: physical or emotional problems; or KP2: problems with family, friends or others).
- '*Physiological features*' (indicative of neuroadaptation to the substance) as manifested by tolerance (KP: needed to use more to get an effect), withdrawal symptoms following cessation or reduction in use of that substance (KP: stopped, cut-down or went without using, and experienced symptoms such as fatigue, headaches, diarrhoea, the shakes or emotional problems), or repeated use of the substance to prevent or alleviate withdrawal symptoms (KP: used to keep from experiencing these symptoms). Withdrawal symptoms must be characteristic for the withdrawal syndrome for that substance and must not simply reflect a hangover effect.

'Harmful pattern of use' is defined as a pattern of substance use causing damage to a person's physical or mental health, but which has not yet resulted in consistently impaired control over consumption, physiological features or persistence in use despite harm. Such patterns of use may have also resulted in behaviour leading to harm to the health of others. Harm may be due to behaviour related to intoxication, direct or secondary toxic effects on body organs and systems, or a harmful mode of administration [29].

To facilitate the assessment of ICD-11 harmful use, a series of items used in the ICD-10 harmful use algorithm, and which also align with similar ICD-11 harmful use features, were identified. These items represent behaviours likely to eventuate in damage to a person's physical (KP: jeopardized your safety because you sometimes drank in

Table 1 WMH sample characteristics by World Bank income categories.[a]

Country by income category	Survey[b]	Sample characteristics[c]	Field dates	Age range (years)	Sample size		Response rate[d]
					Part I	Part II	
I. Low- and lower middle-income countries							
Iraq	IMHS	Nationally representative	2006–07	18–96	4332	4332	95.2
II. Upper middle-income countries							
Brazil–São Paulo	São Paulo Megacity	São Paulo metropolitan area	2005–08	18–93	5037	2942	81.3
Colombia–Medellin	MMHHS	Medellin metropolitan area	2011–12	19–65	3261	1673	97.2
Romania	RMHS	Nationally representative	2005–06	18–96	2357	2357	70.9
III. High-income countries							
Argentina	AMHES	Eight largest urban areas of the country (approximately 50% of the total national population)	2015	18–98	3927	2116	77.3
Australia[e]	NSMHWB	Nationally representative	2007	18–85	8463	8463	60.0
N. Ireland	NISHS	Nationally representative	2005–08	18–97	4340	1986	68.4
Poland	EZOP	Nationally representative	2010–11	18–65	10 081	4000	50.4
Portugal	NMHS	Nationally representative	2008–09	18–81	3849	2060	57.3
Spain - Murcia	PEGASUS–Murcia	Murcia region	2010–12	18–96	2621	1459	67.4
IV. Total					48 268	31 388	65.6

[a]The World Bank (2012) Data. Accessed 12 May 2012 at: http://data.worldbank.org/country. Some of the WMH countries have moved into new income categories since the surveys were conducted. The income groupings above reflect the status of each country at the time of data collection. The current income category of each country is available at the preceding URL. [b]IMHS (Iraq Mental Health Survey); MMHHS (Medellín Mental Health Household Study); RMHS (Romania Mental Health Survey); AMHES (Argentina Mental Health Epidemiologic Survey); NISHS (Northern Ireland Study of Health and Stress); EZOP (Epidemiology of Mental Disorders and Access to Care Survey); NMHS (Portugal National Mental Health Survey); PEGASUS–Murcia (Psychiatric Enquiry to General Population in Southeast Spain-Murcia); NSMHWB (National Survey of Mental Health and Wellbeing); [c]Most WMH surveys are based on stratified multi-stage clustered area probability household samples in which samples of areas equivalent to counties or municipalities in the United States were selected in the first stage followed by one or more subsequent stages of geographic sampling (e.g. towns within counties, blocks within towns, households within blocks) to arrive at a sample of households, in each of which a listing of household members was created and one or two people were selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. These household samples were selected from Census area data in all countries. Poland used municipal or country resident registries to select participants without listing households. Seven of the 10 surveys are based on nationally representative household samples. [d]The response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known not to be eligible, either because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey. The weighted average response rate is 65.6. [e]For the purposes of cross-national comparisons we limit the sample to those 18+.

situations where you could get hurt) or mental health (KP1: resulted in problems with the police, or KP2: interfered frequently with your work or responsibilities at school, on a job or at home). The additional feature 'harm to the health of others' in ICD-11 harmful use was not assessed so harm to family (KP: family been hurt by your substance use) was used as a proxy measure. As Poland, Portugal and Argentina surveys did not collect information relating to whether a person's family had been hurt by their substance use, ICD-11 harmful use diagnoses for these three surveys do not account for this criterion. Regardless, as endorsement rates were very low in surveys that did assess this criterion, and because the complete ICD-11 dependence could be derived, we retain these three surveys in our comparisons under the proviso that their ICD-11 harmful use rates are conservative estimates.

Statistical analysis

All analyses were carried out in SAS version 9.4, included person weights and adjusted for stratification and clustering. AUD analyses are restricted to respondents who, in the year they drank most, consumed alcohol at least three times per week or, if less often, consumed three or more standard alcoholic drinks per drinking day (here on defined as 'regular users'). Some surveys assessed DUDs broadly for all drugs while others assessed DUDs for each specific drug. As the current study focuses on cannabis-specific use disorders, the cannabis use disorder (CUD) analyses are restricted to those who had only ever used cannabis.

An error in a subset of questionnaires (Australia, Northern Ireland, Medellin and Murcia) resulted in 270 cannabis users unintentionally skipping over the dependence item 'cut down'. We imputed data for these people (see, Appendix Method S2).

We report prevalence (and standard errors) at the disorder level for all diagnoses. To investigate the underlying structure of the diagnoses, we also report disaggregated ICD-10 and ICD-11 symptom-level prevalence. Individual-level concordance across diagnoses was evaluated using Cohen's κ [30]. Descriptors of the degree of agreement

are modelled on guidelines reported by Fleiss [31]; κ estimates less than 0.40 are interpreted as poor, between 0.40 and 0.64 as fair, 0.65 to 0.75 as good and excellent for κ greater than 0.75.

For cross-tabulations of DSM-5 and ICD-10 diagnostic categories, we applied the cross-walk coding information provided in the DSM-5 [28]. Specifically, both severe and moderate DSM-5 SUD diagnoses are grouped for comparisons with ICD-10 dependence, while mild DSM-5 diagnosis is compared to ICD-10 harmful use. We also compared ICD-10 dependence with all DSM-5 diagnoses, and with severe DSM-5 disorder alone, but did not investigate comparisons with moderate DSM-5 disorder alone. With the high level of criteria overlap, those with a severe DSM-5 diagnosis are highly likely to meet criteria for ICD-10 dependence. Compounded with the fact that the DSM-5 dimensional approach means that all those with a severe DSM-5 diagnosis also meet the threshold for moderate DSM-5 diagnosis, comparisons of moderate DSM-5 diagnosis alone (i.e. excluding severe cases) with ICD-10 dependence would be inappropriate. The same cross-walk framework was used for cross-tabulations of DSM-5 with the proposed ICD-11 system.

RESULTS

In this paper we focus on diagnostic guidelines and criteria for SUDs across classifications among life-time regular alcohol users or life-time cannabis users. Table 2 shows the prevalence of people within each substance group who endorsed each diagnostic criterion under the ICD classifications, and who met diagnostic criteria under each of the four classification systems considered.

Disorder prevalence

The combined sample of all surveys included 12 182 life-time regular alcohol users (Table 2). Among those users, the pooled prevalence of life-time ICD-11 AUDs was 28.4% overall but varied across countries, ranging from 16.4% in Murcia to 45.7% in Iraq (see Supporting information, Appendix Table S1 for country-specific alcohol prevalence). With pooled AUD rates of 31.0% for ICD-10, 30.1% for DSM-IV and 27.4% for DSM-5, AUD prevalence was similar across all classification systems. Life-time ICD-11 dependence and harmful use rates among life-time regular alcohol users were 7.0 and 21.6%, respectively.

Among the 1788 cannabis users in the pooled sample who were asked about CUDs, life-time ICD-11 CUD prevalence was 12.2% and ranged from no CUDs in Iraq and Romania to 22.9% in São Paulo, Brazil (see Supporting information, Appendix Table S2 for country-specific cannabis prevalence). These CUDs rates were similar compared to the other classification systems considered; pooled CUD prevalence was 13.8% for ICD-10, 13% for DSM-IV and 11.5% for DSM-5. Life-time ICD-11 dependence and harmful use rates among cannabis users were 3.2 and 9.3%, respectively.

Symptom prevalence in ICD-11 disorder definitions

By far the most commonly endorsed ICD-11 dependence feature was 'impaired control', with 33.7% of alcohol users and 12.4% of cannabis users having experienced related symptoms. For both substances, 'impaired control' was most often present due to difficulties in controlling use attributable to using larger amounts/more frequently than intended or being unable to cut-down. 'Centrality of drug use' was the second most common symptom (endorsed by 17.8% of alcohol users and 8% of cannabis users) and explained in large part by the indication of continued use despite recurrent social or interpersonal problems (alcohol) or recurrent physical or psychological problems (cannabis). The least endorsed ICD-11 symptom of substance dependence for both alcohol and cannabis was 'physiological signs', although the difference in prevalence between this symptom and 'centrality of drug use' was small for cannabis (7.6 versus 8.0%) in comparison to alcohol (13.5 versus 17.8%).

Within the ICD-11 harmful use structure, the most frequently endorsed symptom at the survey level was either 'recurrent use resulting in failure to fulfil major obligations' or 'recurrent use in hazardous situations' for both substances. Reporting that 'one's family [had] been hurt by one's use' was the least endorsed ICD-11 harmful use symptom across all surveys, with only 1.8% of alcohol users and 0.3% of cannabis users from the pooled survey samples endorsing this symptom. When excluding 'harm to others' from the ICD-11 harmful use algorithm, no change was observed in any country-specific cannabis harmful use rates. Similarly, exclusion of this criterion from the diagnosis of alcohol harmful use decreased the overall prevalence at most by 0.4%.

Cross-tabulations displaying the co-occurrence of items within each of the three ICD-11 symptoms, broken down by dependence, are presented for both substances in the Supporting information, Appendix Tables S3–S6. Results from two parameter logistic item response models for ICD-10 and ICD-11 among regular alcohol users and cannabis users are provided in Supporting information, Appendix Table S7.

As 'harm to others' provided very little additional information to harmful use diagnoses, all ICD-11 diagnoses from here onwards report harmful use without harm to others (WHTO) to allow for data from Poland, Portugal and Argentina to be incorporated. Sensitivity analyses were conducted investigating the concordance and prevalence estimates excluding these three countries and using

Table 2 Base rates of individual life-time ICD-10 and ICD-11 symptom items, diagnostic categories and use disorders for alcohol and cannabis among population of life-time regular users of alcohol and cannabis users.

			Alcohol (n = 12 182)		*Cannabis (n = 1788)*	
Definition	*Criterion*	*Version*	*Pooled %*	*Country % range*	*Pooled %*	*Country % range*
Harmful use symptoms						
Recurrent use resulting in failure to fulfil major role obligations due to use	Major role	ICD-10 & 11	14.8 (13.9, 15.8)	8.5–35.9	5.4 (4, 6.8)	0–9.4
Recurrent use despite legal problems	Legal	ICD-10 & 11	6.5 (5.8, 7.1)	2–16.5	1.1 (0.5, 1.6)	0–4.1
Recurrent use in hazardous situations	Hazard	ICD-10 & 11	18.4 (17.4, 19.3)	9–24.8	7.8 (6.1, 9.5)	0–12.8
Continued used despite recurrent social/interpersonal problems due to use	Social	ICD-10	14.7 (13.8, 15.6)	6.2–31.8	5.6 (4.1, 7.1)	0–13.7
Family been hurt by use	Harm to others	ICD-11	1.8 (1.4, 2.1)	0.4–6.3	0.3 (0, 0.6)	0–2.7
Harmful use, ICD-10	Social, major role, legal, hazard	ICD-10	25.2 (24.1, 26.2)	14.6–38.2	10.9 (8.9, 12.9)	0–24.6
Harmful use, ICD-11	Major role, legal, hazard, harm[a]	ICD-11	21.6 (20.5, 22.6)	12.5–32.1	9.3 (7.4, 11.1)	0–16.4
Harmful use, ICD-11, removing harm to others	Major role, legal, hazard		21.5 (20.4, 22.5)	12.5–32.1	9.3 (7.4, 11.1)	0–16.4
Abuse,[b] DSM-IV			23.7 (22.6, 24.8)	12.9–34.2	10.2 (8.4, 12.1)	0–20.8
Dependence symptoms						
Craving or a strong desire to use	Craving	ICD-10	9.1 (8.5, 9.8)	2.6–32.7	5.2 (3.7, 6.7)	0–8.1
Difficulties in controlling use	Larger, cut down	ICD-10	32.7 (31.5, 34)	11.7–54.9	11.1 (9.2, 13)	0–19.1
Impaired control	Craving, larger, cut down	ICD-11	33.7 (32.5, 34.9)	12.2–58.2	12.4 (10.3, 14.6)	0–22.5
Time spent	Time spent, give up	ICD-10	9.3 (8.5, 10.1)	2.3–20.2	4.3 (2.6, 6)	0–6
Continued use despite recurrent physical or psychological problems	Continue	ICD-10	14.5 (13.6, 15.4)	6–32.1	6.5 (5.1, 7.9)	0–12.7
Centrality of drug use	Time spent, give up, social, continue	ICD-11	17.8 (16.8, 18.8)	6.7–38.7	8 (6.1, 9.8)	0–14
Tolerance	Tolerance	ICD-10	9.7 (9, 10.4)	4.1–27.6	5.5 (4.1, 6.8)	0–8.3
Withdrawal	Withdrawal	ICD-10	8 (7.4, 8.6)	3.3–33.8	4.9 (3.3, 6.5)	0–7.9
Physiological signs	Tolerance, withdrawal	ICD-11	13.5 (12.7, 14.4)	6.1–44.4	7.6 (6, 9.3)	0–14.1
Dependence, ICD-10			6.3 (5.7, 6.9)	2.3–14.9	3.2 (2.3, 4)	0–6.6
Dependence, ICD-11			7 (6.4, 7.7)	3.9–17.3	3.2 (2.3, 4)	0–6.6
Dependence, DSM-IV			6.4 (5.8, 6.9)	2.7–17.3	2.8 (2, 3.6)	0–4.7
Use disorder, ICD-10			31 (29.8, 32.2)	16.9–49.1	13.8 (11.7, 16)	0–31.2
Use disorder, ICD-11			28.4 (27.3, 29.6)	16.4–45.7	12.2 (10.2, 14.2)	0–22.9
Use disorder, DSM-IV			30.1 (28.9, 31.2)	16.8–49	13 (11, 15.1)	0–25.4
Use disorder, DSM-5			27.4 (26.3, 28.5)	14–55	11.5 (9.3, 13.7)	0–21.4

% = prevalence. [a]Criteria for 'harm to others' not collected in Portugal, Poland or Argentina. [b]Abuse without dependence.

the complete ICD-11 definition including harm to others, and the findings were consistent.

Concordance between classification systems

Concordance was excellent between all comparisons of ICD-11 (WHTO), DSM-IV and ICD-10 AUDs (Table 3). Agreement was also excellent for all comparisons between ICD-11 harmful use (WHTO), DSM-IV abuse and ICD-10 harmful use (Table 4), and between ICD-11, DSM-IV and ICD-10 dependence (Table 5). Concordance of ICD-11 and DSM-5 definitions was noticeably lower; agreement was good for ICD-11 and DSM-5 AUDs, fair for ICD-11 dependence and DSM-5 moderate/severe AUD and poor for ICD-11 harmful use and DSM-5 mild AUD. Findings were similar comparing DSM-5 with DSM-IV and ICD-10 AUDs.

Concordance between DSM-IV, ICD-10 and ICD-11 CUDs was excellent, as were all comparisons of cannabis abuse/harmful use and cannabis dependence. Agreement between DSM-5 and ICD-11 for cannabis diagnoses was

Table 3 Cross-tabulations and concordance between different definitions of alcohol and cannabis use disorders.[a]

	DSM-IV use disorder		*DSM-5 use disorder*		*ICD-10 use disorder*		*ICD-11 use disorder (excl. harm to others)*	
	No (n = 8393)	*Yes (n = 3789)*	*No (n = 8697)*	*Yes (n = 3485)*	*No (n = 8251)*	*Yes (n = 3931)*	*No (n = 8589)*	*Yes (n = 3593)*
Among life-time regular users of alcohol...								
DSM-IV use disorder [Kappa]	–		[0.71]		[0.97]		[0.95]	
No	–	–	90.3	16.1	99.7	3.7	97.5	0.3
Yes	–	–	9.7	83.9	0.3	96.3	2.5	99.7
DSM-5 use disorder [Kappa]	[0.71]		–		[0.7]		[0.69]	
No	93.7	23.5	–	–	93.8	25.3	92.0	23.5
Yes	6.3	76.5	–	–	6.2	74.7	8.0	76.5
ICD-10 use disorder [Kappa]	[0.97]		[0.7]		–		[0.93]	
No	98.4	0.6	89.2	15.5	–	–	96.0	0.7
Yes	1.6	99.4	10.8	84.5	–	–	4.0	99.3
ICD-11 use disorder (excl. harm to others) [Kappa]	[0.95]		[0.69]		[0.93]		–	
No	99.9	6.0	90.8	20.9	99.7	9.3	–	–
Yes	0.1	94.0	9.2	79.1	0.3	90.7	–	–
	DSM-IV use disorder		*DSM-5 use disorder*		*ICD-10 use disorder*		*ICD-11 use disorder (excl. harm to others)*	
	No (n = 1541)	*Yes (n = 247)*	*No (n = 1574)*	*Yes (n = 214)*	*No (n = 1530)*	*Yes (n = 258)*	*No (n = 1560)*	*Yes (n = 228)*
Among people who have used cannabis...[b]								
DSM-IV use disorder [Kappa]	–		[0.66]		[0.97]		[0.93]	
No	–	–	94.8	26.3	100	5.6	98.9	1
Yes	–	–	5.2	73.7	0	94.4	1.1	99
DSM-5 use disorder [Kappa]	[0.66]		–		[0.67]		[0.65]	
No	96.5	35	–	–	96.8	37	96.2	33.1
Yes	3.5	65	–	–	3.2	63	3.8	66.9
ICD-10 use disorder [Kappa]	[0.97]		[0.67]		–		[0.93]	
No	99.1	0	94.2	24.3	–	–	98.1	0
Yes	0.9	100	5.8	75.7	–	–	1.9	100
ICD-11 use disorder (excl. harm to others) [Kappa]	[0.93]		[0.65]		[0.93]		–	
No	99.9	7.5	95.4	29.1	100	11.8	–	–
Yes	0.1	92.5	4.6	70.9	0	88.2	–	–

[a]Unweighted data – raw sample counts. [b]Pooled data excludes Portugal, who did not assess illicit drug use disorders.

Table 4 Cross-tabulations and concordance between life-time ICD and DSM diagnoses of harmful use, abuse and mild use disorder among life-time regular users of alcohol and cannabis users.[a]

	DSM-IV abuse[b]		*DSM-5 mild use disorder*[c]		*ICD-10 harmful use*		*ICD-11 harmful use (excl. harm to others)*	
	No (n = 9273)	*Yes (n = 2909)*	*No (n = 10 446)*	*Yes (n = 1736)*	*No (n = 9079)*	*Yes (n = 3103)*	*No (n = 9531)*	*Yes (n = 2651)*
Among life-time regular users of alcohol …								
DSM-IV abuse [Kappa]	–		[0.42]		[0.94]		[0.93]	
No	–	–	84.0	30.0	99.4	7.6	97.0	0.9
Yes	–	–	16.0	70.0	0.6	92.4	3.0	99.1
DSM-5 mild use disorder [Kappa]	[0.42]		–		[0.41]		[0.39]	
No	94.4	57.8	–	–	94.7	59.1	93.1	59.0
Yes	5.6	42.2	–	–	5.3	40.9	6.9	41.0
ICD-10 harmful use [Kappa]	[0.94]		[0.41]		–		[0.9]	
No	97.5	1.8	82.6	28.0	–	–	95.3	0.5
Yes	2.5	98.2	17.4	72.0	–	–	4.7	99.5
ICD-11 harmful use (excl. harm to others) [Kappa]	[0.93]		[0.39]		[0.9]		-	
No	99.8	10.0	85.2	38.3	99.9	14.9	–	–
Yes	0.2	90.0	14.8	61.7	0.1	85.1	–	–

	DSM-IV abuse[b]		*DSM-5 mild use disorder*[c]		*ICD-10 harmful use*		*ICD-11 harmful use (excl. harm to others)*	
	No (n = 1595)	*Yes (n = 193)*	*No (n = 1672)*	*Yes (n = 116)*	*No (n = 1589)*	*Yes (n = 199)*	*No (n = 1619)*	*Yes (n = 169)*
Among people who have used cannabis…[d]								
DSM-IV abuse [Kappa]	–		[0.4]		[0.97]		[0.92]	
No	–	–	93.0	38.5	99.8	7.8	98.7	2.2
Yes	–	–	7.0	61.5	0.2	92.2	1.3	97.8
DSM-5 mild use disorder [Kappa]	[0.4]		–		[0.39]		[0.37]	
No	97.4	63.8	–	–	97.4	65.7	97.0	63.9
Yes	2.6	36.2	–	–	2.6	34.3	3.0	36.1
ICD-10 harmful use [Kappa]	[0.97]		[0.39]		–		[0.91]	
No	99.1	2.0	92.4	38.1	–	–	98.2	–
Yes	0.9	98.0	7.6	61.9	–	–	1.8	100
ICD-11 harmful use (excl. harm to others) [Kappa]	[0.92]		[0.37]		[0.91]		–	
No	99.8	11.5	93.7	44.6	100	14.9	–	–
Yes	0.2	88.5	6.3	55.4	–	85.1	–	–

[a]Unweighted data - raw sample counts. [b]Abuse without dependence. [c]DSM-5 mild disorder only (exclude moderate or severe). [d]Pooled data excludes Portugal, who did not assess illicit drug use disorders.

Table 5 Cross-tabulations and concordance between life-time dependence, use disorder among life-time regular users of alcohol (n = 12 182) and cannabis users (n = 1788)[a].

	DSM-IV alcohol dependence		*DSM-5 any alcohol use disorder (mild, moderate, severe)*		*DSM-5 moderate alcohol use disorder (moderate, severe)*		*DSM-5 severe alcohol use disorder*		*ICD-10 alcohol dependence*		*ICD-11 alcohol dependence*	
	No (n = 11 302)	*Yes (n = 880)*	*No (n = 8697)*	*Yes (n = 3485)*	*No (n = 10 433)*	*Yes (n = 1749)*	*No (n = 11 172)*	*Yes (n = 1010)*	*No (n = 11 292)*	*Yes (n = 890)*	*No (n = 11 208)*	*Yes (n = 974)*
Among life-time regular users of alcohol ...												
DSM-IV dependence [Kappa]	–		[0.33]		[0.61]		[0.70]		[0.92]		[0.95]	
No	–	–	100	76.7	99.6	54.0	98.2	33.9	99.4	8.3	100	9.5
Yes	–	–	0	23.3	0.4	46.0	1.8	66.1	0.6	91.7	0	90.5
DSM-5 any use disorder (mild, moderate, severe) [Kappa]	[0.33]		–		[0.59]		[0.37]		[0.33]		[0.36]	
No	77.5	0	–	–	83.6	0	78.1	0	77.5	0	78.1	0
Yes	22.5	100	–	–	16.4	100	21.9	100	22.5	100	21.9	100
DSM-5 moderate use disorder (moderate, severe) [Kappa]	[0.61]		[0.59]		–		[0.70]		[0.61]		[0.63]	
No	92.4	5.2	100	52.1	-	-	93.5	0	92.5	3.2	92.9	7.1
Yes	7.6	94.8	0	47.9	-	-	6.5	100	7.5	96.8	7.1	92.9
DSM-5 severe use disorder [Kappa]	[0.70]		[0.37]		[0.70]		–		[0.70]		[0.67]	
No	97.4	26.1	100	74.0	100	45.8	-	-	97.5	24.7	97.5	31.4
Yes	2.6	73.9	0	26.0	0	54.2	-	-	2.5	75.3	2.5	68.6
ICD-10 dependence [Kappa]	[0.92]		[0.33]		[0.61]		[0.7]		–		[0.95]	
No	99.5	9.2	100	77.0	99.8	53.5	98.3	33.3	-	-	100	10.4
Yes	0.6	90.8	0	23.0	0.2	46.5	1.7	66.7	-	-	0	89.6
ICD-11 dependence [Kappa]	[0.95]		[0.36]		[0.63]		[0.67]		[0.95]		–	
No	99.3	0	100	74.3	99.4	0	97.6	32.2	99.2	0	-	-
Yes	0.7	100	0	25.7	0.6	49.8	2.4	67.8	0.8	100	-	-

(*Continues*)

Table 5. (Continued)

	DSM-IV cannabis dependence		*DSM-5 any cannabis use disorder (mild, moderate, severe)*		*DSM-5 moderate cannabis use disorder (moderate, severe)*		*DSM-5 severe cannabis use disorder*		*ICD-10 cannabis dependence*		*ICD-11 cannabis dependence*	
	No (*n* = 1734)	*Yes* (*n* = 54)	*No* (*n* = 1574)	*Yes* (*n* = 214)	*No* (*n* = 1690)	*Yes* (*n* = 98)	*No* (*n* = 1732)	*Yes* (*n* = 56)	*No* (*n* = 1727)	*Yes* (*n* = 61)	*No* (*n* = 1727)	*Yes* (*n* = 61)
Among people who have used cannabis ...[b]												
DSM-IV dependence [Kappa]	–		[0.37]		[0.70]		[0.76]		[0.94]		[0.94]	
No	–	–	100	75.7	100	48.8	99.4	19.5	100	11.5	100	11.5
Yes	–	–	0	24.3	0	51.2	0.6	80.5	0	88.5	0	88.5
DSM-5 any use disorder (mild, moderate, severe) [Kappa]	[0.37]		–		[0.60]		[0.38]		[0.41]		[0.41]	
No	91.1	0	–	–	93.6	0	91.0	0	91.4	0	91.4	0
Yes	8.9	100	–	–	6.4	100	9.0	100	8.6	100	8.6	100
DSM-5 moderate use disorder (moderate, severe) [Kappa]	[0.70]		[0.60]		–		[0.72]		[0.70]		[0.70]	
No	97.3	0	100	52.5	–	–	97.2	0	97.5	4.0	97.5	4.0
Yes	2.7	100	0	47.5	–	–	2.8	100	2.5	96.0	2.5	96.0
DSM-5 severe use disorder [Kappa]	[0.76]		[0.38]		[0.72]		–		[0.71]		[0.71]	
No	99.4	21.0	100	76.1	100	49.8	–	–	99.4	30.1	99.4	30.1
Yes	0.6	79.0	0	23.9	0	50.2	–	–	0.6	69.9	0.6	69.9
ICD-10 dependence [Kappa]	[0.94]		[0.41]		[0.70]		[0.71]		–		[1.00]	
No	99.6	0	100	72.5	99.9	44.5	99.0	19.5	–	–	100	0
Yes	0.4	100	0	27.5	0.1	55.5	1.0	80.5	–	–	0	100
ICD-11 dependence [Kappa]	[0.94]		[0.41]		[0.70]		[0.71]		[1.00]		–	
No	99.6	0	100	72.5	99.9	44.5	99.0	19.5	100	0	–	–
Yes	0.4	100	0	27.5	0.1	55.5	1.0	80.5	0	100	–	–

[a]Unweighted data – raw sample counts. [b]Pooled data excludes Portugal who did not assess illicit drug use disorders.

at most good for CUD, good between dependence and moderate/severe CUD and poor for the comparison between harmful use and mild CUD. DSM-5 CUDs achieved the greatest agreement with both DSM-IV and ICD-10 cannabis dependence using a cut-off of severe, although this agreement was no more than good.

Among those with a DSM-5 diagnosis, the proportion of respondents with no diagnosis under other diagnostic systems ranged from 15.5% (ICD-10) to 20.9% (ICD-11) for AUDs and 24.3% (ICD-10) to 29.1% (ICD-11) for CUDs (Table 3). It is noteworthy, however, that overall there were fewer cases identified in the DSM-5 system than the other definitions. Table 6 shows the cross-tabulations of all ICD-11 diagnostic categories with ICD-10 and DSM-5 diagnostic categories. Figure 1 shows the overlap of ICD-10, ICD-11 and DSM-5 definitions of alcohol and cannabis dependence (moderate/severe SUD for DSM-5). Both clearly demonstrate the almost complete agreement of the two ICD definitions, and much poorer overlap for DSM-5 due to the different group this definition identified.

Associations with other clinical and demographic variables

Comparisons of clinical and demographic correlates between classification system subgroups showed minimal variation for AUD and CUD definitions (Table 7). Medians of age of onset, age of onset of first symptom and age at interview were largely consistent across all classification systems, use disorder/dependence groupings and substances. Looking within classification systems, past-year symptoms, family history of problematic use, life-time hospital treatment, past-year treatment and unemployment tended to be higher among dependence cases compared to the pooled AUD sample of the same classification system. Life-time diagnoses of generalized anxiety disorder, affective disorders and cannabis dependence were also more common among alcohol dependence cases. Conversely, dependence cases had lower high school completion rates for alcohol and lower marriage rates compared to the pooled groups.

DISCUSSION

We used cross-national community epidemiological survey data of life-time regular alcohol users and cannabis users to investigate the diagnostic guidelines for proposed ICD-11 AUD and CUD diagnoses and their concordance with other classification systems (DSM-IV, DSM-5 and ICD-10). For both substances, all comparisons of ICD-11 with ICD-10 and DSM-IV showed excellent concordance. As found in previous work, DSM-5's agreement with ICD-11 was more variable [15]. DSM-5 and ICD-11 concordance was good (cannabis) to fair (alcohol) for comparisons of dependence and moderate/severe CUDs or AUDs [15], and poor between ICD-11 harmful use and DSM-5 mild SUD.

We found very low rates of endorsement of one question that is related to proposed new ICD-11 feature for harmful use, namely harm to others, as assessed in the CIDI. This may have been for several reasons. First, if a person caused

Table 6 Diagnostic cross-walks of ICD-11 diagnostic categories with ICD-10 and DSM-5 among life-time regular alcohol users and cannabis users.[a]

	Alcohol			*Cannabis*		
	ICD-11 no diagnosis	*ICD-11 harmful use*[b,c]	*ICD-11 dependence*	*ICD-11 no diagnosis*	*ICD-11 harmful use*[b,c]	*ICD-11 dependence*
ICD-10 no diagnosis	8227 (67.53%)	0 (0%)	24 (0.2%)	1530 (85.57%)	0 (0%)	0 (0%)
ICD-10 harmful use[c]	362 (2.97%)	2619 (21.5%)	60 (0.49%)	30 (1.68%)	167 (9.34%)	0 (0%)
ICD-10 dependence	0 (0%)	0 (0%)	890 (7.31%)	0 (0%)	0 (0%)	61 (3.41%)
	ICD-11 no diagnosis	*ICD-11 harmful use*[b,c]	*ICD-11 dependence*	*ICD-11 no diagnosis*	*ICD-11 harmful use*[b,c]	*ICD-11 dependence*
DSM-5 no diagnosis	7868 (64.59%)	829 (6.81%)	0 (0%)	1500 (83.89%)	74 (4.14%)	0 (0%)
DSM-5 mild	624 (5.12%)	1045 (8.58%)	67 (0.55%)	53 (2.96%)	59 (3.3%)	4 (0.22%)
DSM-5 moderate	81 (0.66%)	442 (3.63%)	216 (1.77%)	5 (0.28%)	22 (1.23%)	15 (0.84%)
DSM-5 severe	16 (0.13%)	303 (2.49%)	691 (5.67%)	2 (0.11%)	12 (0.67%)	42 (2.35%)

[a]Unweighted data (percentage within substance sample)—raw sample counts. [b]Without harm to others. [c]Without ever an occurrence of dependence.

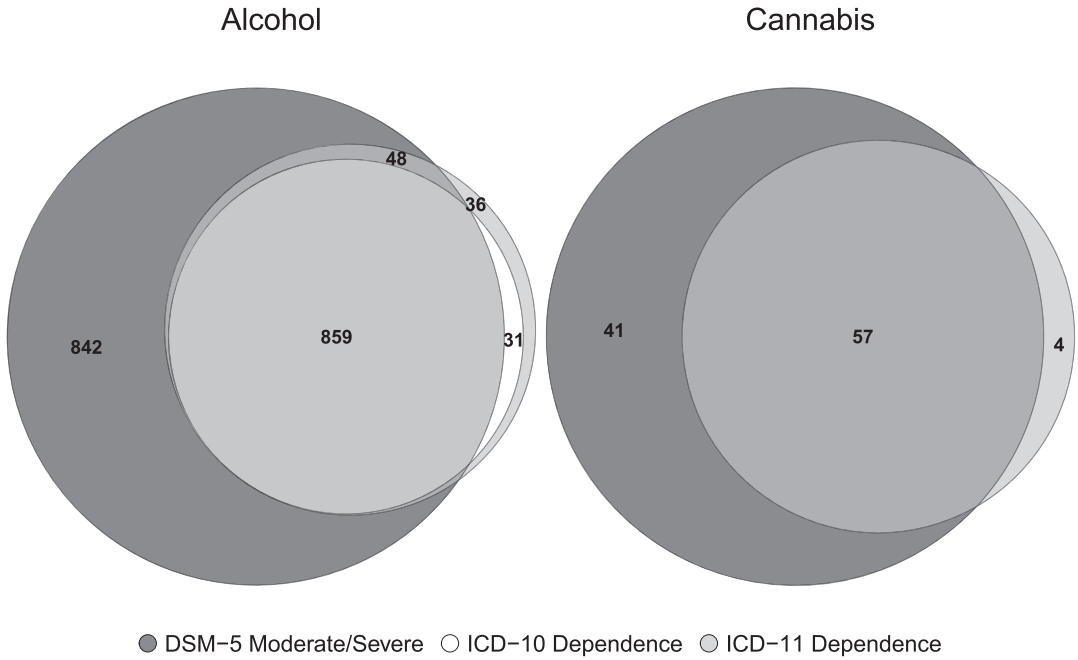

Figure 1 Venn diagrams showing the overlap between cases defined by ICD-10 and ICD-11 dependence definitions, and DSM-5 moderate–severe use disorder, for alcohol and cannabis. Total cases (unweighted *n*) were as follows. Alcohol: ICD-10 dependence *n* = 890; ICD-11 dependence *n* = 974; DSM-5 moderate–severe use disorder *n* = 1749. Cannabis: ICD-10 dependence *n* = 61; ICD-11 dependence *n* = 61; DSM-5 moderate–severe use disorder *n* = 98. Diagrams produced in R [32] using "eulerr" [33]

harm to others through their substance use they may be unwilling to report, or are unaware of, the consequences it has had on those around them, an issue highlighted in previous research [34]. As operationalized in the CIDI interview, this feature was found to add very little information to the harmful use diagnoses. Endorsement rates were the lowest of all ICD criteria and its exclusion from the diagnostic algorithm had little to no impact on the overall harmful use prevalence rate. The limited capacity of self-assessments to evoke a reliable response might indicate that it is more suitable to ask about this feature where the accounts of family or friends can be considered, such as in a clinical setting.

Secondly, it is also possible that the way in which the question was worded meant that the CIDI did not capture the criterion adequately. In fact, in the draft ICD-11 it is rather an expansion of the boundaries of 'harm to health' by including harm to health of others than an additional diagnostic criterion, and not limited to family members. The criterion specified by WHO describes harm to others as any kind of physical or mental health harm that is attributable to substance-induced behaviour, which may not have been adequately captured in the CIDI question: 'How much has your family been hurt by your [substance use]?'. Thirdly, it is possible that harming one's family is more associated with more severe disorder, but more severe disorder is associated with having fewer close relationships or less regular family interactions. Future research might examine both the validity of the expanded concept of 'harm' due to substance use in the draft ICD-11 and how to address this concept in diagnostic and screening instruments.

It is important to note DSM-5's atheoretical approach, and de-emphasis of symptom constellations or subtypes. ICD-11 has taken the opposite approach and attempts to aggregate clinical signs into the fewer inter-related essential features. Comparisons of agreement between levels of DSM-5 severity and either ICD-10, ICD-11 or DSM-IV dependence or harmful use could be argued to be somewhat problematic, unless it is assumed that harmful use is necessarily less severe than dependence (which other research findings do not consensually support [35–39]). DSM-5's implicit goals are to identify cases and to assign severity based on symptom count. To that end, when we compared the agreement of DSM-5 and the other systems in identifying AUDs and CUDs overall, agreement was good. However, it is important to note that up to 29.1% of people identified as cases in DSM-5 were not identified as cases in the other three classification systems, and up to 37.0% of cases of use disorder in the other classification systems were not classified as cases under DSM-5. Although the former may partially be explained by DSM-5's ability to account for 'diagnostic orphans' [40], these findings are not restricted to the lowest levels of DSM severity. It would be of value to investigate these inconsistent cases in more depth to determine the implications of excluding such a high proportion of people defined as cases in other systems and including in the DSM-5 definition such a high proportion of cases that are not defined as cases in the other systems.

Table 7 Demographic and clinical correlates and features of disorder among those meeting varying definitions of alcohol and cannabis use disorders.

	Among those classified as meeting criteria for alcohol use disorders defined via ...							
	DSM-IV use disorder	*DSM-IV dependence*	*DSM-5 use disorder*	*DSM-5 moderate/severe use disorder*	*ICD-10 use disorder*	*ICD-10 dependence*	*ICD-11 use disorder*	*ICD-11 dependence*
	(n = 3789)	*(n = 880)*	*(n = 3485)*	(n = *1749)*	*(n = 3931)*	*(n = 890)*	*(n = 3593)*	*(n = 974)*
History and course of use disorder								
Median age of onset of regular use[a,b]	17	16	17	16	17	16	17	16
Median age of onset of first symptom[b,c]	20	20	20	20	20	20	20	20
% Past 12-month symptoms	22.91 (0.96)	36.26 (1.95)	24.34 (1.02)	27.48 (1.56)	22.63 (0.94)	37.17 (2.01)	23.44 (1.01)	36.16 (1.89)
% Family history of problematic use[b]	42.74 (1.15)	54.8 (1.95)	45.33 (1.26)	51.65 (1.7)	42.56 (1.13)	53.58 (2.04)	42.72 (1.22)	54.12 (1.94)
% Life-time hospital treatment for mental/SUD[b]	4.57 (0.43)	14.32 (1.53)	5.67 (0.52)	9.29 (0.87)	4.58 (0.43)	14.35 (1.53)	4.82 (0.46)	13.15 (1.41)
% Past-year treatment for SUD[b]	3.85 (0.39)	14.15 (1.51)	4.72 (0.49)	7.93 (0.81)	3.75 (0.38)	14.03 (1.52)	4.07 (0.42)	12.81 (1.39)
Demographic variables								
Median age	40	42	39	39	40	41	39	41
% Female	22.39 (0.92)	22.61 (1.68)	25.37 (1.08)	20.39 (1.17)	22.45 (0.9)	22.18 (1.89)	21.34 (0.9)	22.73 (1.76)
% Completed high school	68.34 (1.05)	61.46 (1.88)	67.78 (1.18)	63.4 (1.51)	68.39 (1.04)	60.72 (1.89)	68.7 (1.08)	61.14 (1.85)
% Unemployed/not in labour force	12.71 (0.85)	19.93 (1.63)	13.24 (0.91)	18.53 (1.42)	12.66 (0.84)	18.99 (1.51)	12.95 (0.87)	19.46 (1.53)
% Married	50.23 (1.26)	46.72 (2.32)	48.58 (1.31)	45.15 (1.79)	50.99 (1.24)	46.61 (2.37)	49.57 (1.31)	46.74 (2.24)
Clinical correlates								
% Life-time generalized anxiety disorder	9.47 (0.68)	17.63 (1.77)	10.97 (0.74)	14.8 (1.23)	9.33 (0.67)	18.19 (1.79)	9.03 (0.69)	17.14 (1.68)
% Life-time affective disorder	24.63 (0.98)	38.54 (2.13)	27.35 (1.05)	35.09 (1.61)	24.24 (0.95)	38.42 (1.96)	24.66 (1.03)	36.89 (1.97)
% Life-time cannabis abuse[d,e]	12.06 (0.79)	11.51 (1.37)	12.46 (0.84)	15.05 (1.42)	11.73 (0.77)	11.86 (1.37)	12.42 (0.83)	12.21 (1.49)
% Life-time cannabis dependence[d,e]	6.48 (0.63)	18.81 (2.09)	7.37 (0.7)	12.11 (1.16)	6.4 (0.62)	18.65 (2.14)	6.63 (0.65)	17.88 (1.94)

(*Continues*)

Table 7. (Continued)

	Among those classified as meeting criteria for cannabis use disorders defined via ...[e]							
	DSM-IV use disorder	*DSM-IV dependence*	*DSM-5 use disorder*	*DSM-5 moderate/severe use disorder*	*ICD-10 use disorder*	*ICD-10 dependence*	*ICD-11 use disorder*	*ICD-11 dependence*
	(*n* = 247)	(*n* = 54)	(*n* = 214)	(*n* = 98)	(*n* = 258)	(*n* = 61)	(*n* = 228)	(*n* = 61)
History and course of use disorder								
Median age of onset of use	17	16	16	16	17	16	17	16
Median age of onset of first symptom[c]	19	19	19	19	19	19	19	19
% Past 12-month symptoms	7.32 (1.39)	15.7 (4.44)	7.59 (1.52)	11.16 (2.92)	7.08 (1.33)	14.62 (4.09)	7.14 (1.41)	14.62 (4.09)
% Family history of problematic use[b]	54.39 (3.64)	61.66 (6.66)	59.44 (4.27)	59.45 (6.43)	52.93 (3.81)	59.76 (7.2)	53.98 (3.93)	59.76 (7.2)
% Life-time hospital treatment for mental/SUD[b]	1.37 (0.59)	4.47 (2.62)	2.69 (1.00)	3.12 (1.39)	3.48 (2.19)	3.96 (2.33)	1.2 (0.59)	3.96 (2.33)
% Past-year treatment for SUD	4.45 (1.23)	10.42 (4.48)	5.34 (1.49)	8.18 (2.86)	4.2 (1.17)	9.24 (4.03)	4.76 (1.32)	9.24 (4.03)
Demographic variables								
Median age	34	30	34	29	34	31	34	31
% Female	29.2 (3.28)	34.6 (7.47)	29.55 (3.56)	24.1 (5.31)	28.55 (3.15)	34.35 (7.18)	28.53 (3.3)	34.35 (7.18)
% Completed high school	71.94 (3.3)	72.85 (6.23)	66.21 (3.76)	67.44 (5.61)	71.58 (3.23)	71.95 (5.97)	72.47 (3.47)	71.95 (5.97)
% Unemployed/not in labour force	10.15 (2.79)	10.57 (4.57)	13.56 (2.12)	14.15 (1.45)	11.89 (3.27)	9.36 (4.08)	10.4 (2.97)	9.36 (4.08)
% Married	44.24 (3.68)	32.45 (6.11)	36.45 (3.51)	33.57 (5.21)	43.0 (3.68)	36.19 (7.05)	44.34 (3.89)	36.19 (7.05)
Clinical correlates								
% Life-time generalized anxiety disorder	9.07 (1.99)	9.07 (3.41)	7.53 (1.55)	8.79 (2.43)	10.73 (2.7)	8.03 (3.1)	9.17 (2.1)	8.03 (3.1)
% Life-time affective disorder	23.94 (3.23)	31.18 (7.33)	22.8 (3.22)	24.42 (5.29)	25.26 (3.62)	34.04 (6.85)	24.37 (3.45)	34.04 (6.85)
% Life-time alcohol abuse[d]	41.25 (3.75)	20.18 (7.56)	39.22 (4.42)	41.88 (6.67)	39.6 (3.73)	27.17 (8.11)	42.65 (3.99)	27.17 (8.11)
% Life-time alcohol dependence[d]	18.96 (3.52)	38.65 (6.67)	16.86 (2.43)	24.92 (4.14)	20.47 (3.74)	34.22 (6.36)	18.2 (3.74)	34.22 (6.36)

SUD = substance use disorder. [a]Regular use is defined here as 12 standard drinks in a year. [b]Excludes respondents with unknown or not-stated values. [c]First symptom includes abuse or dependence problem. Does not exclude symptoms that are not part of a specific disorder definition (e.g. legal criterion in DSM-IV). [d]DSM-IV diagnoses. [e]Estimates exclude Portugal, who did not assess illicit drug disorders.

It would also be valuable to reconsider the thresholds for 'mild', 'moderate' and 'severe' use disorders empirically to allow these to fall at symptom counts more consistent with the prior DSM incarnation and the ICD systems.

As noted earlier, a major challenge to nosology in the drug and alcohol field concerns the lack of an objectively determined gold standard method of defining SUDs. To that end, when different classification systems differ in classifying individuals, in the characteristics of those individuals and even in the rate of occurrence of a disorder, it is difficult to know which definition has achieved a more 'accurate' encapsulation of the concepts that are intended to be captured. In the case of our study, to the extent that there was less strong agreement between ICD-11 and DSM-5, even when defined as moderate/severe, DSM-5 was measuring a slightly different construct to the other classification systems. Aside from introducing uncertainty around measurement and issues of implementation, e.g. in clinical settings, it is difficult to know how this can be resolved easily without broad consensus on an approach to definition among the varied expert committees in this area. Future studies might examine other aspects of proposed strategies to examine diagnostic validity in psychiatry, including longitudinal course of disorder, response to treatment and extent of heritability.

This study, and previous works, have shown that specific diagnostic criteria tend to indicate varying levels of disorder severity [see Item Response Theory (IRT) Analysis Results in Appendix Table S7] [41–43]. With the simplification of the ICD-11 dependence structure, it stands to reason that meeting dependence criteria in population surveys will typically be determined by endorsement of the less severe criteria, as these will be more commonly reported than the more severe criteria [15]; the same may not be the case in the clinical setting, where more severe cases may predominate. The two most frequently endorsed dependence symptoms among alcohol users in the current study, 'difficulty in controlling use' and 'continued use despite problems', fall under two separate ICD-11 dependence features; endorsing both would satisfy criteria for ICD-11 dependence. The restructuring of ICD dependence symptoms appeared to increase identification of alcohol dependence cases and had the converse effect on cases of harmful use, resulting in a drop of the overall rate of use disorders. The implications of this are unclear, but it raises the question as to whether the weight of different symptoms and severity of features should be taken into account in the assigning of diagnoses.

As previously mentioned, one of the strengths of this paper was that it used data from countries with varied cultural and income levels, permitting some examination of potential differences in classification across countries. Although there were more cases from high-income countries, our IRT analyses suggested that people responded to the ICD-11 items differently among high- versus low-income countries (Supporting information, Appendix Table S7). Further studies of this in varied countries may shed light on the importance of these differences.

Limitations

One limitation is the potential biases that may be introduced by the reliance on self-report data. However, we used a well-validated structured diagnostic interview to collect symptoms of SUD, although the CIDI instrument was developed before the introduction of innovations in DSM-5 and ICD-11. Self-report of substance use behaviours is also reliable when confidentiality is assured and there are no disincentives for being honest [44,45], as was the case in this study, although, as discussed above, it can be different regarding the impact of substance-induced behaviours on the health of others.

Three surveys (Poland, Portugal and Argentina) did not assess the CIDI item 'family been hurt by others', reflecting the inclusion of harm to health of others in the proposed diagnostic guidance for the 'harmful use' in ICD-11, and thus harmful use rates from these surveys are conservative estimates. In terms of diagnostic concordance results, as previously mentioned, sensitivity analyses including only those surveys for which complete ICD-11 harmful use definitions and diagnostic guidelines could be assessed produced consistent results.

Although the WMH-CIDI was constructed to allow the evaluation of ICD-10 diagnoses, the features used in the algorithms for constructing ICD-10 harmful use do not map directly to the diagnosis definition. Rather, a series of situations or behaviours that may have (but did not necessarily) eventuate in harm and which were directly attributable to substance use were used as proxy measures to capture the diagnostic features. Considering the large overlap between ICD editions, this also extends to evaluation of ICD-11 harmful use. Despite this potential issue, the use of these proxy measures appears to work sufficiently well in the current study, with comparisons of both ICD-10 and ICD-11 with DSM-IV in excellent agreement for both harmful use/abuse and, more broadly, SUDs.

Response rates of the surveys varied widely. Although post-stratification adjustments were conducted to control for differential response, there remains the possibility that survey participation may be related to the presence of a SUD in ways that were not corrected. With that in mind, and considering previous works that suggest household and community-based surveys produced underestimates of substance use problems [46–48], prevalence estimates presented here are probably underestimates.

A lack of representation from North America and most of northern Europe is a noticeable absence. Some

of the earliest WMHS were conducted in these regions; however, a skip error in an early version of the survey instrument meant that all people who did not meet the criteria for abuse were not asked questions relating to dependence. As a result, we have no dependence criteria data for these cases. For this reason, countries with the skip error (which includes the United States and most European surveys) could not be included in the current study.

Finally, some of the surveys included in the current study were conducted years ago. Although policies, attitudes and rates of use of these substances may have changed since data collection, we have no reason to suspect this would impact upon concordance results between diagnostic systems.

CONCLUSIONS

The classification of SUDs has varied throughout versions and systems. While changes with each revision are mostly incremental, there is the need for ongoing review of these classifications to ensure consistency with previous editions and that improvements are in line with developing knowledge. ICD-11 aggregated essential features for alcohol and cannabis dependence as well as for AUDs and CUDs showed excellent concordance ($\kappa \geq 0.9$) with ICD-10 and DSM-IV. However, the concordance of AUDs and CUDs between ICD-11 and DSM-5 varies from good to poor largely—but not exclusively—due to low levels of agreement for the ICD harmful substance use and mild SUD in DSM-5. Diagnostic validity of self-reported 'harm to others' is questionable, and requires further research. The increased number of cases of alcohol dependence identified in ICD-11 compared to ICD-10 needs further exploration. It may be of use to have some consideration for revisiting DSM-5 thresholds, considering the data presented here. It is crucial that further testing of diagnostic guidelines of ICD-11 be conducted to determine their impact, and if varying definitions are better suited for different settings or research methods.

Declaration of interests

During the past three years, L.D. has received investigator-initiated untied educational grants for studies of opioid medications in Australia from Indivior, Mundipharma and Seqirus. R.K. received support for his epidemiological studies from Sanofi Aventis; was a consultant for Johnson & Johnson Wellness and Prevention, Shire, Takeda; and served on an advisory board for the Johnson & Johnson Services Inc. Lake Nona Life Project. R.K. is a co-owner of DataStat, Inc., a market research firm that carries out health-care research. V.P. is a staff member of the World Health Organization involved in the development and field testing of ICD-11 for disorders due to substance use and addictive behaviours. S.C. is also a staff member of the World Health Organization. M.G.'s role on this study is through his involvement as a Science Officer on U01-MH60220. He had no involvement in the other cited grants. All other authors declare no competing interests.

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A complete list of all within-country and cross-national WMH publications can be found at http://www.hcp.med.harvard.edu/wmh/.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.
Appendix Method S1 Overview of the WMH-CIDI Structure.
Appendix Method S2 Imputation of Data.
Appendix Table S1 Base rates of individual lifetime ICD-10 and ICD-11 symptom items and diagnostic categories, alcohol use disorders, among population ever using alcohol.
Appendix Table S2 Base rates of individual lifetime ICD-10 and ICD-11 symptom items and diagnostic categories, cannabis use disorders, among population ever using cannabis.
Appendix Table S3 Prevalence of co-occurring criteria items within ICD-11 'impaired control' feature broken down by ICD-11 alcohol and cannabis dependence diagnoses.
Appendix Table S4 Prevalence of co-occurring criteria items within ICD-11 'centrality of drug use' feature broken down by ICD-11 alcohol dependence diagnosis.
Appendix Table S5 Prevalence of co-occurring criteria items within ICD-11 'centrality of drug use' feature broken down by ICD-11 cannabis dependence diagnosis.
Appendix Table S6 Prevalence of co-occurring criteria items within ICD-11 'physiological signs' feature broken down by ICD-11 alcohol and cannabis dependence diagnoses.
Appendix Table S7 2PL Item response theory (IRT) characteristics of ICD-10 and ICD-11 dependence items.