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Cross-national patterns of substance use disorder treatment and associations with mental disorder comorbidity in the WHO World Mental Health Surveys

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Abstract

Aims:

To examine cross-national patterns of 12-month substance use disorder (SUD) treatment and minimally adequate treatment (MAT), and associations with mental disorder comorbidity.

Design:

Cross-sectional, representative household surveys.

Setting:

Twenty-seven surveys from 25 countries of the WHO World Mental Health Survey Initiative.

Participants:

2,446 people with past-year DSM-IV SUD diagnoses (alcohol or illicit drug abuse and dependence).

Measurements:

Outcomes were SUD treatment, defined as having either received professional treatment or attended a self-help group for substance-related problems in the past 12 months, and MAT, defined as having either 4+ SUD treatment visits to a healthcare professional, 6+ visits to a non-healthcare professional, or being in ongoing treatment at time of interview. Covariates were mental disorder comorbidity and several socio-economic characteristics. Pooled estimates reflect country sample sizes rather than population sizes.

Findings:

Of respondents with past-year SUD, 11.0% (standard error [SE] 0.8) received past 12-month SUD treatment. SUD treatment was more common among people with comorbid mental

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disorders than with pure SUDs (18.1%, SE 1.6 vs 6.8%, SE 0.7), as was MAT (84.0%, SE 2.5 vs 68.3%, SE 3.8) and treatment by healthcare professionals (88.9%, SE 1.9 vs 78.8%, SE 3.0) among treated SUD cases. Adjusting for socio-demographic characteristics, mental disorder comorbidity doubled the odds of SUD treatment (odds ratio [OR] 2.34, 95% confidence interval [CI] 1.71-3.20), MAT among SUD cases (OR 2.75, 95% CI 1.90-3.97) and MAT among treated cases (OR 2.48, 95% CI 1.23-5.02). Patterns were similar within country income groups, although the proportions receiving SUD treatment and MAT were higher in high than low/middle income countries.

Conclusions:

Few people with past-year substance use disorders (SUDs) receive adequate 12-month SUD treatment, even when comorbid with a mental disorder. This is largely due to the low proportion of people receiving any SUD treatment, as the proportion of patients whose treatment is at least minimally adequate is high.

Key words: substance use disorders; comorbidity; mental disorders; treatment; minimally adequate treatment; World Mental Health Surveys

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Introduction

Substance use disorders (SUDs), including alcohol and illicit drug abuse and dependence, are conservatively estimated to affect 2.6% of the world's population each year [1]. SUDs were the eighth leading cause of risk-attributable disability-adjusted life-years globally in 2016 and the fourth-to-fifth leading cause in socio-economically developed regions [2]. Despite the availability of effective interventions for SUD, few people with these disorders receive treatment and even fewer receive minimally adequate treatment (MAT), that is, an amount that could reasonably be expected to provide the opportunity to begin potentially effective intervention [1, 3-6].

Among people with past-year SUDs, having a comorbid mental disorder increases the likelihood of receiving treatment [7-10]. Estimates suggest that more than 40% of people with past-year SUDs have a comorbid mental disorder, most commonly a mood or anxiety disorder [11, 12]. SUD cases with comorbid mental disorders have a more severe and disabling course of illness, poorer social and clinical outcomes if under-treated, and more complications with treatment than those with pure SUDs [13]. Treatment guidelines recommend that when SUDs and mental disorders co-occur, each disorder should be treated in its own right [14]. Countries vary in their funding and organisation of SUD services. High income countries are more likely to have dedicated funding for specialised SUD services and to administer these separately from mental health services [13]. For these reasons, an understanding is needed of the extent to which people with past-year SUDs received 'SUD treatment' (i.e., for the purpose of treating an SUD), and how this differs according to comorbidity status and across countries.

Most population estimates of SUD treatment have come from the US, showing that only 8-15% of people with past-year SUDs received SUD treatment in the preceding 12 months [7, 8]. SUD treatment tended to be more common for SUD cases with comorbid mental disorders (10.5%-42.0% [15-17]) than those with pure SUDs (6.7%-10% [17, 18]). People

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with past-year SUDs also had 1.3 to 3.4 times greater probability of receiving mental health treatment than SUD treatment, even if they did not have a comorbid mental disorder [7, 15-18]. This may occur for several reasons. For example, people with pure SUDs may have sought mental health treatment because they perceived their substance use problem as a mental health problem; people with SUDs and comorbid mental disorders may perceive the latter as the most troubling. People with SUDs, regardless of comorbidity, may regard mental health services as more adequate, acceptable or available [5, 7, 17, 18]. Co-occurring SUDs and mental disorders influence each other [13]; however, the extent to which treatment for a comorbid mental disorder will also be effective in alleviating the SUD is not known and would probably vary greatly depending on the etiology, severity, and type of the comorbid disorder.

Reducing the burden of SUDs requires improvements in the coverage and quality of SUD treatment. In clinical samples, high quality SUD treatment (as indicated by process-based measures of treatment intensity, therapeutic content, and continuity) has been associated with better outcomes for people with SUDs [19-21]. In an analysis of population data from 26 countries in The World Health Organization's (WHO) World Mental Health Survey (WMHS) initiative [1], information about type and number of healthcare visits was used to estimate MAT among people with past-year SUDs who had received treatment for emotional or substance use problems in the previous 12 months. Only 7.1% of people with past-year SUDs received MAT, ranging from 1.0% in low/lower-middle income countries to 10.3% in high income countries [1]. However, corresponding estimates among those who received SUD treatment specifically, and associations with mental disorder comorbidity, are lacking.

We examined cross-national patterns of SUD treatment among people with pure and comorbid past-year SUDs. Specific aims were to: (1) estimate the proportions receiving SUD treatment and MAT, by comorbidity status and country income level; (2) examine the sectors in which people received SUD treatment and MAT, namely from healthcare

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professionals and non-healthcare professionals; and (3) examine potential associations of mental disorder comorbidity with SUD treatment and MAT.

Methods

Sample

Data came from 27 surveys in 25 countries participating in the WMHS (Table 1). Five were classified as low and lower-middle income (Colombia, Iraq, Nigeria, People's Republic of China [PRC], and Peru), six as upper-middle income (Brazil, Bulgaria, Colombia, Lebanon, Mexico, and Romania), and 16 as high income (Argentina, Australia, Belgium, France, Germany, Israel, Italy, Japan, The Netherlands, New Zealand, Northern Ireland, Poland, Portugal, Spain, Spain-Murcia, and The United States). Each survey's interviewing sample size was determined by its' available resources and data collection budget, however, all utilised a probability sample design for the selection of a representative sample of their target population, with the majority using multi-stage, clustered area probability designs. The weighted average response rate across all countries was 68.5% (Table 1).

SUDs were assessed with the WHO Composite International Diagnostic Interview (CIDI) Version 3.0, a validated fully-structured interview designed to generate lifetime and 12-month diagnoses of mental disorders according to DSM-IV and ICD-10 criteria. The interview was developed in English and standardised protocols were used to adapt the CIDI for use in each participating country [22, 23].

All respondents completed Part I of the CIDI, which contained a diagnostic assessment of core mental disorders. Respondents identified with a disorder during the Part I assessment and a probability sample of other Part I respondents were administered Part II, which assessed disorders of secondary interest and correlates. Analyses in the current study are restricted to respondents with a past-year SUD (DSM-IV diagnoses of alcohol or illicit drug abuse or dependence).

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All surveys were administered face-to-face by trained lay-interviewers. Interviewer training and quality control procedures were standardised across surveys [24]. Informed consent was obtained according to protocols endorsed by local institutional review boards.

Table 1 about here

Definitions of SUD treatment and minimally adequate SUD treatment

Among participants with a SUD, SUD treatment was defined as having either received treatment from a healthcare professional or attended a self-help group for substance related problems at any time in the past year. Treatment was classified as having come from a healthcare professional if a specialty mental health professional (psychiatrist, psychologist, other mental health professional in any setting, social worker or counsellor in a mental health specialty treatment setting, or a mental health hotline) or general professional (primary care doctor, other medical doctor or other health care professional in a medical setting) had been consulted. If only non-medical professionals (social worker or counsellor in a non-medical setting, religious or spiritual advisor, or healer) or self-help groups had been consulted, treatment was classified as non-healthcare.

Among persons that received any SUD treatment, minimally adequate treatment (MAT) was defined as having either at least four treatment visits to a healthcare professional, at least six visits to a non-healthcare professional or self-help group, or being in continuing treatment at the time of interview. These thresholds represent the minimum number of visits reasonably expected to provide opportunity to instigate the necessary steps at the beginning of any SUD or mental disorder intervention including patient's report of symptoms, diagnosis, formulation of treatment plan, presentation of diagnosis and plan to the patient, patient acceptance of the plan, for intervention to be started and for the patient to experience and make at least some commitment to the intervention [6].

Comorbid mental disorders

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To investigate the association of a comorbid mental disorder with receipt of SUD treatment, participants with a past-year diagnosis of major depressive disorder, generalised anxiety disorder, bipolar disorders, panic disorder, social disorder, specific disorder and agoraphobia were identified. Standardised diagnostic hierarchy rules among these disorders were applied, where appropriate.

Statistical methods

All analyses were based on weighted data to make samples representative of the target population's socio-demographic characteristics. Individual-level weights were used to adjust for differences in probability of selection, and to match the socio-demographics of the sample to those of the population. To adjust for differential sampling into Part II, Part II respondents were weighted by the inverse of their probability of selection into Part II, equalizing prevalence estimates in the weighted Part II sample and Part I sample. Standard errors were estimated using Taylor Series linearization taking in to account weighting, clustering and stratification. Prevalence estimates were produced in PROC SURVEYFREQ, and logistic regression analyses in PROC SURVEYLOGISTIC, both implemented in SAS Version 9.0.

Surveys are combined for purposes of pooled estimates based on sample sizes rather than sizes of the populations of the countries surveyed. Pooled prevalence estimates therefore represent the weighted mean across our surveys, where weights are based on survey sample size. Furthermore, all regression models included dummy control variables for survey so that coefficients for other predictors could be interpreted as pooled within-survey coefficients. This approach, which implicitly assumed within-survey slopes were constant across surveys, was implemented because the degree of survey-level variability attributable to the parameter of main interest was found to be modest, and allowing (in a random-slope model) for inter-country variation in that slope had little effect on the mean slope estimate and its standard error.

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To test for differences between SUD only and SUD and at least one comorbid mental disorder, and high and low/middle income countries, in relation to the key variables of interest related to the aims of the paper, chi-square tests were applied. Logistic regression analyses were conducted to predict 12-month SUD treatment and MAT among all persons with a past-year SUD, and MAT among the subset of past-year SUD cases with any 12-month SUD treatment. To investigate the associations of comorbid mental disorders with SUD treatment, we defined a single indicator variable capturing the presence of any past-year depression, bipolar, panic, generalised anxiety, social, specific, or agoraphobia disorder. Due to low counts within select disorders, modelling of individual mental disorder indicators was not feasible.

Other covariates included sex, age at interview (<25, 25-34, 35-44 and 45+), personal income defined in within-country quartiles (low, low-average, high-average and high), marriage status (never married, married/cohabitating, separated/widowed/divorced), education level defined within-country (low, low-average, high-average and high) [25] and country income level (high and low/low-middle/upper-middle [or 'low/middle' – levels combined due to low statistical power] from Table 1) of the survey country or region. We conducted analyses with all countries pooled, and subgroup analyses by country income level, however, there was not enough statistical power to make separate estimates for each country.

We conducted sensitivity analyses among a subset of surveys that captured information regarding physical health comorbidities in a consistent manner (1,986 respondents with past-year SUD). The physical comorbidities included past-year presence of any: back or neck problems, headaches, chronic pain, allergies, diabetes, ulcer(s), HIV/infection, epilepsy or seizures, and cancer. We also included lifetime presence of heart disease, hypertension, asthma, and chronic lung disease, as these conditions are typically chronic and require ongoing management or treatment. We modelled the number of past-year physical comorbidities as: exactly one, exactly two, and three or more.

Parameter coefficients and standard errors are reported as odds ratios and 95% confidence intervals (CIs) with statistical significance evaluated using .05-level two-sided tests.

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Results

Across all countries, 2446 (2.6%) people in the WMHS met criteria for a past-year SUD, with prevalence higher in high (3.0%) than in low/middle income countries (1.9%). Overall, around one in three people with a past-year SUD also had at least one other mental disorder in the same timeframe, with higher comorbidity among those in high than in low/middle income countries (Table 2).

SUD treatment

One in nine past-year SUD cases received SUD treatment in the past 12 months. Among past-year SUD cases, SUD treatment was twice as common in high compared to low/middle income countries, and among those with a comorbid mental disorder compared to those with a diagnosis of SUD only. This pattern was consistent in high income and low/middle income countries.

Minimally adequate treatment (MAT)

Among those who received SUD treatment, more than three-quarters met MAT thresholds (Table 2). MAT was more common in high than in low/middle income countries, and among people with a comorbid disorder compared to those with a SUD only.

SUD treatment professionals

Most people with 12-month SUD treatment were treated by at least one healthcare professional. The use of healthcare professionals for treatment was more common among people with a comorbid disorder than among those with an SUD only across all countries and in high income surveys. Among people who received SUD treatment from a healthcare professional, most received MAT. MAT was more common in high income countries than low/middle income countries, and was more common among those with a comorbid

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disorder than among those with an SUD only in low/middle income countries, but not in high income countries.

The use of non-healthcare professionals as the sole source of SUD treatment was uncommon. Levels of MAT from a non-healthcare professional were higher among people with a comorbid disorder compared to those with a SUD only in both the pooled and high income surveys.

Although there was no difference between country income groups in the proportion of SUD cases obtaining treatment from a healthcare professional, MAT provision was more common for those treated by healthcare professionals in high than low/middle income countries. Appendix Table A1 presents bivariate comorbid mental disorder odds ratios for all outcomes shown in Table 2.

Table 2 about here

Comorbid mental disorder and SUD treatment

Results from logistic regression analyses investigating the association of comorbid disorder with receipt of any SUD treatment and MAT are presented in Table 3 and Figure 1. Adjusting for all socio-demographics, the presence of a comorbid disorder more than doubled the odds of receiving SUD treatment, MAT among SUD cases and MAT among treated cases. Consistent results were observed within country-level income groups.

In sensitivity analyses, after adjusting for number of past-year physical comorbidities, people with past-year comorbid mental disorder still had higher odds of SUD treatment (OR 1.75 [95%CI: 1.27-2.40]), and MAT (OR 2.13 [95%CI: 1.47-3.09]) [details available upon request].

Additional models investigated potential differences in correlates of SUD treatment by type of professional. These, along with the full model results from analyses shown in Table 3, are shown in Appendix Tables A2-A10. These show that the patterns observed in the main

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analyses were all similar for those receiving SUD treatment from a healthcare professional specifically and, despite small numbers, were generally similar for those receiving non-healthcare treatment only.

Table 3 about here

Discussion

We are aware of no previous comparative cross-national data on SUD treatment. We found SUD treatment among past-year SUD cases to be low across all countries studied (11.0%). Most treated cases received MAT but, because of the low coverage, only 8.5% of all SUD cases received adequate SUD treatment. MAT was more common among SUD cases with comorbid mental disorders, compared to cases with pure SUDs, due to the higher proportions receiving any SUD treatment and receiving MAT once treatment had started. These patterns were similar within country income groups, even though SUD treatment and MAT were twice as common among SUD cases from high income countries compared to low/middle income countries.

Limitations

There were important limitations. First, our MAT criteria would ideally have included receipt of potentially beneficial pharmacological treatments for SUDs (e.g., naltrexone for alcohol dependence [26] and opioid substitution therapy for opioid dependence [25]). However, medication use (types, timing, duration and adherence) was not covered in sufficient detail in the WMHS. The criteria did count visits to healthcare professionals who are able to prescribe and monitor medications.

Second, due to low counts the individual impact of specific combinations of SUDs and mental disorders on receipt of SUD treatment could not be investigated. The coefficient representing the impact of any comorbid mental disorder represents the mean effect of any and all disorders. Patterns of treatment may vary according to different combinations of diagnoses [27] or other latent structures [6, 28]. This is an avenue for future work.

Third, we assumed that respondents could reliably identify that they had received treatment for substance related problems. Studies have found acceptable levels of agreement between self-reported use of substance use services and administrative records

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or other independent sources among people with substance use problems or disorders [29-33], with better agreement for aggregate measures than for detailed measures [32, 33], and poorer agreement among high-volume service users [29, 30].

Fourth, to our knowledge, the predictive validity of the MAT criteria used in this study has not been established.

Fifth, the comparatively lower disability associated with substance abuse compared to dependence may in part explain the low treatment proportions, however, there was not enough statistical power to conduct separate analyses for abuse and dependence.

Sixth, there may be between-country variations in willingness to report use of various substances, due to legal frameworks, cultural norms and other factors.

Seventh, the number of reported visits used in evaluating MAT may potentially include visits made for mental health problems other than SUDs, so the proportion receiving MAT may be even lower than reported here.

Finally, our sensitivity analyses included many, but not all, physical conditions (e.g., stroke, liver problems) that are prevalent among people with SUDs or may affect SUD treatment [34, 35]. General limitations of the WMHS are discussed in detail elsewhere [1, 36].

Implications

Few past-year SUD cases received 12-month SUD treatment. Our estimates of 12-month SUD treatment in high income countries were broadly similar to independent US estimates for people with any SUD (12.5% vs 8-15% [7, 8]), comorbid SUD and mental disorder (19.9% vs 10.5-42.0% [15-17]) and SUD only (4.8% vs 6.7%-10% [17, 18]). Equivalent comparisons for low/middle income countries were not possible. Reasons for low SUD treatment proportions are many and varied [37-44]. Systemic factors (e.g., low policy priority, scarcity of services and appropriately trained professionals, lack of community-based care options,

out-of-pocket payment models), and community factors (e.g., stigmatising community attitudes) are especially relevant in low/middle income countries [45-47].

Only 8.5% of past-year SUD cases received MAT, lower than has been reported for depression [36] but similar to anxiety disorders [48] (noting that the MAT criteria in those studies [36, 48] took account of medication use which the current study could not). This was largely due to the low proportion receiving any SUD treatment, as the proportion of treated SUD cases who received MAT was high. A US study showed that people with SUDs had more treatment visits (median 6.6) than people with mental disorders (2.4 to 6.0, depending on disorder) [4]. Together, these findings could suggest that people with SUDs who do commence treatment are committed to obtaining a positive outcome and therefore persist with it.

In the pooled professional samples, lower proportions of SUD treatment and MAT among pure SUD cases could indicate that this group are at greater risk of under-treatment. However, SUD cases with comorbid mental disorders have worse clinical presentation and outcomes [13], and are more likely to report unmet treatment needs [42, 49]. Moreover, longitudinal studies show that people with SUDs who do not access treatment have, on average, less severe disorders and more favourable outcomes than treatment users, suggesting that many people appropriately self-select for treatment [50, 51]. Further examination of the relationship between clinical characteristics of SUDs (e.g., comorbidity, severity, persistence and disability) and recent and lifetime treatment patterns may help identify those who should be the focus of policy and service responses to reduce the treatment gap for SUDs.

SUD treatment and MAT proportions in high income countries were double those in low/middle income countries, consistent with other evidence of SUD intervention coverage [52]. Moreover, in low/middle income countries, the proportion receiving MAT was lower for those with pure, compared to comorbid, SUDs. The WHO Mental Health Gap Action

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Programme (mhGAP) Intervention Guide [53, 54] has identified evidence based interventions for SUDs that could feasibly be scaled up in high and low/middle income countries. These include: self-monitoring of high-risk behaviours for substance abuse; guideline-concordant pharmacological and psychological management of alcohol use disorders; and methadone maintenance therapy for opioid dependence and buprenorphine as opioid substitution therapy [55]. In low/middle income countries specifically, there is good evidence that contextually-appropriate regulatory and legal controls can reduce alcohol use and associated harms [56]. Preventive and treatment interventions – e.g., integrating awareness-raising of alcohol and drug misuse into the workplace and collaborative community-based care – are supported by good evidence from high income countries but require more robust evidence from low/middle income settings [55, 56]. Scaling up will require significant investment to increase system capacity, especially in countries with under-developed SUD treatment services and without substance use policies [39, 47]. Improving workforce availability and training are critical to improving detection and quality of care of SUDs [38]; in contexts where specialist skills are scarce, task sharing and transitioning clinical specialists from direct service provision to supervisory roles may help to build capacity [55].

Conclusions

Improving treatment coverage and adequacy for SUDs is a global health priority [57]. We found that few people with past-year SUDs received MAT, even when comorbid with a mental disorder. Scaling up of evidence-based interventions, informed by more robust evidence of population need and intervention efficacy in low/middle income settings, could help address these treatment gaps.

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Table 1. Survey characteristics

Country	Sample characteristics	Field dates	Age range	Sample size		Response rate
				Part 1	Part 2	
Low and lower-middle income countries						
Colombia	All urban areas of the country (about 73% of the total national population)	2003	18-65	4,426	2,381	87.7%
Iraq	Nationally representative	2006-7	18-96	4,332	4,332	95.2%
Nigeria	21 of the 36 states in the country (about 57% of the national population)	2002-4	18-100	6,752	2,143	79.3%
China	Beijing and Shanghai metropolitan areas	2001-3	18-70	5,201	1,628	74.7%
Peru	Five urban areas of the country (approximately 38% of the total national population).	2004-5	18-65	3,930	1,801	90.2%
Total				**24,641**	**12,285**	**83.7%**
Upper-middle income countries						
Brazil	São Paulo metropolitan area	2005-8	18-93	5,037	2,942	81.3%
Bulgaria	Nationally representative	2002-6	18-98	5,318	2,233	72.0%
Colombia (Medellin)	Medellin metropolitan area	2011-12	19-65	3,261	1,673	97.2%
Lebanon	Nationally representative	2002-3	18-94	2,857	1,031	70.0%
Mexico	All urban areas of the country (about 75% of the total national population)	2001-2	18-65	5,782	2,362	76.6%
Romania	Nationally representative	2005-6	18-96	2,357	2,357	70.9%
Total				**24,612**	**12,598**	**77.2%**
High income countries						
Argentina	Eight largest urban areas of the country- approximately 50% of the total national population.	2015	18-98	3,927	2,116	77.3%
Australia	Nationally representative	2007	18-85	8,463	8,463	60.0%
Belgium	Nationally representative	2001-2	18-95	2,419	1,043	50.6%
France	Nationally representative	2001-2	18-97	2,894	1,436	45.9%
Germany	Nationally representative	2002-3	19-95	3,555	1,323	57.8%
Israel	Nationally representative	2003-4	21-98	4,859	4,859	72.6%
Italy	Nationally representative	2001-2	18-100	4,712	1,779	71.3%
Japan	Eleven metropolitan areas	2002-6	20-98	4,129	1,682	55.1%
The Netherlands	Nationally representative	2002-3	18-95	2,372	1,094	56.4%
New Zealand	Nationally representative	2004-5	18-98	12,790	7,312	73.3%
Northern Ireland	Nationally representative	2005-8	18-97	4,340	1,986	68.4%
Poland	Nationally representative	2010-11	18-65	10,081	4,000	50.4%

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Portugal	Nationally representative		2008-9	18-81	3,849	2,060	57.3%
Spain	Nationally representative		2001-2	18-98	5,473	2,121	78.6%
Spain-Murcia	Murcia region		2010-12	18-96	2,621	1,459	67.4%
United States	Nationally representative		2001-3	18-99	9,282	5,692	70.9%
Total					**85,766**	**48,425**	**63.1%**
Overall sample					**135,019**	**73,308**	**68.5%**

[a] The World Bank (2012) Data. Accessed May 12, 2012 at: http://data.world bank.org/count ry. 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.

[b] 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.

Table 2. Any substance use disorder treatment and minimally adequate treatment among all respondents with past-year substance use disorder, by country income group and comorbidity with mental disorders

	N	Distribution of SUD	Any 12-month SUD treatment[2]	MAT[3] among those with 12-month SUD treatment	MAT[3] total	Type of professional						Treatment from healthcare among treated cases	MAT[3] from healthcare among treated cases
						Healthcare[4]			Non-healthcare[5]				
						12-month treatment	MAT[3] within healthcare	MAT[3] total	12-month treatment	MAT[3] within non-healthcare	MAT[3] total		
		% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)	% (SE)
All Countries	2,446		**11.0 (0.8)**	**77.9 (2.2)**	**8.5 (0.7)**	**9.3 (0.7)**	**84.4 (1.9)**	**7.9 (0.7)**	**1.7 (0.3)**	**40.9 (4.5)**	**0.7 (0.2)**	**84.9 (1.5)**	**92.1 (0.8)**
SUD only	1,395	63.1 (1.2)	6.8 (0.7)	68.3 (3.8)	4.7 (0.6)	5.4 (0.6)	81.4 (2.3)	4.4 (0.6)	1.4 (0.4)	-^	0.3 (0.1)	78.8 (3.0)	93.8 (0.6)
SUD and at least one comorbid mental disorder[1]	1,051	36.9 (1.2)	18.1 (1.6)	84.0 (2.5)	15.2 (1.5)	16.1 (1.4)	86.2 (2.5)	13.8 (1.4)	2.0 (0.5)	-^	1.3 (0.4)	88.9 (1.9)	91.2 (1.5)
X^2_1 between SUD only and SUD and at least one comorbid mental disorder[6] [p-value]			68.3* [<0.0001]	13.1* [0.0003]	72.9* [<0.0001]	68.6* [<0.0001]	2.0 [0.1590]	60.8* [<0.0001]	0.8 [0.3615]	-^	14.5* [0.0001]	7.7* [0.0054]	2.3 [0.1335]
Low/Middle income countries	636		**6.3 (0.9)**	**68.4 (2.7)**	**4.3 (0.8)**	**5.3 (0.8)**	**65.8 (3.2)**	**3.5 (0.7)**	**1.0 (0.4)**	**-^**	**0.8 (0.4)**	**83.7 (0.4)**	**80.6 (0.0)**
SUD only	983	68.8 (1.9)	4.4 (0.8)	59.1 (2.6)	2.6 (0.6)	3.8 (0.7)	58.8 (3.0)	2.3 (0.6)	0.6 (0.3)	-^	0.3 (0.2)	-^	-^
SUD and at least one comorbid mental disorder[1]	827	31.2 (1.9)	10.6 (2.2)	76.9 (2.7)	8.1 (1.8)	8.5 (1.8)	72.9 (3.5)	6.2 (1.4)	2.1 (1.2)	-^	1.9 (1.2)	80.3 (1.4)	-^
X^2_1 between SUD only and SUD and at least one comorbid mental disorder[6] [p-value]			11.4* [0.0007]	217.4* [<0.0001]	14.8* [0.0001]	9.1* [0.0025]	151.6* [<0.0001]	12.1* [0.0005]	3.6 [0.0579]	-^	4.3* [0.0391]	-^	-^
High income countries	1,810		**12.5 (1.0)**	**79.5 (2.5)**	**9.9 (0.9)**	**10.6 (0.9)**	**87.5 (2.0)**	**9.3 (0.9)**	**1.9 (0.4)**	**33.4 (5.0)**	**0.6 (0.2)**	**85.2 (1.8)**	**93.8 (1.0)**
SUD only	983	61.3 (1.4)	7.7 (0.9)	70.3 (4.5)	5.4 (0.8)	5.9 (0.8)	86.9 (2.6)	5.2 (0.8)	1.8 (0.5)	-^	0.3 (0.1)	77.0 (3.6)	95.1 (0.6)
SUD and at least one comorbid mental disorder[1]	827	38.7 (1.4)	20.1 (1.8)	85.0 (2.8)	17.1 (1.8)	18.1 (1.7)	87.8 (2.8)	15.9 (1.7)	2.0 (0.5)	-^	1.2 (0.4)	90.1 (2.2)	93.1 (1.7)
X^2_1 between SUD only and SUD and at least one comorbid mental disorder[6] [p-value]			53.2* [<0.0001]	8.4* [0.0037]	56.3* [<0.0001]	55.2* [<0.0001]	0.1 [0.8010]	47.8* [<0.0001]	0.1 [0.7799]	-^	11.2* [0.0008]	8.9* [0.0029]	1.1 [0.2961]
X^2_1 between Low/Middle and High income countries[6] [p-value]		9.6* [0.0020]	18.9* [<0.0001]	9.7* [0.0019]	19.2* [<0.0001]	18.2* [<0.0001]	36.7* [<0.0001]	25.6* [<0.0001]	1.8 [0.1745]	-^	0.3 [0.5694]	0.6 [0.4302]	51.4* [<0.0001]

SUD - substance use disorder; SE - standard error; MAT – minimally adequate treatment

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^ Estimates are excluded as the denominator of the cell contained less than 30 cases.

Estimates are based on weighted Part II data and restricted to those aged 18+ at time of interview.

N = The total unweighted number of respondents.

[1] Includes: depression (with hierarchy); generalised anxiety disorder (with hierarchy), (broad) bipolar disorder (includes bipolar I, bipolar II and bipolar subthreshold), panic disorder, social phobia, specific phobia and agoraphobia (without panic) disorder. If any disorder was not assessed in a particular survey, the diagnosis for all respondents was set to 'no' for that disorder.

[2] SUD treatment was defined as having either received professional treatment or attended a self-help group for substance related problems in the past year.

[3] .MAT was defined as having received SUD treatment in the past 12 months AND (having received 4+ medical doctor visits OR 6+ visits to a non-medical doctor OR still in treatment at the time of interview).

[4] Psychiatrist, general medical or any mental healthcare, with/without non-healthcare provider.

[5] Human services, self-help groups or complementary alternative medicine.

[6] Desgin-adjusted chi-square test of homogeneity to determine if there is variation in estimates across groups [p-value], with * indicating significant at the 5% level.

Table 3. Logistic regression results investigating association between having a comorbid mental disorder and receiving "any" and "minimally adequate" 12-month substance use disorder treatment

Response	Among those with…	Comorbid mental disorder[1] (Ref: No)			
		Bivariate		Multivariable[4]	
		OR	(95% CI)	OR	(95% CI)
All Countries					
Any 12-month SUD treatment[2]	Past-year SUD[3]	2.72*	(2.01-3.67)	2.34*	(1.71-3.20)
Minimally adequate treatment[3]	Any 12-month SUD treatment	2.92*	(1.54-5.53)	2.48*	(1.23-5.02)
Minimally adequate treatment[3]	Past-year SUD[3]	3.34*	(2.35-4.74)	2.75*	(1.90-3.97)
Low/Middle income countries					
Any 12-month SUD treatment[2]	Past-year SUD[3]	2.40*	(1.36-4.21)	2.44*	(1.38-4.32)
Minimally adequate treatment[3]	Any 12-month SUD treatment	-[5]		-[5]	
Minimally adequate treatment[3]	Past-year SUD[3]	2.82*	(1.48-5.39)	2.97*	(1.55-5.69)
High income countries					
Any 12-month SUD treatment[2]	Past-year SUD[3]	2.71*	(1.91-3.84)	2.29*	(1.60-3.29)
Minimally adequate treatment[3]	Any 12-month SUD treatment	3.14*	(1.48-6.67)	2.49*	(1.09-5.68)
Minimally adequate treatment[3]	Past-year SUD[3]	3.29*	(2.21-4.91)	2.68*	(1.75-4.10)

SUD - substance use disorder; OR - odds ratio; CI - confidence interval
*/** Significant at the 5% significance level.
All logistic regression analyses are based on weighted Part II data and include survey dummy variables.
[1] Includes: depression (with hierarchy); generalised anxiety disorder (with hierarchy), (broad) bipolar disorder (bipolar I, bipolar II and bipolar subthreshold), panic disorder, social phobia, specific phobia and agoraphobia (without panic) disorder.
[2] Any SUD treatment was defined as having either received professional treatment or attended a self-help group for substance related problems in the past year.
[3] Minimally adequate treatment is defined as having received SUD-specific professional treatment in the past 12 months AND (having received 4+ medical doctor visits OR 6+ visits to a non-medical doctor OR still in treatment at the time of interview).
[4] Multivariable models adjust for age (<25 years, 25-34 years, 35-44 years, and 45+ years), gender, income level (survey-specific levels defined as low, low-average, high-average, and high), marriage status (never married, married/cohabitating, and separated/widowed/divorced), and education level (survey-specific levels defined as low, low-average, high-average, and high). In the models including all countries, country income level (low/middle, and high) was also included.
[5] Analyses excluded as the denominator contained less than 50 cases.

Figure 1. Forest plot with 95% confidence intervals for odds ratios of comorbid mental disorder (reference=no) associated with receipt of any treatment among all substance use disorders (SUDs), minimally adequate treatment (MAT) among treated SUDs and MAT among all SUDs, for all countries combined (blue), and by low/middle income (red) and high income (green) countries (reference line at 1); note – there were not enough cases to analyse MAT among treated SUDs in low/middle income countries only so no estimate is provided