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Patterns and predictors of the transition between minimally adequate treatment and effective treatment coverage for mental disorders: results from the World Mental Health Survey

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Abstract

Background The quality of mental disorder treatment varies widely, with many patients not receiving treatments based on evidence-based guidelines. We examine data from the World Mental Health (WMH) surveys to investigate prevalence and correlates of receiving effective treatment coverage (ETC) among patients receiving minimally adequate treatment (MAT) in the 12 months before interview.

Methods Data come from 25 WMH surveys carried out in 21 countries that included $n = 1,119$ participants who met the criteria for at least one of nine 12-month disorders considered here who received MAT for $n = 2,313$ disorders. MAT was defined as either (i) medication with 4 + healthcare visits or (ii) 8 + counseling sessions. ETC was defined as a subset of MAT that additionally required (i) medication appropriate for the disorder (e.g., mood stabilizers, anticonvulsant, or antipsychotic for bipolar disorder) taken with adequate control and adherence; and/or (ii) 8 + counseling sessions with a mental healthcare provider. Multivariable regression analysis with person-disorder treated as the case was used to examine associations of socio-demographic, disorder-related, and treatment-related factors with receiving ETC given MAT.

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Results Fewer than half (47.1%) the cases with MAT received treatment qualifying as ETC. The strongest predictors of ETC given MAT were high patient education, mild/moderate disorder severity, treatment by a mental health specialist rather than primary care provider, and receipt of combined treatment with both medication and counseling rather than only one of these types of treatment. Importantly, combined treatment was associated with a significantly higher relative-risk of ETC if it was provided by a psychiatrist rather than a combination of a general medical provider and a non-psychiatrist mental health provider.

Conclusions Noteworthy limitations include the data being cross-sectional, the predictor set being restricted, and the outcome being defined in terms of structural characteristics rather than fidelity of implementation. Within the context of these limitations, results suggest that fewer than half of cases with minimally adequate treatment receive treatment meeting published guidelines for effective treatment coverage. This finding underscores the importance of improving treatment. Future research should focus on targets to improve each stage of the help-seeking process beginning with entry into treatment through receipt of ETC.

Keywords Adequacy of treatment, Cross-national, Mental disorders treatment, Effective treatment coverage, World Mental Health Survey Consortium

Background

The likelihood that an individual will have a mental disorder at some point in their lifetime is roughly 50% [1]. Evidence-based treatments exist for many of these disorders. A critical issue is whether these treatments are provided effectively to individuals who obtain treatment. We know of many obstacles to initiating treatment, remaining in treatment, and receiving adequate care while in treatment. A recent report based on community epidemiologic surveys in 21 countries from the World Mental Health (WMH) Survey Consortium suggested that this combination of barriers results in fewer than 10% of cases of mental disorders receiving an evidence-based treatment [2]. A series of subsequent WMH reports attempted to trace out predictors of key transitions in this coverage cascade, including predictors of problem recognition [3], barriers to initial contact with the treatment system given problem recognition [4], obtaining treatment [5], and treatment being minimally adequate [6].

The current report builds on these earlier studies by using WMH data to estimate the prevalence and predictors of receiving 12-month evidence-based treatment, given minimally adequate treatment. The concept of Minimally Adequate Treatment (MAT) was developed to represent a minimum threshold of treatment that goes beyond simply contacting a treatment provider [6, 7]. Yet, MAT falls short of meeting the standards for evidence-based guidelines from organizations such as the American Psychological Association (APA), the National Institute for Health and Care Excellence (NICE), and the World Health Organization (WHO) [8–12]. The most widely adopted definition defines MAT as receiving either (i) psychotropic medication plus ≥ four visits to any healthcare provider in the past 12 months or (ii) ≥ eight counseling sessions with any professional other than a general medical provider of MAT [13]. These criteria were informed by recommendations suggesting that at least four visits are generally the minimum necessary for proper medication assessment, initiation, and monitoring during the acute and continuation phases of pharmacotherapy, while eight counseling sessions reflect the minimum shown to be effective in most clinical trials. We modified this definition to require that sessions with a psychiatrist counted as counseling only if the average duration was ≥ 30 min in instances where the patient also received psychotropic medication to distinguish these visits from medication checks [14].

In using the term *effective treatment coverage* (ETC), which is operationalized identically to the term *effective treatment* (ET) used in our earlier report [2], we refer to receiving the full recommended dose and regimen of treatment based on evidence-based recommendations but recognizing that the subtleties of the full treatment regimen determining whether the treatment achieves therapeutic benefits are not captured by these structural characteristics. As detailed below, our definition of ETC went beyond that of MAT to require that medications were appropriate for the disorder and taken with adequate control and adherence and that counseling sessions were with a mental healthcare provider. ETC serves as a benchmark for health services researchers and policy analysts to assess quality of care against established treatment guidelines [15]. Importantly, treatment outcome data among the recipients of treatment were not obtained in the WMH survey.

The current report presents the results of analysis of individual-level predictors of ETC given MAT. This is critical, although underexplored, because it examines the quality of patient care and whether the interventions established in controlled trials reach patients in ways that are likely to be effective. Our prior research has focused largely on the different stages leading to treatment entry (e.g., [2, 15]). Among the key findings are that among

individuals with a diagnosable disorder, approximately 60% do not perceive a need for treatment [3]. Among those who do perceive a need, many would rather manage the disorders on their own [4]. We also found that only a small minority of those who receive treatment obtain MAT [6]. In the current report, we present data on the step from receiving MAT to receiving ETC. Such separate analyses of different stages are essential because the factors that predict who moves from one stage to the next vary across stages. The present study builds on our earlier finding that a substantial proportion of cases that receive MAT fail to receive ETC [2], with the definitions identical to those used in that earlier report, but in the current report, we investigate the predictors of this conditional outcome. We consider associations with socio-demographics, disorder characteristics, history of prior treatment, and characteristics of current treatment. Understanding these patterns and predictors is crucial for overcoming barriers and scaling up effective treatment coverage globally.

Methods

Sample

The WMH Surveys are a coordinated series of community epidemiologic surveys carried out in countries around the world using a consistent interview schedule and consistent set of field and post-processing procedures for purposes of making valid cross-national comparisons of prevalence and correlates of mental disorders [1, 16]. The current report uses data from 25 WMH surveys carried out in 21 countries between 2001 and 2019, encompassing a total of n = 117,739 respondents aged 18 and older (Supplementary Table 1, Additional File 1). Sixteen of these surveys were nationally representative, and the other nine were representative of specific regions or metropolitan areas. The participating countries included 13 high-income countries (15 surveys) and eight low-or-middle-income countries (10 surveys) classified by the World Bank. Response rates varied widely (45.9–97.2%), with a weighted average response rate of 69.3% across surveys calculated using the American Association for Public Opinion Research's response rate 1 method for two-phase sample designs [17].

The current report examines data from n = 1,119 participants across surveys who met the criteria for at least one of nine 12-month disorders and received treatment within 12 months of the survey. All participants met the criteria for MAT for at least one of their 12-month disorders. The primary purpose of the work reported here was to evaluate which cases proceed from MAT to ETC.

The n = 1,119 participants who received MAT accounted for n = 2,313 treated 12-month disorders that met criteria for MAT. Treatment was assessed separately for each disorder. Person-disorder was the unit of analysis and is referred to here as the "case". This means that a single respondent could be included in the analysis for one disorder they were treated for based on receiving MAT for that disorder, but excluded for other untreated disorders and that this same respondent might be coded as receiving ETC for one disorder receiving MAT and not for a second disorder receiving MAT. The use of an analysis method that defines cases as person-disorders facilitates making such distinctions. It is noteworthy, though, that we bring the whole patient back into the analysis by including information about comorbidity among the predictors. The report follows the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for reporting observational studies [18].

Study procedures

As detailed elsewhere [19], WMH surveys are carried out by trained lay interviewers who conduct in-person interviews with respondents in their homes. Once a household is selected for the study, respondents are randomly selected from eligible household residents for interviews. Interviewers undergo standardized training before fieldwork, with measures in place to monitor performance and ensure consistent data collection, cleaning, and coding across surveys. Written informed consent is obtained from all participants before administering interviews. Study procedures are approved by the institutional review boards in each country before surveys are implemented.

To reduce respondent burden, WMH interviews are divided into two parts. Part I, administered to the total sample, assesses core mental disorders, while Part II, conducted with a sub-sample, collects information on additional disorders and correlates, including treatment history. The Part II sample includes all respondents meeting lifetime criteria for any disorder assessed in Part I, along with a probability subsample of other respondents. To account for the under-sampling of Part I respondents in the Part II sample, Part II data are weighted by the inverse probability of selection, ensuring that weighted prevalence estimates for Part I disorders remain consistent between the Part I and Part II samples. Additional weights are then applied to adjust for differential probabilities of selection within households and to align the sample with population distributions based on socio-demographic and geographic characteristics from census data. This Part II sample for the surveys considered here included a total of n = 56,927 respondents. All analyses presented in this study were conducted using the weighted Part II data.

Measures

Socio-demographics. The socio-demographic variables considered in the analysis included sex, age (18–29,

30–44, 45–59, 60+), education (categorized into four levels based on the country-specific education system [20]), employment status (homemaker, retired, student, disabled/unemployed, or employed), and health insurance (private or occupational, public insurance, any, and none).

Mental disorders. The WMH surveys use the WHO Composite International Diagnostic Interview (CIDI 3.0), a fully structured interview designed to be administered by trained lay interviewers, to assess lifetime prevalence of mental disorders according to the criteria of both the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and the 10th revision of the International Classification of Diseases (ICD-10) criteria [21]. We focus on participant reports that each syndrome was present in the 12 months before the survey, based on a single question for each disorder, for nine disorders that were assessed across all the surveys: five anxiety disorders (generalized anxiety disorder, panic disorder/agoraphobia, social phobia, specific phobia, and post-traumatic stress disorder), two mood disorders (major depressive disorder and bipolar spectrum disorder, including bipolar I, II, and subthreshold bipolar disorder, defined elsewhere [22], and two substance use disorders (alcohol use disorder and drug use disorder, encompassing both abuse and dependence). Previous clinical reappraisal studies have shown that CIDI diagnoses of these disorders have good concordance with diagnoses based on blinded gold standard clinical reappraisal interviews carried out by trained clinical interviewers [7, 23–28]. As detailed in an earlier report [2], a composite variable constructed using a random forest machine learning algorithm to summarize the associations of multivariable disorder profiles with ETC in the total sample (i.e., both those that received and did not receive treatment) was also used as a control in evaluating associations of individual disorders with ETC. Details on the construction of that composite are provided in the eMethods section of the earlier report [2].

Severity. Each respondent was defined as having a severe, moderate, or mild 12-month disorder profile using definitions established in prior WMH studies (e.g [19, 29, 30]). Profiles were defined as severe if the respondent either (i) met criteria for Bipolar I disorder and/or substance use disorder with a physiological dependence syndrome; (ii) made a suicide attempt in the past 12 months; or (iii) reported severe role impairment in any role domain for at least one month in the past 12 due to mental or substance use disorders. Severity was defined as moderate otherwise if the respondent reported moderate role impairment for at least one month or a 12-month substance use disorder without a physiological dependence syndrome. All other 12-month cases were defined as mild. It is important to note that the severity level was defined as the patient level rather than the case (i.e., person-disorder) level, as clinical severity is inherently defined by comorbidity and cannot be differentiated clearly at the disorder level.

Age-of-onset. Participants reported the age when they first experienced symptoms separately for each disorder. This information was included in the analysis to predict 12-month ETC based on the hypothesis that disorders with an earlier age-of-onset (AOO) may be recognized and treated over time more often than disorders with more recent onsets. For each disorder, median and interquartile range (IQR) AOO were also calculated and used to examine associations between AOO and the likelihood of receiving ETC.

Perceived need for treatment. Earlier WMH analyses documented a strong association between participants' recognition of needing treatment and likelihood of obtaining treatment [5]. However, it remains unclear whether perceived need is also linked to receiving ETC given MAT. Patients who fail to meet criteria for ETC might have sought treatment primarily due to external pressures from others, which might be associated with increased likelihood of treatment dropout. To explore this possibility, perceived need was included as a potential predictor of ETC in the current analysis. Perceived need was operationalized by asking respondents whether seeking professional help was their own decision or if it occurred only due to pressures from others.

Treatment sector. WMH respondents were asked if they ever received treatment for issues related to emotions, nerves, mental health, or substance use and, if so, which types of professionals they ever saw. The categories of providers were adjusted for local contexts while maintaining 11 consistent categories across surveys that were subsequently collapsed into five broad types: *(i) psychiatrist*; *(ii) other mental health professionals*: psychologist, counselor or social workers in a mental health-specialized setting, any other mental health professional (e.g., psychotherapist or mental health nurse); *(iii) general medical*: general practitioner/primary care doctor, any other medical doctor other than a psychiatrist, and any other health care provider (e.g., nurse or physician's assistant other than a mental health provider); *(iv) human services*: social worker or counselor in a human services setting, spiritual advisor; and *(v) complementary or alternative medicine* (CAM): internet or self-help groups, or any other type of healer. For each of the 11 broad categories, respondents who reported lifetime treatment were asked about their age when they first sought treatment, recency of treatment, and number of visits in the past 12 months.

Separate question series outside the 11 category-specific types were then asked about lifetime receipt of pharmacotherapy and psychotherapy. The lifetime pharmacotherapy and psychotherapy questions did not

inquire further about the types of medication or psychotherapy received. However, respondents who reported 12-month use of psychotropic medications were presented with country-specific lists of all available antidepressants, anxiolytics, hypnotics, antipsychotics, and mood stabilizers and asked to report all medications they used, even if only once, over the past 12 months. Twelve-month counseling was defined as receiving treatment in any treatment sector other than general medical (including HS and CAM). However, a psychiatrist was not considered to have provided counseling if the appointment was less than 30 min if medication was given, as a visit of the latter sort was assumed to be a medication check. Importantly, the above treatment questions were not disorder-specific, which means that the aspects of ETC criteria involving medication control and duration of psychotherapy were assumed to be constant within patients across disorders.

Prior treatment history Respondents who reported first contact with a given type of treatment provider > 2 years before age at interview were defined as having had prior contact with that type of provider. Respondents were asked, "Did you ever get a prescription or medicine for your emotion, nerves or mental health or substance use from any type of professional?" and, if so, were asked their age at first doing so. Those who reported age of first receiving medication > 2 years before age at interview were defined as having had prior medication. Respondents were also asked, "Did you ever have a session of psychological counseling or therapy lasting 30 minutes or longer with any type of professional?" and, if so, were asked their age at first doing so. Those who reported age that first receiving counseling > 2 years before age at interview were defined as having had prior counseling. A separate set of disorder-specific questions asked respondents whether they ever received treatment for the disorder (without asking about type or sector of treatment), if so, whether this treatment was ever helpful, and, if so, age at first receiving helpful treatment for the disorder. Responses of respondents who reported that their age of first receiving disorder-specific treatment was > 2 years before age at interview were included in the analysis of the role of prior helpful and unhelpful treatment in predicting 12-month ETC.

Effective Treatment Coverage (ETC). As noted above, the definitions of MAT and ETC used here are identical to those in our earlier reports [2, 6] but are described in somewhat more detail here. Because severity is associated with different needs [13, 31], we defined ETC for mild/moderate disorders as requiring either evidence-based pharmacotherapy or evidence-based psychotherapy. But there were two exceptions. The first was specific phobia, where we required evidence-based psychotherapy. The second was bipolar disorder, where we required evidence-based pharmacotherapy. In other cases, we required both evidence-based pharmacotherapy and psychotherapy for a case to be defined as receiving ETC.

Following previous WMH studies, evidence-based pharmacotherapy was defined for MDD, PTSD, GAD, panic/agoraphobia, and social phobia as taking an antidepressant with adequate medication control and adherence [15, 32–34]. Adequate medication control was defined as at least four visits with a healthcare professional over 12 months [13]. Adequate adherence was defined as missing the prescribed daily dose no more than 10% of days [35–37]. As some patients may be prescribed non-antidepressants due to side effects, failed trials, or other reasons, we also considered pharmacotherapy as evidence-based if non-antidepressants were prescribed by a psychiatrist. For bipolar disorders, evidence-based pharmacotherapy required a mood stabilizer or antipsychotic. For substance use disorders, no restrictions were placed on medication type (requiring only adequate medication control and adherence). Participant reports about types of medication used were based on a comprehensive list of psychotropic medications available in hard copy that varied somewhat across countries because of differences in availability and the use of different trade names. See, for example, the US list in the pharmacoepidemiology section: [38].

Evidence-based psychotherapy required at least eight sessions with a mental health provider [13]. Psychiatrists' visits needed to last at least 30 min to be considered "psychotherapy" rather than medication control if the patients were also receiving medication. It is important to note that this definition of ETC requires that medication be received from a healthcare professional and psychotherapy from a mental health professional. This differs from the definition of MAT, which, unlike ETC, can be obtained by patients seen exclusively in the human services or CAM sectors.

Country-level predictors: In an earlier analysis of country-level predictors of ETC in the total sample of WMH respondents with 12-month disorders [2], we considered associations involving four sets of widely-studied country-level predictors obtained from the United Nations, World Bank, World Health Organization, government agencies in the participating countries, and aggregation of individual-level reports in the WMH surveys: (i) nine human development indicators (e.g., World Bank designations of countries as high-income versus low- or middle-income, median years of education, per capita GDP, gender inequality index); (ii) four indicators of healthcare spending (total spending as a fraction of GDP, government spending as a fraction of total spending, out of pocket spending as a fraction of total spending, mental healthcare spending as a fraction of total spending); (iii) four indicators of direct availability of

resources per 100,000 in the survey year (non-psychiatrist MDs, psychiatrists, psychologists, hospital beds); and (iv) two indicators of stigmatization of care (based on mean country-level response to WMH questions). As it happened, though, only one of these indicators, total healthcare spending as a fraction of GDP, was a significant predictor of ETC in the total sample. We consequently included it in the current analysis.

Statistical analysis procedures

As noted above in the description of the sample, weights were applied to the data to adjust for differences in within-household probabilities of selection and to calibrate the samples to match Census population distributions on socio-demographic and geographic variables. An additional Part II weight was then used to adjust the Part II sample for differential probabilities of selection from Part I. Analysis then began by coding the small number of missing values (fewer than 1% for most variables) conservatively when they involved symptoms (i.e., coding missing symptom ratings as if the respondent did not experience these symptoms) and in other cases either to medians (in the case of ordered variables) or modes (in the case of categorical variables). Cross-tabulations were then used to estimate 12-month ETC prevalence among cases with MAT by disorder followed by regression analyses that paralleled those carried out in our earlier reports on the predictors of ETC in the total sample [2], initial contact with the treatment system [5], and MAT given treatment contact [6] to investigate associations of disorder characteristics (type, number, severity), socio-demographics, prior treatment history, and current treatment types with ETC given MAT. We began by considering predictors one at a time, then in broad classes, and finally, all significant predictors in a single model.

All regression models were estimated using a modified Poisson link function for a dichotomous outcome in STATA [39] with robust standard errors to account for overdispersion and to adjust for the effects of the data being weighted, geographically clustered, and including multiple observations for respondents with comorbid disorders [40]. The regression coefficients from these models were transformed to create risk ratios (RRs), while the transformed coefficients ± 2 design-based standard errors were used to create 95% confidence intervals (CIs) of the RRs. Significance of RR sets defining a single categorical variable (e.g., the three dummy variables distinguishing low, low-average, high-average, and high education categories) was evaluated with Wald χ^2 tests based on design-corrected coefficient variance-covariance matrices. Statistical significance was evaluated consistently using two-sided 0.05-level design-based tests that adjusted for the effects of the data being weighted and geographically clustered, as well as for some respondents contributing multiple cases to the analysis.

We addressed the problem of false positives among the many tests carried out by focusing on multivariable significance tests for sets of related predictors and only interpreting individually significant coefficients if the set in which these coefficients were embedded was significant. We chose this approach over multiple comparison correction methods for individual coefficients, like the Bonferroni test, because the latter is overly conservative [41]. The coefficients for individual-level predictors were estimated in pooled within-country models that included dummy variables for country, whereas the coefficient for the one country-level predictor considered was estimated in a multi-level model adjusting for between-country compositional differences in the individual-level predictors.

Results

Sample characteristics

As noted previously, the sample included n = 1,119 survey respondents who experienced n = 2,313 12-month disorders that received MAT. Roughly two-thirds (69.6%) of the latter cases occurred to women and exactly the same percent (69.6%) to respondents aged 30–59. Associations of these and other socio-demographic characteristics with disorder prevalence [2], perceived need for treatment given prevalence [3], obtaining any treatment given prevalence in the presence and absence of perceived need [5], and MAT given any treatment [6] have been presented in previous WMH reports.

Effective treatment coverage as a function of disorder type, number, and severity

Fewer than half (47.1%) of treated cases with MAT met ETC criteria, with only modest variation across disorder types (33.5–58.7%) (Table 1). Greater variation was observed based on disorder severity (36.3–71.4%), with more severe cases receiving higher rates of ETC. ETC was also higher in the presence rather than absence of perceived need for most comparisons, but that difference was not significant overall due to the small number of cases with MAT who lacked perceived need for treatment (47.9% versus 40.3%, χ^2_1= 1.1, p = 0.29). Regression analysis documented statistically significant variation in ETC prevalence among treated cases by disorder type (χ^2_8= 22.9, p = 0.005) and number (χ^2_2= 7.2, p = 0.029) in univariable models, but not in a within-domain multivariable model (χ^2_8= 13.7, p = 0.10 for type; χ^2_2 = 0.6, p = 0.75 for number) (Table 2). Number of years since disorder onset, in comparison, was a significant predictor of ETC in both univariable and multivariable models (χ^2_1= 9.3–15.3, p = 0.003-<0.001) but not in a preliminary consolidated model that included all initially significant

Table 1 Twelve-month effective treatment coverage (ETC) by disorder among cases with minimally adequate treatment (MAT)[a]

	Prevalence/MAT		Perceived need		Effective treatment coverage given MAT by perceived need (PN)					
					PN = yes		PN = no		Total	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
I. Anxiety disorders										
GAD	15.2	(0.7)	91.4	(1.8)	45.1	(3.4)	49.2	(10.3)	45.5	(3.2)
Panic/AGO	13.5	(0.6)	90.5	(2.0)	52.0	(3.7)	50.2	(10.8)	51.8	(3.6)
PTSD	9.2	(0.6)	92.1	(2.0)	44.7	(3.8)	20.3	(8.2)	42.8	(3.6)
Specific	14.1	(0.7)	87.5	(2.2)	46.6	(3.4)	37.9	(9.3)	45.5	(3.2)
Social	11.8	(0.6)	89.7	(2.3)	53.4	(3.4)	60.4	(11.3)	54.1	(3.3)
Any	63.8	(1.0)	90.1	(1.5)	48.4	(2.2)	45.1	(6.9)	48.0	(2.2)
II. Mood disorders										
MDD	26.6	(1.0)	89.4	(1.4)	48.3	(2.4)	35.7	(6.7)	47.0	(2.2)
BPD	5.1	(0.5)	86.7	(4.1)	38.1	(5.2)	3.2	(3.3)	33.5	(5.2)
Any	31.7	(0.9)	88.9	(1.3)	46.7	(2.1)	29.4	(6.0)	44.8	(2.0)
III. Substance use disorder										
AUD	3.1	(0.5)	70.5	(7.6)	45.9	(9.1)	41.7	(15.8)	44.7	(8.1)
DUD	1.4	(0.3)	75.8	(9.8)	57.8	(14.6)	61.2	(19.9)	58.7	(12.4)
Any	4.5	(0.7)	72.1	(6.0)	49.8	(9.4)	47.0	(14.5)	49.1	(7.5)
IV. Number of disorders										
1	18.4	(1.1)	88.8	(1.9)	51.9	(3.0)	41.0	(9.4)	50.6	(2.8)
2	27.8	(1.7)	86.2	(2.2)	43.4	(3.4)	33.5	(7.3)	42.0	(3.2)
3+	53.8	(2.0)	90.4	(2.0)	48.8	(3.1)	45.2	(10.1)	48.4	(3.0)
V. Severity										
Severe	67.2	(1.7)	88.1	(1.7)	36.8	(2.6)	32.1	(7.5)	36.3	(2.6)
Moderate	25.7	(1.6)	90.9	(2.1)	69.1	(2.9)	63.6	(9.9)	68.6	(2.7)
Mild	7.1	(0.9)	89.8	(3.6)	73.0	(4.1)	56.8	(16.9)	71.4	(4.0)
Any disorder*	100.0	(0.0)	88.9	(1.3)	47.9	(1.9)	40.3	(5.9)	47.1	(1.9)
(n) person disorder	(2,313)		(2,313)		(2,078)		(235)		(2,313)	
(n) person level	(1,119)		(1,119)		(997)		(122)		(1,119)	

ETC, effective treatment coverage; MAT, minimally adequate treatment; PN, Perceived Need for treatment; %, proportion of observation in the column total with the outcome indicated in the heading for the column; SE, the design-based standard error of % taking into consideration the weighting and geographic clustering of observations; GAD, Generalized anxiety disorder; Panic/AGO, Panic disorder or agoraphobia; PTSD, post-traumatic stress disorder; Specific, Specific phobia; Social, Social phobia; MDD, major depressive disorder; BD, bipolar spectrum disorder; AUD, alcohol use disorder (either abuse or dependence); DUD, drug use disorder (either abuse or dependence); Severe, the subset of respondents with either 12-month BD, AUD with a physiological dependence syndrome, DUD with a physiological dependence syndrome, suicide attempt, of self-reported severe role impairment due to their 12-month mental and/or substance use disorders; Moderate, the subset of respondents without severe disorder who reported moderate role impairment due to their 12-month mental and/or substance use disorders; Mild the subset of respondents with a 12-month disorder who do not qualify for either severe or moderate disorder; Any, entries in the Any rows are the weighted averages of the entries in the above rows within the same subset; (n), the unweighted number of survey observations in the denominator (i.e., in the total Part II sample of respondents in the first column, in the total sample of 12-month person-disorders in the second and last columns, in the subsample of person-disorders with perceived need in the third column, and in the subsample of person-disorders without perceived need in the fourth column)

[a]Pooled across all WMH surveys, with surveys weighted by sample size rather than by country population size

*Significant difference between PN = Yes and PN = No at the 0.05 level, two-sided design-based test

Table 2 Pooled within-country disorder-related predictors of 12-month ETC evaluated at the level of the person-disorder (n =2,313)[a]

	Distribution		Univariable		Multivariable		Preliminary Consolidated	
	%	(SE)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
I. Multivariate disorder profile for effective treatment coverage	-	-	1.0	(1.0–1.1)	1.1*	(1.1–1.2)	1.1*	(1.1–1.1)
χ_1^2	-		3.1		18.5*		18.8*	
II. Anxiety disorders[b]								
GAD	15.2	(0.7)	1.0	(0.9–1.1)	0.9	(0.8–1.0)	-	-
Panic/AGO	13.5	(0.6)	1.2*	(1.0–1.3)	1.0	(0.9–1.1)	-	-
PTSD	9.2	(0.6)	0.9	(0.8–1.0)	0.9	(0.8–1.0)	-	-
Specific	14.1	(0.7)	1.0	(0.9–1.1)	1.1	(0.9–1.2)	-	-
Social	11.8	(0.6)	1.1	(1.0–1.2)	1.1	(1.0–1.2)	-	-
III. Mood disorders								
MDD	26.6	(1.0)	1.1	(1.0–1.2)	1.0	(0.9–1.1)	-	-
BD	5.1	(0.5)	0.7*	(0.5–0.9)	0.8	(0.6–1.1)	-	-
IV. Substance use disorders								
AUD	3.1	(0.5)	1.1	(0.8–1.4)	1.2	(1.0–1.5)	-	-
DUD	1.4	(0.3)	1.2	(0.8–1.7)	1.1	(0.9–1.4)	-	-
χ_8^2	-		22.9*		13.7		-	
V. Number of disorders								
1	18.4	(1.1)	1.0	-	-	-	-	-
2	27.8	(1.7)	0.8*	(0.7–1.0)	1.0	(0.8–1.1)	-	-
3+	53.8	(2.0)	0.9*	(0.7–1.0)	0.9	(0.8–1.1)	-	-
χ_2^2	-		7.2*		0.6		-	
VI. Severity								
Severe	67.2	(1.7)	0.5*	(0.4–0.6)	0.4*	(0.3–0.5)	0.3*	(0.3-0.4)
Moderate	25.7	(1.6)	0.9	(0.8–1.1)	0.9	(0.7–1.0)	0.8*	(0.7–1.0)
Mild	7.1	(0.9)	1.0	-	1.0	-	1.0	-
χ_2^2	-		69.8*		117.0*		149.3*	
VII. Number of years since disorder onset								
Continuous (standardized median, IQR)[c]	16	(5, 30)	0.9*	(0.9–1.0)	0.9*	(0.8–0.9)	1.0	(0.9–1.0)
χ_1^2	-		9.3*		15.3*		1.9	

ETC, effective treatment coverage; MAT, minimally adequate treatment; Univariable, associations of each predictor with ETC in a separate model controlling survey and perceived need; Multivariable, associations of all disorder-related predictors with ETC in a single model controlling survey and perceived need; Preliminary consolidated, associations involving all predictors that were significant in within-domain multivariable models controlling survey and perceived need; %, predictor distribution; SE, design-based standard error of %; RR, relative risk of ETC as a function of the row predictor; 95% CI, design-based 95% confidence interval of RR; GAD through DUD, See Table 1 for an explanation of the disorder abbreviations; Severe, the subset of respondents with either 12-month BD, AUD with a physiological dependence syndrome, DUD with a physiological dependence syndrome, suicide attempt, of self-reported severe role impairment due to their 12-month mental and/or substance use disorders; Moderate, the subset of respondents without severe disorder who reported moderate role impairment due to their 12-month mental and/or substance use disorders; Mild, the subset of respondents with a 12-month disorder who do not qualify for either severe or moderate disorder; dx, diagnosis

[a]Based on modified Poisson regression models with robust standard errors to predict 12-month ETC (Coded 1) versus not ETC (Coded 0) among respondents with 12-month disorders and 12-month minimally adequate treatment (MAT) across all WMH surveys, with surveys weighted by sample size rather than by country population size and dummy variables for country included as controls, allowing coefficients to be interpreted as pooled weighted within-country coefficients

[b]RRs for type of disorder were scaled so that the product of the RRs was 1.0 across disorders

[c]Mean (SD) were 19.1 (0.3), but the variable was standardized to 0 (1) for purposes of analysis

*Significant at the 0.05 level, two-sided design-based test

within-domain predictors across domains (χ_1^2= 1.9, p = 0.17). The only disorder-related predictors that remained significant in the preliminary consolidated model were disorder severity (χ_2^2= 149.3, $p < 0.001$, with RR = 0.3 for severe relative to RR = 0.8–1.0 for moderate and mild disorders) and a multivariable disorder profile developed in an earlier WMH report to predict effective treatment coverage in the total sample [2] (χ_1^2 = 18.8, $p < 0.001$; with RR = 1.1 for a predictor that standardized probabilities of ETC based on the profile to have a mean of 0 and variance of 1.0).

Other predictors of effective treatment coverage

There was only one significant socio-demographic predictor of ETC given MAT in the preliminary consolidated model: respondent education (χ_3^2= 9.2, p = 0.029, with RR = 0.7–0.8 for respondents with low/low-average education compared to RR = 0.9–1.0 for high-average/high education; Supplementary Table 2, Additional File 1).

Other socio-demographics (e.g., respondent age and sex) had nonsignificant multivariable associations with ETC in the consolidated cross-domain model. We then examined the associations of prior (pre-12-month) lifetime treatment with 12-month MAT among treated cases. Most (83.8%) respondents with 12-month treatment had a history of prior treatment. However, in this sample of respondents who received MAT in the past 12 months, none of the aspects of prior treatment were a significant predictor of 12-month ETC in the consolidated multivariable cross-domain model (Supplementary Table 3, Additional File 1).

Several characteristics of 12-month treatment, in comparison, emerged as important predictors of ETC (Table 3). Included here were significant univariable associations across all models (i.e., univariable, within-domain multivariable, and preliminary consolidated) for provider type (χ^2_5 = 78.5–50.8, $p < 0.001$) and provider number ($\chi^2_{4/3}$ = 70.6–45.2, $p < 0.001$) as well as treatment type (χ^2_2 = 33.5–50.9, $p < 0.001$). In attempting to interpret these significant associations, though, it is important to appreciate that simple additive associations of the sort seen in Table 3 are misleading because the definition of ETC requires that treatment be received from a healthcare provider and that treatment of most severe disorders includes both pharmacotherapy and psychotherapy. This means that, as reported below, disaggregation is needed to make sense of consolidated predictor model results.

As noted in the introduction, we also examined between-country differences in ETC after adjusting for compositional differences in the above individual-level variables. Total national healthcare spending as a fraction of country GDP was positively and significantly associated with ETC in this analysis, although the association was modest in substantive terms (RR = 1.1, χ^2_1 = 12.6, $p < 0.001$).

Disaggregating consolidated results

We noted above in describing the operational definition of ETC that some cases that received MAT could not receive ETC by virtue of the types of providers they

Table 3 Treatment characteristics predicting 12-month ETC evaluated at the level of the person-disorder (n = 2,313)[a, b]

	Distribution		Univariable		Multivariable		Preliminary consolidated	
	%	(SE)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
I. 12-month provider type								
Psychiatrist	64.1	(1.8)	1.4*	(1.2–1.6)	0.9	(0.7–1.2)	1.1	(0.9–1.3)
Other mental health	57.9	(1.8)	1.8*	(1.5–2.2)	1.0	(0.8–1.3)	1.0	(0.9–1.2)
General medical	55.2	(1.5)	0.8*	(0.7–0.9)	0.6*	(0.5–0.8)	0.7*	(0.5–0.8)
Human services	13.8	(1.2)	1.0	(0.9–1.3)	0.6*	(0.4–0.8)	0.6*	(0.5–0.8)
CAM	17.4	(1.5)	0.9	(0.9–1.6)	0.5*	(0.4–0.7)	0.5*	(0.4–0.7)
χ^2_5	-		78.5*		50.8*		67.9*	
II. Number of 12-month provider types								
1	33.2	(1.6)	-	-	-	-	-	-
2	36.0	(1.7)	1.1	(0.9–1.3)	1.0	-	1.0	-
3	22.3	(1.3)	1.2	(0.9–1.4)	1.4*	(1.1–2.0)	1.5*	(1.1–2.0)
4	6.3	(0.8)	1.2	(0.9–1.7)	2.4*	(1.4–4.0)	2.7*	(1.7–4.4)
5	2.2	(0.8)	2.1*	(1.7–2.6)	7.0*	(3.6–13.8)	6.8*	(3.6–13.0)
$\chi^2_{4/3}$	-		70.6*		57.6*		45.2*	
III. 12-month treatment types[c]								
Medication-only	19.1	(0.1)	0.5*	(0.4–0.6)	0.5*	(0.4–0.6)	0.5*	(0.4–0.7)
Counseling-only[d]	13.7	(0.1)	1.4*	(1.1–1.6)	1.3*	(1.1–1.6)	1.2*	(1.0–1.4)
Both	67.2	(0.2)	1.6*	(1.4–1.8)	1.5*	(1.3–1.8)	1.5*	(1.4–1.8)
χ^2_2	-		50.9*		33.5*		47.1*	

ETC, effective treatment coverage; MAT, minimally adequate treatment; Univariable, associations of each predictor with ETC in a separate model controlling for survey and perceived need; Multivariable, associations of all disorder-related predictors with ETC in a single model controlling for survey and perceived need; Preliminary consolidated, associations of each predictor with ETC in a single model with all predictors that were significant in within-domain multivariable models across predictor domains controlling for survey and perceived need; %, the distribution of the socio-demographic predictors; SE, the design-based standard error of % taking into consideration the weighting and geographic clustering of observations; RR, relative risk of ETC as a function of the row predictor; 95% CI, the design-based 95% confidence interval of RR; taking into consideration the weighting and geographic clustering of observations

[a]Based on modified Poisson regression models with robust standard errors to predict 12-month ETC (Coded 1) versus not ETC (Coded 0) among respondents with 12-month disorders and 12 month minimally adequate treatment (MAT) across all WMH surveys, with surveys weighted by sample size rather than by country population size and dummy variables for country included as controls, allowing coefficients to be interpreted as pooled weighted within-country coefficients

[c]RRs for 12-month treatment types were scaled so that the product of the RRs was 1.0 across types

[d]Counseling was defined as seeing anyone other than a general medical provider, with psychiatrist visits required to be at least 30 min if medication was prescribed to differentiate counseling from medication control visits

*Significant at the 0.05 level, two-sided design-based test

saw. Specifically, ETC requires either evidence-based pharmacotherapy, which can be obtained only by receiving treatment from a healthcare provider, or evidence-based psychotherapy, which can be obtained only by receiving treatment from a mental healthcare provider. This means that cases that received MAT because they obtained counseling in the human services and/or CAM sectors did not receive ETC. In addition, with the exception of specific phobia, severe cases needed to receive both pharmacotherapy and psychotherapy to qualify for ETC, whereas they needed only one of the two to qualify for MAT. Based on these considerations, a total of $n = 66$ mild/moderate and $n = 456$ severe cases with MAT were disqualified from receiving ETC based entirely on the types of providers they saw and the types of treatments they received.

The effects of these definitional exclusions on estimates of RR for the variables involved in these definitional exclusions can be seen in the first two columns of Table 4. In the first column, we show the statistically significant coefficients from the final consolidated multivariable regression model in the total sample of cases with MAT (Table 4). In the second column, we show comparable results in a re-specified model after excluding the $n = 522$ (66 mild/moderate and 456 severe) cases with definitional exclusions. The total-sample results show, consistent with results in the earlier tables, an elevated RR of the multivariable disorder profile, reduced RRs with disorder severity and lower education, and significant associations involving type and number of 12-month treatment providers as well as whether treatment involved medication-only, counseling-only, or both.

The RRs associated with the multivariable disorder profile, disorder severity, and education remain relatively unchanged in the re-specified model after excluding cases with definitional exclusions. However, the RRs associated with providers and treatment types are quite different. In the case of providers, we distinguished the types of providers required for ETC: that is, healthcare providers. There are seven logically possible profiles of treatment by healthcare providers. To improve interpretation, these types were coded using what is known as *effect coding* [42]; that is, the model is specified so that the product of the RRs across these seven profiles equals 1.0. This means that the significance of these RRs is evaluated in comparative perspective with 6 degrees of freedom. Variation across the set is significant (= 52.0, $p <$ 0.001) because of significantly elevated RRs for all profiles that include being seen by a psychiatrist or other mental healthcare provider either alone or with each other relative to the average across profiles (RR = 1.2–1.3) and reduced RRs (significantly so in two of three cases) for all profiles that include being seen by a general medical provider either alone or with only one of the two types of specialty mental healthcare providers (RR = 0.6–0.9). In comparison, information about whether ancillary treatment was received in the human services and CAM sectors ($\chi^2_2 = 1.2$, $p = 0.56$) and whether healthcare treatment involved medication-only, counseling-only, or both ($\chi^2_2 = 1.2$, $p = 0.56$) was unrelated to ETC.

Further insight into these results can be obtained by disaggregating the re-specified model to distinguish between severe (the third column of Table 4) and mild-moderate (the fourth column of Table 4) cases. Results show that the multivariable disorder profile was a significant predictor among severe cases (which tend to be highly comorbid), $\chi^2_1 = 10.1$, $p = 0.002$) but not among mild/moderate cases ($\chi^2_1 = 2.6$, $p = 0.11$). The same was true for high education, which was associated with increased RR among severe cases ($\chi^2 2 = 9.9$, $p = 0.026$) but not mild/moderate cases ($\chi^2_2 = 6.2$, $p = 0.11$). While provider profile remained significant among both severe cases ($\chi^2_6 = 19.5$, $p = 0.004$) and mild/moderate cases ($\chi^2_5 = 19.1$, $p = 0.009$), the critical distinctions differed in the two sets of cases. Among mild/moderate cases, where either pharmacotherapy-alone or psychotherapy-alone is sufficient for ETC of most disorders, the most notable profile involved treatment exclusively from a general medical provider, which was associated with a significantly reduced RR of ETC than for other provider profiles (RR = 0.6). Among severe cases, in comparison, where combined pharmacotherapy-psychotherapy is required for most disorders, the most notable profile involved treatment from a general medical provider in conjunction with a non-psychiatrist mental healthcare provider in the absence of psychiatric treatment, which was associated with a significantly lower RR than for the remaining profiles (RR = 0.5). As in the total sample, information about whether ancillary treatment was received in the human services and CAM sectors ($\chi^2_2 = 0.0–3.9$, $p = 0.98 – 0.15$) was unrelated to ETC among both mild/moderate and severe cases, while whether healthcare treatment involved medication-only, counseling-only, or both was unrelated to ETC among mild/moderate cases ($\chi^2_2 = 0.8$, $p = 0.68$) but was required for most severe cases.

Discussion

This multi-national study examined receipt of ETC in a diverse sample of patients with 12-month treatment of nine different mental disorders. Among cases that received MAT, fewer than half (47.1%) received ETC. The likelihood of receiving ETC was predicted by higher patient education, lower severity, treatment by a psychiatrist or other mental health provider, and by receiving both 12-month medication and counseling rather than only one of the two. Age, sex, perceived need for treatment, and prior history of treatment did not predict receipt of ETC. There was a substantively modest but

Table 4 Pooled within-country predictors of 12-month ETC[a]

	Consolidated		After removing cases definitionally excluded from effective treatment coverage[b]					
			Total		Severe		Mild/moderate	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
I. Multivariate disorder profile for ETC	1.1*	(1.0–1.1)	1.1*	(1.0–1.1)	1.1*	(1.0–1.1)	1.0	(1.0–1.1)
χ_1^2	17.0*		18.0*		10.1*		2.6	
II. Severity (compared to mild)								
Severe	0.3*	(0.3–0.4)	0.5*	(0.4–0.6)	-	-	-	-
Moderate	0.8*	(0.7–1.0)	0.9*	(0.7–1.0)	-	-	0.9	(0.8–1.0)
$\chi_{2/1}^2$	142.5*		77.7*		-		1.8	
III. Education (compared to high)								
Low	0.7*	(0.5–0.9)	0.7*	(0.5–0.9)	0.6*	(0.4–0.8)	0.8*	(0.6–1.0)
Low-average	0.8	(0.7–1.0)	0.8*	(0.6–1.0)	0.7*	(0.5–1.0)	0.9	(0.7–1.0)
High-average	0.9	(0.8–1.1)	0.9	(0.8–1.1)	0.9	(0.7–1.1)	1.0	(0.9–1.1)
χ_3^2	11.3*		13.4*		9.9*		6.2	
IV. 12-month provider type								
Psychiatrist	1.1	(0.9–1.3)	-	-	-	-	-	-
Other mental health	1.0	(0.9–1.3)	-	-	-	-	-	-
General medical (Gen Med)	0.6*	(0.5–0.8)	-	-	-	-	-	-
Human services	0.6*	(0.4–0.8)	-	-	-	-	-	-
CAM	0.5*	(0.4–0.7)	-	-	-	-	-	-
χ_5^2	69.4*		-		-		-	
V. Number of 12-month provider types (compared to 2)								
3	1.5*	(1.1–2.0)	-	-	-	-	-	-
4	2.8*	(1.7–4.5)	-	-	-	-	-	-
5	7.1*	(3.7–13.6)	-	-	-	-	-	-
χ_3^2	48.5*		-		-		-	
VI. 6/7 category 12-month provider type								
Psychiatrist only	-	-	1.2*	(1.0–1.4)	1.2	(1.0–1.5)	1.1	(0.9–1.2)
Other mental health only	-	-	1.2*	(1.1–1.5)	1.2	(0.9–1.6)	1.3*	(1.1–1.5)
Gen Med only	-	-	0.6*	(0.4–0.9)	-	-	0.6*	(0.4–0.9)
Psychiatrist and other mental health (no gen med)	-	-	1.2*	(1.1–1.4)	1.2	(1.0–1.5)	1.2*	(1.1–1.4)
Psychiatrist and gen med (no other mental health)	-	-	0.9	(0.7–1.1)	0.9	(0.6–1.2)	0.9	(0.7–1.1)
Other mental health and gen med (no psychiatrist)	-	-	0.8*	(0.7–0.9)	0.5*	(0.3–0.7)	1.0	(0.9–1.2)
All three types	-	-	1.3*	(1.1–1.4)	1.3*	(1.1–1.6)	1.0	(0.9–1.2)
$\chi_{6/5/6}^2$	-		52.0*		19.5*		19.1*	
VII. Other 12-month provider types (human & CAM)								
Human services	-	-	1.1	(0.9–1.3)	0.9	(0.7–1.3)	1.0	(0.9–1.2)
CAM	-	-	0.9	(0.8–1.1)	0.9	(0.7–1.2)	0.8	(0.7–1.0)
χ_2^2	-		1.2		0.04		3.9	
VIII. 12-month treatment types[c]								
Medication-Only	0.5*	(0.4–0.7)	1.0	(0.8–1.2)	-	-	0.9	(0.8–1.2)
Counseling-Only	1.2*	(1.0–1.4)	1.1	(1.0–1.3)	-	-	1.1	(0.9–1.2)
Both	1.6*	(1.4–1.8)	0.9	(0.8–1.0)	-	-	1.0	(0.9–1.1)

Table 4 (continued)

	Consolidated		After removing cases definitionally excluded from effective treatment coverage[b]					
			Total		Severe		Mild/moderate	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
χ^2_2	46.7*		4.8		-		0.8	
(n)	(2,313)		(1,791)		(1,076)		(715)	

ETC, effective treatment coverage; MAT, minimally adequate treatment; Consolidated, associations of each predictor with ETC in a single model with all predictors that were significant in the preliminary consolidated multivariable model controlling for survey and perceived need; RR, relative risk of effective treatment as a function of the row predictor; 95% CI, the design-based 95% confidence interval of RR; taking into consideration the weighting and geographic clustering of observations. CAM, Complementary and Alternative Medicine

[a]Based on modified Poisson regression models with robust standard errors to predict 12-month ETC (Coded 1) versus not ETC (Coded 0) among respondents with 12-month disorders and 12 month minimally adequate treatment (MAT) across all WMH surveys, with surveys weighted by sample size rather than by country population size and dummy variables for country included as controls, allowing coefficients to be interpreted as pooled weighted within-country coefficients

[b]As noted in the text, $n=522$ cases (456 severe, 66 mild/moderate) with MAT that could not receive ETC by virtue of the types of providers they saw or types of treatment they received. These cases were removed from the last three models in the table. The Total model estimated reparametrized associations of the same predictors as in the Consolidated model with ETC. The Severe and Mild/Moderate models estimated the same associations in the subsamples of severe and mild/moderate cases, noting that the treatment types were not included in the severe model because treatment with both medication in the healthcare sector and counseling in the mental healthcare sector were required for ETC of all disorders other than social phobia

[c]RRs for 12-month treatment types were scaled so that the product of the RRs was 1.0 across types

*Significant at the 0.05 level, two-sided design-based test

statistically significant positive association between the GDP percent in the country spent on healthcare and RR of ETC. It is noteworthy that GDP percent spent on mental healthcare was not significant, reflecting the important role played by primary care in achieving mental disorder ETC.

The association of ETC with healthcare provider type is especially noteworthy. The likelihood of receiving ETC was higher among patients seen by a psychiatrist or other mental healthcare provider, either alone or in combination, in comparison to being seen by a general medical provider alone or with only one of the two types of mental healthcare providers. It is noteworthy in this regard that general medical practitioners are often the first treatment contact for mental disorders. However, our results suggest that treatment is significantly less likely than for specialty treatment to meet criteria for ETC. Among severe cases, where combined pharmacotherapy and psychotherapy is typically required to qualify as ETC, we found that treatment by a general medical provider in conjunction with a non-psychiatrist mental health care provider in the absence of a psychiatrist is associated with a significantly lower probability of receiving ETC than if treatment was provided by a psychiatrist. This is very concerning, given the worldwide shortage of psychiatrists and the fact that combined treatment is most likely to be received by a general medical professional who prescribes and manages psychotropic medication and a non-psychiatrist mental healthcare professional who provides psychotherapy. Our results suggest that improvements are needed in the organization and delivery of this type of combined treatment to guarantee receipt of effective treatment coverage.

Another implication of our findings pertains to public education. The public needs to be better informed about where to seek treatment. Since many patients seek their care from a primary care practitioner rather than a mental health professional, patients need to be educated about the greater likelihood of receiving ETC from specialty mental health professionals. Another possibility is to expand the use of the type of collaborative care model that co-locates psychiatric social workers, psychiatric nurses, or MA-level mental health counselors in primary care settings to deliver brief psychological interventions in conjunction with medication provided by a general medical provider. Programs like this have been shown to be very effective when they are delivered with high fidelity [43, 44]. Positive results have also been found for versions of this general approach that use trained and closely supervised lay counselors rather than mental health professionals to deliver counseling [45] or that provide guided digital CBT delivered by trained lay coaches [46]. It is noteworthy that we found in a prior report that treatment provided by mental health specialists and multiple provider types were also the most important predictors of receiving MAT [6]. Provider type along with type of treatment provided exerts an important influence on receiving ETC. This is especially important given that the range of effective treatments continues to expand and many new treatments, especially those associated with the proliferation of apps, chatbots, and other technology-based interventions, are not evidence-based. This may increase the challenges in educating the public about the treatments that are based on evidence and where to receive them.

Overall, our results suggest the need for additional research on ETC. Although we already know that it is not enough merely to get people into treatment or even into minimally adequate treatment, as fewer than half the patients who receive MAT go on to receive

guideline-concordant ETC, our current study adds to this understanding by providing information on the profile of patient, provider, and treatment characteristics associated with highest probability of receiving ETC given MAT. Interestingly, overall healthcare spending rather than mental healthcare spending was the key country-level predictor of this transition. More research is needed on policy-relevant country-level influences on ETC. The results presented here can serve as a guide for policy, clinical practice, and further research to direct patients to appropriate resources to increase their likelihood of receiving treatment consistent with our current understanding of best practices.

There are noteworthy limitations of the present study. First, the data were cross-sectional, which means that the temporal order between predictors and ETC was inferred rather than confirmed and that some predictors were reported retrospectively, raising the possibility of recall bias. Second, we did not have access to data about duration of each disorder over the 12-month reference period. This information would presumably be associated with probability of receiving treatment and of this treatment meeting criteria for MAT and ETC. Third, we did not evaluate ETC implementation; that is, the fidelity (integrity) or quality of treatment, which is likely to impact outcome. Fourth, we explored multiple but still only a limited set of factors that were likely to predict ETC. Other domains at the individual, provider, and system levels might further elucidate modifiable determinants of receiving ETC. Finally, and arguably most importantly, we did not evaluate treatment outcome. Receiving evidence-based treatment even when delivered in the desired dose and for the appropriate duration does not guarantee recovery. Despite these limitations, the study documented that a substantial proportion of cases that receive MAT do not receive ETC and identified factors that are systematically associated with this transition. We showed that effective treatment coverage is the exception rather than the rule in mental health care. Predictors of such coverage suggest lines of work to pursue to identify who is and who is not likely to receive ETC and whether interventions can be used to increase the likelihood that such care will be received.

Conclusions

This study examined 12-month receipt of ETC among individuals with a mental disorder who received MAT. Somewhat fewer than half of all the cases with MAT received ETC. This is an important result in underscoring the fact that contact with adequate treatment per se is not sufficient to ensure that treatments are delivered in keeping with recommended and empirically supported treatment guidelines. The strongest predictors of ETC given MAT were severity of the disorder, patient education, type of treatment provider seen, and type of treatment received. These findings point to both the need to increase the overall delivery of ETC and the need to identify factors that influence which cases are likely to receive such treatment, along with characteristics of both the treatments and providers where ETC is likely to be provided. These findings can enhance global mental health care by providing targets to increase the likelihood of patients who seek care receiving appropriate interventions.

Abbreviations

APA	American Psychological Association
AOO	Age-of-onset
CAM	Complementary or alternative medicine
CIDI	Composite International Diagnostic Interview
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
ETC	Effective treatment coverage
NICE	National Institute for Health and Care Excellence
ICD-10	International Classification of Diseases 10th revision
IQR	Interquartile range
MAT	Minimally adequate treatment
RRs	Risk ratios
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology
WMH	World Mental Health
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s13033-026-00698-w.

Supplementary Material 1

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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/.

Data availability

Access to the cross-national World Mental Health (WMH) data is governed by the organizations funding and responsible for survey data collection in each country. These organizations made data available to the WMH consortium through restricted data sharing agreements that do not allow us to release the data to third parties. The exception is that the U.S. data are available for secondary analysis via the Inter-University Consortium for Political and Social Research (ICPSR), [http://www.icpsr.umich.edu/icpsrweb/ICPSR/series/00527](http:/www.icpsr.umich.edu/icpsrweb/ICPSR/series/00527).

Declarations

Ethics approval and consent to participate

At all survey sites, the local ethics or institutional review committee reviewed and approved the protocol to ensure protection of human subjects, in line with appropriate international and local guidelines. Details of the ethics committees for the WMH surveys can be viewed at this link: https://www.hcp.med.harvard.edu/wmh/ftpdir/IRB_ethics_approval_WMH-CIDI.pdf.

Consent for publication

Not applicable.

Competing interests

In the past 3 years, Dr. Kessler was a consultant for Cambridge Health Alliance, Child Mind Institute, Massachusetts General Hospital, RallyPoint LLC., Sage Therapeutics, University of Michigan, and University of North Carolina. He has stock options in Cerebral Inc., Mirah, PYM (Prepare Your Mind), and Verisense Health. He owns an interest in Menssano LLC. DJS has received consultancy honoraria from Discovery Vitality, Johnson & Johnson, Kanna, LOreal, Lundbeck, Orion, Servier, Seaport Therapeutics, Takeda, Vistagen, and Wellcome. DVV reports grant support from Health Canada, Canadian Institutes for Health Research, Provincial Health Services Authority and an internal research grant from the University of British Columbia. The BC Ministry of Health and the Department of Interior Health made payments to Dr. Vigo with respect to contracts for projects related to mental health service provision. The remaining authors have no conflicts of interest to declare.

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