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Patterns of care and dropout rates from outpatient mental healthcare in low-, middle- and high-income countries from the World Health Organization's World Mental Health Survey Initiative

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Abstract

Background: There is a substantial proportion of patients who drop out of treatment before they receive minimally adequate care. They tend to have worse health outcomes than those who complete treatment. Our main goal is to describe the frequency and determinants of dropout from treatment for mental disorders in low, middle- and high-income countries.

Methods: Respondents from 13 low- or middle-income countries (N = 60,224) and 15 in high income countries (N = 77,303) were screened for mental and substance use disorders. Cross-tabulations were used to examine the distribution of treatment and dropout rates for those who screened positive. The timing of dropout was examined using Kaplan-Meier curves. Predictors of dropout were examined with survival analysis using a logistic link function.

Results: Dropout rates are high, both in high-income (30%) and low-middle income (45%) countries. Dropout mostly occurs during the first two visits. It is higher in general medical rather than in specialist settings (nearly 60% vs 20% in lower income settings). It is also higher for mild and moderate than for severe presentations. The lack of financial protection for mental health services is associated with overall increased dropout from care.

Conclusions: Extending financial protection and coverage for mental disorders may reduce dropout. Efficiency can be improved by managing the milder clinical presentations at the entry point to the mental health system, providing adequate training, support and specialist supervision for non-specialists, and streamlining referral to psychiatrists for more severe cases.

Keywords: Dropout; mental health; survival analysis; WMH surveys

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Introduction

The treatment gap in mental disorders is well-established. A recent report from the WHO World Mental Health (WMH) Surveys showed that only 13.7% of individuals with a 12-month Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition/Composite International Diagnostic Interview (DSM-IV/CIDI) mental disorder in low/lower-middle income countries, 22.0% in upper-middle income countries, and 36.8% in high income countries receive any type of professional treatment (Evans-Lacko et al., 2018). Only a minority of the people getting treatment received at least minimally adequate treatment when compared to accepted treatment guidelines. A major reason for this is treatment dropout (Degenhardt et al., 2017; Alonso et al., 2018; Evans-Lacko et al., 2018).

It has long been known that premature interruption of mental health treatment is a common event that has negative consequences both for the patients and the mental health care system (Swift & Greenberg, 2012). Numerous studies have been conducted to understand the causes and consequences of treatment dropout (Fassino, Pierò, Tomba, & Abbate-Daga, 2009; Roos & Werbart, 2013; Cooper & Conklin, 2015). These studies have identified socio-demographic, provider and clinical factors associated with different dropout rates. For example, young age among adults (Wang, 2007; Xiang et al., 2010), lower socio-economic status (income and education) (Centorrino et al., 2002; Warden et al., 2009a), ethnic minority status (Wang, 2007), and lack of health insurance (Edlund et al., 2002) have all been linked to increased probability of treatment dropout. However, other studies have not found a consistent relationship between these or other sociodemographic factors and treatment dropout (Olsson et al., 2009; Hoyer et al., 2016). High variability has also been reported in the frequency of dropout. For example, two meta-analyses including studies of psychotherapeutic treatment for a mental disorder reported mean dropout rates of 19.7% (Swift & Greenberg, 2012) and 47% (Wierzbicki & Pekarik, 1993). Dropout has also been

48 studied for specific disorders, including depression, posttraumatic stress (PTSD), gambling,
49 substance use disorders (SUD), and eating disorders, among others. For example, Roberts
50 Murphy, Turner and Sharman (2020) found that for gambling disorder the treatment dropout
51 rate was 51.3% and significantly associated with older age, higher education, higher levels of
52 debt, online gambling, gambling on poker, shorter duration of treatment, higher depression,
53 experience of previous treatment programs and medication, and adverse childhood
54 experiences; Belleau et al. (2017) observed that among individuals with PTSD and SUD, 35
55 to 62% of individuals drop out of treatment; and Huas et al. (2011) found that for anorexia
56 the dropout rate was above 50%. The inconsistency of findings, variability of methods, and
57 the fact that the vast majority of studies have been carried out only in high-income countries
58 limit generalizability. Moreover, most studies have focused on the analysis of treatments
59 provided for a single disorder in a single treatment sector, which may overestimate dropout
60 from overall sources of care (Olfson et al., 2009).

61 The WMH Survey Initiative is the largest effort to date to estimate the burden of
62 mental disorders worldwide, providing population epidemiological data of the prevalence,
63 correlates and treatment for mental disorders in all the continents (Kessler et al., 2009;
64 Andrade et al., 2014). The WMHSI has developed a consistent methodology to estimate the
65 burden of mental and substance use disorders. Every year new countries join the initiative,
66 which means that the same survey protocol is implemented in a new country or region,
67 increasing our sample size and expanding the applicability of our results. In addition to
68 previously reported results (Wells et al., 2013), this study includes data from new surveys
69 conducted in Argentina, Medellin (Colombia), Murcia (Spain), Peru, and Poland. It also
70 includes new variables and stratifies the analyses by early dropout (i.e. dropping out after just
71 1 or 2 visits) and late dropout (i.e. after the third or subsequent visits). Our objective is to

72 describe the frequency and determinants of dropout in population representative samples
73 from low, middle- and high-income countries or regions.

74 From a health systems perspective, dropout from care represents a relevant outcome:
75 it points to an inefficiency that frustrates the successful efforts of the person and the system to
76 produce a clinical encounter. Indeed, several steps need to take place before such an
77 encounter is possible: the person (or their significant others) needs to acknowledge a
78 problem, reach out to a health care provider, and overcome any barriers to accessibility (such
79 as wait times, out of pocket costs, paperwork, etc). So, understanding the dropout
80 phenomenon and its determinants better is of the utmost importance. As will be described in
81 more detail in the following section, we have developed a distinction between “early” and
82 “late” dropout, depending on whether it occurs during the first two encounters or after the
83 third. This distinction seeks to capture an important clinical consideration: whether the initial
84 contact was somehow frustrated or dissatisfactory for the patient, or whether the initial
85 contact was potentially established, treatment initiated, and then interrupted.

86

87 **Methods and Procedures**

88 **Sample**

89 Thirteen WMH surveys were carried out in countries classified by the World Bank as
90 low- or middle-income countries at the time of data collection (combined N = 60,224;
91 weighted mean response rate 81.1%) and 15 in countries classified as high-income (combined
92 N = 77,303; weighted response rate 63.5%) (Table 1). Eighteen of the 28 surveys (6 in
93 low/middle-income countries and 12 in high-income countries) were of nationally
94 representative multistage clustered area probability household samples. Of the surveys that
95 were not nationally representative, two included all parts of the country with the exception of

96 deeply rural areas, one included only selected regions of the country, and the remaining seven
97 included only one or more urbanized areas.

98 **(Table 1 about here)**

99 The interviews were carried out face-to-face by lay interviewers monitored closely by
100 supervisors who were trained by the WMH professional survey administration staff from the
101 Survey Research Center (SRC) at the University of Michigan's Institute for Social Research.
102 Training and field quality control procedures are discussed in more detail elsewhere (Pennell
103 et al., 2008). The interviews in most surveys were in two parts. All respondents were
104 administered the Part I interview, which contained assessments of core psychiatric disorders.
105 A subsample of Part I respondents, which included 100% of those with a Part I psychiatric
106 disorder and a probability sample of other Part I respondents, were then administered Part II.
107 This two-part subsampling was done to reduce survey burden among respondents who did
108 not have a disorder. All surveys used a Part I weight to adjust for differences in within-
109 household probability of selection and to post-stratify for discrepancies between the sample
110 and population on known demographic and geographic variables. A Part II weight was then
111 used to adjust for the under-sampling of Part I respondents who did not have any Part I
112 disorder. These weighting procedures are discussed in more detail elsewhere (Heeringa et al.,
113 2008).

114 **Measures**

115 **Translation and administration procedures:** The WMH interview schedule was
116 originally developed in English. Translation, back-translation, and harmonization of the
117 interview in local languages for use in the WMH surveys were carried out in each country
118 using WHO guidelines and monitored by a centralized back-translation monitoring
119 committee (Pennell et al., 2008). A mix of paper and pencil and computer administration
120 procedures was used, with low/middle income countries more likely than high income

121 countries to use paper and pencil administration. Informed consent was obtained in all
122 countries before beginning interviews. Local Institutional Review Boards approved and
123 monitored the procedures used to protect human subjects.

124 **Diagnostic assessment:** DSM-IV disorders were assessed with Version 3.0 of the
125 WHO Composite International Diagnostic Interview (CIDI; Kessler & Üstün, 2004), a fully-
126 structured diagnostic interview designed to be administered by trained lay interviewers.
127 Disorders were assessed using the definitions of the American Psychiatric Association DSM-
128 IV (APA, 1994). The disorders assessed included mood disorders (major depressive disorder,
129 dysthymic disorder, bipolar disorder), anxiety disorders (panic disorder, generalized anxiety
130 disorder, agoraphobia without panic disorder, social phobia, specific phobia, separation
131 anxiety disorder, post-traumatic stress disorder), externalizing disorders (attention-
132 deficit/hyperactivity disorder, conduct disorder, intermittent explosive disorder, oppositional-
133 defiant disorder), and substance disorders (alcohol and illicit drug abuse with or without
134 dependence). DSM-IV organic exclusion rules were used to make diagnoses. Methodological
135 evidence collected in clinical reappraisal studies shows that diagnoses based on CIDI 3.0
136 have generally good concordance with diagnoses based on blinded clinical reappraisal
137 interviews (Kessler et al., 2005; Haro et al., 2006). This study only included respondents with
138 a diagnosed disorder.

139 **Disorder severity:** Twelve-month DSM-IV/CIDI disorders were classified as severe,
140 moderate or mild. Respondents were classified as having a severe 12-month disorder if they
141 met criteria for bipolar I disorder, substance dependence with a physiological dependence
142 syndrome, had a suicide attempt in the past 12 months in conjunction with any 12-month
143 disorder, or if they had at least one 12-month disorder associated with self-reported severe
144 role impairment as assessed with the Sheehan Disability Scale (SDS; Sheehan, Harnett-
145 Sheehan, & Raj, 1996). Respondents not classified as having a severe disorder were classified

146 as moderate if interference was rated as at least moderate in any SDS domain or if the
147 respondent had substance dependence without a physiological dependence syndrome. The
148 remaining respondents with any 12-month disorder were categorized as mild.

149 **Treatment:** All Part II respondents were asked whether they ever received treatment
150 for “problems with your emotions or nerves or your use of alcohol or drugs.” Both outpatient
151 and inpatient treatment are included in the results, as the surveys do not distinguish between
152 treatment settings for each episode of care. Separate assessments were made for different
153 types of professionals, support groups, self-help groups, mental health crisis hotlines, and
154 complementary-alternative medicine (CAM) therapies.

155 Reports of 12-month treatment were classified into three mutually exclusive
156 categories: treatment by a psychiatrist whether or not treatment was also received from some
157 other healthcare professional; treatment by other mental health professional in the absence of
158 psychiatric treatment; and treatment in the general medical sector only. This classification
159 focuses on the level of specialization of the care required by the patient, which is tied to
160 increased costs and complexity of the care delivered. Hence, disorder severity indicates the
161 need, while the type of services used (as defined above) provides an initial breakdown of the
162 system’s resources. Of note, we are not comparing between different providers (in fact, those
163 receiving care from a psychiatrist may also receive care from a psychologist and a general
164 physician), but between levels in a stepped care model that meets increased need with
165 increasingly resource-intensive services.

166 **Treatment dropout:** Respondents who received treatment in each healthcare
167 treatment sector in the past 12 months were asked whether treatment had stopped or was
168 ongoing. Respondents that reported they stopped treatment in the healthcare sector were
169 asked whether they “quit before the [provider(s) in that sector] wanted [them] to stop”.
170 Respondents who reported quitting before the provider(s) wanted them to stop were classified

171 as having dropped out from that treatment sector. For purposes of these analyses overall
172 dropout denotes dropping out of all studied healthcare sectors. Further, we distinguished
173 whether dropout occurs during the first two encounters (i.e., early), or after the third (i.e.,
174 late). This distinction is consistent with an important clinical consideration: it may take more
175 than one encounter for the patient to sufficiently engage with a provider in order to move to
176 the next stage of care. And, we posit that three or more encounters may indicate that the
177 treatment stage was achieved. We acknowledge that this threshold is to some extent arbitrary,
178 so our findings with this respect should be interpreted with caution.

179 **Predictors:** All respondents were asked about health insurance. Responses were
180 classified into the categories state-funded or subsidized, insurance through an employer or
181 national social security, direct private/optional insurance, any other health insurance, and
182 none. Socio-demographic predictors included gender, age (18-29, 30-44, 45-59, 60+),
183 education and family income (each coded low, low-average, high-average, high), and marital
184 status (married/cohabiting, previously married, never married). Given the wide cross-national
185 variation in education, the four categories of educational attainment were coded to be
186 appropriate for the specific country. In high-income countries, the high education category
187 corresponds to a college degree, high-average to some post-secondary education without a
188 college degree, low-average to secondary school graduation, and low to less than secondary
189 education. These thresholds divide the populations of high-income countries into four groups
190 of roughly equal size. The thresholds in other countries were selected to do the same. For
191 family income, we classified high income as greater than three times the within-country
192 median per capita family income (i.e. income divided by number of family members), high-
193 average income as between one and three times than median, low-average as 50–100% of
194 that median, and low income as less than 50% median per capita family income.

195 **Analysis methods**

196 All analyses were carried out using SAS Version 9.4 (SAS Institute Inc., 2002).
197 Cross-tabulations were used to examine the distribution of treatment and dropout rates across
198 sectors. The timing of dropout was examined using Kaplan-Meier curves. Predictors of
199 dropout were examined with survival analysis using a logistic link function. Survival
200 coefficients and these coefficients +/- two standard errors were exponentiated and reported as
201 odds-ratios (ORs) with 95% confidence intervals (CIs). Separate models were examined for
202 early and later dropout. Standard errors of estimates were obtained using the SUDAAN
203 (SUDAAN 8.0, 2002) software system to adjust for the geographic clustering and weighting
204 of the WMH data. Multivariate significance tests were made using Wald χ^2 tests based on
205 coefficient variance-covariance matrices adjusted for design effects using the Taylor series
206 method. Statistical significance was evaluated using two-sided design-based tests ($\alpha=.05$).

207 **Results**

208 The distribution of treatment across providers was similar in high-income and
209 low/middle-income countries, with 30.8-32.9% of patients, respectively, treated by a
210 psychiatrist, 22.2-19.4% by other mental health professions but not psychiatrists, and the
211 remaining 47.0-47.7% treated exclusively in the general medical sector (Table 2). Mean
212 (interquartile range) number of visits (across all sectors) in high- and low/middle-income
213 countries was consistently highest among patients seen by psychiatrists (18.4 [3-21], 13.6 [2-
214 12]), intermediate among patients seen by other mental health professionals (13.5 [2-15], 6.2
215 [1-6]), and lowest among patients seen exclusively in the general medical sector (3.0 [1-2],
216 2.9 [1-3]).

217 **(Table 2 and Figure 1 about here)**

218 The treatment dropout rate was lowest in both high- and low/middle-income countries
219 among patients treated by a psychiatrist (17.2-18.5%), intermediate among those treated by
220 other mental health professions (19.9-44.2%), and highest among those treated exclusively in

221 the general medical sector (43.2-57.2%) (Table 2). However, these were all lower-bound
222 estimates because the number of patients still in treatment at the time of interview was
223 consistently higher than the number who reported successfully completing treatment, raising
224 the likelihood that some of these patients dropped out of treatment subsequent to the time of
225 interview. An estimate of these cumulative dropout rates was obtained by generating Kaplan-
226 Meier curves based on retrospective data of conditional probabilities of dropout as a function
227 of number of visits (Figure 1). Projected cumulative dropout was estimated to be close to
228 30% overall after 13 visits (the largest number for visits over which stable estimates of
229 cumulative dropout could be projected) in high-income countries and approximately 45% in
230 low/middle-income countries. Projected dropout rates varied from values close to 15% for
231 specialty treatment to nearly 50% for general medical treatment in high-income countries and
232 from 25% for psychiatry treatment to 50% for other mental health specialty treatment and
233 60% for general medical treatment in low/middle-income countries. The majority of
234 projected dropouts in each curve occurred within two visits. This was especially pronounced
235 among patients seen exclusively in the general medical sector, where well over 90% of all
236 projected dropout occurred after one or two visits.

237 **(Table 3 about here)**

238 **Predictors of treatment dropout**

239 **Severity and disorder type:** Models were estimated separately for dropout after “1 or
240 2” and “3 or more”. The severity of the clinical presentation for respondents with any
241 disorder was a significant predictor in a number of models (Table 3). For both low- and high-
242 income countries, dropout was significantly elevated among patients with mild (OR = 1.8)
243 and moderate (OR = 1.5) disorders after 1-2 visits. In high-income countries, these increased
244 odds were driven by early dropout from psychiatric treatment. The associations of severity
245 and dropout in low/middle-income countries were diverse and more nuanced. In addition to

246 the increased early dropout of people with less severe presentations (also driven by increased
247 dropout from treatment with psychiatrists; OR = 2.2 for mild and 4.7 for moderate), we found
248 a significant association of severity with dropout after 3 or more visits. The direction of these
249 associations was contingent on the type of treatment provided: people with milder clinical
250 presentations had elevated odds of dropout from treatment with a psychiatrist after 3 or more
251 visits (OR = 2.2 for mild and OR=1.9 for moderate), whereas people with severe
252 presentations that were not seeing a psychiatrist had decreased dropout after 3 or more visits
253 (OR = 0.5-0.4 for moderate in “other mental health service” and “general medical”
254 respectively). No consistent associations were found involving disorder type (see Appendix
255 Table 1), and the small numbers of respondents with some specific disorders and disorder
256 combinations precluded us from estimating more complex models combining disorder type,
257 number, and severity.

258 **(Table 4 about here)**

259 **Insurance:** Patients with no coverage (either in the form of insurance or public
260 mental health services) in high-income countries were significantly more likely to drop out
261 from psychiatric care after 3+ visits than patients who did have insurance (Table 4). This was
262 true regardless of the type of insurance the patient carried (see Appendix Table 2). The same
263 general pattern for dropout from psychiatric treatment was found in low/middle-income
264 countries (i.e., higher dropout after 3+ visits among patients with no insurance with than with
265 insurance), and this association was also significant for those seeking treatment by other
266 mental health providers. Patients with no insurance in low- and middle-income countries are
267 significantly less likely to drop out after 1-2 visits if they sought help only in the general
268 medical sector.

269 **Socio-demographics:** The socio-demographic variables considered here had
270 generally non-significant multivariate associations with treatment dropout in the 16

271 multivariate models estimated across sectors crossed by number of visits separately in
272 low/middle- and high-income countries after controlling for type-severity of disorders and
273 type of insurance. Summary multivariate results are reported in Appendix Table 3. Perhaps
274 the most striking result is that the indicators of socio-economic status (education,
275 employment, family income) are for the most part unrelated to dropout.

276 **Conclusion and Discussion**

277 These findings indicate that dropout during treatment for mental disorders is high,
278 reaching nearly 30% in high-income and 45% in low-income countries. Dropout is higher in
279 general medical rather than in specialist settings (nearly 60% vs 20% in lower income
280 settings), and higher for mild and moderate than for severe presentations. We also found that
281 the lack of financial protection for mental health services is associated with overall increased
282 dropout from specialist care, as well as with increased relative dropout rates for people with
283 milder clinical forms from psychiatric care, and for people with more severe presentations
284 from general medical services, especially in low-income settings.

285 The results of this study need to be assessed taking into consideration the following
286 limitations. First, data are based on self-report which is susceptible to recall bias. Second,
287 data do not indicate if visits in the previous 12 months correspond to a single episode of care,
288 or if the treatment from two or more professionals occurred within an interdisciplinary care
289 system. In case of visits being conducted by more than one professional, this would
290 underestimate dropout rate. Third, there is heterogeneity across the countries in disorder
291 prevalence (Demyttenaere et al., 2004), health system service organization and resources
292 (WHO, 2017) that may affect the conclusions based on pooled analyses, which was necessary
293 to avoid sparse data. Analysis by country income level and inclusion of a variable to capture
294 financial protection through insurance or public services, seek to mitigate this limitation.
295 Fourth, community surveys fail to adequately capture low prevalence disorders (such as

296 schizophrenia) due to methodological constraints; most respondents with these disorders
297 though, can be expected to meet criteria for comorbid anxiety, mood, or substance disorders,
298 and would therefore be indirectly captured in our analyses. Fifth, our analysis focuses on
299 dropout from treatments provided within the healthcare system, and does not consider
300 community supports provided through community-based human services, CAM, and support
301 groups. Sixth, we highlight that the number of visits does not imply a consistent interval of
302 time. One advantage of the application of discrete-time survival analysis models is that it
303 does not require an x-axis related to time (which would be continuous) and also allows
304 inconsistent time intervals. Similar approaches in which Kaplan–Meier curves were used to
305 examine drop out by number of visits have been published before in the area (see e.g. Edlund
306 et al., 2002; Olfson et al., 2009; Wells et al., 2013). Seventh, we also acknowledge that we
307 are not able to attribute each episode of care to specific diagnoses. However, mental health
308 providers are expected to treat people as a whole, so it is reasonable to expect that disorders
309 that meet well-established thresholds (such as CIDI diagnosed disorders) would be captured
310 by a clinical assessment performed within the healthcare system. Finally, several country-
311 specific socioeconomic and cultural characteristics may explain variations in help-seeking
312 behaviors: we have shown the impact of financial coverage on dropout rates, but also stigma
313 toward mental illness and other cultural norms may affect people’s ability to seek and remain
314 engaged care, and would be important areas of additional research.

315 Despite these limitations, our results have important implications for mental health
316 policy and systems planning. In addition to the findings summarized above, our data indicate
317 that the impact of sociodemographic variables on dropout rates is not significant. This may
318 signal that dropout is not so much a consequence of predisposing population characteristics
319 but of how the healthcare system is resourced and organized, or of how treatment is perceived
320 in terms of effectiveness (Andersen, 1995). This is consistent with a previous report of the

321 WMH Surveys Initiative (Evans-Lacko et al., 2018), and provides targets for improvement
322 that are within the health system itself (as opposed to socially pre-determined individual
323 variables).

324 Dropout generally occurs during the first two visits of care, most likely before
325 beneficial effects of treatment can be produced and perceived by the individual. This is
326 especially true of general medical services, where 90% of dropouts occur before the third
327 session. This is consistent with previous epidemiological and administrative data studies
328 (Olfson et al., 2009; Pan, Liu, & Yeh, 2013; Wells et al., 2013; Petterson, Miller, Payne-
329 Murphy, & Phillips, 2014), and highlights the need to improve training, supervision, support
330 and to review treatment practices for general health providers if they are to be effective entry
331 points to the mental health system. Indeed, patterns of dropout varied remarkably between
332 professionals and country income level. Mean number of visits was higher and dropout rates
333 lower (more than 10 visits and less than 20% dropout rates) for psychiatrists across country
334 income levels. Figures were similar for the “other health professionals” group in high-income
335 countries. However, the figures were very different (3 to 6 mean number of visits and 43 to
336 57% dropout rates) for the general medical sector across country income levels or for those
337 treated by other mental health professionals in low/middle-income countries. Given that
338 current guidelines call for common mental disorders to be treated in primary care (NICE,
339 2004; Fletcher et al., 2009), our findings indicate that significant efforts remain to be made
340 before the general medical sector can provide adequate mental care: most people actually
341 drop out before reaching the minimum required number of visits by any standard (NICE,
342 2009; APA, 2010; Gautam, Jain, Gautam, Vahia, & Grover, 2017).

343 Our findings also indicate that dropout is significantly associated with severity but not
344 with disorder type. Previous studies have been inconsistent: Simon and Ludman found an
345 association in patients with depression between severity and dropout rates (Simon &

346 Ludman, 2010; Pan et al., 2013), while Warden et al. did not (Warden et al., 2009a, 2009b).
347 With respect to specific mental disorders, some studies found variability in dropout rates
348 (Murphy et al., 2015; Oflaz et al., 2015; Fernandez-Arias et al., 2016), while others did not
349 (Gonzalez, Weersing, Warnic, Scahill, & Woolston, 2011). The granularity of our data allows
350 us to go one step further and draw preliminary conclusions that shed light on these
351 inconsistencies. In general, people with milder presentations tend to drop out more and drop
352 out earlier, but this tendency is mostly driven by dropout of treatment with psychiatrists. Data
353 from lower income settings show that, in addition to this increased dropout of people with
354 milder clinical presentations from psychiatric care, there is an increase in dropout of people
355 with more severe presentations from general medical and other mental health services. This
356 finding is relevant for health systems planning because it points to what may be the specific
357 changes required to improve outcomes. Indeed, best practices prescribe the management of
358 common and milder mental disorders through primary care, while reserving the scarce
359 specialist resources for more severe clinical presentations and for supervision of general
360 medical services. Our data indicate that in low- and middle-income settings, there may be
361 inefficiencies and potential quality gaps in how the system is organized: a subgroup of people
362 with milder clinical presentations are receiving care from psychiatrists (and dropping out
363 more than people with severe disorders), while a subgroup of people with more severe
364 clinical forms are not receiving care from psychiatrists (and dropping out more than people
365 with less severe disorders). Hence, a stepped care framework in which milder forms are dealt
366 with directly through general medical services while severe cases are systematically referred
367 to psychiatrists or managed in closer consultations with specialists seems like a promising
368 evidence-based approach.

369 Finally, these results show a significant effect of financial coverage of health services
370 (in the form of insurance or direct public provision) on dropout rates. Insurance was

371 associated with lower dropout rates after the third visit in patients being treated by
372 psychiatrists both in high-income and low/middle-income countries. In low/middle-income
373 countries, insurance was associated with lower dropout rates in treatment with other mental
374 health professionals as well. Previous studies (which were constrained to the mental health
375 sector and/or were not stratified by service provider) have also found an effect of insurance
376 on dropout rates (Warden et al., 2009b; Agarwal, Pan, & Sambamorthi, 2013). Our granular
377 data highlight the impact of financial protection on the continuity of care at different level of
378 specialization both in low- and high-income settings.

379 Collectively these findings have implications for policy and health systems planning.
380 First, dropout from mental health treatment is relevant globally because of its high frequency,
381 its potential to increase health care costs due to inefficiencies, and to worsen health outcomes
382 due to missed opportunities to intervene early (Barnicot, Katsakou, Marougka, & Priebe,
383 2011; Swift & Greenberg, 2012). Second, extending financial protection and coverage for
384 mental disorders may reduce dropout and therefore improve continuity of care and health
385 outcomes, especially for those that need specialist care. Third, dropout seems to affect diverse
386 subgroups differently, and a holistic, stepped-care approach to providing mental health
387 services can be expected to improve efficiency and quality of care by: (a) grounding the entry
388 point to the mental health system in primary care, which should manage milder clinical
389 presentations; (b) providing adequate training, support and specialist supervision for non-
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502

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509

510 **Ethical standards**

511 The authors assert that all procedures contributing to this work comply with the ethical
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Table 1. WMH sample characteristics by World Bank income categories^a

Country by income category	Survey ^b	Sample characteristics ^c	Field dates	Age range	Sample size		Part II and age ≤ 44 ^d	Response rate ^e
					Part I	Part II		
I. Low and middle income countries								
Brazil - São Paulo	São Paulo Megacity	São Paulo metropolitan area.	2005-8	18-93	5,037	2,942	--	81.3
Bulgaria	NSHS	Nationally representative.	2002-6	18-98	5,318	2,233	741	72.0
Colombia	NSMH	All urban areas of the country (approximately 73% of the total national population).	2003	18-65	4,426	2,381	1,731	87.7
Colombia - Medellin ^h	MMHHS	Medellin metropolitan area	2011-12	19-65	3,261	1,673		97.2
Iraq	IMHS	Nationally representative.	2006-7	18-96	4,332	4,332	--	95.2
Lebanon	LEBANON	Nationally representative.	2002-3	18-94	2,857	1,031	595	70.0
Mexico	M-NCS	All urban areas of the country (approximately 75% of the total national population).	2001-2	18-65	5,782	2,362	1,736	76.6
Nigeria	NSMHW	21 of the 36 states in the country, representing 57% of the national population. The surveys were conducted in Yoruba, Igbo, Hausa and Efik languages.	2002-4	18-100	6,752	2,143	1,203	79.3
Peru	EMSMP	Five urban areas of the country (approximately 38% of the total national population).	2004-5	18-65	3,930	1,801	1,287	90.2
PRC ^f - Shenzhen ^g	Shenzhen	Shenzhen metropolitan area. Included temporary residents as well as household residents.	2005-7	18-88	7,132	2,475	--	80.0
Romania	RMHS	Nationally representative.	2005-6	18-96	2,357	2,357	--	70.9
South Africa ^g	SASH	Nationally representative.	2002-4	18-92	4,315	4,315	--	87.1
Ukraine	CMDPSD	Nationally representative.	2002	18-91	4,725	1,720	541	78.3
TOTAL					(60,224)	(31,765)	(7,834)	81.1
II. High-income countries								
Argentina	AMHES	Eight largest urban areas of the country (approximately 50% of the total national population)	2015	18-98	3,927	2,116	--	77.3
Belgium	ESEMeD	Nationally representative. The sample was selected from a national register of Belgium residents.	2001-2	18-95	2,419	1,043	486	50.6
France	ESEMeD	Nationally representative. The sample was selected from a national list of households with listed telephone numbers.	2001-2	18-97	2,894	1,436	727	45.9
Germany	ESEMeD	Nationally representative.	2002-3	19-95	3,555	1,323	621	57.8
Israel	NHS	Nationally representative.	2003-4	21-98	4,859	4,859	--	72.6
Italy	ESEMeD	Nationally representative. The sample was selected from municipality resident registries.	2001-2	18-100	4,712	1,779	853	71.3
Japan	WMHJ 2002-2006	Eleven metropolitan areas.	2002-6	20-98	4,129	1,682	--	55.1
Netherlands	ESEMeD	Nationally representative. The sample was selected from municipal postal registries.	2002-3	18-95	2,372	1,094	516	56.4
New Zealand ^g	NZMHS	Nationally representative.	2004-5	18-98	12,790	7,312	--	73.3
N. Ireland	NISHS	Nationally representative.	2005-8	18-97	4,340	1,986	--	68.4

Table 1 continued. WMH sample characteristics by World Bank income categories^a

Country by income category	Survey ^b	Sample characteristics ^c	Field dates	Age range	Sample size		Part II and age ≤ 44 ^d	Response rate ^e
					Part I	Part II		
Poland	EZOP	Nationally representative	2010-11	18-65	10,081	4,000	2,276	50.4
Portugal	NMHS	Nationally representative.	2008-9	18-81	3,849	2,060	1,070	57.3
Spain	ESEMeD	Nationally representative.	2001-2	18-98	5,473	2,121	960	78.6
Spain - Murcia	PEGASUS- Murcia	Murcia region. Regionally representative.	2010-12	18-96	2,621	1,459	--	67.4
United States	NCS-R	Nationally representative.	2001-3	18-99	9,282	5,692	3,197	70.9
TOTAL					(77,303)	(39,962)	(10,706)	63.5
III. TOTAL					(137,527)	(71,727)	(18,540)	70.2

^aThe World Bank (2012) Data. Accessed May 12, 2012 at: <http://data.worldbank.org/country>. Some of the WMH countries have moved into new income categories since the surveys were conducted. The income groupings above reflect the status of each country at the time of data collection. The current income category of each country is available at the preceding URL.

^bNSMH (The Colombian National Study of Mental Health); IMHS (Iraq Mental Health Survey); NSMHW (The Nigerian Survey of Mental Health and Wellbeing); EMSMP (La Encuesta Mundial de Salud Mental en el Peru); CMDPSD (Comorbid Mental Disorders during Periods of Social Disruption); NSHS (Bulgaria National Survey of Health and Stress); MMHHS (Medellin Mental Health Household Study); LEBANON (Lebanese Evaluation of the Burden of Ailments and Needs of the Nation); M-NCS (The Mexico National Comorbidity Survey); RMHS (Romania Mental Health Survey); SASH (South Africa Health Survey); AMHES (Argentina Mental Health Epidemiologic Survey); ESEMeD (The European Study Of The Epidemiology Of Mental Disorders); NHS (Israel National Health Survey); WMHJ2002-2006 (World Mental Health Japan Survey); NZMHS (New Zealand Mental Health Survey); NISHS (Northern Ireland Study of Health and Stress); EZOP (Epidemiology of Mental Disorders and Access to Care Survey); NMHS (Portugal National Mental Health Survey); PEGASUS-Murcia (Psychiatric Enquiry to General Population in Southeast Spain-Murcia); NCS-R (The US National Comorbidity Survey Replication).

^cMost WMH surveys are based on stratified multistage clustered area probability household samples in which samples of areas equivalent to counties or municipalities in the US were selected in the first stage followed by one or more subsequent stages of geographic sampling (e.g., towns within counties, blocks within towns, households within blocks) to arrive at a sample of households, in each of which a listing of household members was created and one or two people were selected from this listing to be interviewed. No substitution was allowed when the originally sampled household resident could not be interviewed. These household samples were selected from Census area data in all countries other than France (where telephone directories were used to select households) and the Netherlands (where postal registries were used to select households). Several WMH surveys (Belgium, Germany, Italy, Poland, Spain-Murcia) used municipal, country resident or universal health-care registries to select respondents without listing households. The Japanese sample is the only totally un-clustered sample, with households randomly selected in each of the 11 metropolitan areas and one random respondent selected in each sample household. 18 of the 28 surveys are based on nationally representative household samples.

^dArgentina, Brazil, Colombia-Medellin, Iraq, Israel, Japan, New Zealand, Northern Ireland, PRC - Shenzhen, Romania, South Africa and Spain-Murcia did not have an age restricted Part 2 sample. All other countries, with the exception of Nigeria and Ukraine (which were age restricted to ≤ 39) were age restricted to ≤ 44.

^eThe response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known not to be eligible either because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey. The weighted average response rate is 70.2%.

^f People's Republic of China

^g For the purposes of cross-national comparisons we limit the sample to those 18+.

^hColombia moved from the "lower and lower-middle income" to the "upper-middle income" category between 2003 (when the Colombian National Study of Mental Health was conducted) and 2010 (when the Medellin Mental Health Household Study was conducted), hence Colombia's appearance in both income categories. For more information, please see footnote a.

Table 2. Number of visits by sector (Part I) and treatment status (Part II) and by treatment among respondents with at least one disorder in the 12 months before interview who received mental health treatment in the past 12 months in the the World Mental Health Surveys, by country income group

Part I

	High-income countries						Low-middle income countries					
	n ^a	% ^b	(SE)	Mean number of visits	(SE)	IQR ^c	n ^a	% ^b	(SE)	Mean number of visits	(SE)	IQR ^c
Treatment												
Psychiatrist (whether or not received other service)	1197	30.8	(0.9)	18.4	(1.0)	[3, 21]	395	32.9	(1.5)	13.6	(0.9)	[2, 12]
Not psychiatrist but other mental health (whether or not received general medical)	828	22.2	(0.8)	13.5	(0.5)	[2, 15]	235	19.4	(1.2)	6.2	(0.4)	[1, 6]
General medical (only)	1762	47.0	(1.0)	3.0	(0.1)	[1, 2]	573	47.7	(1.7)	2.9	(0.1)	[1, 3]
Any of the 3 services	3787			10.1	(0.4)	[1, 10]	1203			7.0	(0.4)	[1, 5]

Part II

	High-income countries									Low-middle income countries								
	Treatment drop out			Completed treatment			Still in treatment			Treatment drop out			Completed treatment			Still in treatment		
	n ^a	% ^b	(SE)	n ^a	% ^b	(SE)	n ^a	% ^b	(SE)	n ^a	% ^b	(SE)	n ^a	% ^b	(SE)	n ^a	% ^b	(SE)
Treatment																		
Psychiatrist (whether or not received other service)	174	17.2	1.2	110	9.6	0.8	913	73.2	1.4	84	18.5	1.6	55	16.5	1.8	256	65.0	2.0
Not psychiatrist but other mental health (whether or not received General Medical)	150	19.9	1.5	160	19.2	1.2	518	60.9	1.6	106	44.2	3.0	37	16.9	2.5	92	38.9	2.9
General medical (only)	784	43.2	1.2	284	17.4	1.1	694	39.5	1.3	308	57.2	1.9	95	17.6	1.3	170	25.2	1.9
Any of the 3 services	1108			554			2125			498			187			518		

^aUnweighted number of respondents who received treatment in the sector.

^bWeighted percentage. Percentages are weighted to adjust for differences in selection probabilities, differential non-response, oversampling of Part II cases and residual differences on sociodemographic variables between the sample and the population.

^cIQR: Interquartile range...

Table 3. Bivariate associations of 12-month disorder severity with treatment dropout after 1-2 and 3+ visits among patients with 12-month DSM-IV/CIDI disorders in the World Mental Health Surveys, by country income group¹

	1-2 visits						3+ visits - OR (95% CI)					
	Mild		Moderate		χ^2_2 (p-value)	Sample size	Mild		Moderate		χ^2_2 (p-value)	Sample size
	OR	95% CI	OR	95% CI			OR	95% CI	OR	95% CI		
I. High income countries												
Psychiatrist (whether or not received other service)	1.8	(0.9-3.4)	2.4*	(1.4-4.2)	0.007	225	2.2	(1.0-4.6)	1.2	(0.7-2.0)	0.115	972
Not psychiatrist but other mental health (whether or not received general medical)	1.0	(0.5-1.9)	0.8	(0.4-1.4)	0.665	195	0.9	(0.3-2.3)	1.2	(0.7-1.9)	0.693	633
General medical (only)	1.4	(1.0-1.8)	1.1	(0.9-1.4)	0.083	1319	0.9	(0.4-2.1)	0.7	(0.4-1.3)	0.566	443
Any of the three services	1.8*	(1.4- 2.2)	1.5*	(1.2-1.9)	<.0001	1739	1.6	(0.9-2.8)	1.5*	(1.0-2.1)	0.049	2048
II. Low-Middle income countries												
Psychiatrist (whether or not received other service)	2.2*	(1.2-4.1)	4.7*	(2.4-8.9)	<.0001	126	2.2*	(1.4-3.7)	1.9	(0.5-6.7)	0.005	269
Not psychiatrist but other mental health (whether or not received general medical)	1.7	(0.8-3.5)	1.8*	(1.0-3.0)	0.111	132	0.8	(0.5-1.4)	0.5*	(0.3-0.8)	0.001	103
General medical (only)	0.9	(0.5-1.5)	0.9	(0.6-1.3)	0.833	399	0.8	(0.5-1.2)	0.4*	(0.3-0.6)	<.0001	174
Any of the three services	1.8*	(1.2-2.5)	1.8*	(1.4-2.4)	0.000	657	2.9*	(2.1-4.0)	1.5	(0.9-2.5)	<.0001	546

*Significant at the .05 level, two-sided test compared to patients with severe disorders

¹Each model included dummy variable controls for survey and number of visits. The models for any dropout additionally controlled for treatment sector.

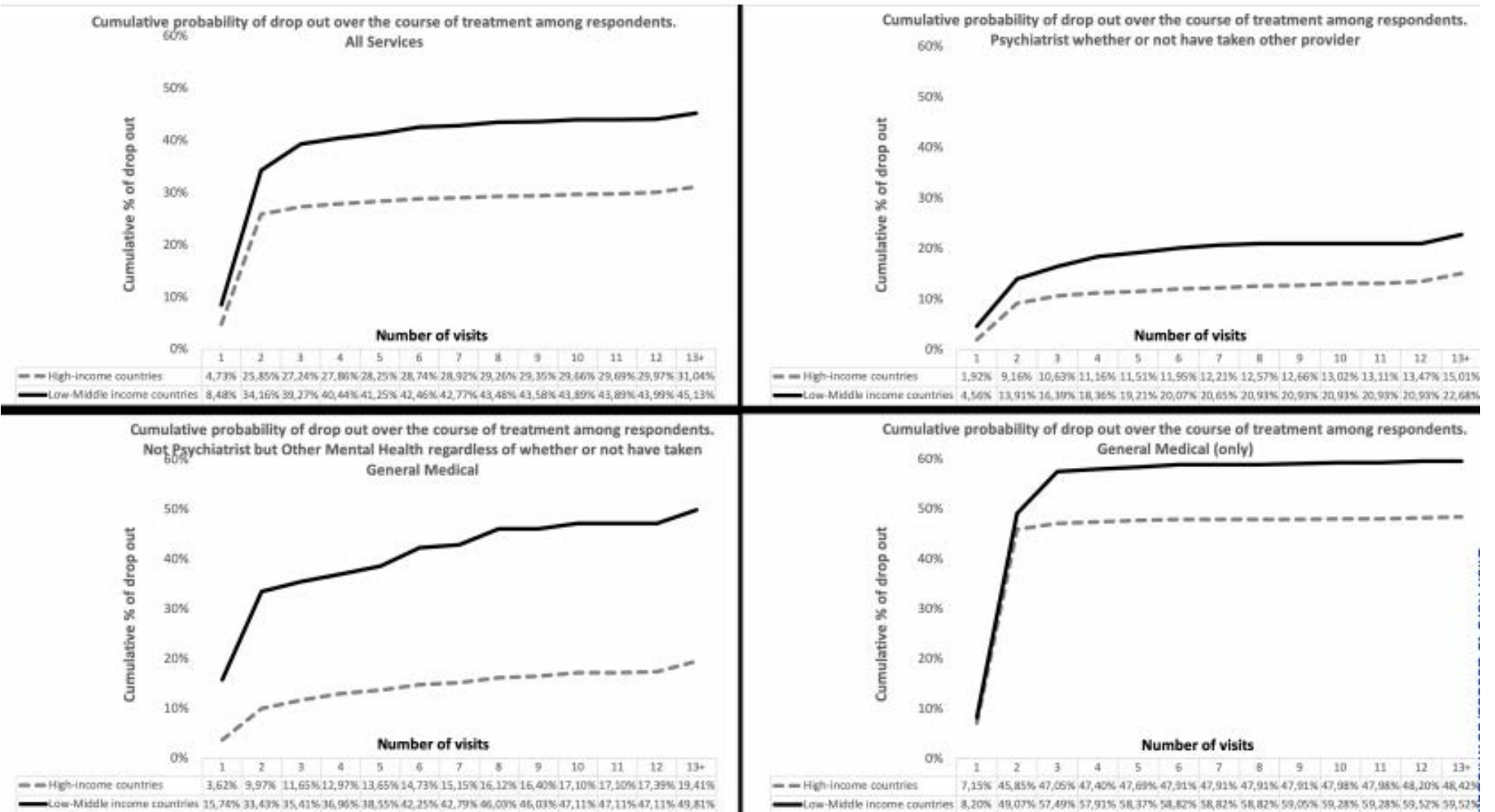
Table 4. Bivariate associations¹ of health insurance with treatment dropout (after 1-2 and 3+ visits) among patients with 12-month DSM-IV/CIDI in the World Mental Health Surveys disorders in the WMH surveys, by country income group

	No insurance		χ^2_1 (p-value)	Sample size
	OR	95% CI		
I. High income countries				
After 1-2 visits				
Psychiatrist (whether or not received other service)	1.7	(0.7-4.4)	0.230	225
Not psychiatrist but other mental health (whether or not received general medical)	1.6	(0.5-4.6)	0.395	195
General medical (only)	1.1	(0.7-1.9)	0.677	1319
Any of the three services	1.4	(0.9-2.1)	0.131	1739
After 3+ visits				
Psychiatrist (whether or not received other service)	6.0*	(2.3-15.3)	0.000	972
Not psychiatrist but other mental health (whether or not received general medical)	0.4	(0.1-2.1)	0.271	633
General medical (only)	1.1	(0.2-6.4)	0.901	443
Any of the three services	2.0	(0.8-4.6)	0.122	2048
II. Low-Middle income countries				
After 1-2 visits				
Psychiatrist (whether or not received other service)	1.2	(0.7-2.2)	0.518	126
Not psychiatrist but other mental health (whether or not received general medical)	0.8	(0.4-1.4)	0.418	132
General medical (only)	0.4*	(0.2-0.6)	<.0001	399
Any of the three services	0.7	(0.5-1.2)	0.218	657
After 3+ visits				
Psychiatrist (whether or not received other service)	7.5*	(4.0-14.1)	<.0001	269
Not psychiatrist but other mental health (whether or not received general medical)	11.9*	(7.4-18.9)	<.0001	103
General medical (only)	1.1	(0.5-2.3)	0.854	174
Any of the three services	2.9*	(1.8-4.8)	<.0001	546

*Significant at the .05 level, two-sided test compared to patients with any insurance

¹Each model included dummy variable controls for survey and number of visits. The models for any dropout additionally controlled for treatment sector.

Figure 1.



Appendix table 1. Bivariate analyses^a of the association of mental disorder diagnosis with treatment drop out within each country income group among World Mental Health Survey respondents with at least one disorder in the 12 months before interview and received mental health treatment. Results for any of the three services^b, stratified by number of visit

Disorder type ^c	High income countries						Low-Middle income countries					
	1-2 visits n=1739			3+ visits n=2048			1-2 visits n=657			3+ visits n=546		
	OR	(95% CI)	χ^2 (p-value)	OR	(95% CI)	χ^2 (p-value)	OR	(95% CI)	χ^2 (p-value)	OR	(95% CI)	χ^2 (p-value)
Any anxiety ^d	1.2	(0.9-1.4)	0.195	0.9	(0.6-1.3)	0.672	1.2	(0.9-1.6)	0.252	0.4***	(0.2-0.6)	<.0001
Any mood ^e	0.8*	(0.7-1.0)	0.032	0.6**	(0.4-0.9)	0.009	0.8	(0.6-1.1)	0.145	1.5*	(1.1-2.0)	0.011
Any substance ^f	0.7	(0.5-1.0)	0.077	1.4	(1.0-2.1)	0.063	0.6*	(0.4-1.0)	0.049	2.7***	(1.6-4.5)	0.000
Any impulse ^g	1.0	(0.7-1.5)	0.974	0.7	(0.4-1.2)	0.144	0.7	(0.5-1.1)	0.102	0.9	(0.4-1.8)	0.737
Panic disorder	0.8	(0.7-1.1)	0.184	0.4**	(0.2-0.7)	0.001	0.8	(0.6-1.2)	0.277	0.1***	(0.0-0.3)	0.000
Generalized anxiety disorder	0.9	(0.7-1.1)	0.364	0.8	(0.6-1.2)	0.374	1.0	(0.7-1.3)	0.787	0.2***	(0.1-0.4)	<.0001
Social phobia	0.8	(0.7-1.0)	0.098	0.8	(0.5-1.2)	0.277	1.0	(0.8-1.4)	0.799	0.8	(0.5-1.3)	0.405
Specific phobia	1.3**	(1.1-1.5)	0.003	0.5**	(0.3-0.8)	0.009	1.2	(0.8-1.6)	0.340	0.8	(0.4-1.7)	0.559
Agoraphobia	0.6*	(0.5-0.9)	0.010	0.6*	(0.3-1.0)	0.044	0.7	(0.5-1.1)	0.122	0.5**	(0.3-0.8)	0.002
PTSD	0.7*	(0.6-1.0)	0.040	1.2	(0.8-1.8)	0.353	1.1	(0.7-1.7)	0.823	0.6	(0.3-1.3)	0.192
Separation anxiety	1.3	(0.8-2.0)	0.342	0.3	(0.1-1.1)	0.075	0.8	(0.5-1.4)	0.532	0.5	(0.1-1.7)	0.266
Major depressive episode	0.8*	(0.6-0.9)	0.014	0.7*	(0.5-0.9)	0.021	0.8	(0.6-1.1)	0.142	1.4*	(1.1-1.9)	0.014
Bipolar disorder	0.9	(0.6-1.1)	0.293	0.7	(0.5-1.2)	0.240	0.8	(0.4-1.4)	0.392	1.6	(0.5-5.2)	0.469
Oppositional defiant disorder	0.6	(0.2-1.4)	0.232	1.4	(0.4-5.0)	0.619	0.2	(0.0-1.2)	0.079	1.1	(0.3-4.5)	0.844
Conduct disorder	0.4	(0.1-1.7)	0.201	0.2***	(0.1-0.3)	<.0001	1.7	(0.6-5.2)	0.315	1.6	(0.2-14.3)	0.658
Attention deficit disorder	1.1	(0.6-1.9)	0.724	0.6	(0.2-1.7)	0.340	1.9	(0.8-4.6)	0.127	<0.1***	(<0.1-<0.1)	<.0001
Intermittent explosive disorder	1.2	(0.8-1.8)	0.345	0.7	(0.3-1.4)	0.286	0.6*	(0.4-0.9)	0.018	0.9	(0.4-2.0)	0.771
Alcohol abuse	0.8	(0.5-1.2)	0.218	1.4	(0.8-2.3)	0.196	0.7	(0.4-1.3)	0.263	2.9***	(1.7-5.1)	0.000
Alcohol dependence	0.6	(0.4-1.0)	0.076	1.0	(0.5-1.9)	0.987	0.5	(0.2-1.0)	0.057	1.9	(0.8-4.7)	0.145
Drug abuse	0.8	(0.5-1.4)	0.522	1.8*	(1.1-3.0)	0.020	0.5	(0.2-1.5)	0.188	2.2*	(1.2-4.0)	0.010
Drug dependence	0.6	(0.3-1.4)	0.261	0.9	(0.5-1.4)	0.535	0.8	(0.2-3.1)	0.744	0.4	(0.1-1.1)	0.081

^aModels are bivariate and based on a discrete time survival framework with a person-visit file. Country is also included in the model (not shown).

^bIt includes dropout from all of up to 3 different providers: Psychiatrist, Other Mental Health professional, General Medical

^cReference category is not having the disorder

^dAny anxiety disorder includes Panic Disorder, Generalized Anxiety Disorder, Social Phobia, Specific Phobia, Agoraphobia, PTSD, Social Anxiety

^eAny mood disorder includes Major Depressive Episode, Dysthymia and Bipolar Disorder

^fAny substance disorder includes Alcohol Abuse, Alcohol Dependence, Drug Abuse, Drug Dependence

^gAny impulse control disorder includes Oppositional Defiant Disorder, Conduct disorder, Attention Deficit Disorder, Intermittent Explosive Disorder

* p<0.05

**p<0.01

***p<0.001

Appendix table 2. Bivariate associations of health insurance type with treatment dropout after 1-2 and 3+ visits among patients with 12-month DSM-IV/CIDI disorders in the WMH surveys¹

	State funded coverage or subsidized insurance			Insurance through employment or national social security			Direct private/optional insurance			Other types of insurance			χ^2_4 (p-value)	Sample size
	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%		
I. High income countries														
After 1-2 visits														
Psychiatrist (whether or not have received other service)	0.6	(0.1-2.8)	14.7	0.6	(0.2-1.4)	44.4	0.3	(0.1-1.1)	12.4	2.2	(0.5-9.8)	2.2	0.195	225
Not psychiatrist but other mental health (whether or not received general medical)	0.4	(0.1-1.3)	7.7	0.8	(0.3-2.4)	34.9	0.4	(0.1-2.0)	13.3	0.5	(0.1-3.7)	1.5	0.374	195
General medical (only)	0.7	(0.4-1.3)	9.9	1.0	(0.6-1.8)	29.6	0.8	(0.4-1.4)	13.0	1.0	(0.3-3.4)	0.9	0.550	1319
Any of the three services	0.6	(0.4-1.1)	10.2	0.8	(0.5-1.2)	32.1	0.6*	(0.4-0.9)	13.0	1.0	(0.4-2.5)	1.2	0.080	1739
After 3+ visits														
Psychiatrist (whether or not have received other service)	0.1*	(0.0-0.6)	13.9	0.2*	(0.1-0.5)	40.4	0.2*	(0.1-0.5)	15.6	0.0*	(0.0-0.0)	1.3	<.0001	972
Not psychiatrist but other mental health (whether or not received general medical)	2.7	(0.4-17.7)	7.9	3.8	(0.6-22.8)	31.6	1.2	(0.2-6.9)	14.2	1.0	(0.1-11.9)	1.9	0.291	633
General medical (only)	0.9	(0.2-3.4)	7.5	0.9	(0.1-8.0)	27.3	0.9	(0.1-9.6)	13.3	-- ²		0.7	-- ²	443
Any of the three services	0.4	(0.1-1.3)	10.6	0.6	(0.3-1.4)	34.9	0.5	(0.2-1.2)	14.7	0.3	(0.0-1.6)	1.4	0.502	2048
II. Low-Middle income countries														
After 1-2 visits														
Psychiatrist (whether or not received other service)	1.1	(0.4-3.4)	18.3	0.9	(0.4-1.7)	27.0	0.5	(0.2-1.7)	9.5	-- ²		0.8	-- ²	126
Not psychiatrist but other mental health (whether or not received general medical)	0.4	(0.1-1.1)	9.1	1.8	(0.9-3.6)	39.4	1.0	(0.4-2.8)	10.6	2.3	(1.0-5.4)	4.6	0.013	132
General medical (only)	4.5*	(2.2-9.0)	16.8	1.8	(1.0-3.4)	14.3	2.9*	(1.3-6.6)	5.5	5.1*	(1.6-16.2)	2.8	0.000	399
Any of the three services	1.5	(0.9-2.7)	15.5	1.3	(0.7-2.1)	21.8	1.1	(0.6-2.0)	7.3	1.9	(0.6-5.5)	2.7	0.558	657
After 3+ visits														
Psychiatrist (whether or not received other service)	0.1*	(0.0-0.3)	27.1	0.1*	(0.0-0.2)	26.0	0.2*	(0.1-0.5)	11.9	0.1	(0.0-1.4)	3.7	<.0001	269
Not psychiatrist but other mental health (whether or not received general medical)	0.0*	(0.0-0.0)	14.6	0.1*	(0.0-0.1)	27.2	0.1*	(0.0-0.1)	14.6	2.1*	(1.3-3.4)	3.9	<.0001	103
General medical (only)	0.9	(0.5-1.5)	14.4	1.2	(0.6-2.4)	13.2	1.5	(0.3-7.1)	5.8	0.2*	(0.1-0.4)	5.2	<.0001	174
Any of the three services	0.3*	(0.2-0.6)	20.7	0.4*	(0.2-0.7)	22.2	0.4*	(0.2-0.8)	10.4	0.1*	(0.1-0.4)	4.2	<.0001	546

*Significant at the .05 level, two-sided test compared to patients with no insurance

¹Each model included dummy variable controls for survey and number of visits. The models for any dropout additionally controlled for treatment sector.

²Results not shown because of small cell size. Small cell size determined by calculating the expected number of cases based on the percentage of people with the outcome and the total number of people with the condition. If the expected value was less than five, then the OR is dashed out.

Appendix table 3. Predictors of treatment dropout within each country income group respondents with at least one disorder in the 12 months before interview who received mental health treatment in the past 12 months in the World Mental Health Surveys, by country income group

	1-2 visits				3+ visits											
	Psychiatrist (whether or not received other service)		Not psychiatrist but other mental health (whether or not received general medical)		General medical (only)		Psychiatrist (whether or not received other service)		Not psychiatrist but other mental health (whether or not received general medical)		General medical (only)					
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)				
I. High income countries ^{*,1}																
Gender (male vs. female)	1.0	(0.8-1.2)	0.8	(0.4-1.6)	0.7	(0.4-1.2)	1.2	(0.9-1.5)	1.2	(0.8-1.8)	1.6	(1.0-2.5)	1.5	(0.9-2.6)	0.6	(0.3-1.3)
Age	1.0	(1.0- 1.0)	1.0	(1.0-1.0)	1.0	(1.0-1.0)	1.0*	(1.0-1.0)	1.0*	(1.0-1.0)	1.0*	(0.9-1.0)	1.0	(1.0-1.0)	1.0	(1.0-1.0)
Education	0.9	(0.8-1.0)	0.9	(0.7-1.1)	1.0	(0.8-1.3)	0.9	(0.8-1.1)	0.9	(0.7-1.1)	0.8	(0.6-1.1)	0.7	(0.5-1.0)	1.3	(0.9-1.8)
Employed (yes vs. all others)	1.1	(0.9-1.4)	1.0	(0.6-1.6)	0.8	(0.4-1.4)	1.2	(0.9-1.5)	1.0	(0.6-1.5)	2.1*	(1.2-3.8)	0.6	(0.3-1.2)	1.2	(0.6-2.4)
Family income	1.0	(0.9-1.0)	1.0	(0.8-1.3)	1.1	(0.8-1.5)	1.0	(0.9-1.1)	1.0	(0.8-1.2)	1.0	(0.8-1.2)	0.9	(0.7-1.2)	1.4*	(1.0-1.9)
Marital Status (ref.: married or cohabiting)																
Previously married	1.2	(1.0-1.6)	0.9	(0.6-1.6)	1.0	(0.6-1.7)	1.5*	(1.2-2.0)	0.5*	(0.3-0.8)	0.7	(0.3-1.5)	0.3*	(0.2-0.5)	0.9	(0.4-1.9)
Never married	1.2	(0.9-1.5)	1.9*	(1.0-3.6)	0.8	(0.5-1.4)	1.1	(0.8-1.5)	0.6*	(0.4-1.0)	0.9	(0.4-1.8)	0.4*	(0.2-0.7)	0.6	(0.3-1.3)
χ^2_2 (p-value)	3.3	(0.189)	5.8	(0.056)	0.5	(0.782)	8.6	(0.014)	10.0	(0.007)	0.8	(0.672)	24.7	(<.0001)	1.5	(0.471)
Global χ^2 (p-value)	8.0	(0.333)	11.4	(0.123)	4.8	(0.683)	21.7	(0.003)	25.8	(0.001)	38.3	(<.0001)	65.7	(<.0001)	13.5	(0.060)
Sample size	3787		1197		828		1762		2048		972		633		443	
II. Low-Middle income countries																
Gender (female vs. male)	0.8	(0.6-1.1)	0.1*	(0.0-0.4)	0.8	(0.5-1.5)	1.0	(0.6-1.6)	1.4	(0.9-2.3)	0.6	(0.3-1.0)	0.9	(0.6-1.3)	3.7*	(1.8-7.3)
Age	1.0	(1.0-1.0)	1.0	(1.0-1.0)	1.0	(1.0-1.0)	1.0*	(1.0-1.0)	1.0	(1.0-1.0)	1.0	(1.0- 1.0)	0.9*	(0.9-0.9)	1.0	(1.0-1.0)
Education	0.9	(0.8-1.1)	1.2	(0.8-1.9)	0.8	(0.6-1.1)	1.0	(0.8-1.2)	0.8	(0.6-1.1)	0.8	(0.6- 1.2)	0.8	(0.6-1.1)	0.7	(0.5-1.1)
Employed (yes vs. all others)	1.0	(0.7-1.4)	0.8	(0.4-1.7)	0.9	(0.6-1.3)	1.0	(0.6-1.5)	1.0	(0.6-1.7)	1.7	(0.9- 3.3)	1.1	(0.7-1.7)	1.1	(0.8-1.4)
Family income	1.1	(0.9-1.2)	0.8	(0.6-1.0)	1.0	(0.8-1.2)	1.1	(1.0-1.4)	0.9	(0.8-1.1)	1.2	(1.0- 1.6)	1.3	(1.0-1.7)	0.8*	(0.6-1.0)
Marital status (ref.: married or cohabiting)																
Previously married	1.4	(1.0-2.0)	0.8	(0.4-1.6)	1.8	(1.0-3.4)	1.5	(1.0-2.3)	1.2	(0.6-2.4)	0.8	(0.4-1.6)	4.9*	(2.1-11.2)	1.7	(0.8-3.9)
Never married	1.2	(0.8-1.8)	2.6*	(1.2-5.5)	1.2	(0.7-2.3)	1.2	(0.6-2.2)	0.8	(0.4-1.4)	0.5	(0.2-1.3)	0.6*	(0.4-1.0)	1.0	(0.4-2.8)
χ^2_2 (p-value)	3.7	(0.158)	8.1	(0.017)	3.7	(0.158)	3.4	(0.188)	1.1	(0.580)	3.1	(0.215)	20.0	(<.0001)	2.2	(0.388)
Global χ^2 (p-value)	11.0	(0.140)	22.2	(0.002)	10.1	(0.181)	16.9	(0.018)	6.4	(0.498)	11.8	(0.107)	51.4	(<.0001)	26.9	(0.000)
Sample size	1203		395		235		573		546		269		103		174	

*Significant at the .05 level, two-sided test compared to patients with the omitted category described in parentheses

¹Each model included dummy variable controls for survey, number of visits, number-severity of disorders, and type of insurance. The model for any dropout additionally controlled for treatment sector.