Abstract: 250
Text: 5580
Tables: 5
Figures: 0

Cross-National Epidemiology of DSM-IV Major Depressive Episode

Evelyn Bromet[1*] (ebromet@notes.cc.sunysb.edu), Laura Helena Andrade[2] (laurandrade@uol.com.br), Irving Hwang[3] (hwang@hcp.med.harvard.edu), Nancy A. Sampson[3] (sampson@hcp.med.harvard.edu), Jordi Alonso[4] (jalonso@imim.es), Giovanni de Girolamo[5] (gdegirolamo@fatebenefratelli.it), Ron de Graaf[6] (rgraaf@trimbos.nl), Koen Demyttenaere[7] (koen.demyttenaere@uz.kuleuven.ac.be), Chiyi Hu[8] (chiyihu@yahoo.com.cn), Noboru Iwata[9] (iwatan@he.hirokoku-u.ac.jp), Jagdish Kaur[10] (jagdish.kaur@nic.in), Aimee N. Karam[11] (aimeekaram@hotmail.com), Stanislav Kostyuchenko[12] (staskiev@yahoo.com), Jean-Pierre Lepine[13] (jean-pierre.lepine@lrb.aphp.fr), Daphna Levinson[14] (daphna.levinson@moh.health.gov.il), Herbert Matschinger[15] (Herbert.Matschinger@medizin.uni-leipzig.de), Maria Elena Medina Mora[16] (medinam@imp.edu.mx), Mark Oakley Browne[17] (mark.oakley-browne@dhhs.tas.gov.au), Jose Posada-Villa[18] (latos98@yahoo.com), Maria Carmen Viana[19] (mcviana@uol.com.br), David R. Williams[20] (dwilliam@hsph.harvard.edu), Ronald C. Kessler[3] (kessler@hcp.med.harvard.edu)

Contributing author affiliations:

[*1] (Corresponding Author) Department of Psychiatry, State University of New York at Stony Brook, Putnam Hall - South Campus, Stony Brook, NY 11794-8790, Tel. (631) 632-8853, Fax: (631) 632-9433. Email: ebromet@notes.cc.sunysb.edu

[2] Department & Institute of Psychiatry, University of Sao Paulo, School of Medicine, Sãu Paulo, Brazil

[3]Department of Health Care Policy, Harvard Medical School, Boston, MA

[4]Health Services Research Unit, IMIM (Hospital del Mar Research Institute), Barcelona, Spain, and CIBER en Epidemiología y Salud Pública (CIBERESP), Barcelona, Spain.

[5]IRCCS Centro S. Giovanni di Dio Fatebenefratelli, Brescia, Italy

[6]Netherlands Institute of Mental Health and Addiction, Utrecht, The Netherlands

[7]Department of Psychiatry, University Hospital Gasthuisberg, Leuven, Belgium

[8]Shenzhen Institute of Mental Health & Shenzhen Kangning Hospital, Shenzhen, China

[9]Department of Clinical Psychology, Hiroshima International University, Japan

[10] Directorate General of Health Services, New Delhi, India

[11]Department of Psychiatry and Clinical Psychology, Saint George Hospital University Medical Center, Balamand University Medical School, and the Institute for Development, Research, Advocacy and Applied Care (IDRAAC), Beirut, Lebanon

[12]Ukrainian Psychiatric Association, Kiev Ukraine

[13] Hôpital Lariboisière Fernand Widal, Assistance Publique Hôpitaux de Paris INSERM U 705, CNRS UMR 7157 University Paris Diderot and Paris Descartes Paris, France

[14]Research & Planning, Mental Health Services Ministry of Health, Jerusalem, Israel

[15] Institut of Social Medicine, Occupational Health and Public Health University of Leipzig, Leipzig, Germany

[16]National Institute of Psychiatry, Mexico City, Mexico

[17]The University of Tasmania Statewide and Clinical Director Dept of Health and Human Services New Town, Tasmania, Australia

[18]Instituto Colombiano del Sistema Nervioso, Bogota D.C. Colombia

[19]Section of Psychiatric Epidemiology, Institute of Psychiatry, School of Medicine, University of São Paulo, São Paulo SP/ Brazil

[20]Department of Society, Human Development, and Health, Harvard School of Public Health, Boston, MA, USA

ABSTRACT

Background: Major depression is one of the leading causes of disability worldwide, yet epidemiologic data are not available for many countries, particularly low-middle income countries. This paper presents data on the prevalence, impairment, and demographic correlates of depression from 18 high and low-middle income countries in the World Mental Health Survey Initiative.

Methods: DSM-IV major depressive episodes (MDE) were evaluated in face-to-face interviews using the World Health Organization Composite International Diagnostic Interview (CIDI). Data from 18 countries were analyzed in this report (n = 89,037). All countries surveyed representative, population-based samples of adults.

Results: The average lifetime and 12-month prevalence estimates of DSM-IV MDE were 14.6% and 5.5% in the 10 high income and 11.1% and 5.9% in the 8 low-middle income countries. The average age of onset ascertained retrospectively was 25.7 in high and 24.0 in low-middle income countries. Functional impairment was associated with recency of MDE. The female:male ratio was about 2:1. In high income countries, younger age was associated with higher 12-month prevalence; in several low-middle income countries, in comparison, older age was associated with greater likelihood of MDE. The strongest demographic correlate in high income countries was being separated and in low-middle income countries was being divorced or widowed.

Conclusions: MDE is a significant public health problem across all regions of the world and is strongly linked to social conditions. Future research is needed to investigate the combination of demographic risk factors that are most strongly associated with MDE in the specific countries included in the WMH.

BACKGROUND

Major depression is a serious, recurrent disorder linked to diminished role functioning and quality of life, medical morbidity, and mortality [1, 2]. The World Health Organization ranked depression as the 4th leading cause of disability worldwide [3] and projects that by 2020, it will be the second leading cause [4]. Although direct information on the prevalence of depression does not exist for most countries, the available data indicate wide variability in the prevalence rates. Weissman et al. [5] published the first cross-national comparison of DSM-III major depression from 10 population-based surveys that administered the Diagnostic Interview Schedule (DIS) [6]. The lifetime prevalence ranged from 1.5% (Taiwan) to 19.0% (Beirut), with the midpoints at 9.2% (West Germany) and 9.6% (Edmonton, Canada). The 12-month prevalence ranged from 0.8% (Taiwan) to 5.8% (Christchurch, New Zealand), with the midpoints at 3.0% (US) and 4.5% (Paris). A subsequent cross-national comparison [7] included 10 population-based studies that administered the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI) for DSM-III-R and DSM-IV [8]. Consistent with the earlier report [5], the lifetime rates ranged from 1.0% (Czech Republic) to 16.9% (US), with midpoints at 8.3% (Canada) and 9.0% (Chile). The 12-month prevalence ranged from 0.3% (Czech Republic) to 10% (US), with midpoints at 4.5% (Mexico) and 5.2% (West Germany). Most recently, Moussavi et al. [9] summarized data on ICD-10 depressive episode in participants in the WHO World Health Survey administered in 60 countries, noting that the one-year prevalence was 3.2% in participants without comorbid physical disease and 9.3% to 23.0% in participants with chronic conditions.

The wide variability in lifetime and 12-month prevalence estimates of major depression is presumably due to a combination of substantive (genetic vulnerability and environmental risk factors) and measurement (cultural differences in the acceptance and meaning of items and the psychometric properties of the instruments) factors. Differences in study design might be involved as well. That is, apart from administering a common interview schedule, the surveys were not designed as replications with a standard protocol for translation, interviewer training, sampling, and quality control. More recently, the WHO World Mental Health (WMH) Survey Initiative conducted a coordinated series of

studies using a common protocol and a common instrument, the WHO Composite International Diagnostic Interview (CIDI) Version 3.0 [10], to assess a set of DSM-IV disorders in countries from every continent [11]. The 12-month prevalence of DSM-IV major depressive episode (MDE) in 18 countries ranged from 2.2% (Japan) to 10.4% (Brazil) [12]. The mid-point across all countries was similar to that in previous surveys (5%), as was the weighted average 12-month prevalence for the ten high income (5.5%) and eight low-middle income (5.9%) countries.

Almost all studies find that gender, age, and marital status are associated with depression. Women have a two-fold increased risk of MDE compared to men [13], individuals who are separated or divorced have significantly higher rates of depression than the currently married [5, 7], and the rate of depression generally goes down with age [5, 7]. This evidence, however, comes primarily from studies conducted in Western countries. The sparse data available from low-middle income countries suggest that the age pattern is either not monotonic or the association is reversed, with depression increasing with age [12, 14]. Other socioeconomic factors have less consistent relationships with depression in different countries [7].

The current report presents data on the prevalence, age-of-onset, and socio-demographic correlates of MDE in 18 countries participating in the WHO WMH Survey Initiative. As noted earlier, each of the WMH surveys administered the CIDI for DSM-IV. The CIDI includes a series of diagnostic stem questions to determine which diagnoses are assessed. Unlike in previous reports from the WMH or previous surveys, we used the screening information for MDE in responses to these diagnostic stem questions to conduct an examination of the screen-positive percentages as well as of the conditional lifetime and 12-month prevalence of MDE among respondents who endorsed the diagnostic stem questions. This was done to investigate the possibility that cross-national differences in prevalence estimates of MDE are due, at least in part, to differences across countries in the optimal threshold of CIDI symptom scores for detecting clinical cases. If such variation exists, we would expect much smaller cross-national differences in endorsement of diagnostic stem questions, which merely ask respondents if they had episodes of several days of being sad or depressed or losing interest in usual activities, than in

diagnoses. If this was the case, we would expect the largest cross-national differences in conditional prevalence estimates of MDE among screened positives. If differential variation of this sort exists, it would provide more reason than currently exists to suspect that cross-national differences in optimal diagnostic thresholds of the CIDI symptom scale lead to biased estimates of cross-national differences in prevalence in the WMH data.

A justification for this line of thinking comes from an earlier cross-national WHO study of major depression among primary care patients, which found strong similarity in the latent structure of depressive symptoms across 14 different countries in different parts of the world, but also found that countries with the highest prevalence estimates generally reported the lowest impairment associated with depression [15]. The authors concluded from these results that while cross-national differences in the estimated prevalence of depression cannot be attributed to differences in the nature or validity of the concept of a depressive episode, it is possible that DSM criteria may define different levels of depression severity in different countries. Our cross-national comparison of responses to diagnostic stem questions, described in the previous paragraph, was designed to shed some light on this possibility. In addition, we carried out a parallel analysis of cross-national differences in impairment associated with MDE. Results are organized by distinguishing between countries classified by the World Bank [16] as low or middle income versus higher income. This distinction was made based on patterns both in the WMH surveys [10] and in other cross-national epidemiologic surveys [7, 9] that raise concerns that MDE prevalence estimates might be artificially lower in low-middle than higher income countries due to methodological differences of the sort considered here.

METHODS

Sample and Procedure

The WMH surveys are a series of community-based studies conducted throughout the world [11]. This paper included data on MDE from 10 high income (Belgium, France, Germany, Israel, Italy, Japan, Netherlands, New Zealand, Spain, United States) and 8 low-middle income (São Paulo [Brazil], Colombia, Pondicherry [India], Shenzhen [China], Lebanon, Mexico, South Africa, Ukraine) countries

based on World Bank development criteria [16]. As noted in the introduction, we distinguished results from low-middle versus higher income countries based on the suspicion that optimal thresholds for defining clinically significant depression might be lower than the CIDI thresholds in the former countries, resulting in under-estimation of the prevalence of MDE in the CIDI in those countries. The surveys involved either national household samples or representative samples of urban areas. (Table 1) Weights were used to adjust for differential probabilities of selection into the study and to match the sample socio-demographic distributions with population distributions within each country. Sample sizes ranged from 2,372 (the Netherlands) to 12,790 (New Zealand), for a total of 89,037. The average weighted response rate was 71.7%.

--- Insert Table 1 about here ---

The WMH interviews were administered face-to-face by trained lay interviewers. To reduce respondent burden, the interview was divided into 2 parts. All respondents completed Part I, which assessed a set of core mental disorders, including MDE. Part II assessed additional disorders and correlates and was administered to all Part I respondents who met criteria for a Part I disorder plus a probability subsample of other Part I respondents. Part II responses were weighted by the inverse of their probability of selection into Part II to adjust for differential selection. Details about WMH survey methodology and weighting procedures are presented elsewhere [11, 17].

Standardized procedures for interviewer training, translation of study materials, and quality control were consistently employed in each country [11]. Procedures for human subject protection were approved and monitored for compliance by the institutional review boards of each local organization coordinating the survey. Informed consent was obtained before beginning interviews in all countries.

Measures

Major depressive episode (MDE): Near the start of the interview, the CIDI includes 3 screening questions about sadness/depressed mood, feelings of discouragement, and loss of interest lasting several days or longer. Respondents endorsing one or more of these questions (screen-positives) are administered the remainder of the MDE module. DSM-IV MDE requires the presence of 5 out of 9 cardinal symptoms

that persist for 2 weeks or longer, are present for most of the day nearly every day, and cause significant distress or impairment. These symptoms are depressed mood and markedly diminished interest or pleasure (one must be present to meet criteria for diagnosis), as well as clinically significant weight gain/loss or appetite disturbance, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness or excessive guilt, diminished ability to concentrate or think clearly, and recurrent thoughts of death or suicide. MDE was defined for purposes of the present report without organic exclusions and without diagnostic hierarchy rules [12]. Clinical reappraisal studies conducted in several countries found good agreement between diagnoses of MDE based on the CIDI and independent diagnoses based on blinded clinician-administered reappraisal interviews [18].

It is noteworthy that the CIDI interview translation, back-translation, and harmonization protocol required culturally competent bilingual clinicians in the participating countries to review, modify, and approve the key phrases used to describe symptoms of all disorders assessed in the survey [19]. That meant that the terms used to describe core symptoms of depression (i.e., sadness, depression, loss of interest) were customized when the original CIDI wording did not match the terms used in the local settings. However, no attempt was made to go beyond the DSM-IV criteria to develop distinct criteria for depression-equivalents that might be unique to specific countries. It is conceivable that the latter kind of expansion would have led to a reduction in cross-national variation in prevalence estimates. As noted in the introduction, though, previous research has shown that the latent structure among the symptoms of major depression is quite consistent across countries [15], providing a principled basis for focusing on this criterion set in our analysis.

Global impairment: A modified version of the WHO Disability Assessment Schedule-II (WHODAS-II) was administered to assess frequency and intensity of restrictions in performing normal activities during the 30 days prior to interview [20]. The activity areas included number of days unable to carry out normal daily activities because of problems with physical or emotional health as well as various difficulties in role performance on days in role. WHO-DAS scores are coded in the range 0-100, where 0 represents no impairment and 100 total impairment. Reported levels of impairment are low in all

countries, with means in the range 1.0-5.5 in high income countries and 1.1-4.8 in low-middle income countries.

Demographic factors: We examined sex, age (18-34, 35-49, 50-64, 65+), current marital status (separated, divorced, widowed, never married, currently married), living arrangement (alone, with others but not spouse/partner, with spouse/partner), income (low, low average, high average, high, based on country-specific quartiles of gross household earnings in the past 12 months [21]), and education (low, low average, high average, high, based on country-specific quartiles that take into consideration the fact that distributions of educational attainment vary widely across countries [22]).

Statistical analysis

Cross-tabulations were used to estimate the absolute and relative lifetime and 12-month prevalence of endorsing diagnostic stem questions and meeting DSM-IV/CIDI criteria for a diagnosis of MDE. F-tests (linear regression) were used to study differences in global impairment by recency of MDE (past 30 days, past month but not in the past 30 days, prior to the past year, never). Logistic regression analysis was used to examine socio-demographic correlates. Unadjusted odds ratios and 95% confidence intervals are presented for these associations. Because the data were weighted and clustered, the Taylor series linearization method [23] implemented in the SUDAAN software package [24] was used to estimate design-based standard errors. Statistical significance was consistently evaluated using .05-level two-sided tests.

RESULTS

Prevalence of MDE

As shown in Table 2, on average about half of the respondents in both high income (52.3%) and low-middle income (54.1%) countries endorsed at least one depression diagnostic stem question (screen-positive). (Table 2) However, the screen-positive rate ranges widely, from less than 30% in Japan and the Pondicherry region of India to 60% or more in France, New Zealand, the US, São Paulo, and Ukraine. The ratio of the highest to lowest screen-positive rates across countries is 3.3. On average, the estimated lifetime prevalence is higher in high income (14.6%) than low-middle income (11.1%) countries (t=5.7,

$p<0.001$). Indeed, the 4 lowest lifetime prevalence estimates (<10%) are in low-middle income countries (Pondicherry, Mexico, Shenzen, South Africa). Conversely, with the exception of São Paulo, the highest rates (>18%) are in 4 high income countries (France, the Netherlands, New Zealand, the US).

--- Insert Table 2 about here ---

The percent with lifetime MDE among the screen-positive respondents is also higher in surveys carried out in high income (28.1%) than low-middle income (19.8%) countries, although both the lowest and the highest percentages are in low-middle income countries (12.0%, Shenzhen vs. 35.9%, Pondicherry). The ratio of the highest to lowest conditional prevalence scores among screened positives is 3.0. Among high income countries, these conditional prevalence estimates are relatively low (<25%) in Germany, Italy, Israel and Japan, and higher (>30%) in the Netherlands and US.

We previously reported that the pooled 12-month prevalence of MDE was similar in high income (5.5%) and low-middle income (5.9%) countries (t=1.2, p=.25), with the specific estimates varying from 2.2% (Japan) to 8.3% (US) in high income countries and from 3.8% (Shenzhen) to 10.4% (São Paulo) in low-middle income countries [11]. Table 2 shows that among the screen-positive respondents, the percent with 12-month MDE is also similar for high income (10.6%) and low-middle income (10.5%) countries. The lowest rate is 6.7% (Italy) and the highest 18.0% (Pondicherry). In 10 countries, these percentages are between 8-12%.

The ratio of 12-month prevalence to lifetime prevalence is an indirect indicator of persistence. As shown in Table 2, this ratio is significantly lower on average in surveys carried out in high income (37.7%) than low-middle income (53.3%) countries ($t = 7.5$, $p<0.001$). Among high-income countries, the ratio ranges from $\leq$30% in France, Germany, Italy, and the Netherlands to >40% in the US and Israel. Among low-middle income countries, the lowest ratios are in Colombia (46.7%) and South Africa (49.6%), and the highest (57-58%) in São Paulo, Shenzhen, and Ukraine. Consistent with these results, the 30-day prevalence of MDE is somewhat lower in high income (1.8%; SE 0.1) than low-middle income (2.6%; SE 0.1) countries.

The last column of Table 2 shows that median retrospectively-reported age of onset (AOO) is similar for high income and low-middle income countries (25.7 vs. 24.0, respectively) and that the inter-quartile ranges are largely overlapping. The 95% confidence intervals indicate that across all countries, the risk period for onset of depression ranges from mid-late adolescence to the early 40s. In high income countries, the earliest median AOO estimates are in the US (22.7) and New Zealand (24.2), while the latest are in Spain (30.0) and Japan (30.1). In low-middle income countries, the earliest median AOO estimates are in Shenzhen (18.8) and South Africa (22.3) and the latest in Ukraine (27.8) and Pondicherry (31.9).

Impairment

As expected, MDE is associated with substantial impairment in the WMH data. Moreover, the degree of impairment increases progressively with recency of MDE. (Table 3) This is true in both high and low-middle income countries apart from Japan. The impairment level is exceptionally low in Japan. We note that the non-MDE comparison group, which has the lowest level of impairment, is comprised not only of healthy respondents but also of respondents with other DSM-IV diagnoses.

--- Insert Table 3 about here ---

For respondents with current MDE, the mean level of impairment is between approximately 5 (high income) and 8 (low-middle income) times as high as for respondents without MDE, with differences in mean scores of 12.3 (15.3 – 3.0) in high income countries and 8.8 (10.1 – 1.3) in low-middle income countries. To put these differences into perspective, the mean differences in all high income countries combined (15.3 – 3.0 = 12.3) and in all low-middle income countries combined (10.1 – 1.3 = 8.9) are both equal to 1.4 standard deviations on the impairment scale in those countries. Effect sizes such as these are quite large [25]. The biggest differences (>7-fold as high) are in Italy, Spain, São Paulo, and Mexico and the smallest ($\leq$5-fold) in Belgium, Israel, Pondicherry, and Ukraine. Respondents with MDE in the past year (but not currently) reported impairment scores between approximately 2-fold (high income) and 4-fold (low-middle income) as high as the non-MDE group, although this difference is not significant in Germany or the Netherlands. The largest mean differences (> 3-fold) are in low-middle

income countries (Mexico, São Paulo, Colombia, Pondicherry, and Shenzhen), and the smallest (~2-fold) in 4 high income countries (France, Belgium, Israel, New Zealand). In 7 countries, (5 high income and 2 low-middle income), there is no significant difference in impairment between respondents with MDE prior to the past year and the non-MDE subsample. In 5 countries (Spain, São Paulo, Colombia, Lebanon, and Mexico), the MDE positive group has a ~2-fold higher level of impairment than the non-MDE group.

The association between prevalence and impairment

As noted in the introduction, a previous cross-national WHO study carried out in primary care waiting room samples, found that depressed respondents in countries where the prevalence of depression was estimated to be highest reported the lowest average levels of impairment associated with their depression, while the highest impairment was reported by depressed respondents in countries where the prevalence of depression was estimated to be lowest [15]. We investigated this issue in the WMH data by creating a small data file in which each survey was treated as a separate observation and the variables were the measures of prevalence reported in Table 2 and a measure of impairment associated with MDE based on the results reported in Table 3. The impairment scores differed from those in Table 3, though, in that they represented the *difference* in mean impairment scores of respondents with 12-month MDE compared to those with no lifetime history of MDE in the survey. This difference was taken to represent the effect of recent MDE as assessed by the CIDI on impairment in the survey.

Unlike the earlier primary care study, we found that the association between prevalence and impairment is positive. (Table 4) This is true not only in the total sample of all countries (r = .48) but also when we look separately in high income (r = .34) and low-middle income (r = .80) countries. In addition, when we decomposed these associations into correlations of impairment with the two components of prevalence – the percent of respondents endorsing an MDE stem question and the conditional prevalence estimate of MDE among screen-positives – we found that the first correlation is considerably stronger than the second in the total sample of countries (r = .45, .11) as well as in low-

middle income countries (r = .76, .04), while the first correlation is stronger than the second in high income countries (r = .17, .45).

Socio-demographic factors

Tables 4a and 4b show the bivariate associations of the socio-demographic characteristics with 12-month MDE. (Tables showing the country-specific distributions of the demographic variables and 12-month prevalences of MDE are available upon request.) Consistent with previous epidemiologic studies, women are twice as likely as men to be classified as having MDE on average. This difference is statistically significant in 15 of the 18 countries, and even in the 3 exceptions (Belgium, Germany, and Shenzhen), women have higher rates than men. In the developed countries, the significant odds ratios range from 1.6 in Israel to 2.7 in Spain. In the developing countries, they range from 1.9 in Pondicherry and Colombia to 2.6 in São Paulo. The association between sex and MDE does not differ significantly between high income and low-middle income countries ($\chi^2_1 = 2.3$, p = .13).

--- Insert Tables 4a and 4b about here ---

The associations between age group and MDE varies considerably across countries. In 2 high income and 5 low-middle income countries, there are no significant associations. In 6 high income countries and in São Paulo, respondents in the youngest age group (18-34) are 3-5.5 times as likely to have MDE as those in the oldest age group (65+), but in Pondicherry and Ukraine, young age is associated with low risk. The 35-49 year age group is also at increased risk for MDE, especially in New Zealand (OR=4.4), the US (OR=3.9), and São Paulo (OR=3.3); in Ukraine, however, they have a significantly lower risk than those in the oldest age group. The mid-life group, ages 50-64, encompasses a period of transition from work to retirement in many countries. Compared to respondents age 65+, they have an increased risk of MDE in 8 high income countries as well as São Paulo, with ORs ranging from 1.6 (Spain) to 3.1 (US). Overall, the association between age and MDE is significantly stronger in high income than low-middle income countries ($\chi^2_3 = 67.1$, $p < .001$).

Marital status is a consistently significant correlate of MDE. Being separated is associated with elevated risk of MDE in 12 countries, with odds ratios varying from < 4.0 in five countries to >8.0 in Pondicherry (OR=8.2), Japan (OR=10.8), and Lebanon (OR=19.3). Being divorced is associated with MDE in 7 of the 10 developed and 4 of the 8 developing countries, with unusually high ORs in Japan (OR=5.1), Shenzhen (OR=6.2) and Ukraine (OR=4.2). Being widowed is less consistently and more modestly associated with MDE with the exception of Ukraine, where widows are eight times as likely as the married to have MDE. In 5 high income countries, there is a significantly elevated OR of MDE among the never married. However, Pondicherry and South Africa are the only two low-middle income samples with significant ORs, and in these countries never being married is associated with low risk. Overall, the association between marital status and MDE differs significantly between high and low-middle income countries ($\chi^2_3 = 124.4$, $p < .001$) due to stronger associations of being separated and never married with depression in high income countries and stronger associations of being divorced and widowed with depression in low-middle income countries. In contrast to marital status, living arrangements per se are more modestly associated with MDE. This association is significant in 8 of the high income countries and in Ukraine and Shenzhen, with the overall difference in the association between high and low-middle income countries significant ($\chi^2_2 = 39.0$, $p < .001$) due to a higher OR between being unmarried but living with others in high than low-middle income countries.

The poorest respondents in France, Germany, New Zealand, and the US have about 2-fold increased odds of MDE compared to those in the highest income group. In the low-middle income countries, in comparison, income is not significantly related to MDE. This stronger association between income and MDE in higher income countries is statistically significant overall ($\chi^2_3 = 19.3$, $p < .001$). Similarly, among the non-Asian countries, low education is significantly associated with MDE only in Israel, the US, Mexico and Ukraine. The findings for the Asian countries are more complex. In Pondicherry, respondents with the lowest education are 14 times as likely to have MDE as those with the highest education. In Japan and Shenzhen, the reverse pattern is found, with the least educated having the

lowest risk of MDE. The association between education and MDE overall does not differ significantly between high and low-middle income countries ($\chi^2_3 = 6.2$, p = .10).

DISCUSSION

Consistent with previous cross-national reports, the WMH MDE prevalence estimates varied considerably across countries, with the highest prevalence estimates found in some of the wealthiest countries in the world. Contrary to our initial expectation, though, we found no evidence that this wide cross-national variation was due as much to cross-national differences in endorsing diagnostic stem questions as to conditional prevalence of MDE among respondents who endorsed a diagnostic stem. The ratio of highest to lowest screen-positive rates across countries (3.3) is very similar to the ratio of highest to lowest conditional prevalence rates among screen-positives (3.0). As expected, we also found that MDE is associated with substantial impairment. However, contrary to our initial expectation, we did not find that cross-national differences in prevalence estimates were inversely related to differences in average level of impairment associated with depression. Indeed, the opposite pattern was found.

Taken together, these results argue against the suggestion that the wide cross-national variation in depression prevalence estimates in the WMH surveys and previous epidemiologic studies is due to the threshold for defining clinically significant depression in standard diagnostic interviews differing across countries. If that was the case, we would expect that the cases of depression detected in countries with the lowest estimated prevalence of depression would be the most severe cases, resulting in high impairment rates among these cases, while the opposite would be true in countries with the highest estimated prevalence of depression. Furthermore, we would expect that reports of core depressive symptoms would be more similar across countries than estimates of disorder prevalence. Neither of these expectations is borne out in the WMH data. A question can be raised by our results regarding the association between prevalence and impairment are so different from those reported in the earlier WHO study [15]. It is important to bear in mind, though, that this earlier study was based on primary care samples, where selection bias into help-seeking on the basis of either distress or impairment might induce a more negative association between these two variables than exists in the population. The WMH surveys, in comparison,

are based on general population samples, where the selection bias issues that occur in treatment samples do not arise.

While these results add indirect support to a substantive interpretation of the cross-national differences in MDE found here, they shed no light on why these differences exist. Differences in stress exposure, in reactivity to stress, and in endogenous depression unrelated to environmental provoking factors are all possibilities. On one level it seems counter-intuitive that people in high income countries would experience more stress than those in low-middle income countries. However, it has been suggested that depression is to some extent an illness of affluence [26]. A related argument is that income inequality, which is for the most part greater in high than low-middle income countries, promotes a wide variety of chronic conditions that includes depression [27]. While further analyses of the WMH data might be able to shed some light on these perspectives, such an analysis is beyond the scope of the current report, which focused on the evaluation of a more methodological interpretation of the observed cross-national differences in depression prevalence estimates.

In considering a substantive interpretation of our findings, it is noteworthy that while lifetime prevalence estimates were found to be significantly higher in high than low-middle income countries overall, no significant difference was found in 12-month prevalence. The ratio of 12-month to lifetime prevalence estimates, furthermore, was significantly higher in low-middle than high income countries. It might be that these results reflect genuinely lower lifetime prevalence but higher persistence of depression in low-middle than high income countries, but another plausible and more parsimonious explanation is that error in recall of prior lifetime episodes is higher in low-middle than high income countries. Longitudinal data collection would be required to document such a difference rigorously [28, 29]. Although such data do not exist in all WMH series, it is important to recognize this possibility of cross-national variation in recall error before launching an extensive investigation of substantive explanations. It might be that a fruitful focus of subsequent WMH analysis would be on the youngest respondents, where lifetime recall error might be least pronounced. Or it might be that the investigation of cross-national differences in lifetime prevalence should be abandoned in favor of a focus on recent prevalence

in recognition of the plausibility of significant cross-national variation in recall error of lifetime prevalence.

Another implication of the methodological limitation that the WMH surveys were all cross-sectional is that it made it impossible to determine the temporal direction of the associations examined between depression and the socio-demographic variables. This means that even though variables such as education and marital status were considered predictors of depression, they might actually have been consequences or involved in reciprocal causal relationships with depression. Within the context of that limitation, though, the socio-demographic patterns reported here are broadly consistent with those found in previous community epidemiologic surveys of depression [2, 5, 7, 9, 13], adding to confidence in the generalizability of the WMH finding.

The results reported here are limited in a number of other ways that apply to the WMH findings more generally [30]. Some of the most important of these issues involve sampling. The response rates varied widely. Although the response rates do not appear to be related to depression prevalence, it is possible that in some settings, particularly those where treatment is unavailable, the most depressed individuals were unable to participate. Some surveys only included metropolitan areas, while others involved national samples. This too may have affected estimates of cross-national variation in prevalence. In addition, the surveys did not include institutionalized patients, people in jails and prisons, individuals in the military, individuals who were too intoxicated to be interviewed, or people with severe cognitive or physical disabilities. The samples also reflected survivor bias, which could be of considerable importance for understanding differences between high and low-middle income countries given the 10-15 year gap in life expectancy between people in the developed and developing world [31]. Thus the rates reported here provide conservative estimates of MDE prevalence. A final noteworthy sample bias is that South Africa was the only African country included in this report [32] even though the WMH survey was also conducted in Nigeria [33]. Nigeria was excluded because of the extremely low prevalence of MDE (3.1% lifetime; 1.1% 12-month) and other disorders. These low prevalence estimates raise questions about the willingness of respondents in the Nigerian survey to disclose symptoms to

strangers or lay interviewers as well as the appropriateness of the CIDI structure for that setting [34]. They also reduced our statistical power to examine the associations of depression considered here in the Nigerian data. A similar experience may have occurred in another African population-based survey using the CIDI that was not part of the WMH series. That survey, carried out in Addis Ababa, also found low rates of affective disorders [35]. Given the high level of exposure to trauma in extremely poor countries such as these [36], research is urgently needed to determine the best approaches to study the prevalence of mental disorders in these settings.

The measure of MDE also had inherent limitations. The structure of the CIDI, including the choice of stem questions in the screening section, may have led to underestimates of depression in some settings. As noted above in the section on measurement, the interview translation, back-translation, and harmonization process in the WMH surveys included customization within countries of the terms used to describe the core symptoms of depression (i.e., sadness, depression, loss of interest) based on clinical experiences of local collaborators and the results of pilot studies [19]. However, no attempt was made to develop distinct cut-points in the CIDI diagnostic algorithms for different countries or to go beyond the DSM-IV criteria to develop distinct criteria for different countries that might have increased our ability to detect depression or depression-equivalents. It is noteworthy that in the countries where we carried out blinded clinical reappraisal interviews with subsamples of WMH respondents, we found no evidence for systematic bias in the diagnostic threshold for depression [18], but clinical reappraisal interviews were not carried out in all WMH countries and it is conceivable that such studies would have found systematic differences in the ability of the CIDI to detect clinical depression across countries.

Despite these limitations, the WMH data provide useful new information about the epidemiology of MDE. We find wide variation not only in the prevalence of MDE but also in the proportion of people who endorse diagnostic stem questions for MDE, a pattern that has seldom been examined in previous epidemiologic studies [37]. We find cross-national consistency, in comparison, in the impairment associated with MDE. This association has to our knowledge never before been considered in cross-national community epidemiologic surveys. Our results confirm the public health importance of major

depression as a commonly occurring and seriously impairing condition with generally early age of onset and persistent course in a wide range of countries. The specifications we found of these results suggest that, if anything, the WMH prevalence estimates are likely to be conservative. In addition, we replicated previous findings about socio-demographic correlates of MDE. We also documented an intriguing opposite-sign pattern of differences between high and low-middle income countries in estimates of lifetime prevalence and persistence of MDE that might be due to differences in recall error. Future research on cross-national differences in depression needs to take this pattern into consideration and to develop a workable strategy to deal with the possibility of differential recall error as a plausible contributor to cross-national differences in prevalence estimates.

COMPETING INTERESTS

Dr. Kessler has been a consultant for AstraZeneca, Analysis Group, Bristol-Myers Squibb, Cerner-Galt Associates, Eli Lilly & Company, GlaxoSmithKline Inc., HealthCore Inc., Health Dialog, Integrated Benefits Institute, John Snow Inc., Kaiser Permanente, Matria Inc., Mensante, Merck & Co, Inc., Ortho-McNeil Janssen Scientific Affairs, Pfizer Inc., Primary Care Network, Research Triangle Institute, Sanofi-Aventis Groupe, Shire US Inc., SRA International, Inc., Takeda Global Research & Development, Transcept Pharmaceuticals Inc., and Wyeth-Ayerst; has served on advisory boards for Appliance Computing II, Eli Lilly & Company, Mindsite, Ortho-McNeil Janssen Scientific Affairs, Plus One Health Management and Wyeth-Ayerst; and has had research support for his epidemiological studies from Analysis Group Inc., Bristol-Myers Squibb, Eli Lilly & Company, EPI-Q, GlaxoSmithKline, Johnson & Johnson Pharmaceuticals, Ortho-McNeil Janssen Scientific Affairs., Pfizer Inc., Sanofi-Aventis Groupe, and Shire US, Inc. The remaining authors report no competing interests.

AUTHOR'S CONTRIBUTIONS

All authors were involved in data collection in their individual countries as well as participation in the design of the study for this report. EB, NAS, IH and RCK carried out the data analyses. All authors made critical revisions and approved the final manuscript.

ACKNOWLEDGMENTS

This report is carried out in conjunction with the World Health Organization World Mental Health (WMH) Survey Initiative. We thank the WMH staff for assistance with instrumentation, fieldwork, and data analysis. These activities were supported by the United States National Institute of Mental Health (R01MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and R01 DA016558), the Fogarty International Center (FIRCA R03-TW006481), the Pan American Health Organization, the Eli Lilly & Company

Foundation, Ortho-McNeil Pharmaceutical, Inc., GlaxoSmithKline, Sanofi Aventis and Bristol-Myers Squibb. A complete list of WMH publications can be found at http://www.hcp.med.harvard.edu/wmh/. The São Paulo Megacity Mental Health Survey is supported by the State of São Paulo Research Foundation (FAPESP) Thematic Project Grant 03/00204-3. The Chinese World Mental Health Survey Initiative is supported by the Pfizer Foundation. The Colombian National Study of Mental Health (NSMH) is supported by the Ministry of Social Protection. The ESEMeD project is funded by the European Commission (Contracts QLG5-1999-01042; SANCO 2004123), the Piedmont Region (Italy), Fondo de Investigación Sanitaria, Instituto de Salud Carlos III, Spain (FIS 00/0028), Ministerio de Ciencia y Tecnología, Spain (SAF 2000-158-CE), Departament de Salut, Generalitat de Catalunya, Spain, Instituto de Salud Carlos III (CIBER CB06/02/0046, RETICS RD06/0011 REM-TAP), and other local agencies and by an unrestricted educational grant from GlaxoSmithKline. The Epidemiological Study on Mental Disorders in India was funded jointly by Government of India and WHO. The Israel National Health Survey is funded by the Ministry of Health with support from the Israel National Institute for Health Policy and Health Services Research and the National Insurance Institute of Israel. The World Mental Health Japan (WMHJ) Survey is supported by the Grant for Research on Psychiatric and Neurological Diseases and Mental Health (H13-SHOGAI-023, H14-TOKUBETSU-026, H16-KOKORO-013) from the Japan Ministry of Health, Labour and Welfare. The Lebanese National Mental Health Survey (LEBANON) is supported by the Lebanese Ministry of Public Health, the WHO (Lebanon), Fogarty International, anonymous private donations to IDRAAC, Lebanon, and unrestricted grants from Janssen Cilag, Eli Lilly, GlaxoSmithKline, Roche, and Novartis. The Mexican National Comorbidity Survey (MNCS) is supported by The National Institute of Psychiatry Ramon de la Fuente (INPRFMDIES 4280) and by the National Council on Science and Technology (CONACyT-G30544- H), with supplemental support from the PanAmerican Health Organization (PAHO). Te Rau Hinengaro: The New Zealand Mental Health Survey (NZMHS) is supported by the New Zealand Ministry of Health, Alcohol Advisory Council, and the Health Research Council. The South Africa Stress and Health Study (SASH) is supported by the US National Institute of Mental Health (R01-MH059575) and National Institute of

Drug Abuse with supplemental funding from the South African Department of Health and the University of Michigan. The Ukraine Comorbid Mental Disorders during Periods of Social Disruption (CMDPSD) study is funded by the US National Institute of Mental Health (RO1-MH61905). The US National Comorbidity Survey Replication (NCS-R) is supported by the National Institute of Mental Health (NIMH; U01-MH60220) with supplemental support from the National Institute of Drug Abuse (NIDA), the Substance Abuse and Mental Health Services Administration (SAMHSA), the Robert Wood Johnson Foundation (RWJF; Grant 044708), and the John W. Alden Trusts.

The funding organizations had no role in the study design; in the collection, analysis, and interpretation of data; in the writing of the manuscript; and in the decision to submit the manuscript for publication.

REFERENCES

1. Spijker J, Graaf R, Bijl RV, Beekman AT, Ormel J, Nolen WA: **Functional disability and depression in the general population. Results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS)**. *Acta Psychiatr Scand* 2004, **110**(3):208-214.
2. Üstün TB, Ayuso-Mateos JL, Chatterji S, Mathers C, Murray CJ: **Global burden of depressive disorders in the year 2000**. *Br J Psychiatry* 2004, **184**:386-392.
3. Murray CJ, Lopez AD: **Evidence-based health policy--lessons from the Global Burden of Disease Study**. *Science* 1996, **274**(5288):740-743.
4. Murray CJL, Lopez AD (Eds.): *The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020*. Cambridge, MA: Harvard University Press; 1996.
5. Weissman MM, Bland RC, Canino GJ, Faravelli C, Greenwald S, Hwu HG, Joyce PR, Karam EG, Lee CK, Lellouch J, Lepine JP, Newman SC, Rubio-Stipec M, Wells JE, Wickramaratne PJ, Wittchen H, Yeh EK: **Cross-national epidemiology of major depression and bipolar disorder**. *JAMA* 1996, **276**(4):293-299.
6. Robins LN, Helzer JE, Croughan JL, Ratcliff KS: **National Institute of Mental Health Diagnostic Interview Schedule: its history, characteristics and validity**. *Arch Gen Psychiatry* 1981, **38**(4):381-389.
7. Andrade L, Caraveo-Anduaga JJ, Berglund P, Bijl RV, Dragomericka E, Kohn R, Keller MB, Kessler RC, Kawakami N, Kilic C, D. O, Ustun TB, Vicente B, Wittchen H: **The epidemiology of major depressive episodes: results from the International Consortium of Psychiatric Epidemiology (ICPE) Surveys**. *Int J Methods Psychiatr Res* 2003, **12**(1):3-21.
8. Kessler RC, Wittchen H-U, Abelson JM, McGonagle K, Schwarz N, Kendler KS, Knauper B, Zhao S: **Methodological studies of the Composite International Diagnostic Interview (CIDI) in the US National Comorbidity Survey**. *Int J Methods Psychiatr Res* 1998, **7**(1):33-55.

9. Moussavi S, Chatterji S, Verdes E, Tandon A, Patel V, Ustun B: **Depression, chronic diseases, and decrements in health: results from the World Health Surveys**. *Lancet* 2007, **370**(9590):851-858.

10. Kessler RC, Üstün TB: **The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI)**. *Int J Methods Psychiatr Res* 2004, **13**(2):93-121.

11. Kessler RC, Üstün TB: *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. New York, NY: Cambridge University Press; 2008.

12. Kessler RC, Birnbaum HG, Shahly V, Bromet E, Hwang I, McLaughlin KA, Sampson N, Andrade LH, de Girolamo G, Demyttenaere K, Haro JM, Karam AN, Kostyuchenko S, Kovess V, Lara C, Levinson D, Matschinger H, Nakane Y, Browne MO, Ormel J, Posada-Villa J, Sagar R, Stein DJ: **Age differences in the prevalence and co-morbidity of DSM-IV major depressive episodes: results from the WHO World Mental Health Survey Initiative**. *Depress Anxiety* 2010, **27**(4):351-364.

13. Van de Velde S, Bracke P, Levecque K: **Gender differences in depression in 23 European countries. Cross-national variation in the gender gap in depression**. *Soc Sci Med* 2010, **71**(2):305-313.

14. Bromet EJ, Gluzman SF, Paniotto VI, Webb CP, Tintle NL, Zakhozha V, Havenaar JM, Gutkovich Z, Kostyuchenko S, Schwartz JE: **Epidemiology of psychiatric and alcohol disorders in Ukraine: findings from the Ukraine World Mental Health survey**. *Soc Psychiatry Psychiatr Epidemiol* 2005, **40**(9):681-690.

15. Simon GE, Goldberg DP, Von Korff M, Ustun TB: **Understanding cross-national differences in depression prevalence**. *Psychol Med* 2002, **32**(4):585-594.

16. World Bank: **Data & Statistics, Country Groups by Income** [http://go.worldbank.org/D7SN0B8YU0]

17. Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine JP, Angermeyer MC, Bernert S, de Girolamo G, Morosini P, Polidori G, Kikkawa T, Kawakami N, Ono Y, Takeshima T, Uda H, Karam EG, Fayyad JA, Karam AN, Mneimneh ZN, Medina-Mora ME, Borges G, Lara C, de Graaf R, Ormel J, Gureje O, Shen Y, Huang Y, Zhang M, Alonso J, Haro JM, Vilagut G, Bromet EJ, Gluzman S, Webb C, Kessler RC, Merikangas KR, Anthony JC, Von Korff MR, Wang PS, Brugha TS, Aguilar-Gaxiola S, Lee S, Heeringa S, Pennell BE, Zaslavsky AM, Ustun TB, Chatterji S: **Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys**. *JAMA* 2004, **291**(21):2581-2590.

18. Haro JM, Arbabzadeh-Bouchez S, Brugha TS, de Girolamo G, Guyer ME, Jin R, Lepine JP, Mazzi F, Reneses B, Vilagut G, Sampson NA, Kessler RC: **Concordance of the Composite International Diagnostic Interview Version 3.0 (CIDI 3.0) with standardized clinical assessments in the WHO World Mental Health surveys**. *Int J Methods Psychiatr Res* 2006, **15**(4):167-180.

19. Harkness J, Pennell BE, Villar A, Gebler N, Aguilar-Gaxiola S, Bilgen I: **Translation procedures and translation assessment in the World Mental Health Survey Initiative**. In *The WHO World Mental Health Surveys: Global perspectives on the epidemiology of mental disorders*. Edited by Kessler RC, Üstün TB. New York, NY: Cambridge University Press; 2008:91-113.

20. Von Korff M, Crane PK, Alonso J, Vilagut G, Angermeyer MC, Bruffaerts R, de Girolamo G, Gureje O, de Graaf R, Huang Y, Iwata N, Karam EG, Kovess V, Lara C, Levinson D, Posada-Villa J, Scott KM, Ormel J: **Modified WHODAS-II provides valid measure of global disability but filter items increased skewness**. *J Clin Epidemiol* 2008, **61**(11):1132-1143.

21. Levinson D, Lakoma MD, Petukhova M, Schoenbaum M, Zaslavsky AM, Angermeyer M, Borges G, Bruffaerts R, de Girolamo G, de Graaf R, Gureje O, Haro JM, Hu C, Karam AN, Kawakami N, Lee S, Lepine JP, Browne MO, Okoliyski M, Posada-Villa J, Sagar R, Viana MC,

Williams DR, Kessler RC: **Associations of serious mental illness with earnings: results from the WHO World Mental Health surveys**. *Br J Psychiatry* 2010, **197**(2):114-121.

22. Lee S, Tsang A, Breslau J, Aguilar-Gaxiola S, Angermeyer M, Borges G, Bromet E, Bruffaerts R, de Girolamo G, Fayyad J, Gureje O, Haro JM, Kawakami N, Levinson D, Oakley Browne MA, Ormel J, Posada-Villa J, Williams DR, Kessler RC: **Mental disorders and termination of education in high-income and low- and middle-income countries: epidemiological study**. *Br J Psychiatry* 2009, **194**(5):411-417.

23. Wolter KM: *Introduction to Variance Estimation*. New York, NY: Springer-Verlag; 1985.

24. Research Triangle Institute: **SUDAAN: Professional Software for Survey Data Analysis [computer program].** 8.0.1. edition. Research Triangle Park, NC: Research Triangle Institute; 2002.

25. Ellis PD: *The Essential Guide to Effect Sizes: Statistical Power, Meta-Analysis, and the Interpretation of Research Results*. New York, NY: Cambridge University Press; 2010.

26. Koplewicz HS, Gurian A, Williams K: **The era of affluence and its discontents**. *J Am Acad Child Adolesc Psychiatry* 2009, **48**(11):1053-1055.

27. Wilkinson RG, Pickett KE: **Income inequality and population health: a review and explanation of the evidence**. *Soc Sci Med* 2006, **62**(7):1768-1784.

28. Patten SB: **Accumulation of major depressive episodes over time in a prospective study indicates that retrospectively assessed lifetime prevalence estimates are too low**. *BMC Psychiatry* 2009, **9**:19.

29. Wells JE, Horwood LJ: **How accurate is recall of key symptoms of depression? A comparison of recall and longitudinal reports**. *Psychol Med* 2004, **34**(6):1001-1011.

30. Kessler RC, Birnbaum H, Bromet E, Hwang I, Sampson N, Shahly V: **Age differences in major depression: results from the National Comorbidity Survey Replication (NCS-R)**. *Psychol Med* 2010, **40**(2):225-237.

31. Riley JC: **Estimates of regional and global life expectancy, 1800-2001**. *Popul Dev Rev* 2005, **31**(3):537-543.

32. Tomlinson M, Grimsrud AT, Stein DJ, Williams DR, Myer L: **The epidemiology of major depression in South Africa: results from the South African stress and health study**. *S Afr Med J* 2009, **99**(5 Pt 2):367-373.

33. Gureje O, Uwakwe R, Oladeji B, Makanjuola VO, Esan O: **Depression in adult Nigerians: results from the Nigerian Survey of Mental Health and Well-being**. *J Affect Disord* 2010, **120**(1-3):158-164.

34. Gureje O, Adeyemi O, Enyidah N, Ekpo M, Udofia O, Uwakwe R, Wakil A: **Mental disorders among adult Nigerians: risks, prevalence, and treatment**. In *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. Edited by Kessler RC, Üstün TB. New York, NY: Cambridge University Press; 2008.

35. Kebede D, Alem A: **Major mental disorders in Addis Ababa, Ethiopia. II. Affective disorders**. *Acta Psychiatr Scand* 1999, **100**(Suppl 397):18-23.

36. Benjet C: **Childhood adversities of populations living in low-income countries: prevalence, characteristics, and mental health consequences**. *Curr Opin Psychiatry* 2010, **23**(4):356-362.

37. Chang SM, Hahm BJ, Lee JY, Shin MS, Jeon HJ, Hong JP, Lee HB, Lee DW, Cho MJ: **Cross-national difference in the prevalence of depression caused by the diagnostic threshold**. *J Affect Disord* 2008, **106**(1-2):159-167.

Table 1. World Mental Health (WMH) Survey sample characteristics

Country	Survey[a]	Sample Characteristics[b]	Field Dates	Age Range	Sample Size			Response Rate[c]
					Part I	Part II	Part II and Age ≤ 44[d]	
I. High income								
Belgium	ESEMeD	Stratified multistage clustered probability sample of individuals residing in households from the national register of Belgium residents. NR	2001-2	18+	2419	1043	486	50.6
France	ESEMeD	Stratified multistage clustered sample of working telephone numbers merged with a reverse directory (for listed numbers). Initial recruitment was by telephone, with supplemental in-person recruitment in households with listed numbers. NR	2001-2	18+	2894	1436	727	45.9
Germany	ESEMeD	Stratified multistage clustered probability sample of individuals from community resident registries. NR	2002-3	18+	3555	1323	621	57.8
Israel	NHS	Stratified multistage clustered area probability sample of individuals from a national resident register. NR	2002-4	21+	4859	4859	--	72.6
Italy	ESEMeD	Stratified multistage clustered probability sample of individuals from municipality resident registries. NR	2001-2	18+	4712	1779	853	71.3
Japan	WMHJ 2002-2006	Un-clustered two-stage probability sample of individuals residing in households in nine metropolitan areas (Fukiage, Higashi-ichiki, Ichiki, Kushikino, Nagasaki, Okayama, Sano, Tamano, Tendo, and Tochigi)	2002-6	20+	3416	1305	425	59.2
Netherlands	ESEMeD	Stratified multistage clustered probability sample of individuals residing in households that are listed in municipal postal registries. NR	2002-3	18+	2372	1094	516	56.4
New Zealand[e]	NZMHS	Stratified multistage clustered area probability sample of household residents. NR	2004-5	18+	12790	7312	4119	73.3
Spain	ESEMeD	Stratified multistage clustered area probability sample of household residents. NR	2001-2	18+	5473	2121	960	78.6
United States	NCS-R	Stratified multistage clustered area probability sample of household residents. NR	2002-3	18+	9282	5692	3197	70.9
II. Low-middle income								
Brazil	São Paulo Megacity	Stratified multistage clustered area probability sample of household residents in the São Paulo metropolitan area.	2004-7	18+	5037	2942	--	77.7
Colombia	NSMH	Stratified multistage clustered area probability sample of household residents in all urban areas of the country (approximately 73% of the total national population)	2003	18-65	4426	2381	1731	87.7
India	WMHI	Stratified multistage clustered area probability sample of household residents in Pondicherry region. NR	2003-5	18+	2992	1373	642	98.6
Lebanon	LEBANON	Stratified multistage clustered area probability sample of household residents. NR	2002-3	18+	2857	1031	595	70.0
Mexico	M-NCS	Stratified multistage clustered area probability sample of household residents in all urban areas of the country (approximately 75% of the total national population).	2001-2	18-65	5782	2362	1736	76.6
South Africa	SASH	Stratified multistage clustered area probability sample of household residents. NR	2003-4	18+	4315	4315	--	87.1
Ukraine	CMDPSD	Stratified multistage clustered area probability sample of household residents. NR	2002	18+	4724	1719	540	78.3
PRC	Shenzhen	Stratified multistage clustered area probability sample of household residents and temporary residents in the Shenzhen area.	2006-7	18+	7132	2475	1994	80.0

[a]ESEMeD (The European Study Of The Epidemiology Of Mental Disorders); NHS (Israel National Health Survey); WMHJ 2002-2006 (World Mental Health Japan Survey); NZMHS (New Zealand Mental Health Survey); NCS-R (The US National Comorbidity Survey Replication); NSMH (The Colombian National Study of Mental Health); WMHI (World Mental Health India); LEBANON (Lebanese Evaluation of the Burden of Ailments and Needs of the Nation); M-NCS (The Mexico National Comorbidity Survey); SASH (South Africa Stress and Health Study); CMDPSD (Comorbid Mental Disorders during Periods of Social Disruption)

[b]Most 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) used municipal resident 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 four sample areas and one random respondent selected in each sample household. Fourteen surveys are based on nationally representative (NR) household samples, while two others are based on nationally representative household samples in urbanized areas (Colombia, Mexico). The Israel survey is a representative sample of individuals.

[c]The response rate is calculated as the ratio of the number of households in which an interview was completed to the number of households originally sampled, excluding from the denominator households known not to be eligible either because of being vacant at the time of initial contact or because the residents were unable to speak the designated languages of the survey. The weighted average response rate for all countries included is 71.7%.

[d]Brazil, Israel, and South Africa did not have an age restricted Part II sample. All other countries, with the exception of India and Ukraine (which were age restricted to ≤ 39) were age restricted to ≤ 44.

[e] New Zealand response rate is calculated on the entire survey sample size which was of respondents age 16+ totaling 12,992. For purposes of this analysis we only used respondents aged 18+.

Table 2. Prevalence of DSM-IV/CIDI major depressive episodes in the 18 countries participating in the WMH surveys [a]

	Screen+ % (SE)	Lifetime prevalence % (SE)	Lifetime/ screen+ % (SE)	12-month prevalence % (SE)	12-month/ screen+ % (SE)	12-month/ lifetime % (SE)	Age of onset Median (IQR)[b]
I. High income							
Belgium	49.4 (2.5)	14.1 (1.0)	28.5 (1.9)	5.0 (0.5)	10.0 (1.0)	35.2(2.8)	29.4 (20.9-41.3)
France	65.0 (1.7)	21.0 (1.1)	32.3 (1.4)	5.9 (0.6)	9.0 (0.9)	27.9(2.6)	28.4 (19.3-38.9)
Germany	43.1 (1.4)	9.9 (0.6)	23.0 (1.3)	3.0 (0.3)	6.9 (0.6)	30.1 (2.1)	27.6 (18.6-39.6)
Israel	45.1 (0.8)	10.2 (0.5)	22.6 (1.0)	6.1 (0.4)	13.5 (0.8)	59.6 (2.3)	25.5 (18.1-38.5)
Italy	44.9 (1.7)	9.9 (0.5)	22.1 (1.0)	3.0 (0.2)	6.7 (0.5)	30.2 (1.9)	27.7 (19.1-39.1)
Japan	29.9 (0.8)	6.6 (0.5)	22.2 (1.4)	2.2 (0.4)	7.4 (1.2)	33.3 (4.2)	30.1 (20.8-45.3)
Netherlands	53.2 (1.6)	17.9 (1.0)	33.6 (1.8)	4.9 (0.5)	9.2 (1.0)	27.3 (2.6)	27.2 (19.3-39.5)
New Zealand	61.9 (0.6)	17.8 (0.4)	28.7 (0.6)	6.6 (0.3)	10.6 (0.5)	37.0 (1.5)	24.2 (16.1-34.5)[c]
Spain	37.7 (1.0)	10.6 (0.5)	28.2 (1.2)	4.0 (0.3)	10.6 (0.8)	37.5 (1.9)	30.0 (19.7-44.3)
United States	62.0 (0.9)	19.2 (0.5)	30.9 (0.7)	8.3 (0.3)	13.3 (0.5)	43.1 (1.2)	22.7 (15.1-34.6)
Total	52.3 (0.4)	14.6 (0.2)	28.1 (0.3)	5.5 (0.1)	10.6 (0.2)	37.7 (0.7)	25.7 (17.3-37.2)
II. Low-middle income							
Brazil	66.0 (1.0)	18.4 (0.8)	27.9 (1.1)	10.4 (0.6)	15.8 (0.8)	56.7 (1.5)	24.3 (17.2-35.8)
Colombia	58.6 (1.1)	13.3 (0.6)	22.6 (1.0)	6.2 (0.4)	10.6 (0.7)	46.7 (2.6)	23.5 (15.6-33.6)
India	25.0 (0.9)	9.0 (0.5)	35.9 (1.5)	4.5 (0.4)	18.0 (1.4)	50.0 (3.0)	31.9 (24.5-42.7)
Lebanon	57.7 (1.8)	10.9 (0.9)	18.9 (1.3)	5.5 (0.7)	9.5 (1.2)	50.0 (3.7)	23.8 (17.5-32.8)
Mexico	40.6 (1.1)	8.0 (0.5)	19.6 (1.2)	4.0 (0.3)	9.8 (0.8)	50.0 (2.7)	23.5 (16.7-34.0)
Shenzhen	54.6 (0.9)	6.5 (0.4)	12.0 (0.7)	3.8 (0.3)	6.9 (0.5)	58.0 (2.6)	18.8 (14.9-23.4)
South Africa	56.1 (1.3)	9.8 (0.7)	17.4 (1.2)	4.9 (0.4)	8.6 (0.8)	49.6 (2.7)	22.3 (15.8-33.8)
Ukraine	82.4 (1.1)	14.6 (0.7)	17.7 (0.8)	8.4 (0.6)	10.2 (0.7)	57.8 (2.2)	27.8 (18.7-39.6)
Total	54.1 (0.4)	11.1 (0.2)	19.8 (0.4)	5.9 (0.2)	10.5 (0.3)	53.3 (0.9)	24.0 (17.0-34.8)

[a]Assessed in part I sample. Prevalence for the pooled samples (developed and developing) include respondents ages 18+. Prevalence for individual countries are assessed for the total sample in the country.
[b]IQR, interquartile range

Table 3. Comparisons of functional impairment (WHO-DAS Global Scores)[a] by recency of DSM-IV/CIDI major depressive episodes in the 18 countries participating in the WMH surveys

	Past 30 days		Past 12 months[b]		>12 months ago		No lifetime MDE			
	Mean (SE)	(n)	Mean (SE)	(n)	Mean (SE)	(n)	Mean (SE)	(n)	SD[c]	F
I. High income										
Belgium	11.3 (3.3)+	(42)	7.5 (2.1)+	(71)	3.5 (0.5)	(254)	3.2 (0.7)	(676)	8.4	3.2*
France	13.6 (2.6)+	(38)	6.6 (1.1) +	(134)	4.0 (0.5)	(476)	3.2 (0.4)	(788)	8.4	7.9*
Germany	15.3 (5.4)+	(36)	4.1 (1.0)	(73)	2.4 (0.4)	(263)	2.7 (0.3)	(951)	7.9	2.8
Israel	21.5 (2.4)+	(82)	9.7 (1.0)+	(208)	6.8 (0.8)+	(211)	5.0 (0.2)	(4358)	12.0	24.7*
Italy	15.4 (2.5)+	(58)	6.3 (2.0)+	(71)	3.0 (0.4)+	(323)	2.1 (0.2)	(1327)	6.8	13.5*
Japan	2.9 (2.6)	(11)	2.9 (0.8)+	(49)	1.5 (0.2)	(125)	1.0 (0.2)	(882)	4.4	2.3
Netherlands	17.9 (2.4)+	(42)	5.7 (1.1)	(93)	5.1 (0.4)	(341)	4.1 (0.5)	(618)	8.8	12.5*
New Zealand	11.7 (1.0)+	(292)	5.0 (0.5)+	(606)	3.2 (0.2)+	(1473)	2.5 (0.1)	(5064)	7.6	32.9*
Spain	15.7 (2.2)+	(109)	6.1 (1.0)+	(138)	4.3 (0.6)+	(425)	2.1 (0.2)	(1449)	7.6	24.9*
United States	15.8 (1.2)+	(297)	7.6 (0.6)+	(496)	4.3 (0.2)+	(1002)	3.0 (0.2)	(3896)	9.0	54.9*
Total	15.3 (0.7)+	(1005)	6.8 (0.3)+	(1942)	3.9 (0.1)+	(4903)	3.0 (0.1)	(20,096)	8.9	149.4*
II. Low-middle income[d]										
Brazil	12.9 (1.6)+	(260)	6.8 (0.6)+	(280)	4.1 (0.5)+	(413)	1.8 (0.2)	(1989)	7.8	44.0*
Colombia	5.1 (1.4)+	(82)	3.3 (0.7)+	(194)	1.8 (0.3)+	(316)	0.9 (0.1)	(1789)	4.2	11.1*
India	2.3 (0.5)+	(71)	3.2 (0.8)+	(83)	1.5 (0.4)	(153)	1.0 (0.1)	(1066)	4.3	3.9*
Lebanon	9.3 (1.5)+	(72)	3.7 (0.8)+	(71)	3.4 (0.7)+	(162)	1.5 (0.2)	(726)	5.8	17.3*
Mexico	8.0 (1.8)+	(117)	3.4 (0.7)+	(142)	1.4 (0.3)+	(250)	0.6 (0.1)	(1853)	4.3	8.5*
Shenzhen	3.3 (0.5)+	(101)	1.7 (0.4)+	(144)	0.6 (0.1)	(138)	0.5 (0.0)	(2093)	2.4	16.9*
Ukraine	14.8 (1.2)+	(229)	10.9(1.1)+	(159)	6.8 (1.1)+	(238)	3.7 (0.3)	(1093)	9.7	46.3*
Total	10.1 (0.7)+	(932)	5.2 (0.3)+	(1073)	3.1 (0.2)+	(1670)	1.3 (0.1)	(10,608)	6.1	112.6*

*Significantly different from respondents with no lifetime MDE at the .05 level based on a two-sided test

[a]WHO-DAS: World Health Organization-Disability Assessment Schedule

[b]Excludes respondents with MDE in the past 30 days

[c]SD: Standard deviation of the impairment score in the total sample

[d]Data for South Africa are not available

Table 4a. Associations of demographic characteristics with 12-month DSM-V/CIDI major depressive episode in high income countries (bivariate analyses)[a]

	Total OR (95% CI)	Belgium OR (95% CI)	France OR (95% CI)	Germany OR (95% CI)	Israel OR (95% CI)	Italy OR (95% CI)	Japan OR (95% CI)	Netherlands OR (95% CI)	New Zealand OR (95% CI)	Spain OR (95% CI)	United States OR (95% CI)
Sex											
Women	1.8 (1.6-2.0)*	1.6 (0.9-2.8)	1.7 (1.2-2.5)*	1.7 (1.0-3.0)	1.6 (1.2-2.1)*	2.5 (1.6-3.8)*	2.3 (1.4-4.0)*	2.3 (1.5-3.5)*	1.7 (1.4-2.1)*	2.7 (1.9-3.8)*	1.7 (1.4-2.1)*
Men	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Age											
18-34	2.7 (2.3-3.1)*	2.6 (0.9-7.7)	3.5 (1.7-7.4)*	3.8 (1.6-9.2)*	1.1 (0.7-1.6)	0.8 (0.5-1.5)	4.8 (2.3-10.0)*	2.6 (1.2-5.7)*	5.5 (3.9-7.8)*	1.0 (0.6-1.7)	4.3 (3.1-6.0)*
35-49	2.2 (1.9-2.6)*	2.2 (1.0-4.8)*	2.5 (1.2-5.3)*	2.3 (1.0-5.5)	1.0 (0.6-1.4)	0.7 (0.4-1.3)	2.7 (1.3-5.6)*	2.5 (1.2-5.4)*	4.4 (3.2-6.2)*	1.1 (0.7-1.6)	3.9 (2.7-5.5)*
50-64	2.0 (1.7-2.3)*	2.5 (1.1-5.6)*	2.3 (1.1-4.7)*	2.4 (1.0-5.5)*	1.0 (0.7-1.6)	1.2 (0.7-2.1)	2.4 (1.2-4.8)*	1.9 (0.9-3.8)*	2.9 (2.0-4.1)*	1.6 (1.1-2.3)*	3.1 (2.1-4.5)*
65+	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Marital status[b]											
Separated	3.6 (2.9-4.6)*	7.3 (1.8-29.7)*	6.2 (1.8-21.3)*	---	2.6 (1.0-6.8)	2.8 (1.1-7.5)*	10.8 (2.1-55.6)*	--	3.4 (2.4-4.8)*	3.2 (1.3-7.7)*	4.0 (2.7-6.0)*
Divorced	2.1 (1.8-2.5)*	1.9 (0.7-5.3)	1.1 (0.5-2.5)	3.1 (1.4-7.1)*	2.2 (1.5-3.4)*	0.6 (0.1-5.0)	5.1 (2.1-12.6)*	2.7 (1.5-4.9)*	2.8 (2.0-3.8)*	3.3 (1.2-8.9)*	1.7 (1.3-2.3)*
Widowed	1.4 (1.2-1.7)*	1.4 (0.6-3.4)	1.5 (0.7-3.2)	2.3 (1.2-4.5)*	2.1 (1.4-3.3)*	1.5 (0.9-2.7)	0.9 (0.4-2.1)	0.8 (0.3-2.2)	1.3 (0.9-1.8)	1.4 (0.9-2.2)	1.2 (0.8-1.9)
Never married	1.8 (1.6-2.0)*	1.3 (0.6-2.9)	2.0 (1.2-3.5)*	2.6 (1.6-4.2)*	1.4 (1.0-1.9)*	1.5 (1.0-2.2)	3.1 (1.6-5.7)*	1.8 (1.0-3.4)	2.3 (1.8-3.0)*	0.9 (0.6-1.4)	1.8 (1.5-2.1)*
Currently married	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Living arrangement											
Alone	1.8 (1.6-2.0)*	1.3 (0.6-2.7)	1.4 (0.9-2.3)	2.5 (1.6-3.9)*	2.1 (1.5-2.9)*	1.7 (1.1-2.8)*	2.9 (1.2-6.8)*	1.6 (1.1-2.4)*	1.8 (1.4-2.3)*	1.0 (0.7-1.6)	1.7 (1.4-2.2)*
With others	1.9 (1.7-2.2)*	1.5 (0.8-2.8)	2.2 (1.4-3.7)*	2.9 (1.6-5.1)*	1.6 (1.2-2.1)*	1.4 (0.9-2.1)	3.0 (1.6-5.6)*	1.9 (0.8-4.3)	2.5 (2.0-3.1)*	1.2 (0.8-1.7)	1.8 (1.5-2.1)*
With spouse	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Income											
Low	1.7 (1.5-2.0)*	1.3 (0.7-2.6)	2.4 (1.2-4.6)*	2.7 (1.3-5.6)*	1.1 (0.7-1.7)	1.3 (0.6-2.9)	0.5 (0.2-1.4)	1.1 (0.6-1.9)	2.2 (1.6-3.0)*	1.0 (0.5-2.0)	2.1 (1.5-2.8)*
Low average	1.3 (1.1-1.5)*	1.1 (0.5-2.4)	1.4 (0.7-2.6)	1.6 (0.7-3.5)	0.9 (0.6-1.3)	1.2 (0.6-2.3)	0.5 (0.2-1.2)	0.8 (0.4-1.8)	1.5 (1.2-2.0)*	1.1 (0.7-1.8)	1.4 (1.0-1.8)*
High average	1.1 (0.9-1.2)	0.9 (0.4-2.0)	1.3 (0.7-2.3)	1.6 (0.9-3.1)	0.8 (0.6-1.1)	0.9 (0.5-1.5)	0.5 (0.2-1.3)	0.8 (0.5-1.6)	1.3 (1.0-1.7)	1.0 (0.6-1.5)	1.1 (0.8-1.5)
High	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Education											
Low	1.0 (0.9-1.2)	1.4 (0.8-2.5)	--	1.0 (0.2-4.3)	1.5 (1.0-2.2)*	1.5 (0.9-2.5)	0.2 (0.1-0.6)*	1.1 (0.6-1.9)	0.9 (0.7-1.2)	1.2 (0.7-1.9)	1.4 (1.1-1.8)*
Low average	1.1 (1.0-1.3)	0.9 (0.4-2.2)	--	1.6 (0.4-5.8)	1.3 (0.9-1.8)	0.8 (0.4-1.4)	0.7 (0.4-1.4)	1.3 (0.7-2.6)	1.1 (0.8-1.4)	0.8 (0.5-1.3)	1.2 (0.9-1.5)
High average	1.1 (0.9-1.3)	1.8 (0.8-3.8)	--	1.1 (0.2-5.2)	1.0 (0.7-1.6)	0.9 (0.5-1.5)	0.7 (0.3-1.6)	1.5 (0.7-3.2)	0.9 (0.7-1.1)	1.0 (0.7-1.6)	1.4 (1.0-1.8)*
High	1.0	1.0	--	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*Significant at the .05 level, two-sides test

[a]All models were bivariate models with the socio-demographic factors as predictors and 12-month MDE as the response variable. The models for total (first column) control for countries. The models for income were estimated in Part II samples, while all other models were estimated in Part I samples.

[b]In some countries, people were categorized as separated/widowed/divorced because they were known to have married previously but not anymore, but the specific category was unknown. These cases were dropped from the model using marriage as the predictor. Specifically, there was 1 such case in Japan, 2 cases in the US, 1 case in New Zealand, and 91 in the ESEMED countries (France, Germany, Italy, Netherlands, Spain, Belgium).

Table 4b. Associations of demographic characteristics with 12-month DSM-IV/CIDI major depressive episode in low-middle income countries: bivariate analyses)[a]

	Total	Brazil	Colombia	India	Lebanon	Mexico	Shenzhen	South Africa	Ukraine
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sex									
Women	2.1 (1.8-2.3)*	2.6 (1.9-3.5)*	1.9 (1.4-2.7)*	1.9 (1.3-2.7)*	2.1 (1.3-3.4)*	2.1 (1.5-2.9)*	1.2 (0.8-1.7)	2.2 (1.5-3.2)*	2.5 (2.0-3.0)*
Men	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Age									
18-34	0.9 (0.8-1.1)	3.0 (1.6-5.7)*	4.9 (0.9-28.3)	0.4 (0.2-1.0)*	1.7 (0.8-3.7)	0.4 (0.2-1.2)	2.8 (0.8-9.4)	1.3 (0.6-2.6)	0.4 (0.3-0.6)*
35-49	1.0 (0.8-1.2)	3.3 (1.7-6.5)*	3.9 (0.7-23.1)	1.2 (0.6-2.5)	2.2 (1.0-5.2)	0.5 (0.2-1.3)	1.6 (0.5-5.3)	1.6 (0.8-3.2)	0.5 (0.3-0.7)*
50-64	1.0 (0.8-1.3)	2.5 (1.4-4.5)*	3.4 (0.6-20.1)	1.5 (0.7-3.2)	1.9 (0.9-4.1)	0.5 (0.2-1.5)	0.8 (0.2-3.3)	1.7 (0.8-3.6)	0.7 (0.5-1.1)
65+	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Marital status[b]									
Separated	1.7 (1.3-2.2)*	1.6 (1.1-2.3)*	0.9 (0.6-1.6)	8.2 (2.2-30.6)*	19.3 (5.0-74.4)*	1.9 (1.0-3.6)*	--	2.7 (0.7-9.6)	6.6 (1.1-38.0)*
Divorced	3.0 (2.4-3.9)*	3.0 (1.9-4.9)*	1.2 (0.3-4.3)	--	0.8 (0.2-4.2)	1.2 (0.4-3.8)	6.2 (2.2-17.3)*	2.1 (1.3-3.5)*	4.2 (2.9-6.2)*
Widowed	2.7 (2.2-3.2)*	1.1 (0.7-1.9)	1.6 (0.9-2.9)	2.2 (1.5-3.2)*	1.4 (0.6-3.6)	2.7 (1.5-5.0)*	4.1 (0.8-20.7)	2.3 (1.3-4.0)*	8.0 (5.3-12.0)*
Never married	1.0 (0.9-1.1)	1.0 (0.7-1.3)	1.3 (0.9-1.8)	0.3 (0.1-0.6)*	1.3 (0.8-2.0)	0.8 (0.5-1.3)	1.4 (1.0-1.9)	0.7 (0.5-1.0)*	0.8 (0.5-1.3)
Currently married	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Living arrangement									
Alone	1.6 (1.4-1.9)*	1.3 (0.8-2.0)	0.6 (0.3-1.2)	1.2 (0.6-2.5)	1.3 (0.7-2.5)	1.0 (0.5-1.9)	1.6 (1.1-2.3)*	1.2 (0.8-1.9)	2.5 (1.9-3.3)*
With others	1.2 (1.1-1.3)*	1.2 (1.0-1.5)	1.3 (0.9-1.8)	0.6 (0.4-0.9)*	1.4 (0.8-2.2)	1.1 (0.8-1.6)	0.9 (0.4-2.1)	0.9 (0.6-1.2)	1.5 (1.1-2.0)*
With spouse	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Income									
Low	1.1 (0.9-1.3)	1.0 (0.7-1.5)	1.4 (0.8-2.3)	1.7 (0.9-3.2)	1.0 (0.5-2.3)	2.1 (1.4-3.2)*	0.7 (0.4-1.2)	0.9 (0.6-1.4)	0.7 (0.4-1.3)
Low average	1.1 (0.9-1.3)	1.1 (0.8-1.6)	1.5 (0.9-2.5)	2.1 (1.2-3.8)*	1.1 (0.5-2.5)	1.5 (1.0-2.3)	0.6 (0.3-1.0)	0.9 (0.5-1.4)	0.8 (0.4-1.4)
High average	1.0 (0.8-1.2)	1.2 (0.8-1.8)	0.8 (0.5-1.3)	2.0 (1.2-3.5)*	1.3 (0.6-2.7)	1.4 (0.8-2.2)	0.5 (0.3-0.8)*	0.5 (0.3-1.2)	0.9 (0.5-1.7)
High	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Education									
Low	1.1 (1.0-1.4)	0.7 (0.5-1.1)	0.9 (0.6-1.4)	14.1 (3.4-58.9)*	1.2 (0.7-2.1)	2.1 (1.3-3.2)*	0.2 (0.1-0.6)*	0.5 (0.2-1.5)	2.3 (1.4-3.8)*
Low average	1.1 (0.9-1.3)	1.1 (0.8-1.6)	1.2 (0.7-1.9)	1.0 (0.1-12.5)	1.2 (0.6-2.4)	1.6 (1.0-2.5)	0.5 (0.3-0.7)*	2.1 (1.1-4.1)*	1.3 (0.9-1.8)
High average	0.9 (0.8-1.1)	0.9 (0.7-1.2)	0.9 (0.5-1.5)	3.9 (0.6-27.0)	1.3 (0.7-2.4)	1.2 (0.7-1.9)	0.8 (0.5-1.2)	1.0 (0.5-1.9)	1.0 (0.6-1.5)
High	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*Significant at the .05 level, two-sides test

[a]All models were bivariate models with the socio-demographic factors as predictors and 12-month MDE as the response variable. The models for total (first column) control for countries. The models for income were estimated in Part II samples, while all other models were estimated in Part I samples.

[b]In some countries, people were categorized as separated/widowed/divorced because they were known to have married previously but not anymore, but the specific category was unknown. These cases were dropped from the model using marriage as the predictor. There were 48 cases in India, 35 in Brazil, 664 in Ukraine, and 1 case in South Africa.