Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys

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Background
Although significant associations of childhood adversities with adult mental disorders are widely documented, most studies focus on single childhood adversities predicting single disorders.

Aims
To examine joint associations of 12 childhood adversities with first onset of 20 DSM-IV disorders in World Mental Health (WMH) Surveys in 21 countries.

Method
Nationally or regionally representative surveys of 51,945 adults assessed childhood adversities and lifetime DSM-IV disorders with the WHO Composite International Diagnostic Interview (CIDI).

Results
Childhood adversities were highly prevalent and interrelated. Childhood adversities associated with maladaptive family functioning (e.g. parental mental illness, child abuse, neglect) were the strongest predictors of disorders. Co-occurring childhood adversities associated with maladaptive family functioning had significant subadditive predictive associations and little specificity across disorders. Childhood adversities account for 29.8% of all disorders across countries.

Conclusions
Childhood adversities have strong associations with all classes of disorders at all life-course stages in all groups of WMH countries. Long-term associations imply the existence of as-yet undetermined mediators.

Declaration of interest
R.C.K. has been a consultant for GlaxoSmithKline, Kaiser Permanente, Pfizer, Sanofi-Aventis, Shire Pharmaceuticals and Wyeth-Ayerst; has served on advisory boards for Eli Lilly & Company and Wyeth-Ayerst; and has had research support for his epidemiological studies from Bristol-Myers Squibb, Eli Lilly & Company, GlaxoSmithKline, Johnson & Johnson Pharmaceuticals, Ortho-McNeil Pharmaceuticals, Pfizer and Sanofi-Aventis.

Significant associations between retrospectively reported childhood adversities and adult mental disorders have been documented in numerous epidemiological studies.1–8 Most of these studies, however, either considered only a single childhood adversity2–8 or a composite measure that did not allow differential effects of multiple childhood adversities to be examined. Only a few studies compared associations of childhood adversities with different types of mental disorders or examined changes in childhood adversities’ effects over the life course.10,11 Few studies examined cross-national variation in exposure12,13 or effects14,15 of childhood adversities. Furthermore, lack of comparability of measures across countries raises questions about accuracy of the few existing cross-national comparisons.12 The present study addresses these problems by examining the prevalence and associations of retrospectively reported childhood adversities with first onset of a wide variety of mental disorders across the life course in epidemiological surveys in 21 countries in the World Health Organization (WHO) World Mental Health (WMH) Survey Initiative.16

Method
Sample
The WMH surveys were administered in nine countries classified by the World Bank as high income (Belgium, France, Germany, Israel, Italy, Japan, The Netherlands, Spain, USA), six high-middle income (Brazil, Bulgaria, Lebanon, Mexico, Romania, South Africa), and six low/low-middle income (Colombia, India, Iraq, Nigeria, People’s Republic of China, Ukraine)17 (online Table DS1). A total of 51,945 adults (age 18 and older) participated in these surveys. Most featured nationally representative household samples. Two (Colombia and Mexico) were representative of urban areas, one of selected states (Nigeria) and the remaining four of selected metropolitan areas (Brazil, India, Japan, People’s Republic of China). Informed consent was obtained before administering interviews. The samples that are not nationally representative all focus on urban areas. The institutional review board of the organisations that coordinated the surveys approved and monitored compliance with procedures for informed consent and protecting participants. Weights were used to adjust samples for differential probabilities of selection and to match the sample with population sociodemographic distributions. The weighted (by sample size) average response rate was 73.1% (range 45.9–98.8). Further details about WMH survey methodology are available elsewhere.18

Measures
Mental disorders
Mental disorders were assessed with the WHO Composite International Diagnostic Interview (CIDI) Version 3.0,19 a fully-structured lay-administered interview that generated diagnoses for 20 commonly occurring mood disorders (major depressive disorder, dysthmic disorder, bipolar I disorder, bipolar II...
disorder, subthreshold bipolar disorder), anxiety disorders (generalised anxiety disorder, panic disorder, agoraphobia without panic disorder, specific phobia, social phobia, post-traumatic stress disorder, separation anxiety disorder), behaviour disorders (attention-deficit hyperactivity disorder, oppositional–defiant disorder, conduct disorder, intermittent explosive disorder) and substance disorders (alcohol and drug misuse, alcohol and drug dependence with misuse). DSM–IV criteria were used with diagnostic hierarchy rules (other than oppositional–defiant disorder, which was defined with or without conduct disorder, and substance misuse, which was defined with or without dependence) and organic exclusion rules. Masked clinical reappraisal interviews with the Structured Clinical Interview for DSM–IV (SCID)21 in four WMH countries found generally good concordance between diagnoses based on the CIDI and SCID.22 Age at onset of lifetime disorders was assessed retrospectively using a special question sequence shown experimentally to yield more plausible distributions than standard age at onset questions.23

Childhood adversities

Twelve dichotomously scored childhood adversities occurring before age 18 were assessed, including three types of interpersonal loss (parental death, parental divorce, other separation from parents), four types of parental maladjustment (mental illness, substance misuse, criminality, violence), three types of maltreatment (physical abuse, sexual abuse, neglect) and two other childhood adversities (life-threatening respondent physical illness, family economic adversity). The measures of parental death, divorce and other loss (e.g., respondent foster care placement) include biological and non-biological parents. Parental criminality, family economic adversity and sexual abuse were assessed with questions used in previous epidemiological surveys.11 Parental criminality was assessed with questions about property crime and imprisonment, and economic adversity with questions about whether the family often lacked enough money to pay for basic necessities of living.10 Sexual abuse was assessed with questions about repeated fondling, attempted rape or rape.24 Parental mental illness (major depression, generalised anxiety disorder, panic disorder, antisocial personality disorder) and substance misuse were assessed with the Family History Research Diagnostic Criteria Interview.25,26 Family violence and physical abuse were assessed with a modified version of the Conflict Tactics Scale.27 Neglect was assessed with questions used in child welfare research about frequency of not having adequate food, clothing or medical care, having inadequate supervision, and having to do age-inappropriate chores.28 Finally, life-threatening childhood physical illness was assessed with a standard chronic conditions checklist.29

Several WMH countries omitted selected childhood adversities (sexual abuse in Iraq and Shenzhen; neglect in South Africa; parental divorce and neglect in the six Western European countries; neglect and parent psychopathology in Israel) based on concerns about respondent embarrassment. Rather than exclude this large subset of countries from analysis or exclude the missing childhood adversities from the countries where they were assessed, we included a separate dummy predictor variable to indicate whether each childhood adversity was assessed and multiple imputation30 to impute individual-level missing values. Multiple imputation implicitly assumes that the correlates of the missing childhood adversities are the same as in the countries where the childhood adversities were and were not assessed. Although this assumption is unlikely to be completely accurate, it allows us to maximise the use of available childhood adversities data. Imprecision in imputations is likely to lead to underestimation of overall childhood adversities effects.

Analysis methods

Tetrachoric factor analysis was used to examine associations among the childhood adversities. Multivariate associations of childhood adversities with first onset of DSM–IV/CIDI disorders (based on retrospective age at onset reports) were estimated using discrete-time survival analysis with person-year as the unit of analysis31 and a consolidated data file that stacked the 20 disorder-specific person-year files across the 21 countries and included dummy predictor variables that distinguished among these 420 data files. Each model controlled for respondent age at interview, gender and other prior DSM–IV/CIDI disorders. A number of different model specifications were examined. The Akaike information criterion (AIC)32 was used to select the best model, which was then estimated in subsamples defined by life-course stage and class of disorders (mood, anxiety, behaviour and substance disorders). Survival coefficients and standard errors were exponentiated to create odds ratios and 95% confidence intervals.

The population-attributable risk proportion (PARP) was calculated using simulation methods for each class of disorders, life-course stage and group of countries. The PARP is the proportion of the cumulative predicted value of an outcome disorder explained statistically by specific predictors. If the odds ratios in the model are as a result of causal effects of the childhood adversities, PARP can be interpreted as the expected proportional reduction in outcome prevalence if childhood adversities were eradicated.33 All significance tests were evaluated using 0.05-level two-sided tests. As the WMH data are both clustered and weighted, the design-based Taylor series method34 implemented in the SUDAAN (version 8.0.1) software system on UNIX was used to estimate standard errors and to evaluate statistical significance.

Results

Prevalence and structure of childhood adversities

Similar proportions of respondents reported any childhood adversities in high- (38.4%), high-middle- (38.9%), and low-/lower-middle- (39.1%) income countries (Table 1). Parental death was the most common childhood adversity (11.0–14.8%). Other common childhood adversities included physical abuse (5.3–10.8%), family violence (4.2–7.8%) and parental mental illness (5.3–6.7%). Multiple childhood adversities were common among respondents with any childhood adversities (59.3–66.2%), with mean childhood adversities among respondents with two or more of 2.5–2.9.

A total of 62 of the 66 tetrachoric correlations between pairs of childhood adversities (94%) were positive in high and low/lower-middle and 58 (88%) in high-middle-income countries. Medians and interquartile ranges (twenty-fifth to seventy-fifth percentiles) of correlations were 0.27 (0.14–0.35) in high, 0.20 (0.12–0.42) in high-middle and 0.17 (0.10–0.31) in low/lower-middle-income countries. Factor analysis found one consistently strong factor representing maladaptive family functioning (parental mental illness, substance misuse, criminal behaviour, domestic violence, physical and sexual abuse, neglect), with factor loadings of 0.44–1.0. The remaining childhood adversities were less highly intercorrelated.

Associations of childhood adversities with DSM–IV/CIDI disorders

All 12 childhood adversities were significantly associated with elevated risk of DSM–IV disorders in bivariate models pooled across all outcomes and countries, with odds ratios of 1.6–2.0.
for childhood adversities associated with maladaptive family functioning and 1.1–1.5 for other childhood adversities. (Detailed results of this and other models described below are available from the authors on request.) Odds ratios were smaller in multivariate models that included all childhood adversities as predictors (1.1–1.6 childhood adversities associated with maladaptive family functioning; 1.1–1.3 for other childhood adversities). The 12 degree of freedom χ²-test for the joint effects of all childhood adversities was significant (χ² = 1536.6, P < 0.001). A multivariate model that considered only number rather than type of childhood adversities showed generally increasing odds ratios from 1.5 for exactly one to 3.5–3.2 for six and for seven or more childhood adversities (compared with no childhood adversities). The χ²-test for the joint effects of number-of-childhood adversities was statistically significant (χ² = 1345.8, P < 0.001). A model that considered both types and numbers of childhood adversities had a better AIC, with both types (χ² = 695.7, P < 0.001) and number (χ² = 200.4, P < 0.001) significant. More complex inherently non-linear models did not improve AIC further. However, fit was improved by distinguishing between number of childhood adversities associated with maladaptive family functioning and number of other childhood adversities.

Results of this final model are strikingly consistent across country groups (Table 2). Odds ratios of childhood adversities associated with maladaptive family functioning are consistently positive and significant (1.3–2.4). Odds ratios of other childhood adversities are generally smaller (0.9–1.5) and less consistently significant. Odds ratios of number of childhood adversities associated with maladaptive family functioning are consistently negative, mostly significant, and inversely related to number of such adversities (0.4–0.9 for two to three, 0.2–0.5 for four to five and 0.0–0.3 for six to seven adversities). This negative pattern means that the increasing odds of disorder onset with increasing number of childhood adversities associated with maladaptive family functioning occurs at a significantly decreasing rate as the number of these adversities increases. The odds ratio associated with number of other childhood adversities is less consistent in sign and significance.

**Table 1** Prevalence of childhood adversities in World Mental Health (WMH) surveys carried out in high-, high-middle-, and low/low-middle-income countries

<table>
<thead>
<tr>
<th></th>
<th>High-income countries (n = 20,652)</th>
<th>High-middle-income countries (n = 15,240)</th>
<th>Low/low-middle-income countries (n = 16,053)</th>
<th>Total (n = 51,945)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (s.e.)</td>
<td>% (s.e.)</td>
<td>% (s.e.)</td>
<td>% (s.e.)</td>
</tr>
<tr>
<td>I. Interpersonal loss</td>
<td>Parental death</td>
<td>11.0 (0.3)</td>
<td>11.9 (0.4)</td>
<td>14.8 (0.4)</td>
</tr>
<tr>
<td></td>
<td>Parental divorce</td>
<td>10.1 (0.3)</td>
<td>5.2 (0.3)</td>
<td>3.5 (0.2)</td>
</tr>
<tr>
<td></td>
<td>Other parental loss</td>
<td>4.0 (0.2)</td>
<td>4.0 (0.2)</td>
<td>7.4 (0.3)</td>
</tr>
<tr>
<td>II. Parental maladjustment</td>
<td>Parental mental illness</td>
<td>5.3 (0.2)</td>
<td>6.7 (0.3)</td>
<td>6.7 (0.3)</td>
</tr>
<tr>
<td></td>
<td>Parental substance disorder</td>
<td>4.5 (0.2)</td>
<td>5.0 (0.3)</td>
<td>2.5 (0.2)</td>
</tr>
<tr>
<td></td>
<td>Parental criminal behaviour</td>
<td>3.4 (0.1)</td>
<td>3.1 (0.2)</td>
<td>2.2 (0.2)</td>
</tr>
<tr>
<td></td>
<td>Family violence</td>
<td>7.8 (0.3)</td>
<td>7.1 (0.3)</td>
<td>4.2 (0.2)</td>
</tr>
<tr>
<td>III. Maltreatment</td>
<td>Physical abuse</td>
<td>5.3 (0.2)</td>
<td>10.8 (0.4)</td>
<td>9 (0.3)</td>
</tr>
<tr>
<td></td>
<td>Sexual abuse</td>
<td>2.4 (0.1)</td>
<td>0.6 (0.1)</td>
<td>1.5 (0.1)</td>
</tr>
<tr>
<td></td>
<td>Neglect</td>
<td>4.4 (0.2)</td>
<td>5.2 (0.2)</td>
<td>3.6 (0.2)</td>
</tr>
<tr>
<td>IV. Other childhood adversities</td>
<td>Physical illness</td>
<td>3.9 (0.2)</td>
<td>2.4 (0.2)</td>
<td>2.6 (0.2)</td>
</tr>
<tr>
<td></td>
<td>Economic adversity</td>
<td>5.2 (0.2)</td>
<td>2.9 (0.2)</td>
<td>1.4 (0.2)</td>
</tr>
<tr>
<td>V. Total number of childhood adversities</td>
<td>Any</td>
<td>38.4 (0.5)</td>
<td>38.9 (0.6)</td>
<td>39.1 (0.6)</td>
</tr>
<tr>
<td></td>
<td>One/any</td>
<td>59.3 (0.7)</td>
<td>59.6 (0.8)</td>
<td>66.2 (0.9)</td>
</tr>
<tr>
<td></td>
<td>Two/any</td>
<td>22.5 (0.6)</td>
<td>24.6 (0.8)</td>
<td>21.8 (0.7)</td>
</tr>
<tr>
<td></td>
<td>Three/any</td>
<td>9.0 (0.4)</td>
<td>9.0 (0.5)</td>
<td>7.5 (0.5)</td>
</tr>
<tr>
<td></td>
<td>Four/any</td>
<td>5.0 (0.4)</td>
<td>4.1 (0.3)</td>
<td>3.1 (0.3)</td>
</tr>
<tr>
<td></td>
<td>Five or more/any</td>
<td>4.2 (0.2)</td>
<td>2.7 (0.3)</td>
<td>1.4 (0.2)</td>
</tr>
</tbody>
</table>

a. Prevalence estimates in the last five rows represent the proportions of all respondents with any childhood adversity who have exactly one, two, three, four, five or more. These five proportions sum to 100% in each column.

Differential associations of childhood adversities with class of disorder and life-course stage

Disaggregation showed that childhood adversities significantly predict first onset of all classes of disorder in all groups of countries. Childhood adversities associated with maladaptive family functioning had consistently higher odds ratios (inter-quartile range, IQR = 1.4–2.0) than other childhood adversities (IQR = 1.1–1.3) across classes and groups. Odds ratios associated with the number of maladaptive family functioning childhood adversities were consistently and significantly negative across classes and groups (0.3–1.0 for two to three, 0.1–0.6 for four to five, 0.0–0.4 for six to seven adversities). Odds ratios associated with number of other childhood adversities were less consistent in sign and significance.

Similar results were found for models estimated by life-course stage. As coefficients were quite comparable across the different groups of countries (detailed results are available from the authors on request), we focus on results pooled across all countries (Table 3). Type of childhood adversity had significant and almost entirely positive odds ratios at each life-course stage, including childhood (ages 4–12), adolescence (ages 13–19), young adulthood (ages 20–29) and later adulthood (ages 30+) (χ² = 197.8–407.5, P < 0.001). Odds ratios associated with childhood adversities associated with maladaptive family functioning were generally higher than those associated with other childhood adversities (IQRs of 1.5–1.9 and 1.1–1.3 respectively) and relatively consistent across life-course stage. Odds ratios associated with number of
maladaptive family functioning childhood adversities were consist-
ently negative, significant ($\chi^2 = 35.3–119.8$, $P < 0.001$), inversely
related to number of such adversities (0.4–0.8 for two to three,
0.2–0.4 for four to five and 0.0–0.2 for six to seven adversities)
and relatively consistent across life-course stage.

**Population-attributable risk proportions**

Population-attributable risk proportions suggest that eradica-
tion of childhood adversities would lead to a 22.9% reduction in
mood disorders, 31.0% in anxiety disorders, 41.6% in behaviour dis-
orders, 27.5% in substance disorders and 29.8% of all disorders
(Table 4). The higher PARP for behaviour disorders than other
disorders exists in all three groups of countries, as is the generally
lowest PARP for mood disorders. These differences are partly as a
result of PARPs for most disorders being highest in childhood and
to a much higher proportion of behaviour disorders than other
disorders beginning in childhood.35,36 When we focus exclusively
on childhood-onset cases, PARPs for behaviour disorders
(50.3–59.0%) are comparable with those for mood (53.8–64.9%)
and substance (51.2–65.0%) disorders. Population-attributable
risk proportions for mood and behaviour disorders decrease with
age in all groups of countries, whereas PARPS remain rather stable
after childhood for substance disorders and show less evidence of
variation across the age range for anxiety disorders.

**Discussion**

**Limitations**

The results are limited by variation across surveys in language of
interview, survey auspice, response rates, field procedures, sample
frames (most notably, underrepresentation of rural areas in low- and middle-income countries) and omission of some childhood adversities in some countries. These inconsistencies could increase variation in estimates. However, we estimated models separately by country using only the childhood adversities assessed in that country and found good consistency of results. (Detailed results are available from the authors on request.)

Another limitation is that the WMH surveys did not assess psychosis, which has been found in other research to be significantly related to childhood adversities. Disorder assessment was also limited by focusing exclusively on DSM–IV cases. The DSM categories might not capture the full relevant range of psychopathology in the countries studied. An additional limitation related to measurement is that childhood adversities and disorders were assessed retrospectively. Retrospective recall bias is likely to be conservative, leading to underreporting of both childhood adversities and disorders. Long-term prospective study is needed to resolve this problem using available prospective data-sets. Some interesting preliminary work of this sort has already begun.

Analyses were limited by not examining patterns separately for men and women or across other important subsamples and by not controlling all unmeasured common causes of childhood adversities and disorders that could induce the associations observed here in the absence of causal effects of childhood adversities. Special caution is needed in interpreting the PARPs because of this limitation, as the actual effects of eradicating childhood adversities could be much lower than those estimated by the PARPs.

Within the context of these limitations, the WMH results are consistent with previous studies in suggesting that substantial proportions of children are exposed to childhood adversities.
Consistency of WMH exposure rates with those reported in previous studies is difficult to assess precisely, as measurement approaches across studies differ and cannot be compared directly. World Mental Health survey respondent reports of parental divorce, the childhood adversity most often found in government statistics, are generally consistent with official estimates. However, are lower than in some other surveys. This suggests that WMH estimates might be conservative.

Although early studies on associations between a single childhood adversity and a single mental disorder implied the existence of specificity of effects, little evidence of specificity was found in the WMH data. The implication is that causal pathways linking childhood adversities to disorders are quite general. Although several recent comparative studies found more evidence for specificity among children and adolescents, those studies focused on prevalent cases, whereas the current analysis focused on first lifetime onsets.

Table 4 Population attributable risk proportions (PARPs) of childhood adversities predicting lifetime DSM–IV/CIDI disorders by type of disorder and life-course stage

<table>
<thead>
<tr>
<th>Stage of Life</th>
<th>Mood Disorders</th>
<th>Anxiety Disorders</th>
<th>Substance Disorders</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood, age 4–12</td>
<td>38.2</td>
<td>38.3</td>
<td>38.6</td>
<td>39.0</td>
</tr>
<tr>
<td>Adolescence, age 13–19</td>
<td>38.2</td>
<td>38.3</td>
<td>38.6</td>
<td>39.0</td>
</tr>
<tr>
<td>Early adulthood, age 20–29</td>
<td>38.2</td>
<td>38.3</td>
<td>38.6</td>
<td>39.0</td>
</tr>
<tr>
<td>Later adulthood, age 30+</td>
<td>38.2</td>
<td>38.3</td>
<td>38.6</td>
<td>39.0</td>
</tr>
</tbody>
</table>

Implications and future research

We showed that childhood adversities often co-occur and that clusters of childhood adversities associated with maladaptive family functioning are linked with the highest risk of mental health disorders. We also found generally subadditive effects of multiple childhood adversities associated with maladaptive family functioning. This has important implications for intervention because it means prevention or amelioration of only a single childhood adversity among individuals exposed to many is unlikely to have important effects. Early intervention to reduce exposure to all childhood adversities (e.g. multisystem family therapy, foster care placement) and later intervention to address long-term adult maladaptive psychological and behavioural consequences of having been exposed to childhood adversities would seem to hold the most promise in light of these results.

Intervention, of course, requires detection. Screening of youngsters in routine medical settings would seem the easiest approach to detection of severe childhood adversities (e.g. physical/sexual abuse and neglect). Although children are often reluctant to admit these childhood adversities and health professionals are often reluctant to ask, promising approaches have been developed to increase the success of detection based on health worker questioning. Although it is less clear whether retrospective detection of childhood adversities in adulthood would have value, the WMH data show that history of childhood adversities predicts disorder onset in adulthood. This is much more striking than showing that childhood adversities continue to be associated with adult prevalence, and suggests that retrospective detection might help find adults in need of interventions to address the long-term emotional and behavioural consequences of childhood adversities that contribute to their ongoing elevated risk on new onsets.
also be useful to study genetic influences on inter-generational continuity of childhood adversities exposure. A new WMH initiative is collecting saliva samples from respondents in close to a dozen different WMH surveys in order to allow genetic studies of this sort to be carried out.

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References


Table DS1 World Mental Health (WMH) survey sample characteristics by World Bank income categories

<table>
<thead>
<tr>
<th>Country</th>
<th>Survey</th>
<th>Sample characteristics</th>
<th>Field dates</th>
<th>Age range</th>
<th>Sample size</th>
<th>Total</th>
<th>Age ≤39/44</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. High-income countries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Belgium</td>
<td>ESEMeD</td>
<td>Stratified multistage clustered probability sample of individuals residing in households from the national register of Belgium residents. NR</td>
<td>2001–2 18+</td>
<td>1043</td>
<td>486</td>
<td>50.6</td>
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<tr>
<td>France</td>
<td>ESEMeD</td>
<td>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</td>
<td>2001–2 18+</td>
<td>1436</td>
<td>727</td>
<td>45.9</td>
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</tr>
<tr>
<td>Germany</td>
<td>ESEMeD</td>
<td>Stratified multistage clustered probability sample of individuals from community resident registries. NR</td>
<td>2002–3 18+</td>
<td>1323</td>
<td>621</td>
<td>57.8</td>
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</tr>
<tr>
<td>Israel</td>
<td>NHS</td>
<td>Stratified multistage clustered area probability sample of individuals from a national resident register. NR</td>
<td>2002–4 21+</td>
<td>4859</td>
<td>–</td>
<td>72.6</td>
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<tr>
<td>Italy</td>
<td>ESEMeD</td>
<td>Stratified multistage clustered probability sample of individuals from municipality resident registries. NR</td>
<td>2001–2 18+</td>
<td>1779</td>
<td>853</td>
<td>71.3</td>
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<tr>
<td>Japan</td>
<td>WMHJ</td>
<td>Unclustered two-stage probability sample of individuals residing in households in nine metropolitan areas (Fukiage, Higashi-ichik, Ichiki, Kushikino, Nagasaki, Okayama, Sano, Tamano, and Tendo)</td>
<td>2002–6 20+</td>
<td>1305</td>
<td>425</td>
<td>59.2</td>
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<tr>
<td>The Netherlands</td>
<td>ESEMeD</td>
<td>Stratified multistage clustered probability sample of individuals residing in households that are listed in municipal postal registries. NR</td>
<td>2002–3 18+</td>
<td>1094</td>
<td>516</td>
<td>56.4</td>
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<tr>
<td>Spain</td>
<td>ESEMeD</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2001–2 18+</td>
<td>2121</td>
<td>960</td>
<td>78.6</td>
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<td></td>
</tr>
<tr>
<td>USA</td>
<td>NCS–R</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2002–3 18+</td>
<td>5692</td>
<td>3197</td>
<td>70.9</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>20,652</td>
<td>7785</td>
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<td></td>
</tr>
<tr>
<td><strong>II. High-middle-income countries</strong></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Brazil</td>
<td>São Paulo Megacity</td>
<td>Stratified multistage clustered area probability sample of household residents in the São Paulo metropolitan area.</td>
<td>2005–7 18+</td>
<td>2942</td>
<td>–</td>
<td>81.3</td>
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<tr>
<td>Bulgaria</td>
<td>NSHS</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2003–7 18+</td>
<td>2233</td>
<td>741</td>
<td>72.0</td>
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<tr>
<td>Lebanon</td>
<td>LEBANON</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2002–3 18+</td>
<td>1031</td>
<td>595</td>
<td>70.0</td>
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</tr>
<tr>
<td>Mexico</td>
<td>M-NCS</td>
<td>Stratified multistage clustered area probability sample of household residents in all urban areas of the country (approximately 75% of the total national population).</td>
<td>2001–2 18–65</td>
<td>2062</td>
<td>1736</td>
<td>76.6</td>
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<tr>
<td>Romania</td>
<td>RMHS</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2005–6 18+</td>
<td>2357</td>
<td>–</td>
<td>70.9</td>
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<td>South Africa</td>
<td>SASH</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2003–4 18+</td>
<td>4315</td>
<td>–</td>
<td>87.1</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>15,240</td>
<td>3072</td>
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<tr>
<td><strong>III. Low/lower-middle-income countries</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Colombia</td>
<td>NSMH</td>
<td>Stratified multistage clustered area probability sample of household residents in all urban areas of the country (approximately 73% of the total national population)</td>
<td>2003 18–65</td>
<td>2381</td>
<td>1731</td>
<td>87.7</td>
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<tr>
<td>India</td>
<td>WMHI</td>
<td>Stratified multistage clustered area probability sample of household residents in Pondicherry region. NR</td>
<td>2003–5 18+</td>
<td>1373</td>
<td>642</td>
<td>98.8</td>
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<tr>
<td>Iraq</td>
<td>IMHS</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2006–7 18+</td>
<td>4332</td>
<td>–</td>
<td>95.2</td>
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<tr>
<td>Nigeria</td>
<td>NSMMW</td>
<td>Stratified multistage clustered area probability sample of household residents in 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</td>
<td>2002–3 18+</td>
<td>2143</td>
<td>1203</td>
<td>79.3</td>
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</tr>
</tbody>
</table>

(continued)
### Table DS1  World Mental Health (WMH) survey sample characteristics by World Bank income categories (Continued)

<table>
<thead>
<tr>
<th>Country</th>
<th>Survey</th>
<th>Sample characteristics*</th>
<th>Field dates</th>
<th>Age range</th>
<th>Sample size</th>
<th>Response rate</th>
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</thead>
<tbody>
<tr>
<td><strong>III. Low/lower-middle-income countries</strong> (continued)</td>
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<tr>
<td>People's Republic of China</td>
<td>B–WMH, S–WMH</td>
<td>Stratified multistage clustered area probability sample of household residents in the Beijing and Shanghai metropolitan areas</td>
<td>2002–3</td>
<td>18+</td>
<td>1628</td>
<td>74.7</td>
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<tr>
<td>People's Republic of China</td>
<td>Shenzhen</td>
<td>Stratified multistage clustered area probability sample of household residents and temporary residents in the Shenzhen area</td>
<td>2006–7</td>
<td>18+</td>
<td>1993</td>
<td>80.0</td>
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<tr>
<td>Ukraine</td>
<td>CMDPSD</td>
<td>Stratified multistage clustered area probability sample of household residents. NR</td>
<td>2002</td>
<td>18+</td>
<td>1720</td>
<td>78.3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6680</td>
<td></td>
</tr>
</tbody>
</table>

*ESEMeD, European Study of the Epidemiology of Mental Disorders; NR, nationally representative household samples; NHS, Israel National Health Survey; WMH.J 2002–2006, World Mental Health Japan Survey; NCS–R, US National Comorbidity Survey Replication; NSHS, Bulgaria National Survey of Health and Stress; LEBANON, Lebanese Evaluation of the Burden of Illness and Needs of the Nation; M–NCS, Mexico National Comorbidity Survey; RMHS, Romania Mental Health Survey; SASH, South Africa Health Survey; NSMH, Colombian National Study of Mental Health; CMDPSD, Comorbid Mental Disorders during Periods of Social Disruption.

a. Most WMH surveys are based on stratified multistage clustered area probability samples in which samples of areas equivalent to counties or municipalities in the USA 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 unclustered sample of households, with households randomly selected in each of the sample areas and one random respondent selected in each sample household. In total 15 of the 22 surveys are based on nationally representative (NR) household samples, and 2 others are based on NR household samples in urbanised areas (Colombia, Mexico). The remaining five are based on regional samples (Brazil, India, Nigeria, and both surveys in the People's Republic of China).

b. Childhood-onset disorders (attention-deficit hyperactivity disorder, conduct disorder, oppositional-defiant disorder, separation anxiety disorder) were assessed only for respondents 4-18 years of age in most countries, >39 in India, Nigeria, People's Republic of China and Ukraine, and without age restrictions in Brazil, Israel, Romania and South Africa. Analyses predicting first onset of these disorders are consequently restricted to these age ranges.

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 is 73.1%.
Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys
Ronald C. Kessler, Katie A. McLaughlin, Jennifer Greif Green, Michael J. Gruber, Nancy A. Sampson, Alan M. Zaslavsky, Sergio Aguilar-Gaxiola, Ali Obaid Alhamzawi, Jordi Alonso, Matthias Angermeyer, Corina Benjet, Evelyn Bromet, Somnath Chatterji, Giovanni de Girolamo, Koen Demyttenaere, John Fayyad, Silvia Florescu, Gilad Gal, Oye Gureje, Josep Maria Haro, Chi-yi Hu, Elie G. Karam, Norito Kawakami, Sing Lee, Jean-Pierre Lépine, Johan Ormel, José Posada-Villa, Rajesh Sagar, Adley Tsang, T. Bedirhan Üstün, Svetlozar Vassilev, Maria Carmen Viana and David R. Williams
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