

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

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.^{1–6} Most of these studies, however, either considered only a single childhood adversity^{7,8} or a composite measure that did not allow differential effects of multiple childhood adversities to be examined.⁹ 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 exposure^{12,13} or effects^{14,15} 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

Africa), and six low/lower-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

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

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, dysthymic 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-IV²⁰ 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

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

	High-income countries (<i>n</i> = 20 652)		High-middle-income countries (<i>n</i> = 15 240)		Low-/lower-middle-income countries (<i>n</i> = 16 053)		Total (<i>n</i> = 51 945)	
	%	(s.e.)	%	(s.e.)	%	(s.e.)	%	(s.e.)
I. Interpersonal loss								
Parental death	11.0	(0.3)	11.9	(0.4)	14.8	(0.4)	12.5	(0.2)
Parental divorce	10.1	(0.3)	5.2	(0.3)	3.5	(0.2)	6.6	(0.2)
Other parental loss	4.0	(0.2)	4.0	(0.2)	7.4	(0.3)	5.1	(0.1)
II. Parental maladjustment								
Parental mental illness	5.3	(0.2)	6.7	(0.3)	6.7	(0.3)	6.2	(0.2)
Parental substance disorder	4.5	(0.2)	5.0	(0.3)	2.5	(0.2)	4.0	(0.1)
Parental criminal behaviour	3.4	(0.1)	3.1	(0.2)	2.2	(0.2)	2.9	(0.1)
Family violence	7.8	(0.3)	7.1	(0.3)	4.2	(0.2)	6.5	(0.1)
III. Maltreatment								
Physical abuse	5.3	(0.2)	10.8	(0.4)	9	(0.3)	8.0	(0.2)
Sexual abuse	2.4	(0.1)	0.6	(0.1)	1.5	(0.1)	1.6	(0.1)
Neglect	4.4	(0.2)	5.2	(0.2)	3.6	(0.2)	4.4	(0.1)
IV. Other childhood adversities								
Physical illness	3.9	(0.2)	2.4	(0.2)	2.6	(0.2)	3.1	(0.1)
Economic adversity	5.2	(0.2)	2.9	(0.2)	1.4	(0.2)	3.4	(0.1)
V. Total number of childhood adversities ^a								
Any	38.4	(0.5)	38.9	(0.6)	39.1	(0.6)	38.8	(0.4)
One/any	59.3	(0.7)	59.6	(0.8)	66.2	(0.9)	61.5	(0.5)
Two/any	22.5	(0.6)	24.6	(0.8)	21.8	(0.7)	22.9	(0.4)
Three/any	9.0	(0.4)	9.0	(0.5)	7.5	(0.5)	8.5	(0.3)
Four/any	5.0	(0.4)	4.1	(0.3)	3.1	(0.3)	4.1	(0.2)
Five or more/any	4.2	(0.2)	2.7	(0.3)	1.4	(0.2)	2.9	(0.2)

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.

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 χ^2 -test for the joint effects of all childhood adversities was significant ($\chi^2_{12} = 1536.6$, $P < 0.001$). 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 χ^2 -test for the joint effects of number-of-childhood adversities was statistically significant ($\chi^2_7 = 1345.8$, $P < 0.001$). A model that considered both types and numbers of childhood adversities had a better AIC, with both types ($\chi^2_{12} = 695.7$, $P < 0.001$) and number ($\chi^2_6 = 200.4$, $P < 0.001$) 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.

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+) ($\chi^2_{12} = 197.8$ – 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

Table 2 Multivariate associations (odds ratios) between childhood adversities and the subsequent first onset of DSM-IV/CIDI disorders based on the final multivariate model^a

	High-income countries (n = 20 652)			High-middle-income countries (n = 15 240)			Low-/lower-middle-income countries (n = 16 053)			Total (n = 51 945)		
	OR	(95% CI)	χ^2	OR	(95% CI)	χ^2	OR	(95% CI)	χ^2	OR	(95% CI)	χ^2
I. Maladaptive family functioning ^b			289.2*			152.6*			244.2*			585.8*
Parental mental illness	1.9*	(1.7–2.1)		1.9*	(1.7–2.1)		2.4*	(2.2–2.7)		2.0*	(1.9–2.2)	
Parental substance misuse	1.8*	(1.6–2.0)		1.4*	(1.2–1.6)		1.6*	(1.3–1.9)		1.6*	(1.5–1.7)	
Parental criminality	1.6*	(1.4–1.8)		1.6*	(1.3–1.8)		1.7*	(1.4–2.1)		1.6*	(1.4–1.7)	
Family violence	1.7*	(1.5–1.9)		1.6*	(1.4–1.8)		1.6*	(1.3–1.9)		1.6*	(1.5–1.8)	
Physical abuse	1.9*	(1.7–2.1)		1.6*	(1.4–1.9)		2.0*	(1.7–2.3)		1.8*	(1.7–2.0)	
Sexual abuse	1.9*	(1.7–2.2)		1.7*	(1.4–2.1)		1.5*	(1.2–1.9)		1.8*	(1.6–2.0)	
Neglect	1.6*	(1.4–1.8)		1.3*	(1.1–1.5)		1.7*	(1.4–2.0)		1.5*	(1.4–1.6)	
II. Other childhood adversities ^c			365.5*			35.8*			32.8*			104.7*
Parental death	1.1	(1.0–1.2)		1.1*	(1.0–1.3)		1.0	(0.9–1.2)		1.1*	(1.0–1.2)	
Parental divorce	1.1	(1.0–1.2)		1.3*	(1.1–1.4)		1.2*	(1.1–1.4)		1.1*	(1.0–1.2)	
Other parental loss	1.4*	(1.3–1.5)		1.3*	(1.1–1.6)		1.3*	(1.1–1.5)		1.4*	(1.2–1.5)	
Serious physical illness	1.4*	(1.2–1.5)		1.5*	(1.3–1.9)		1.4*	(1.2–1.7)		1.4*	(1.3–1.5)	
Family economic adversity	1.2*	(1.1–1.4)		1.2	(0.9–1.5)		0.9	(0.7–1.2)		1.2*	(1.0–1.3)	
III. Number of maladaptive family functioning childhood adversities ^d			124.9*			42.1*			115.0*			193.9*
Zero to one	–			–			–			–		
Two	0.6*	(0.6–0.8)		0.9	(0.8–1.0)		0.7*	(0.6–0.9)		0.7*	(0.7–0.8)	
Three	0.4*	(0.4–0.6)		0.7*	(0.5–0.9)		0.4*	(0.3–0.6)		0.5*	(0.4–0.6)	
Four	0.3*	(0.2–0.4)		0.5*	(0.3–0.7)		0.3*	(0.2–0.4)		0.3*	(0.3–0.4)	
Five	0.2*	(0.1–0.3)		0.3*	(0.2–0.5)		0.2*	(0.1–0.3)		0.2*	(0.2–0.3)	
Six	0.1*	(0.1–0.2)		0.2*	(0.1–0.4)		0.2*	(0.1–0.4)		0.1*	(0.1–0.2)	
Seven	0.0*	(0.0–0.1)		0.2*	(0.0–0.8)		0.0*	(0.0–0.1)		0.0*	(0.0–0.1)	
IV. Number of other childhood adversities ^e			14.7*			2.0			0.3			14.3*
Zero to one	–			–			–			–		
Two	0.8*	(0.7–0.9)		0.9	(0.7–1.1)		1.0	(0.8–1.2)		0.8*	(0.8–0.9)	
Three	0.7*	(0.6–0.9)		1.0	(0.6–1.8)		1.0	(0.5–1.8)		0.8*	(0.6–0.9)	
Four+	0.8	(0.6–1.2)		0.9	(0.6–1.3)		1.1	(0.4–3.5)		0.8	(0.6–1.1)	

a. The model is a discrete-time survival model in a logistic regression framework with person-year as the unit of analysis to predict first onset of each of the 20 DSM-IV/CIDI disorders included in the analysis separately in each of three groups of countries. Age at onset was assessed using retrospective reports. Controls were included in the model for respondent age at interview, person-year, country, and type of disorder. The 19 type-of-disorder controls were included because the separate person-year data files for each of the 20 disorders were pooled, thereby forcing the slopes to be constant across disorders within each group of countries. As noted in the text, this assumption was subsequently relaxed and the model was estimated separately for each of four classes of disorders (mood, anxiety, behaviour and substance disorders) and then for each of the 20 separate disorders. Broad consistency of coefficients across these disaggregated models supports the validity of interpreting results pooled across all 20 disorders. The model is significant overall in each of the three groups of countries and overall ($\chi^2_{21} = 534.4-1853.7, P < 0.001$). The sample sizes reported are the numbers of respondents who contributed at least one person-year to the data file in each group of countries. The numbers of person-years in the analysis were 18 800 397 for high-income countries, 12 608 715 for high-middle-income countries, 12 193 251 for low/lower-middle-income countries and 43 602 363 for all countries combined. These person-years represent the combination of 20 separate person-year data files, each with a sample size equal to the combined number of years of life of all respondents up to and including their age at onset of the focal disorder for respondents who experienced the disorder and age at interview for respondents who never experienced the disorder. Because of the sample sizes being enormous, a random 5% of observations with a negative score on the outcome were used in the analysis, each such case being assigned a weight of 20 (i.e. 1/0.05) to represent the undersampling.

b. For χ^2 d.f. = 7.

c. For χ^2 d.f. = 5.

d. For χ^2 d.f. = 6.

e. For χ^2 d.f. = 3.

*Significant at the 0.05 level, two-sided test.

maladaptive family functioning childhood adversities were consistently negative, significant ($\chi^2_6 = 35.3-119.8, P < 0.001$), 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 eradication of childhood adversities would lead to a 22.9% reduction in mood disorders, 31.0% in anxiety disorders, 41.6% in behaviour disorders, 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

Table 3 Multivariate associations (odds ratios) between childhood adversities and the subsequent first onset of DSM-IV/CIDI disorders in each of four life-course stages based on the final multivariate model^a

	Childhood, age 4–12 (<i>n</i> = 51 945)			Adolescence, age 13–19 (<i>n</i> = 51 945)			Young adulthood, age 20–29 (<i>n</i> = 41 426)			Later adulthood, age 30+ (<i>n</i> = 38 692)		
	OR	(95% CI)	χ^2	OR	(95% CI)	χ^2	OR	(95% CI)	χ^2	OR	(95% CI)	χ^2
I. Maladaptive family functioning^b			314.2*			205.8*			236.9*			163.2*
Parental mental illness	2.4*	(2.1–2.6)		1.9*	(1.7–2.2)		2.1*	(1.8–2.3)		1.9*	(1.7–2.2)	
Parental substance misuse	1.6*	(1.4–1.9)		1.6*	(1.4–1.8)		1.8*	(1.5–2.2)		1.6*	(1.4–1.9)	
Parental criminality	1.5*	(1.3–1.8)		1.5*	(1.3–1.8)		1.7*	(1.4–2.0)		1.4*	(1.1–1.7)	
Family violence	1.7*	(1.5–1.9)		1.5*	(1.3–1.8)		1.7*	(1.5–1.9)		1.7*	(1.4–2.0)	
Physical abuse	2.0*	(1.8–2.2)		2.0*	(1.8–2.2)		1.8*	(1.6–2.1)		1.7*	(1.5–1.9)	
Sexual abuse	2.1*	(1.8–2.5)		1.7*	(1.4–2.0)		1.7*	(1.4–2.1)		1.4*	(1.2–1.7)	
Neglect	1.5*	(1.4–1.8)		1.5*	(1.3–1.7)		1.7*	(1.5–2.0)		1.4*	(1.2–1.6)	
II. Other childhood adversities^c			63.7*			45.7*			30.1*			22.5*
Parental death	1.1*	(1.0–1.2)		1.2*	(1.1–1.3)		1.0	(0.9–1.1)		1.1*	(1.0–1.3)	
Parental divorce	1.1	(1.0–1.2)		1.2*	(1.0–1.3)		1.1	(1.0–1.3)		1.0	(0.9–1.2)	
Other parental loss	1.3*	(1.2–1.5)		1.3*	(1.2–1.5)		1.5*	(1.3–1.74)		1.3*	(1.2–1.6)	
Serious physical illness	1.5*	(1.4–1.7)		1.4*	(1.2–1.6)		1.4*	(1.1–1.7)		1.2*	(1.0–1.4)	
Family economic adversity	1.3*	(1.1–1.5)		1.0	(0.9–1.2)		1.1	(0.9–1.4)		1.2	(1.0–1.4)	
III. Number of maladaptive family functioning childhood adversities^d			75.5*			119.8*			71.3*			35.3*
Zero to one	–			–			–			–		
Two	0.8*	(0.7–0.9)		0.8*	(0.6–0.9)		0.7*	(0.6–0.8)		0.7*	(0.6–0.8)	
Three	0.6*	(0.4–0.7)		0.5*	(0.4–0.7)		0.4*	(0.3–0.5)		0.5*	(0.4–0.7)	
Four	0.4*	(0.3–0.5)		0.3*	(0.2–0.5)		0.2*	(0.2–0.4)		0.3*	(0.2–0.5)	
Five	0.3*	(0.2–0.4)		0.2*	(0.1–0.3)		0.2*	(0.1–0.3)		0.3*	(0.2–0.6)	
Six	0.2*	(0.1–0.3)		0.1*	(0.0–0.1)		0.1*	(0.0–0.2)		0.2*	(0.1–0.4)	
Seven	0.1*	(0.0–0.2)		0.0*	(0.0–0.1)		0.0*	(0.0–0.1)		0.1*	(0.0–0.3)	
IV. Number of other childhood adversities^e			5.7			10.1*			9.7*			3.6
Zero to one	–			–			–			–		
Two	0.8	(0.8–1.0)		0.8*	(0.7–0.9)		0.8*	(0.6–1.0)		0.8	(0.6–1.0)	
Three	0.8	(0.6–1.1)		0.8	(0.5–1.1)		0.6*	(0.4–0.9)		0.8	(0.5–1.3)	
Four+	1.2	(0.6–2.0)		0.5*	(0.2–1.0)		0.3*	(0.1–0.8)		0.6	(0.2–1.6)	

a. The model is a discrete-time survival model in a logistic regression framework with person-year as the unit of analysis to predict first onset of each of the 20 DSM-IV/CIDI disorders included in the analysis pooled across all countries in each of four sets of person-years that define life-course stages. Age at onset was assessed using retrospective reports. Controls were included in the model for respondent age at interview, person-year, country, and type of disorder. The 19 type-of-disorder controls were included because the separate person-year data files for each of the 20 disorders were pooled, thereby forcing the slopes to be constant across disorders within each age range. As noted in the text, this assumption was subsequently relaxed and the model was estimated separately for each of four classes of disorders (mood, anxiety, behaviour and substance disorders) and then for each of the 20 separate disorders. Broad consistency of coefficients across these disaggregated models supports the validity of interpreting results pooled across all 20 disorders. The model is significant in each life-course stage ($\chi^2_{21} = 328.5-1162.6, P < 0.001$). The sample sizes reported are the numbers of respondents who contributed at least one person-year to the data file at each of the life-course stages. The numbers decrease with age as some respondents were younger than 20 and even more younger than 30 at the time of interview. The numbers of person-years in the analysis were 9 817 605 for childhood, 7 617 351 for adolescence, 9 459 051 for young adulthood and 16 708 356 for later adulthood. These person-years represent the combination of 20 separate person-year data files, each with a sample size equal to the combined number of years of life of all respondents in the age ranges of the life-course stages described in the column headings, where the upper end of the records are the age at onset of the focal disorder for respondents who experienced the disorder and age at interview for respondents who never experienced the disorder. Because of the sample sizes being enormous, a random 5% of observations with a negative score on the outcome were used in the analysis, each such case being assigned a weight of 20 (i.e. 1/0.05) to represent the undersampling.

b. For χ^2 d.f. = 7.
c. For χ^2 d.f. = 5.
d. For χ^2 d.f. = 6.
e. For χ^2 d.f. = 3.
*Significant at the 0.05 level, two-sided test.

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.^{37–39} 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 adversities⁴⁰ and disorders.⁴¹ Long-term prospective study is needed to resolve this problem using available prospective data-sets.^{1,42–44} Some interesting preliminary work of this sort has already begun.⁴⁵

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.

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

	Childhood, age 4–12	Adolescence, age 13–19	Early adulthood, age 20–29	Later adulthood, age 30+	Total
I. High-income countries					
Mood disorders	57.1	28.8	19.1	13.6	19.7
Anxiety disorders	34.1	29.7	29.6	22.6	30.0
Behaviour disorders	50.3	36.4	– ^b	– ^b	43.6
Substance disorders	62.4	24.2	25.8	32.4	22.8
All disorders	41.2	30.9	25.3	19.1	28.7
II. High-middle-income countries					
Mood disorders	64.9	32.1	26.9	13.5	23.5
Anxiety disorders	31.5	28.4	41.3	25.6	30.0
Behaviour disorders	59.0	40.9	25.3	– ^b	46.7
Substance disorders	65.0	24.1	29.6	44.2	28.8
All disorders	40.0	30.0	32.1	24.3	30.0
III. Low-/lower-middle-income countries					
Mood disorders	53.8	34.7	30.4	19.6	25.6
Anxiety disorders	31.4	28.1	34.0	40.3	29.2
Behaviour disorders	53.7	42.9	19.8	– ^b	43.7
Substance disorders	51.2	32.9	27.7	27.8	29.2
All disorders	33.3	34.7	30.2	27.8	29.9
IV. Total					
Mood disorders	59.5	32.6	24.2	13.6	22.9
Anxiety disorders	31.1	30.3	36.7	28.3	31.0
Behaviour disorders	49.6	36.2	17.4	– ^b	41.6
Substance disorders	62.3	30.0	28.9	34.2	27.5
All disorders	38.2	32.3	29.0	21.8	29.8

a. The PARPs were calculated using simulation methods to generate individual-level predicted probabilities of the outcome disorders twice from the coefficients in final model, where these coefficients were estimated separately for each cell of the table. The first time the calculations were made using all the coefficients in the model and the second time assuming that the coefficients associated with the childhood adversities were all zero. One minus the ratio of the predicted prevalence estimates in the two specifications was then used to calculate PARP.

b. Too few onsets occurred at this life-course stage to estimate PARP.

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.⁴⁶ World Mental Health survey respondent reports of parental divorce, the childhood adversity most often found in government statistics, are generally consistent with official estimates.⁴⁷ World Mental Health survey respondent reports of other childhood adversities such as physical and sexual abuse⁴⁸ and parental violence,⁴⁹ 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,^{50,51} 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,^{52–54} those studies focused on prevalent cases, whereas the current analysis focused on first lifetime onsets.

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 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.⁵⁵ 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,^{56,57} 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.⁵⁸

There is nothing in our retrospective WMH results that addresses the number of hypotheses that could be advanced to explain the patterns documented here.^{57,59,60} Our results are nonetheless important, in providing empirical justification for further analyses to explore such hypotheses to identify mediators, modifiers and developmental sequences that might be fruitful targets for preventive interventions.⁶¹ It would also be useful to examine these associations in an epidemiological sample that had a genetically informative design to investigate the extent to which exposure and reactivity to childhood adversities are under genetic control. Consistent with other recent research,³⁸ it would

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.

Ronald C. Kessler, PhD, **Katie A. McLaughlin**, PhD, Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts, USA; **Jennifer Greif Green**, PhD, School of Education, Boston University, Boston, Massachusetts, USA; **Michael J. Gruber**, MS, **Nancy A. Sampson**, BS, **Alan M. Zaslavsky**, PhD, Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts, USA; **Sergio Aguilar-Gaxiola**, MD, PhD, Center for Health Disparities, University of California at Davis, California, USA; **Ali Obaid Alhamzawi**, MBChB, MD, Al-Qadisia University, College of Medicine, Diwania Governate, Iraq; **Jordi Alonso**, MD, PhD, Health Services Research Unit, Institut Municipal d'Investigació Mèdica (IMIM-Hospital del Mar) and CIBER en Epidemiología y Salud Pública (CIBERESP), Barcelona, Spain; **Matthias Angermeyer**, MD, Center for Public Mental Health, Goessing am Wagram, Austria; **Corina Benjet**, PhD, National Institute of Psychiatry, Mexico City, Mexico; **Evelyn Bromet**, PhD, State University of New York at Stony Brook, Department of Psychiatry, New York, USA; **Somnath Chatterji**, MD, World Health Organization, Geneva, Switzerland; **Giovanni de Girolamo**, MD, IRCCS Centro S. Giovanni di Dio Fatebenefratelli, Brescia, Italy; **Koen Demeyttenaere**, MD, PhD, Department of Psychiatry, University Hospital Gasthuisberg, Leuven, Belgium; **John Fayyad**, MD, St George Hospital University Medical Center, Balamand University, Faculty of Medicine, Institute for Development, Research, Advocacy & Applied Care (IDRAAC), Medical Institute for Neuropsychological Disorders (MIND), Beirut, Lebanon; **Silvia Florescu**, MD, PhD, Public Health Research and Evidence Based Medicine Department, National School of Public Health and Health Services Management, Bucharest, Romania; **Gilad Gal**, PhD, Mental Health Epidemiology and Psychosocial Aspects of Illness, The Gertner Institute for Epidemiology and Health Policy Research, Sheba Medical Center, Israel; **Oye Gureje**, MD, PhD, FRCPsych, University College Hospital, Ibadan, Nigeria; **Josep Maria Haro**, MD, MPH, PhD, Parc Sanitari Sant Joan de Déu, Fundació Sant Joan de Déu, CIBER en Salud Mental, Sant Boi de Llobregat, Barcelona, Spain; **Chi-yi Hu**, MD, PhD, Shenzhen Institute of Mental Health & Shenzhen Kangning Hospital, Shenzhen, China; **Elie G. Karam**, MD, St George Hospital University Medical Center, Balamand University, Faculty of Medicine, Institute for Development, Research, Advocacy & Applied Care (IDRAAC), Medical Institute for Neuropsychological Disorders (MIND), Beirut, Lebanon; **Norito Kawakami**, MD, Department of Mental Health, School of Public Health, University of Tokyo, Japan; **Sing Lee**, MB, BS, FRCPsych, The Chinese University of Hong Kong, Shatin, Hong Kong, China; **Jean-Pierre Lépine**, MD, Hôpital Lariboisière Fernand Widal, Assistance Publique Hôpitaux de Paris INSERM U 705, CNRS UMR 7157 University Paris Diderot and Paris Descartes Paris, France; **Johan Ormel**, MA, PhD, Department of Psychiatry and Psychiatric Epidemiology, University Medical Center Groningen, University Center for Psychiatry, Groningen, The Netherlands; **José Posada-Villa**, MD, Ministry of Social Protection, Colegio Mayor de Cundinamarca University, Bogota, Colombia; **Rajesh Sagar**, MD, All India Institute of Medical Sciences, Department of Psychiatry, New Delhi, India; **Adley Tsang**, BSoSc, The Chinese University of Hong Kong, Shatin, Hong Kong, China; **T. Bedirhan Üstün**, PhD, World Health Organization, Geneva, Switzerland; **Svetlozar Vassilev**, MD, New Bulgarian University, Sofia, Bulgaria; **Maria Carmen Viana**, MD, PhD, Section of Psychiatric Epidemiology, Institute of Psychiatry, School of Medicine, University of São Paulo, São Paulo, Brazil; **David R. Williams**, MPH, PhD, Harvard School of Public Health, Department of Society, Human Development, and Health, Boston, Massachusetts, USA

Correspondence: Ronald C. Kessler, Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, MA 02115, USA. Email: kessler@hcp.med.harvard.edu

First received 26 Mar 2009, final revision 28 May 2010, accepted 10 Jun 2010

Funding

The WMH surveys 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 (PAHO), the Eli Lilly & Company Foundation, Ortho-McNeil Pharmaceutical, GlaxoSmithKline, Bristol-Myers Squibb, and Shire. 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 Bulgarian Epidemiological Study of common mental disorders EPIBUL is supported by the Ministry of Health and the National Center for Public Health Protection. The Chinese World Mental Health Survey Initiative is supported by the Pfizer Foundation. The Shenzhen Mental Health Survey is supported by the Shenzhen Bureau of Health and the Shenzhen Bureau of Science, Technology, and Information. 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 QLGS-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 WMH was funded by WHO (India) and helped by Dr R Chandrasekaran, JIPMER. Implementation of the Iraq Mental Health Survey (IMHS) and data entry were carried out by the staff of the Iraqi MOH and MOP with direct support from the Iraqi IMHS team with funding from both the Japanese and European Funds through United Nations Development Group Iraq Trust Fund (UNDG ITF). 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 (WMH) 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, Act for Lebanon, 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 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 Nigerian Survey of Mental Health and Wellbeing (NSMHW) is supported by the WHO (Geneva), the WHO (Nigeria), and the Federal Ministry of Health, Abuja, Nigeria. The Romanian WMH study projects 'Policies in Mental Health Area' and 'National Study regarding Mental Health and Services Use' were carried out by National School of Public Health & Health Services Management (former National Institute for Research & Development in Health), with technical support of Metro Media Transilvania, the National Institute of Statistics-National Centre for Training in Statistics, SC. Cheyenne Services SRL, Statistics Netherlands and were funded by Ministry of Public Health (former Ministry of Health) with supplemental support of Eli Lilly Romania SRL. 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 Comorbidity Mental Disorders during Periods of Social Disruption (CMDPSD) study is funded by the US National Institute of Mental Health (R01-MH61905). The US National Comorbidity Survey Replication (NCS-R) is supported by the National Institute of Mental Health (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 Trust.

Acknowledgements

These surveys were carried out in conjunction with the World Health Organization WMH Survey Initiative. We thank the WMH staff for assistance with instrumentation, fieldwork and data analysis. A complete list of WMH publications can be found at www.hcp.med.harvard.edu/wmh.

References

- Cohen P, Brown J, Smaile E. Child abuse and neglect and the development of mental disorders in the general population. *Dev Psychopathol* 2001; **13**: 981–99.
- Collishaw S, Pickles A, Messer J, Rutter M, Shearer C, Maughan B. Resilience to adult psychopathology following childhood maltreatment: evidence from a community sample. *Child Abuse Negl* 2007; **31**: 211–29.
- Fergusson DM, Horwood LJ, Lynskey MT. Childhood sexual abuse and psychiatric disorder in young adulthood: II. psychiatric outcomes of childhood sexual abuse. *J Am Acad Child Adolesc Psychiatry* 1996; **35**: 1365–74.
- Fristad MA, Jedel R, Weller RA, Weller EB. Psychosocial functioning in children after the death of a parent. *Am J Psychiatry* 1993; **150**: 511–3.
- Wark MJ, Kruczek T, Boley A. Emotional neglect and family structure: impact on student functioning. *Child Abuse Negl* 2003; **27**: 1033–43.
- Widom CS. Posttraumatic stress disorder in abused and neglected children grown up. *Am J Psychiatry* 1999; **156**: 1223–9.
- Bifulco A, Harris TO, Brown GW. Mourning or inadequate care? Reexamining the relationship of maternal loss in childhood with adult depression and anxiety. *Dev Psychopathol* 1992; **4**: 433–49.
- Rodgers B. Pathways between parental divorce and adult depression. *J Child Psychol Psychiatry* 1994; **35**: 1289–308.
- Chapman DP, Whitfield CL, Felitti VJ, Dube SR, Edwards VJ, Anda RF. Adverse childhood experiences and the risk of depressive disorders in adulthood. *J Affect Disord* 2004; **82**: 217–25.
- Green JG, McLaughlin KA, Berglund PA, Gruber MJ, Sampson NA, Zaslavsky AM, et al. Childhood adversities and adult psychopathology in the National Comorbidity Survey Replication (NCS-R). I. associations with first onset of DSM-IV disorders. *Arch Gen Psychiatry* 2010; **67**: 113–23.
- Kessler RC, Davis CG, Kendler KS. Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychol Med* 1997; **27**: 1101–19.
- Pereda N, Guilera G, Forns M, Gomez-Benito J. The international epidemiology of child sexual abuse: a continuation of Finkelhor (1994). *Child Abuse Negl* 2009; **33**: 331–42.
- Wagner M, Weib B. On the variation of divorce risk in Europe: findings from a meta-analysis of European longitudinal studies. *Eur Sociol Rev* 2006; **22**: 483–500.
- Cohen RA, Paul RH, Stroud L, Gunstad J, Hitsman BL, McCaffery J, et al. Early life stress and adult emotional experience: an international perspective. *Int J Psychiatry Med* 2006; **36**: 35–52.

- 15 Dunne MP, Zolotor AJ, Runyan DK, Andrevia-Miller I, Choo WY, Dunne SK, et al. IPSCAN Child Abuse Screen Tools Retrospective version (ICAST-R): Delphi study and field testing in seven countries. *Child Abuse Negl* 2009; **33**: 815–25.
- 16 Kessler RC, Üstün TB. *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders*. Cambridge University Press, 2008.
- 17 The World Bank. *Data and Statistics*. The World Bank, 2008 (<http://go.worldbank.org/D7SN0B8YU0>).
- 18 Heeringa SG, Wells JE, Hubbard F, Mneimneh Z, Chiu WT, Sampson NA. Sample designs and sampling procedures. In *The WHO World Mental Health Surveys: Global Perspectives on the Epidemiology of Mental Disorders* (eds RC Kessler, TB Üstün): 14. Cambridge University Press, 2008.
- 19 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**: 93–121.
- 20 American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (4th edn) (DSM-IV)*. APA, 1994.
- 21 First MB, Spitzer RL, Gibbon M, Williams JBW. *Structured Clinical Interview for DSM-IV Axis I Disorders, Research Version, Non-patient Edition (SCID-I/NP)*. Biometrics Research, New York State Psychiatric Institute, 2002.
- 22 Haro JM, Arbabzadeh-Bouchez S, Brugha TS, de Girolamo G, Guyer ME, Jin R, et al. 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**: 167–80.
- 23 Knauper B, Cannell CF, Schwarz N, Bruce ML, Kessler RC. Improving the accuracy of major depression age of onset reports in the US National Comorbidity Survey. *Int J Methods Psychiatr Res* 1999; **8**: 39–48.
- 24 Molnar BE, Buka SL, Kessler RC. Child sexual abuse and subsequent psychopathology: results from the National Comorbidity Survey. *Am J Public Health* 2001; **91**: 753–60.
- 25 Endicott J, Andreasen N, Spitzer RL. *Family History Research Diagnostic Criteria*. Biometrics Research, New York State Psychiatric Institute, 1978.
- 26 Kendler KS, Silberg JL, Neale MC, Kessler RC, Heath AC, Eaves LJ. The family history method: whose psychiatric history is measured? *Am J Psychiatry* 1991; **148**: 1501–4.
- 27 Straus MA. Measuring intrafamily conflict and violence: the Conflict Tactics (CT) Scales. *J Marriage Fam* 1979; **41**: 75–88.
- 28 Courtney ME, Piliavin I, Grogan-Kaylor A, Nesmith A. *Foster Youth Transitions to Adulthood: A Longitudinal View of Youth Leaving Care*. Institute for Research on Poverty, 1998.
- 29 Merikangas KR, Ames M, Cui L, Stang PE, Üstün TB, Von Korff M, et al. The impact of comorbidity of mental and physical conditions on role disability in the US adult household population. *Arch Gen Psychiatry* 2007; **64**: 1180–8.
- 30 Klebanoff MA, Cole SR. Use of multiple imputation in the epidemiologic literature. *Am J Epidemiol* 2008; **168**: 355–7.
- 31 Singer JD, Willett JB. It's about time: using discrete-time survival analysis to study duration and the timing of events. *J Educ Stat* 1993; **18**: 155–95.
- 32 Burnham KP, Anderson DR. *Model Selection and Multimodel Inferences: A Practical-theoretic Approach (2nd edn)*. Springer-Verlag, 2002.
- 33 Northridge ME. Public health methods – attributable risk as a link between causality and public health action. *Am J Public Health* 1995; **85**: 1202–3.
- 34 Wolter KM. *Introduction to Variance Estimation*. Springer-Verlag, 1985.
- 35 Kessler RC, Amminger GP, Aguilar-Gaxiola S, Alonso J, Lee S, Üstün TB. Age of onset of mental disorders: a review of recent literature. *Curr Opin Psychiatry* 2007; **20**: 359–64.
- 36 Kessler RC, Angermeyer M, Anthony JC, de Graaf R, Demyttenaere K, Gasquet I, et al. Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative. *World Psychiatry* 2007; **6**: 168–76.
- 37 Bebbington P. Childhood sexual abuse and psychosis: aetiology and mechanism. *Epidemiol Psychiatr Soc* 2009; **18**: 284–93.
- 38 Read J, Bentall RP, Fosse R. Time to abandon the bio-bio-bio model of psychosis: exploring the epigenetic and psychological mechanisms by which adverse life events lead to psychotic symptoms. *Epidemiol Psychiatr Soc* 2009; **18**: 299–310.
- 39 Read J, Fink P, Rudegeair T, Felitti V, Whitfield CL. Child maltreatment and psychosis: a return to a genuinely integrated bio-psycho-social model. *Clin Schizophr Relat Psychoses* 2008; **2**: 235–54.
- 40 Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *J Child Psychol Psychiatry* 2004; **45**: 260–73.
- 41 Moffitt TE, Caspi A, Taylor A, Kokaua J, Milne BJ, Polanczyk G, et al. How common are common mental disorders? Evidence that lifetime prevalence rates are doubled by prospective versus retrospective ascertainment. *Psychol Med* 2010; **40**: 1–11.
- 42 Fergusson DM, Horwood LJ. The Christchurch Health and Development Study: review of findings on child and adolescent mental health. *Aust N Z J Psychiatry* 2001; **35**: 287–96.
- 43 Jones GT, Power C, Macfarlane GJ. Adverse events in childhood and chronic widespread pain in adult life: results from the 1958 British Birth Cohort Study. *Pain* 2009; **143**: 92–6.
- 44 Melchior M, Moffitt TE, Milne BJ, Poulton R, Caspi A. Why do children from socioeconomically disadvantaged families suffer from poor health when they reach adulthood? A life-course study. *Am J Epidemiol* 2007; **166**: 966–74.
- 45 Clark C, Caldwell T, Power C, Stansfeld SA. Does the influence of childhood adversity on psychopathology persist across the lifecourse? A 45-year prospective epidemiologic study. *Ann Epidemiol* 2010; **20**: 385–94.
- 46 Burgermeister D. Childhood adversity: a review of measurement instruments. *J Nurs Meas* 2007; **15**: 163–76.
- 47 Snyder T, Shafer L. *Youth Indicators, NCES 96–027*. US Department of Education, National Center for Education Statistics, 1996.
- 48 Finkelhor D. The international epidemiology of child sexual abuse. *Child Abuse Negl* 1994; **18**: 409–17.
- 49 Garcia-Moreno C, Heise L, Jansen HA, Ellsberg M, Watts C. Public health. Violence against women. *Science* 2005; **310**: 1282–3.
- 50 Bifulco A, Brown GW, Adler Z. Early sexual abuse and clinical depression in adult life. *Br J Psychiatry* 1991; **159**: 115–22.
- 51 Tennant C, Bebbington P, Hurry J. Parental death in childhood and risk of adult depressive disorders: a review. *Psychol Med* 1980; **10**: 289–99.
- 52 McMahon SD, Grant KE, Compas BE, Thurm AE, Ey S. Stress and psychopathology in children and adolescents: is there evidence of specificity? *J Child Psychol Psychiatry* 2003; **44**: 107–33.
- 53 Shanahan L, Copeland W, Costello EJ, Angold A. Specificity of putative psychosocial risk factors for psychiatric disorders in children and adolescents. *J Child Psychol Psychiatry* 2008; **49**: 34–42.
- 54 Spinhoven P, Elzinga BM, Hovens JG, Roelofs K, Zitman FG, van Oppen P, et al. The specificity of childhood adversities and negative life events across the life span to anxiety and depressive disorders. *J Affect Disord* 2010; March 19 (Epub ahead of print).
- 55 Read J, Hammersley P, Rudegeair T. Why, when and how to ask about child abuse. *Adv Psychiatr Treat* 2007; **13**: 101–10.
- 56 Edwards VJ, Holden GW, Felitti VJ, Anda RF. Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: results from the adverse childhood experiences study. *Am J Psychiatry* 2003; **160**: 1453–60.
- 57 Horwitz AV, Widom CS, McLaughlin J, White HR. The impact of childhood abuse and neglect on adult mental health: a prospective study. *J Health Soc Behav* 2001; **42**: 184–201.
- 58 Edwards VJ, Dube SR, Felitti VJ, Anda RF. It's ok to ask about past abuse. *Am Psychol* 2007; **62**: 327–8; discussion 30–2.
- 59 Hazel NA, Hammen C, Brennan PA, Najman J. Early childhood adversity and adolescent depression: the mediating role of continued stress. *Psychol Med* 2008; **38**: 581–9.
- 60 Turner H, Butler M. Direct and indirect effects of childhood adversity on depressive symptoms in young adults. *J Youth Adolesc* 2003; **32**: 89–103.
- 61 Hankin BL. Childhood maltreatment and psychopathology: prospective tests of attachment, cognitive vulnerability, and stress as mediating processes. *Cogn Ther Res* 2005; **29**: 645–71.

