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REVIEW

Sexual and physical abuse in childhood is associated with depression and anxiety over the life course: systematic review and meta-analysis

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Abstract
Objectives To determine whether depression and anxiety in adulthood are associated with abuse exposure in childhood.
Methods A search of PUBMED, EMBASE and PSYCHINFO databases (2002–2012) was supplemented by hand searches of bibliographies of articles and reviews. We included studies contrasting abuse exposure vs. no-abuse exposure before age 16 years to depression and anxiety after age 16 years. Data on sample and exposure and outcome instruments, covariates and odds ratios (ORs) with the respective 95 % confidence intervals (CI) were extracted. Combined ORs and 95 % CI were calculated using random effects models. Heterogeneity was quantified using the I^2 test.
Results Inclusion criteria were met by 19 studies with 115,579 study participants, for assessing depression ($n = 14$) and anxiety ($n = 13$). The combined ORs for depression were 2.04 (95 % CI: 1.65–2.53) for sexual abuse and 1.49 (95 % CI: 1.29–1.72) for physical abuse. The combined ORs for anxiety were 2.52 (95 % CI: 2.12–2.98) for sexual abuse and 1.70 (95 % CI: 1.33–2.18) for physical abuse.
Conclusions High levels of depression, anxiety and distress are reported in adults exposed to childhood sexual and physical abuse. These findings require increased awareness for the potential needs of adults exposed to child abuse and public health interventions to prevent child abuse.

Keywords Meta-analysis · Child abuse · Depression · Anxiety · Life course

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Introduction

There is increasing evidence that early life experiences and exposures can have long-term effects on health that may manifest as disease later in life (Kessler et al. 2010; Shonkoff and Garner 2012). In particular, strong, frequent or prolonged activation of the body's stress response system in childhood in the absence of buffering from supportive relationships has been suspected of leading to physiological changes early in life that may persist and increase risks for lifelong adverse health outcomes. Therefore, the term "toxic stress" has been coined for exposure to physical and sexual child abuse (Garner and Shonkoff 2012). However, recent international data suggest

no consistent evidence for a decrease in child maltreatment (Gilbert et al. 2012).

Depression (depressive symptoms and depressive disorders) and anxiety (anxiety symptoms and anxiety disorders) represent big challenges to public health as both are highly prevalent worldwide (depression up to 21 % lifetime prevalence rate in the USA and up to 7 % in Europe, anxiety up to 31.0 % in the USA and up to 14 % in Europe) (Kessler et al. 2009). Depression and anxiety are leading causes of disability worldwide (excluding substance abuse disorders) and account for almost 12 % of total years lived with disability. In the World Health Organization's (WHO) worldwide estimates for 2000, depression of all ages alone ranked fourth among all causes of Disability-Adjusted Life Years (DALYs) lost (4.4 %) and first among all causes of Years Lived with Disability (11.9 %) (World Health Organization 2001). To the extent that childhood abuse may contribute to these outcomes, it would offer a potential avenue for intervention to reduce the associated disease burden—in addition to the reduction to the burden of disease in children that could be avoided directly by preventing child abuse.

Childhood sexual and physical abuses are highly prevalent a half century since Kempe et al. (1962) described the "Battered-Child Syndrome" which increased the awareness of childhood physical and sexual abuse. Corporal punishment of children is accepted and tolerated in 168 countries, and a recent meta-analysis of 217 publications published between 1980 and 2008 suggested that the prevalence of sexual abuse is as high as 27 % for girls in Australia and 29 % for men in Africa (Stoltenborgh et al. 2011). Increasing evidence is shedding light on how such exposures can have important physiological effects on the brain, including in regions critical for fear and anxiety (McEwen et al. 2012).

A number of studies have assessed the relationship between abuse among children or adolescents and increased short-term risk for a variety of outcomes such as internalizing and externalizing behavior in children (Nalavany et al. 2009), suicidal ideation, problem drinking and depression and anxiety in adolescents (Tonmyr et al. 2011). However, some studies do not find such associations and, even when effects are found, the question remains whether they are pervasive and persist into later life (Wingo et al. 2010). A variety of studies in adults assessing experience of childhood sexual and/or physical abuse were conducted among special populations, e.g., among adoptees (Van der Vegt et al. 2009), drug users (Schafer et al. 2010), HIV-positive persons (Martinez et al. 2009), homeless persons (Stewart et al. 2004) and psychiatric patients (Friedman et al. 2011). These studies, however, may be biased by a greater recall of history of abuse among participants with adverse and severe outcomes; they also are likely to include the most severe cases of abuse and disease, and thus may not be representative of the general population.

Other prospective studies have investigated cases of child abuse identified in childhood as a result of mandated reporting (Widom et al. 2007; Panter-Brick et al. 2011), but these cases might differ in important ways from cases of abuse that do not come to the attention of authorities. Because they were among children who by definition received interventions as a result of the abuse, it is difficult to determine the independent impact of abuse. The World Mental Health Initiative reported an association between a broad range of childhood adversities and first onset of disorders (Shonkoff and Garner 2012). However, childhood itself is a contentious issue and the age limits differ between cultures. Most countries agree that legal majority is attained at the 18th birthday; however, the age of consent for sex is 16 years in most countries and legal responsibility has been lowered to the age of 10 years in some countries (Cunningham 1995). Therefore, we included studies on childhood sexual or physical abuse before age 16 years and depression or anxiety in adulthood.

We aim to determine whether abuse in childhood is associated with depression and anxiety in later life.

Methods

Search strategy and study selection

We conducted a systematic literature search for studies from January 2000 to March 2012 describing the association between child and adolescent physical or sexual abuse and depression or anxiety according to the "Meta-analysis of Observational Studies in Epidemiology Guidelines" (Stroup et al. 2000). PubMed/MEDLINE (National Library of Medicine), EMBASE (Elsevier) and PsycINFO (EBSCO) were searched using terms for sexual and physical abuse of children and terms for the outcomes. Controlled terms from MeSH (NLM), EMTREE (Elsevier) and Thesaurus of Psychological Index Terms (APA) were included. We limited the results to epidemiological studies using a modification of the broad PubMed Clinical Queries filter for etiology (Wilczynski and Haynes 2003). The results of these searches were combined with sets created with depression OR depressive AND anxiety OR distress. Bibliographies of located articles were reviewed for possible data sources, as were the bibliographies of articles thus located. No language limits were applied. Reference lists of relevant studies and reviews were scanned to identify additional records. To determine the studies to be assessed further, one author (JL) read the abstract and/or titles of every record retrieved for the selection criteria, and two authors (OvE, RG) read each part of the abstracts and/or

titles of every record retrieved. Differences in opinion were resolved by consensus or through consultation with the corresponding author, when necessary.

Studies were eligible for inclusion if they assessed exposure to physical or sexual abuse in childhood or adolescence before the age of 16 years, and depression or anxiety in subjects at least 16 years old. We applied the following inclusion criteria for studies: (a) presented original data from an epidemiologic cross-sectional or longitudinal study in peer-reviewed literature; (b) included at least 100 participants who were from the general community (i.e., not a selective sample); (c) used quantitative categorical assessment of child abuse before age 16 years; (d) assessed depression and anxiety with validated scales or clinical diagnoses after age 16 years; and (e) reported effect estimates with confidence intervals (CIs).

Data extraction

Rules for extracting and synthesizing data from selected studies were based on the recommendations outlined by Lipsey et al. (2000) and on the PRISMA checklist. For samples for which more than one article was published, we included only the most recent publication. We extracted the following data from the studies: study characteristics (study name, authors, publication year, journal, study site), study population (number of participants, age, gender), recruitment method, assessment mode (face-to face interviews, telephone interviews, mailed interviews), exposure (sexual or physical abuse, instrument to asses exposure), main outcomes measured (instruments to assess outcomes), covariates and results. If necessary, the standardized form was supplemented with information from an excluded paper on the same study population. Missing information was requested from authors.

Data synthesis

All included studies reported odds ratios (ORs) as effect estimates. Forest plots were created to visually assess the ORs and corresponding 95 % CIs of each study and across studies included in the analyses. We calculated combined ORs and 95 % CI using random effects models. In this approach, weights reflect the inverse variance of each study's effect estimate. For the one study that reported only results stratified by sex (Luo et al. 2008), we used fixed-effect methods with Mantel–Haenszel weighting to summarize the stratified estimates into a single parameter. Heterogeneity of effects was assessed using the Cochrane Q test and quantified using the I^2 test (Higgins and Thompson 2002). We also explored potential sources of heterogeneity by arranging groups of studies according to potentially relevant characteristics such as gender and age, geographic region (USA-based studies vs. elsewhere), exposure and outcome assessment method. Because age group- or gender-specific results were not reported in most studies, the influence of these factors was assessed by running a random effects meta-regression on the mean age or gender ratio for each pooled OR examined using the metaphor package in R (R Foundation for Statistical Computing, Vienna, Austria). The possibility of publication bias was evaluated by visually investigating funnel plot asymmetry using the "rank correlation Begg's method". Analyses were computed using STATA version 12 (STATA Corporation, College Station, Texas) and R. P values were two-sided with a significance level of 0.05.

Results

Literature search

The search yielded 3,099 unique citations. Of these, 3,013 did not meet the inclusion criteria based on their titles and abstracts. Of the remaining 86, upon more detailed review of the full papers, 65 additional papers did not meet inclusion criteria. Two of the remaining 21 papers were subsequently excluded because it did not present CIs (Libby et al. 2005; Hussey et al. 2006). This process resulted in 19 articles (with 20 samples) that met the inclusion criteria (Fig. 1).

Study characteristics

Characteristics of the 19 selected studies are shown in Table 1. The total number of participants included in the meta-analysis was 115,579. The study samples ranged from 971 to 21,755. Most of the studies were from North America (5 from the USA, 1 from Canada) (Afifi et al. 2009; Chartier et al. 2010; Cougle et al. 2010; Kendler et al. 2000; Thompson et al. 2004), four were from Asia (China, Philippines, Japan and Thailand) (Luo et al. 2008; Fujiwara and Kawakami 2011; Jirapramukpitak et al. 2011; Lee et al. 2011; Ramiro et al. 2010), four from Europe (Netherlands, Israel and UK) (Bebbington et al. 2011; Comijs et al. 2007; Gal et al. 2011; Janssen et al. 2004), two from Latin-America (Mexico, Paraguay) (Benjet 2010; Ishida et al. 2010) and one each from Africa (South Africa) (Slopen et al. 2010), Australia (Draper et al. 2008) and New Zealand (Moffitt et al. 2007). Most of the studies comprised both men and women, while two studies included only women (60–64). Fourteen studies assessed depression (Afifi et al. 2009; Chartier et al. 2010; Cougle et al. 2010; Fujiwara and Kawakami 2011; Lee et al. 2011; Bebbington et al. 2011; Comijs et al. 2007; Gal et al. 2011; Ishida et al. 2010; Slopen et al. 2010; Moffitt et al. 2007;

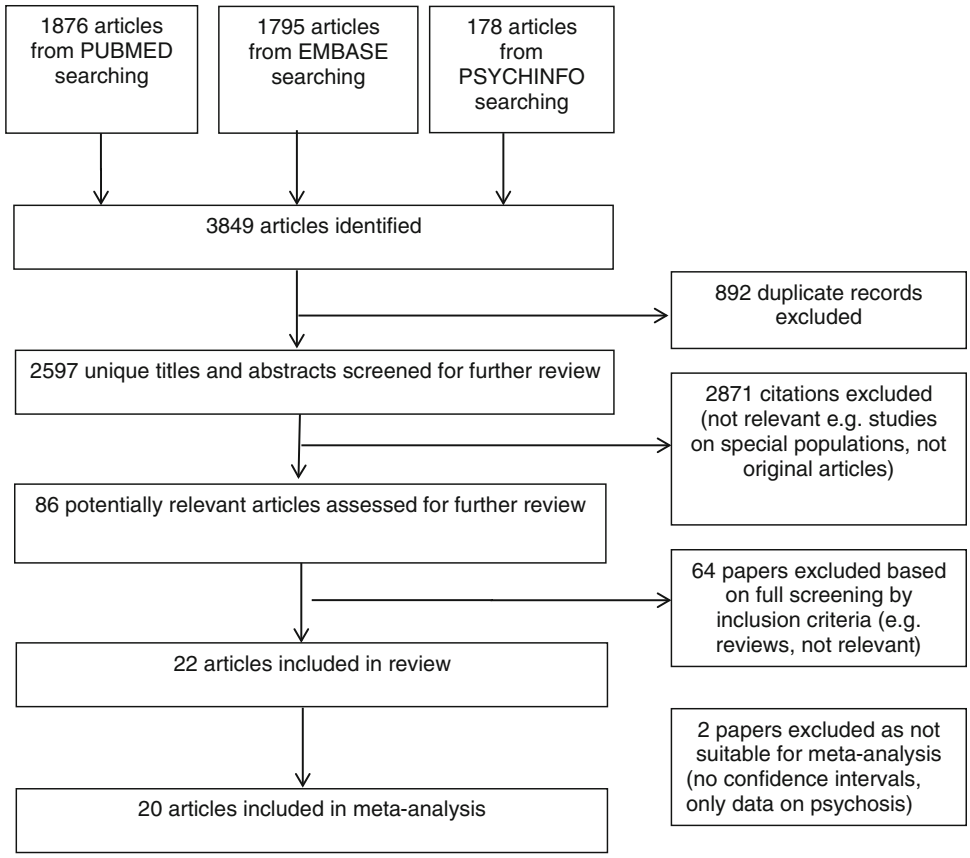

Fig. 1 Flow diagram showing the review process from 15 September 2011 to 6 March 2012

Anda et al. 2006; Benjet et al. 2010), 12 anxiety (Afifi et al. 2009; Chartier et al. 2010; Cougle et al. 2010; Fujiwara and Kawakami 2011; Lee et al. 2011; Bebbington et al. 2011; Gal et al. 2011; Slopen et al. 2010; Moffitt et al. 2007; Benjet et al. 2009), and 8 assessed distress, which means either depression or anxiety (Luo et al. 2008; Afifi et al. 2009; Chartier et al. 2010; Thompson et al. 2004; Jirapramukpitak et al. 2011; Bebbington et al. 2011; Benjet 2010; Ishida et al. 2010). Most studies used face-to-face interviews (Luo et al. 2008; Libby et al. 2005; Afifi et al. 2009; Cougle et al. 2010; Fujiwara and Kawakami 2011; Bebbington et al. 2011; Comijs et al. 2007; Gal et al. 2011; Janssen et al. 2004; Benjet et al. 2010; Ishida et al. 2010; Slopen et al. 2010; Moffitt et al. 2007), three used postal interviews (Draper et al. 2008; Kendler et al. 2004; Anda et al. 2006), one a phone interview (Thompson et al. 2004) and two mixed methods (Chartier et al. 2010; Thompson et al. 2004). Mostly interviewees were assessed by trained lay interviewers (Table 1).

Physical and sexual abuse were assessed by questionnaires in all studies using a variety of instruments (Table 1), the most common of which were instruments based on the "Conflict Tactics Scales" (CTS) (Strauss 1979), and the "Family Health Questionnaire" (Felitti et al. 1998). Depression was assessed by several different instruments: versions of the "WHO Composite International Diagnostic Interview" (CIDI) (e.g., CIDI 1.1; CIDI 3) (American Psychiatric Association 1994) or the WMH-CIDI (Kessler et al. 2004), "Schedules for Clinical Assessment in Neuropsychiatry" (SCAN) (Wing et al. 1990) "Center for Epidemiologic Studies Depression Scale" (CES-D) (Radloff 1977) "Clinical Interview Schedule-Revised" (CIS-R) (Lewis et al. 1992) "Depression and Anxiety Stress Scale" (DASS) (Lovibond and Lovibond 1995), "Patient Health Questionnaire" (PHQ) (Spitzer et al. 1999), "Hospital Anxiety and Depression Scale" (HADS) (Zigmond and Snaith 1983) and "Zung's Self Rating Depression Scale" (SDS) (Zung 1965). Anxiety was assessed with the CIDI, SCAN (Wing et al. 1990), PHQ (Spitzer et al. 1999), DASS (Lovibond and Lovibond 1995) and HADS (Zigmond and Snaith 1983). Some studies used a case definition that involved meeting criteria for depression or anxiety or for "common mental disorders". Because we could not separate depression and anxiety in these studies, we considered these papers separately and defined the outcome to be "distress".

Study quality

The study design for all but one of the studies included in the meta-analysis was cross-sectional. These studies included some form of random sampling of a general

Table 1 Characteristics of studies included in the meta-analysis

Source	Study name	Participants (*N*, sex, age group, mean age)	Design, sampling method (response rate)	Assessment method	Exposure types; instruments	Outcome; instruments	Covariates
Afifi et al. (2009) (USA)	National Comorbidity Survey	5,856; 2,921 women, 2,945 men; 15–54	Cross-sectional study, multi-stage area probability sampling (82.4 %)	Face-to-face interviews	Sexual abuse (SA), physical abuse (PA); modified version of the Conflict Tactics Scales (CTS) (Straus 1979)	Depression, anxiety, distress; Composite International Diagnostic Interview 1.1 (CIDI) (World Health Organization 1990)	Age, gender, socioeconomic status (SES), marital status, ethnicity, employment, parental psychopathology, witnessing domestic violence, parental divorce
Anda et al. (2006) (USA)	Adverse Childhood Experiences (ACE)	17,337; 9,369 women; 7,978 men; 21–75 (mean: women: 56, men: 58)	Cross-sectional study at two time points (65.0 %)	Postal interviews	SA, PA; ACE questionnaires (Centers for Disease Control and Prevention 2005) (CDC)	Depression, anxiety; Patient Health Questionnaire (PHQ) (Spitzer et al. 1999)	Age, gender, SES, marital status, employment, parental psychopathology, domestic violence
Bebbington et al. (2011) (England)	Adult Psychiatric Morbidity Survey in England III	7,353; 3,722 men, 3,631 women; <16	Cross-sectional, random household sampling (57.0 %)	Face-to-face interviews	SA (questions on exposure)	Depression, anxiety; Clinical Interview Schedule (CIS) (Lewis et al. 1992), Schedules for Clinical Assessment in Neuropsychiatry (SCAN) (Wing et al. 1990)	Age, gender, SES, marital status, employment, cannabis use
Benjet et al. (2010) (Mexico)	Mexican National Comorbidity Survey	2,362; 18–65	Cross-sectional study, stratified, multi-stage area probability sampling (76.6 %)	Face-to-face interviews	SA, PA (modified version of the CTS)	Depression, anxiety; World Mental Health Composite International Diagnostic Interview (WMH-CIDI) (Kessler et al. 2004)	Age, gender, SES, marital status, employment, parental loss, parental psychopathology, economic adversity
Chartier et al. (2010) (Canada)	Ontario Health Survey	8,116; 4,074 women, 4,042 men, 15–64	Cross-sectional study, multistage stratified probability sample (49.8 %)	Face-to-face interviews with self-administered part	SA, PA (modified version of the CTS)	Depression, anxiety, distress; CIDI	Age, gender, SES, marital status, employment, marital conflict, adult physical health, pain
Comijs et al. (2007) (Netherlands)	Study on Living Arrangements and Social Networks of Older Adults	1,887; 55–85	Cross-sectional study with two time points (81.7 %)	Face-to-face interviews	One open-ended question	Depression; Center for Epidemiologic Studies Depression Scale (Radloff 1977)	Age, gender, SES, marital status, employment, recent life events, MMS

Table 1 continued

Source	Study name	Participants (*N*, sex, age group, mean age)	Design, sampling method (response rate)	Assessment method	Exposure types; instruments	Outcome; instruments	Covariates
Cougle et al. (2010) (USA)	National Comorbidity Survey Replication	4,141; 2,319 women, 1,812 men; 15–54	Cross-sectional study; stratified multistage probability sampling (85.9 %)	Face-to-face interviews	SA, PA (modified version of the CTS)	Depression, anxiety (WMH-CIDI)	Age, gender, SES, marital status, birthplace, education, employment, parental psychopathology, parental divorce or loss
Draper et al. (2008) (Australia)	Depression and Early Prevention of Suicide in General Practice Study	21,755; 12,812 women, 10,439 men; <60	Multi-center randomized controlled trial with nested cross-sectional study (97.8 % for both types of abuse)	Postal questionnaire	SA, PA (2 questions)	Distress (PHQ, Hospital Anxiety and Depression Scale, Zigmond and Snaith 1983)	Age, gender, SES, marital status, employment, living arrangements, religion, smoking, alcohol consumption, physical activity, age at the time of death of mother/father
Fujiwara and Kawakami (2011) (Japan)	World Mental Health Survey, Japan	1,722; 851 women, 871 men, <20	Probability sampling (58.4 %)	Face-to-face interviews	SA, PA; modified version of the CTS	Depression, anxiety; WMH-CIDI	Age, gender, SES, marital status, employment, household in-come, parental psychopathology, parental divorce
Gal et al. (2011) (Israel)	World Mental Health Survey, Israel	4,859; 2,023 women, 1,955 men, <21	Cross-sectional study, probability sampling (73.0 %)	Face-to-face interviews	SA, PA; modified version of the CTS	Depression, anxiety; WMH-CIDI	Age, gender, SES, religiosity, adverse events the previous 24 months
Ishida et al. (2010) (Paraguay)	Paraguayan National Survey of Demography and Sexual and Reproductive Health (ENDSSR)	6,540 women, 15–44 years	Cross-sectional study, multi-stage household cluster sampling (95.1 %)	Face-to-face interviews	SA, PA; modified version of the CTS	Depression, distress; Self Report Questionnaire-20 (WHO 1994)	Age, gender, SES, marital status, employment, health, substance use, BMI
Jirapramukpitak et al. (2011) (Thailand)	–	1 052; 16–25	Cross-sectional, Kish Grid method (97.4 %)	Face-to-face interviews	PA; modified version of the CTS	Distress; revised clinical interview (Lewis et al. 1992)	Age, gender, SES, marital status, employment, head of house-holds, household assets, domestic violence, illicit drug use, alcohol use
Kendler et al. (2000) (USA)	Virginia Twin Registry	1,411; 17–55 (58.6 ± 9.3 years)	Twin-study, purposive sampling (72.7 %)	Mailed questionnaire	SA	Depression, anxiety (structured clinical interview for DSM-III-R) (Spitzer and Williams 1985)	Age, gender, SES, marital status, employment, parental psychopathology
Lee et al. (2011) (China)	World Mental Health Survey, China	5,201; 2,731, women, 2,465 men; 18–70	Cross-sectional, multistage household probability sampling (76.4 %)	Face-to-face interviews	SA, PA	Depression, anxiety (WMH-CIDI 3.0)	Age, gender, SES, marital status, employment parents mental disorders, parental death, parental physical illness

Table 1 continued

Source	Study name	Participants (*N*, sex, age group, mean age)	Design, sampling method (response rate)	Assessment method	Exposure types; instruments	Outcome; instruments	Covariates
Luo et al. (2008) (China)	Chinese Health and Family Life Survey (CHFLS)	3,821,1,519 women, 1,475 men; 20–64 (76.0)	Cross-sectional study, stratified, multi-stage sampling (76.0 %)	Face-to-face interviews	SA (4 questions)	Distress; Zung's Self-rating Depression Scale (Zung 1965)	Age, gender, SES, marital status, employment, adult sexual behavior
Moffitt et al. (2007) (New Zealand)	Dunedin Multidisciplinary Health and Development Study	971; 32	Birth cohort study since 1972 (96.0 %)	Face-to-face interviews	SA, PA (semi-structured questions)	Depression, anxiety (custom-written questions based on DSM-III-symptom criteria)	Age, gender, SES, marital status, employment
Ramiro et al. (2010) (Philippines)	Adverse childhood experiences (ACE) and health risk behaviors among adults in a developing country setting	1,068, 533 women, 535 men (46.7 ± 9.2)	Cross-sectional, random household sample (100.0 %)	Self-administration	SA, PA; ACE (CDC 2005)	Distress; ACE (CDC 2005)	Age, gender, SES, marital status, employment, childhood adversities
Slopen et al. (2010) (South Africa)	South African Stress and Health Study (SASH)	4,351	Cross-sectional study, probability sampling (85.5 %)	Face-to-face interviews;	SA, PA	Depression, anxiety (WMH-CIDI 3.0)	Age, gender, SES, marital status, employment, family economic adversity, physical illness, parental substance abuse
Thompson et al. (2004) (USA)	National Violence against Women Survey	15,776, 7,856 women, 7,920 men	Cross-sectional study, probability sampling (69.0 %)	Random digit-dialing, phone interview	SA, PA; questions based on the CTS	Distress; questions	Age, gender, SES, marital status, employment, drug abuse, use of medication

PA physical abuse, *SA* sexual abuse, *SES* socioeconomic status

population, in which prior child abuse was assessed retrospectively and psychological outcomes were assessed at the time of recruitment. Some of these studies had a component that prospectively followed participants over time, but the analyses from those studies that are included in this meta-analysis relate to reported past abuse and psychological outcomes reported at the baseline questionnaire. Response rates varied from 58 to 100 % (Table 1). The one study that had a different design was a birth cohort in New Zealand followed since 1972 (Moffitt et al. 2007). In this study, it was not the child that was recruited. The children self-reported child abuse at age 32 years, but in this design there is concern that selection bias in the original study could have occurred because study recruitment was of people who would have been perpetrating the abuse rather than of people who suffered it. Questions used to assess abuse varied, although the majority of the studies ($n = 11$) used questions derived from the CTS scale.

Different instruments were used to assess the outcomes, but all studies used well-established instruments (Table 1). All studies adjusted for age, gender, socioeconomic status, marital status and employment, and many studies adjusted for additional variables as well (Table 1). A few studies adjusted for later life factors such as adult sexual behavior, substance abuse or recent life events (Table 1). If these intervening variables are in fact on the causal path between child abuse and adult psychopathological symptoms, then adjusting for them could have reduced the effect estimate attributed to child abuse.

Depression

Among studies that examined child sexual abuse and depression in later life, all but one reported an increased OR of depression among subjects reporting abuse (Fig. 2a). These studies yielded estimates between OR = 0.50 (95 % CI: 0.10–4.20) and OR = 5.07 (95 % CI: 2.70–7.60) with an overall OR = 2.04 (95 % CI: 1.65–2.53). Substantial heterogeneity was apparent ($I^2 = 81$ %, $p < 0.0001$). Subgroup analyses to explore heterogeneity split by outcome assessment instrument yielded similar estimates for sexual abuse and depression assessed with the CIDI (8 studies; OR = 2.15; 95 % CI: 1.85–2.51) and depression assessed with another instrument (6 studies; OR = 1.90; 95 % CI: 1.38–2.62). There was only modest heterogeneity among the studies that used the CIDI ($I^2 = 45.8$ %, $p = 0.74$), although there was more among studies that used other instruments ($I^2 = 86.8$ %, $p < 0.0001$).

All studies of childhood physical abuse and depression found increased OR of depression among those reporting physical abuse (Fig. 2b). Estimates ranged from 1.20 (95 % CI: 0.80–1.80) to 1.93 (95 % CI: 1.35–2.76) with a pooled OR of 1.49 (95 % CI: 1.29–1.72). Only modest heterogeneity was observed ($I^2 = 36$ %, $p = 0.16$).

Anxiety

The studies on child sexual abuse and anxiety had estimates between OR = 1.40 (95 % CI: 0.50–4.20) and OR = 4.49 (95 % CI: 1.50–13.50) resulting in a combined OR of 2.52 (95 % CI: 2.12–2.98; Fig. 3a). There was heterogeneity observed among these studies ($I^2 = 58.7$ %, $p = 0.004$). There was a slightly weaker relation among studies that used the CIDI (OR = 2.15; 95 % CI: 1.85–2.51; $I^2 = 83.0$ %, $p < 0.0001$) compared with those that did not (OR = 3.04; 95 % CI: 2.32–3.99; $I^2 = 73.3$ %, $p = 0.005$).

The studies on physical child abuse and anxiety had estimates between OR = 1.00 (95 % CI: 0.60–1.60) and OR = 4.34 (95 % CI: 3.72–5.07) and a combined OR of 1.70 (95 % CI: 1.33–2.18; Fig. 3b). There was substantial heterogeneity among these studies ($I^2 = 95$ %, $p < 0.001$). The results were slightly weaker among studies that used the CIDI (OR = 2.17; 95 % CI: 1.87–2.52) compared with those that did not (OR = 3.04; 95 % CI: 2.32–3.99). In both subgroups there was virtually no heterogeneity ($I^2 = 73.3$ %, $p = 0.005$).

Distress

A variety of instruments were used to define distress (meeting criteria for either depression or anxiety). Studies that evaluated child sexual abuse and distress had estimates between OR = 2.00 (95 % CI: 1.40–3.60) and OR = 3.72 (95 % CI: 2.50–5.60) with a combined OR of 3.01 (95 % CI: 2.41–3.76; data not shown). There was modest heterogeneity among these studies ($I^2 = 45$ %, $p = 0.119$). The results were essentially unchanged when the New Zealand birth cohort study was excluded.

Lastly, we evaluated physical child abuse and distress. These studies had estimates between OR = 1.19 (95 % CI: 1.03–1.37) and OR = 4.34 (95 % CI: 1.38–3.40) with a combined OR of 2.16 (95 % CI: 1.38–3.40; data not shown). Substantial heterogeneity was observed ($I^2 = 96.6$ %, $p < 0.0001$).

Age, gender and abuse and outcome

We found no evidence of a linear relation between mean age of the study samples and the OR for either type of abuse and depression or anxiety. p values for the influence of age were far from statistical significance (all $p \geq 0.53$). Similarly, we found no linear relationship with the gender ratio for any of the exposure–outcome associations (all $p \geq 0.60$). "The lack of a moderating effect of mean age in

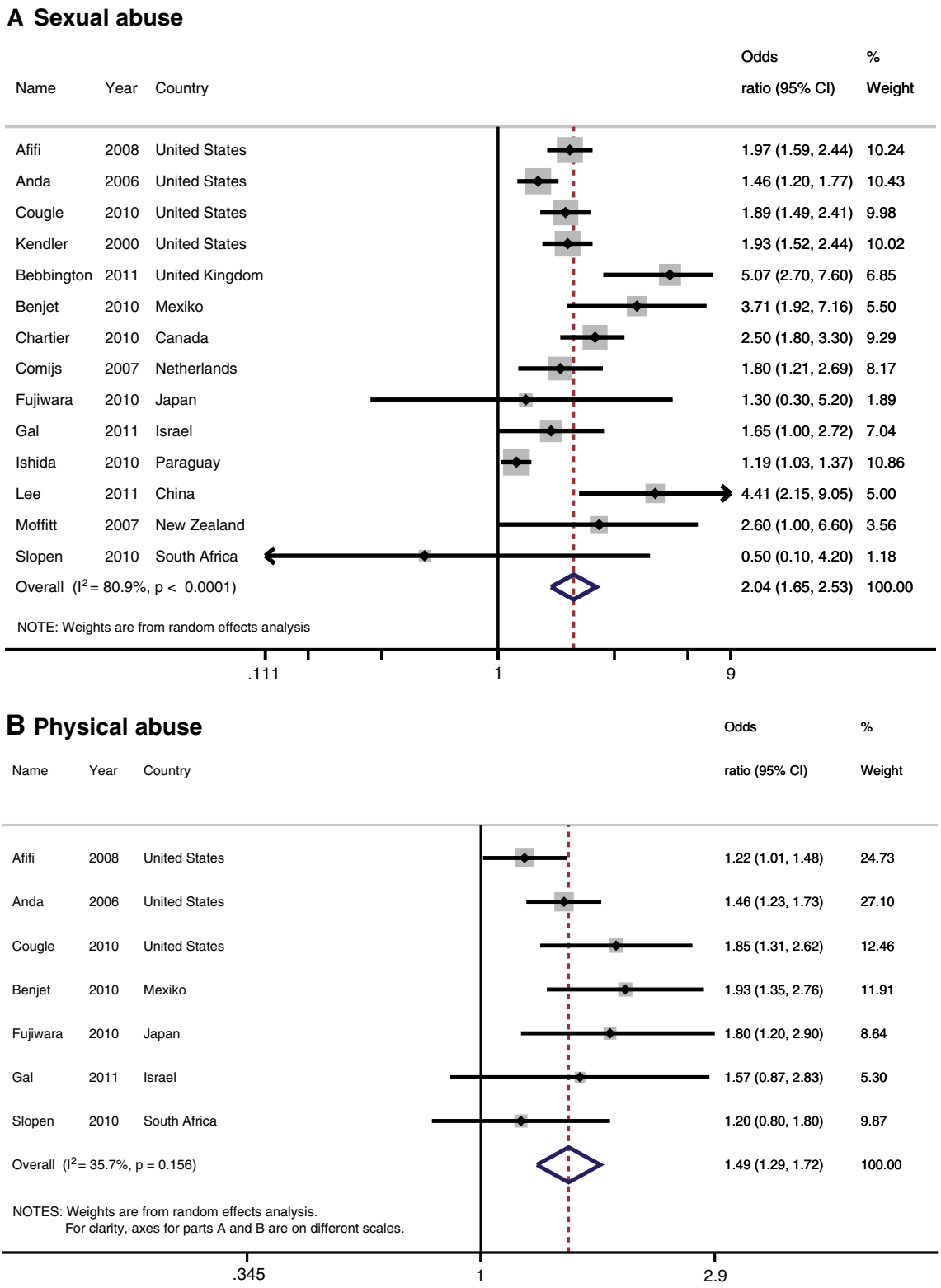

Fig. 2 Forest plot of individual study and pooled odds ratios (OR) and 95 % confidence intervals (CI) for depression by history of child sexual abuse (*panel A*) and child physical abuse (*panel B*). The side of the *shaded box* around the individual study ORs represents the weight for that study for the pooled analysis

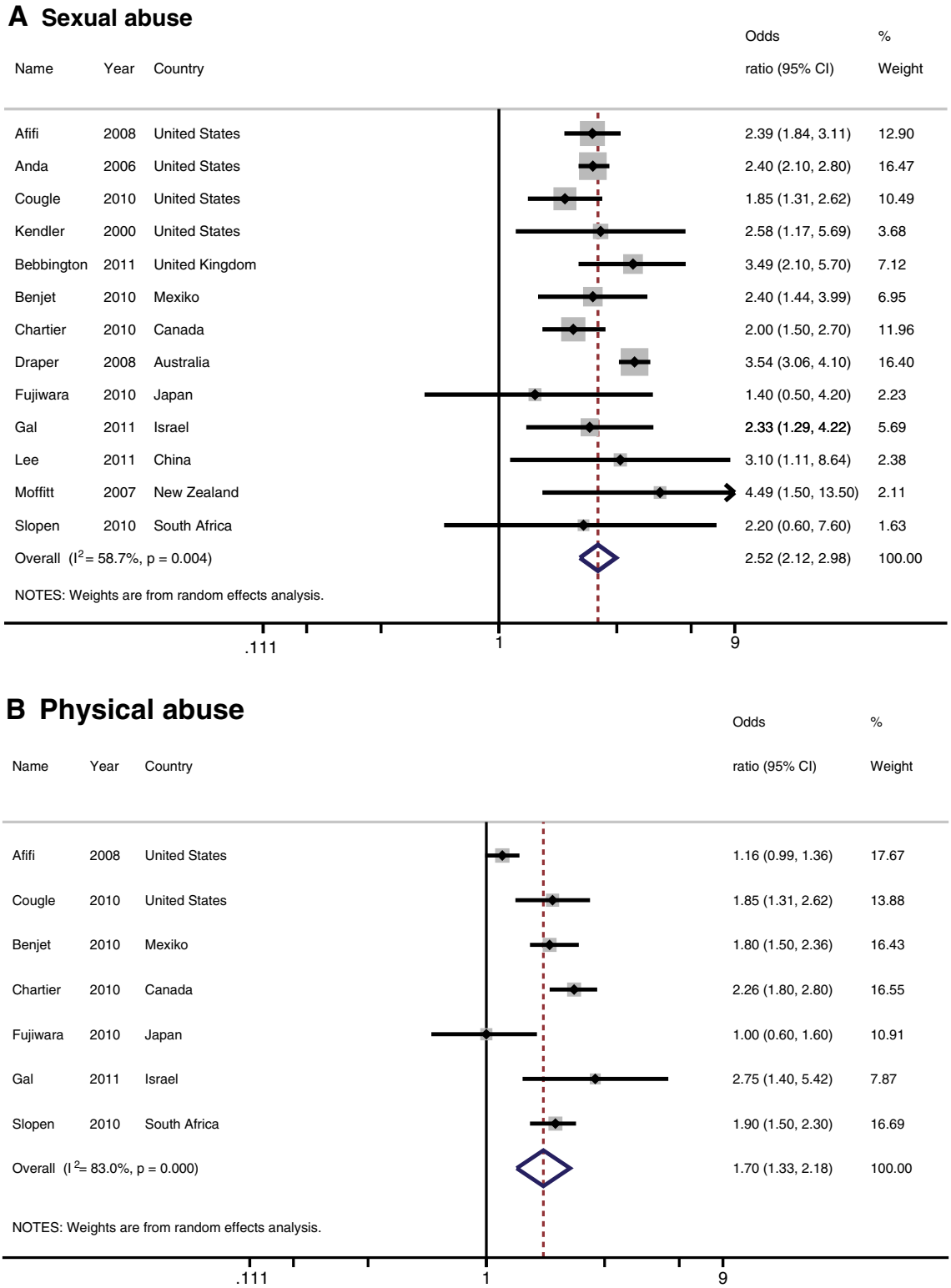

Fig. 3 Forest plot of individual study and pooled odds ratios (OR) and 95 % confidence intervals (CI) for anxiety by history of child sexual abuse (*panel A*) and child physical abuse (*panel B*). The side of the *shaded box* around the individual study ORs represents the weight for that study for the pooled analysis

a meta-regression may be due to differences in sample distribution and design between studies".

Discussion

The results of this meta-analysis support the hypothesis that abuse occurring in childhood may become apparent at any time during the life course. Pooled estimates suggest at least a doubled OR for depression or anxiety related to sexual abuse and a smaller, but significant OR related to physical abuse. There was also no indication of publication bias, and the results did not differ by gender or age. All studies were of at least reasonably good quality. Some of the studies included in our review adjusted for recent life events or adult behavioral issues, which could have changed the association between abuse in childhood and later depression and anxiety if these factors were intermediates on the causal pathway—i.e., a result of child abuse and a cause of adult psychopathological symptoms. Despite the assumption that toxic stress in childhood is related to physiological changes and psychiatric outcomes in childhood and in adults, to our knowledge this is the first paper to systematically review and conduct a meta-analysis of population-based studies of subjects after childhood.

Several studies have found that exposure to child abuse leads to psychopathological symptoms in the short term, i.e., outcomes in childhood itself. An important question, however, is whether such effects persist into later life. A meta-analysis of studies of child abuse and psychiatric disorders among young adult college students suggested that depression and anxiety were not increased among those having experienced abuse (Rind et al. 1998). However, the meta-analysis exclusively focused on the selected sample of college students. We included in our review all non-clinical populations. Several narrative reviews have summarized studies of child abuse and later adult life psychiatric disorders and have suggested increased risk of anxiety and depression among those exposed to child abuse (Mulvihill 2005). However, these reviews focused on studies that have followed children identified specifically because they had come to the attention of authorities as a result of abuse and were therefore involved in intervention processes. Thus, such children may not be representative of the general population and, more importantly, it is impossible to assess the contribution to later life the psychopathological outcomes of the child abuse itself without the likely moderating influence of interventions. The findings of our meta-analyses suggest that the psychopathological effects of early life abuse are observable across all age groups.

Increasing evidence from neurobiology, epigenetics and neuropsychiatric epidemiology together suggest that sexual and physical abuse might be non-specific risk factors associated with a broad range of lasting effects on neurophysiology and other somatic medical disorders of the abused (Kelly-Irving et al. 2013). Animal and human studies have found abuse to be associated with accelerated cell aging and epigenetic changes (Szyf 2012), changes in the hypothalamic–pituitary–adrenal (HPA) axis, changes in neurotransmitter systems—notably the corticotrophin-releasing hormone (CRH) circuits—and changes in brain morphology, especially in structural and functional changes in the hippocampus (Bremner 2006). Many of these systems, in particular monoaminergic and CRH signaling systems and the HPA axis, are critical in depression and anxiety (Knapman et al. 2012) and effects of child abuse on these systems could account, at least in part, for psychiatric phenotypes over the life course.

Limitations of the individual studies and thus the meta-analysis should be considered. Abuse experience was reported retrospectively in all of the studies included in the meta-analysis. However, given the drawbacks mentioned above to prospectively studying later effects of child abuse, it may be that studies using retrospective reporting of abuse have advantages (Benjet et al. 2010). A potential further limitation of our meta-analysis is that we restricted this to original research studies reporting adjusted ORs. Another limitation for the meta-analysis was that the abuse was assessed with a variety of different methods, although for the majority of the studies this was based on the CTS. Furthermore, there was no detailed data on the important aspects of abuse, such as frequency, duration and severity. This may have contributed to some of the heterogeneity observed between studies.

The instruments for the outcomes have been widely used in research and validated in different contexts. Nonetheless, the variety of outcome definitions in the studies is a limitation of the meta-analysis. However, varying case definitions might introduce variability that would bias the overall results to null; thus our overall estimates likely underestimate the strength of associations. This could have also contributed to some of the heterogeneity of the results, although the fact that the results were reasonably consistent despite these assessment differences supports the overall robustness of the findings. It should also be noted that because only those who had the outcomes assessed were included in the studies, it is possible that the study samples did not include people with particularly severe depression or anxiety symptoms. However, if there is an association between childhood abuse and later life depression and anxiety as our meta-analysis suggests, then this limitation would be expected to have led to our pooled estimates being an underestimation. Moreover, reviewed studies reported prevalence proportions and not incidences, thus information on age at first onset of outcomes is lacking, as

well as information on the persistence or recurrence during different time points over the life course.

An additional limitation in the studies assessed in this meta-analysis is that only one study reported gender-specific outcomes (Luo et al. 2008). It is suggested that there are notable gender differences in biological systems underlying the stress response, and hormonal regulation contributes to sexual dimorphism in stress responses (McEwen 2003). Although our attempt to consider differences by gender did not suggest such differences, this could only be based on considering the gender ratio of each study sample. Further exploration of this issue in a way that gender-specific effects can be estimated is warranted.

"The meta-analysis suggests that adults exposed to child abuse may have health needs different from those who did not have an early life abuse experience. Public health experts and clinicians need to raise awareness for higher professional standards of agencies and practitioners, develop, pilot, test, implement and evaluate a short screening instrument to screen for child violence exposure (Maier et al. 2013). Joint public health efforts are needed to address the increasing rates of 9 % CSA for women and 3 % for men (Barth et al. 2012). Additionally, there is a need to regularly update systematic reviews on the impact of CSA and CPA on mental health, expanding the meta-analysis from psychopathological outcomes to somatic diseases such as cancer (Kelly-Irving et al. 2013). Our meta-analysis suggests that abuse in childhood is in fact toxic and may be a nonspecific risk factor for depression, anxiety and distress over the life course, independent of age and gender. Clinicians need to be aware of the importance of early childhood experiences to better meet the need of patients.

References

Afifi TO, Boman J, Fleisher W, Sareen J (2009) The relationship between child abuse, parental divorce, and lifetime mental disorders and suicidality in a nationally representative adult sample. Child Abuse Negl 33(3):139–147

American Psychiatric Association (APA), Composite International Diagnostic Interview 1.1. (CIDI) (1994) Researchers manual. APA, Washington

Anda RF, Felitti VJ, Bremner JD, Walker JD, Whitfield C, Perry BD et al (2006) The enduring effects of abuse and related adverse experiences in childhood. A convergence of evidence from neurobiology and epidemiology. Eur Arch Psychiatr Clin Neurosci 256(3):174–186

Barth J, Bermetz L, Heim E, Trelle S, Tonia T (2012) The current prevalence of child sexual abuse worldwide: a systematic review and meta-analysis. Int J Public Health 58(3):460–483

Bebbington P, Jonas S, Kuipers E, King M, Cooper C, Brugha T et al (2011) Childhood sexual abuse and psychosis: data from a cross-sectional national psychiatric survey in England. Br J Psychiatr 199:29–37

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

Benjet C, Borges G, Medina-Mora ME, Zambrano J, Cru C, Mendez E (2009) Descriptive epidemiology of chronic childhood adversity in Mexican adolescents. J Adolesc Health 45(5):483–489

Benjet C, Thompson RJ, Gotlib IH (2010) 5-HTTLPR moderates the effect of relational peer victimization on depressive symptoms in adolescent girls. J Child Psychol Psychiatr 51(2):173–179

Bremner JD (2006) Traumatic stress: effects on the brain. Dialogues Clin Neurosci 8(4):445–461

Centers for Disease Control and Prevention (2005) Centers for disease control and prevention, Department of Health and Human Services. Adverse childhood experiences study. http://www.cdc/nccdph/ACE/questionnaire.htm2008

Chartier MJ, Walker JR, Naimark B (2010) Separate and cumulative effects of adverse childhood experiences in predicting adult health and health care utilization. Child Abuse Negl 34(6):454–464

Comijs HC, Beekman AT, Smit F, Bremmer M, van Tilburg T, Deeg DJ (2007) Childhood adversity, recent life events and depression in late life. J Affect Disord 103(1–3):243–246

Cougle JR, Timpano KR, Sachs-Ericsson N, Keough ME, Riccardi CJ (2010) Examining the unique relationships between anxiety disorders and childhood physical and sexual abuse in the National Comorbidity Survey-Replication. Psychiatry Res 177(1–2):150–155

Cunningham H (1995) Children and childhood in Western society since 1500. Longman, London

Draper B, Pfaff JJ, Pirkis J, Snowdon J, Lautenschlager NT, Wilson I et al (2008) Long-term effects of childhood abuse on the quality of life and health of older people: results from the depression and early prevention of suicide in general practice project. J Am Geriatr Soc 56(2):262–271

Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V et al (1998) Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) study. Am J Prev Med 14(4):245–258

Friedman SH, Loue S, Goldman Heaphy EL, Mendez N (2011) Intimate partner violence victimization and perpetration by Puerto Rican women with severe mental illnesses. Community Ment Health J 47(2):156–163

Fujiwara T, Kawakami N (2011) Association of childhood adversities with the first onset of mental disorders in Japan: results from the World Mental Health Japan, 2002–2004. J Psychiatr Res 45(4):481–487

Gal G, Levav I, Gross R (2011) Psychopathology among adults abused during childhood or adolescence: results from the Israel-based World Mental Health survey. J Nerv Ment Dis 199(4):222–229

Garner AS, Shonkoff JP (2012) Early childhood adversity, toxic stress, and the role of the pediatrician: translating developmental science into lifelong health. Pediatrics 129(1):224–231

Gilbert R, Fluke J, O'Donnell M, Gonzalez-Izquierdo A, Brownell M, Gulliver P et al (2012) Child maltreatment: variation in trends and policies in six developed countries. Lancet 379(9817):758–772

Higgins JPT, Thompson SG (2002) Quantifying heterogeneity in a meta-analysis. Stat Med 21(11):1539–1558

Hussey JM, Chang JJ, Kotch JB (2006) Child maltreatment in the United States: prevalence, risk factors, and adolescent health consequences. Pediatrics 118(3):933–942

Ishida K, Stupp P, Melian M, Serbanescu F, Goodwin M (2010) Exploring the associations between intimate partner violence and women's mental health: evidence from a population-based study in Paraguay. Soc Sci Med 71(9):1653–1661

Janssen I, Krabbendam L, Bak M, Hanssen M, Vollebergh W, de Graaf R et al (2004) Childhood abuse as a risk factor for psychotic experiences. Acta Psychiatr Scand 109(1):38–45

Jirapramukpitak T, Harpham T, Prince M (2011) Family violence and its 'adversity package': a community survey of family violence and adverse mental outcomes among young people. Soc Psychiatry Psychiatr Epidemiol 46(9):825–831

Kelly-Irving M, Mabile L, Grosclaude P, Lang T, Delpierre C (2013) The embodiment of adverse childhood experiences and cancer development: potential biological mechanisms and pathways across the life course. Int J Public Health 58:3–11

Kempe CH, Silverman FN, Steele BF, Droegemueller W, Silver HK (1962) The battered-child syndrome. JAMA 181:17–24

Kendler KS, Bulik CM, Silberg J, Hettema JM, Myers J, Prescott CA (2000) Childhood sexual abuse and adult psychiatric and substance use disorders in women: an epidemiological and cotwin control analysis. Arch Gen Psychiatry 57(10):953–959

Kendler KS, Kuhn JW, Prescott CA (2004) Childhood sexual abuse, stressful life events and risk for major depression in women. Psychol Med 34(8):1475–1482

Kessler RC, Abelson J, Demler O, Escobar JI, Gibbon M, Guyer ME et al (2004) Clinical calibration of DSM-IV diagnoses in the World Mental Health (WMH) version of the World Health Organization (WHO) Composite International Diagnostic Interview (WMHCIDI). Int J Methods Psychiatry Res 13(2):122–139

Kessler RC, Aguilar-Gaxiola S, Alonso J, Chatterji S, Lee S, Ormel J et al (2009) The global burden of mental disorders: an update from the WHO World Mental Health (WMH) surveys. Epidemiologia Psichiatria Sociale 18(1):23–33

Kessler RC, McLaughlin KA, Green JG, Gruber MJ, Sampson NA, Zaslavsky AM et al (2010) Childhood adversities and adult psychopathology in the WHO World Mental Health surveys. Br J Psychiatry 197(5):378–385

Knapman A, Kaltwasser SF, Martins-de-Souza D, Holsboer F, Landgraf R, Turck CW et al (2012) Increased stress reactivity is associated with reduced hippocampal activity and neuronal integrity along with changes in energy metabolism. Eur J Neurosci 35(3):412–422

Lee S, Guo WJ, Tsang A, He YL, Huang YQ, Zhang MY et al (2011) The prevalence of family childhood adversities and their association with first onset of DSM-IV disorders in metropolitan China. Psychol Med 41(1):85–96

Lewis G, Pelosi AJ, Araya R, Dunn G (1992) Measuring psychiatric disorder in the community: a standardized assessment for use by lay interviewers. Psychol Med 22(2):465–486

Libby AM, Orton HD, Novins DK, Beals J, Manson SM (2005) Childhood physical and sexual abuse and subsequent depressive and anxiety disorders for two American Indian tribes. Psychol Med 35(3):329–340

Lipsey M, Lipsey M, Wilson DB (2000) Practical meta-analysis. Sage, Thousand Oaks

Lovibond SH, Lovibond PF (1995) Manual for the Depression Anxiety Stress Scales. University of New South Wales, New South Wales

Luo Y, Parish WL, Laumann EO (2008) A population-based study of childhood sexual contact in China: prevalence and long-term consequences. Child Abuse Negl 32(7):721–731

Maier T, Mohler-Kuo M, Landolt MA, Schnyder U, Jud A (2013) The tip of the iceberg. Incidence of disclosed cases of child sexual abuse in Switzerland: results from a nationwide agency agency survey. Int J Public Health doi:10.1007/s00038-013-0498-6

Martinez J, Hosek SG, Carleton RA (2009) Screening and assessing violence and mental health disorders in a cohort of inner city HIV-positive youth between 1998–2006. AIDS Patient Care STDs 23(6):469–475

McEwen BS (2003) Early life influences on life-long patterns of behavior and health. Ment Retard Develop Disabil Res Rev 9(3):149–154

McEwen BS, Eiland L, Hunter RG, Miller MM (2012) Stress and anxiety: structural plasticity and epigenetic regulation as a consequence of stress. Neuropharmacology 62(1):3–12

Moffitt TE, Caspi A, Harrington H, Milne BJ, Melchior M, Goldberg D et al (2007) Generalized anxiety disorder and depression: childhood risk factors in a birth cohort followed to age 32. Psychol Med 37(3):441–452

Mulvihill D (2005) The health impact of childhood trauma: an interdisciplinary review, 1997–2003. Issues Compr Pediatr Nurs 28(2):115–136

Nalavany BA, Ryan SD, Hinterlong J (2009) Externalizing behavior among adopted boys with preadoptive histories of child sexual abuse. J Child Sexual Abuse 18(5):553–573

Panter-Brick C, Goodman A, Tol W, Eggerman M (2011) Mental health and childhood adversities: a longitudinal study in Kabul, Afghanistan. J Am Acad Child Psychiatry 50(4):349–363

Radloff LS (1977) The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas 1:385–401

Ramiro LS, Madrid BJ, Brown DW (2010) Adverse childhood experiences (ACE) and health-risk behaviors among adults in a developing country setting. Child Abuse Negl 34(11):842–855

Rind B, Tromovitch P, Bauserman R (1998) A meta-analytic examination of assumed properties of child sexual abuse using college samples. Psychol Bull 124(1):22–53

Schafer I, Langeland W, Hissbach J, Luedecke C, Ohlmeier MD, Chodzinski C et al (2010) Childhood trauma and dissociation in patients with alcohol dependence, drug dependence, or both—a multi-center study. Drug Alcohol Depend 109(1–3):84–89

Shonkoff JP, Garner AS (2012) The lifelong effects of early childhood adversity and toxic stress. Pediatrics 129(1):232–246

Slopen N, Williams DR, Seedat S, Moomal H, Herman A, Stein DJ (2010) Adversities in childhood and adult psychopathology in the South Africa stress and health study: associations with first-onset DSM-IV disorders. Soc Sci Med 71(10):1847–1854

Spitzer RL, Williams JBW (1985) Structured clinical interview for DSM-III-R (SCID). NY Biometrics Research Dept. New York State Psychiatric Institute, New York

Spitzer RL, Kroenke K, Williams JB (1999) Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary care evaluation of mental disorders. Patient health questionnaire. JAMA 282(18):1737–1744

Stewart AJ, Steiman M, Cauce AM, Cochran BN, Whitbeck LB, Hoyt DR (2004) Victimization and posttraumatic stress disorder among homeless adolescents. J Am Acad Child Adolesc Psychiatry 43(3):325–331

Stoltenborgh M, van Ijzendoorn MH, Euser EM, Bakermans-Kranenburg MJ (2011) A global perspective on child sexual abuse: meta-analysis of prevalence around the world. Child Maltreat 16(2):79–101

Straus MA (1979) Measuring intra family conflict and violence: the Conflict Tactics Scale. J Marriage Fam 41:75–88

Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D et al (2000) Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis of Observational Studies in Epidemiology (MOOSE) group. JAMA 283(15):2008–2012

Szyf M (2012) The early-life social environment and DNA methylation. Clin Genet 81(4):341–349

Thompson MP, Kingree JB, Desai S (2004) Gender differences in long-term health consequences of physical abuse of children: data from a nationally representative survey. Am J Public Health 94(4):599–604

Tonmyr L, Williams G, Hovdestad WE, Draca J (2011) Anxiety and/or depression in 10-15-year-olds investigated by child welfare in Canada. J Adolesc Health 48(5):493–498

Van der Vegt EJ, Tieman W, van der Ende J, Ferdinand RF, Verhulst FC, Tiemeier H (2009) Impact of early childhood adversities on adult psychiatric disorders: a study of international adoptees. Soc Psychiatry Psychiatr Epidemiol 44(9):724–731

Widom CS, DuMont K, Czaja SJ (2007) A prospective investigation of major depressive disorder and comorbidity in abused and neglected children grown up. Arch Gen Psychiatry 64(1):49–56

Wilczynski NL, Haynes RB (2003) Developing optimal search strategies for detecting clinically sound causation studies in MEDLINE. In: AMIA annual symposium proceedings, pp 719–723

Wing JK, Babor T, Brugha T, Burke J, Cooper JE, Giel R et al (1990) SCAN. Schedules for clinical assessment in neuropsychiatry. Arch Gen Psychiatry 47(6):589–593

Wingo AP, Wrenn G, Pelletier T, Gutman AR, Bradley B, Ressler KJ (2010) Moderating effects of resilience on depression in individuals with a history of childhood abuse or trauma exposure. J Affect Disord 126(3):411–414

World Health Organization (1990) Composite International Diagnostic Interview (CIDI). http://www3.who.int/cidi. Accessed 13 Jan 2011

World Health Organisation (1994) A user guide to the self reproting questionnaire (SRQ). World Health Organization Press, Geneva

World Health Organization (2001) The world health report 2001—mental health: new understanding, new hope. World Health Organization Press, Geneva

Zigmond AS, Snaith RP (1983) The Hospital Anxiety and Depression Scale. Acta Psychiatr Scand 67(6):361–370

Zung WW (1965) A self-rating depression scale. Arch Gen Psychiatry 12:63–70