



Focused psychosocial interventions for children in low-resource humanitarian settings: a systematic review and individual participant data meta-analysis

Marianna Purgato, Alden L Gross, Theresa Betancourt, Paul Bolton, Chiara Bonetto, Chiara Gastaldon, James Gordon, Paul O'Callaghan, Davide Papola, Kirsi Peltonen, Raija-Leena Punamaki, Justin Richards, Julie K Staples, Johanna Unterhitzenberger, Mark van Ommeren, Joop de Jong, Mark J D Jordans, Wietse A Tol*, Corrado Barbui*

Summary

Background Results from studies evaluating the effectiveness of focused psychosocial support interventions in children exposed to traumatic events in humanitarian settings in low-income and middle-income countries have been inconsistent, showing varying results by setting and subgroup (eg, age or gender). We aimed to assess the effectiveness of these interventions, and to explore which children are likely to benefit most.

Methods We did a systematic review and meta-analysis of individual participant data (IPD) from 3143 children recruited to 11 randomised controlled trials of focused psychosocial support interventions versus waiting list. We searched the Cochrane Central Register of Controlled Trials, MEDLINE, PubMed, PsycArticles, Web of Science, and the main local low-income and middle-income countries (LMICs) databases according to the list of databases relevant to LMIC developed collaboratively by Cochrane and WHO Library, up to November, 2016. We included randomised controlled trials that assessed the effectiveness of focused psychosocial support interventions in children exposed to traumatic events in LMICs, compared with waiting lists (eg, inactive controls). We excluded quasi-randomised trials, studies that did not focus on psychosocial support interventions, and studies that compared two active interventions without control conditions. We requested anonymised data from each trial for each of the prespecified variables for each child who was randomly assigned. The main outcomes considered were continuous scores in post-traumatic stress disorder (PTSD) symptoms, depressive symptoms, and anxiety symptoms assessed with rating scales administered immediately (0–4 weeks) after the intervention. We harmonised all individual items from rating scales using item response theory methods. This study is registered with PROSPERO, number CRD42013006960.

Findings We identified a beneficial effect of focused psychosocial support interventions on PTSD symptoms (standardised mean difference [SMD] -0.33 , 95% CI -0.52 to -0.14) that was maintained at follow-up (-0.21 , -0.42 to -0.01). We also identified benefits at the endpoint for functional impairment (-0.29 , -0.43 to -0.15) and for strengths: coping (-0.22 , -0.43 to -0.02), hope (-0.29 , -0.48 to -0.09), and social support (-0.27 , -0.52 to -0.02). In IPD meta-analyses focused on age, gender, displacement status, region, and household size we found a stronger improvement in PTSD symptoms in children aged 15–18 years (-0.43 , -0.63 to -0.23), in non-displaced children (-0.40 , -0.52 to -0.27), and in children living in smaller households (<6 members; -0.27 , -0.42 to -0.11).

Interpretation Overall, focused psychosocial interventions are effective in reducing PTSD and functional impairment, and in increasing hope, coping, and social support. Future studies should focus on strengthening interventions for younger children, displaced children, and children living in larger households.

Funding European Commission FP7th Framework Programme for Research (Marie Curie International Outgoing Fellowship) and the National Institute on Aging.

Copyright © The Author(s). Published by Elsevier Ltd. This is an Open Access article under the CC BY-NC-ND 4.0 license.

Introduction

Humanitarian crises involve a broad range of emergencies, including wars, armed conflicts, and disasters triggered by natural or industrial hazards. These crises disproportionately affect populations living in low-income and middle-income countries (LMICs)¹ and can have a wide range of effects on children's mental health and psychosocial wellbeing. Studies^{2,4} have found high

prevalence of symptoms of post-traumatic stress disorder (PTSD), depression, and anxiety in conflict affected populations^{2,3} and in other humanitarian crises in LMICs.⁴ Much less is known about resilience processes, including factors associated with reduced likelihood of mental illness.^{3,5}

Mental health and psychosocial support (MHPSS) is a composite term used by humanitarian practitioners to

Lancet Glob Health 2018;
6: e390–400

See Comment page e354

*Contributed equally

WHO Collaborating Centre for Research and Training in Mental Health and Service Evaluation, Section of Psychiatry, University of Verona, Verona, Italy (M Purgato PhD, C Bonetto PhD, C Gastaldon MD, D Papola MD, Prof C Barbui MD); Departments of International Health and Mental Health (M Purgato, P Bolton MBBS, W A Tol PhD), Department of Epidemiology (A L Gross PhD), and Center for Refugee and Disaster Response, Department of International Health (P Bolton), Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; Cochrane Global Mental Health, Verona, Italy (M Purgato, Prof C Barbui); Department of Global Health and Population, Harvard TH Chan School of Public Health, Boston, MA, USA (T Betancourt ScD); The Center for Mind-Body Medicine, Washington, DC, USA (J Gordon MD, J K Staples PhD); School of Psychology, Queen's University, Belfast, UK (P O'Callaghan PhD); Department of Psychology, Faculty of Social Sciences, University of Tampere, Tampere, Finland (K Peltonen PhD); Department of Psychology, Faculty of Social Sciences, University of Tampere, Tampere, Finland (Prof R-L Punamaki PhD); School of Public Health & Charles Perkins Centre, University of Sydney, Sydney NSW, Australia (J Richards PhD); Department of Psychology, Catholic University Eichstaett-Ingolstadt, Eichstaett, Germany (J Unterhitzenberger PhD); Department of Mental Health & Substance Abuse, World

Health Organization, Geneva, Switzerland (M van Ommeren PhD); Amsterdam Institute for Social Science Research, University of Amsterdam, Amsterdam, Netherlands (Prof J de Jong PhD); Boston University School of Medicine, Boston, MA, USA (Prof J de Jong); Center for Global Mental Health, Institute of Psychiatry, Psychology & Neuroscience, King's College London, London, UK (M J D Jordans PhD); Research and Development Department, War Child Holland, Amsterdam, Netherlands (M J D Jordans); and Peter C Alderman Foundation, Kampala, Uganda (W A Tol)

Correspondence to: Dr Marianna Purgato, WHO Collaborating Centre for Research and Training in Mental Health and Service Evaluation, Section of Psychiatry, University of Verona, Verona 37134, Italy marianna.purgato@univr.it

Research in context

Evidence before this study

Previous randomised studies on the effectiveness of focused psychosocial support interventions for children exposed to traumatic events in humanitarian settings in low-income countries (LICs) have had conflicting results. Evaluations of school-based interventions found promising improvements in child mental health, indicated by reduced distress symptoms and by increased protective factors, such as peer and family support. However, focused psychosocial support interventions might be effective only for specific subgroups.

Added value of this study

To the best of our knowledge, this is the first study that systematically assessed randomised controlled trials on focused psychosocial support interventions for children exposed to traumatic events in humanitarian settings in LICs, and did individual participant data (IPD) meta-analyses in subgroups identified by age, gender, displacement status, regions, and household size. All individual items from rating

scales were harmonised for common domains (ie, post-traumatic stress disorder, depression, and anxiety) across datasets using the item response theory method, an innovative approach that enables questions more strongly correlated with other questions (within and across the datasets) to be weighted differently.

Implications of all the available evidence

Focused psychosocial support interventions are effective in reducing PTSD symptoms and functional impairment, and in increasing hope, coping, and social support. IPD meta-analyses highlight a stronger improvement in PTSD symptoms in older children (aged 15–18 years), in non-displaced children, and in children living in smaller households. Future studies should focus on strengthening interventions for younger children, displaced children, and children living in larger households—eg, through a better understanding of the intervention mechanisms and their interaction with contextual vulnerabilities and strengths.

describe “any type of local or outside support that aims to protect or promote psychosocial well-being and/or prevent or treat mental disorder”.⁶ Consensus guidance developed by international humanitarian agencies have emphasised the importance of delivering different types of MHPSS to address the diverse needs of populations.⁶ The idea of multilayered supports has been depicted with a pyramid, which indicates the affected populations at large benefit from humanitarian services that are safe, socially appropriate, and protect dignity, while simultaneously recognising that smaller sections of affected populations will require more focused and, for some, clinical supports.⁶ The third layer in this pyramid is labelled focused psychosocial supports (figure 1).⁷ Focused psychosocial support interventions have generally been developed pragmatically to meet conditions in humanitarian settings—ie, settings with overwhelming needs and few resources. These interventions might be characterised by their implementation by lay workers or by targeting people with psychological distress or other psychosocial problems broadly, as opposed to people identified with specific mental disorders.

Given the observation that people in humanitarian settings will continue to encounter substantial stressors, interventions often also focus on building strengths (eg, social support, pro-social behaviour, self-esteem, emotional regulation, coping, and hope). A core principle of the much used Inter-Agency Guidelines for Mental Health and Psychosocial Support⁶ is building capacities of affected people. A wide range of focused interventions are implemented in practice and most have not been subject to study.² However, a subset of focused interventions among children and adolescents have been trialled and these tend to involve techniques from

evidence-based psychotherapeutic interventions, such as cognitive behavioural therapy, but not following complete standard treatment protocols (eg, trauma-focused cognitive behavioural therapy including exposure-based techniques), and the inclusion of additional techniques aimed at establishing strengths, such as creative expressive techniques (eg, drama, dance, music, art, and games), social support-building activities (eg, cooperative games, trust-focused activities, sharing difficulties, and coping methods), or mind–body oriented skills (eg, meditation and breathing exercises).^{3,8}

The results from focused psychosocial support evaluations have been diverse.^{8,9} For example, evaluations of school-based interventions have found promising improvements in child mental health, indicated by reduced PTSD and distress symptoms and by increased protective factors such as peer and family support. However, results have been inconsistent across settings, with different results for specific subgroups (eg, by gender, age, or previous trauma exposure) or outcomes.^{10–12} This inconsistency might partly be due to lack of power in subgroup analyses of single randomised controlled trials (RCTs).

Although single RCTs are crucial steps in the process of ensuring the delivery of evidence-based interventions, an analysis based on the combined data for all children included in trials with similar aims and methods is likely to lead to major advances in our knowledge of what works, where, for whom, and under what conditions. Individual participant data (IPD) meta-analysis could generate a more precise estimate of changes on primary outcomes and allow to explore the effects of variables that moderate primary outcomes, as effectiveness studies are commonly powered only for analysis of primary outcomes and not for moderation analyses.

We aimed to provide a detailed assessment of the effectiveness of focused psychosocial support interventions for children exposed to potentially traumatic events in humanitarian settings in LMICs in the present systematic review and IPD meta-analysis. Specific research questions that guided the systematic review and IPD meta-analysis were: (i) are focused psychosocial support interventions effective in reducing psychological distress (ie, symptoms of PTSD, depression, and anxiety)? (ii) Are focused psychosocial support interventions effective in reducing functional impairment and improving strengths (eg, coping, hope, and social support)? (iii) Do people identified by different characteristics (ie, gender, age, displacement status, household size, and region) benefit in a different way from interventions?

Methods

Search strategy and selection criteria

We did this systematic review and IPD meta-analysis according to the relevant Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA-IPD) guidelines.¹³ Eligible papers were published and unpublished randomised studies that assessed the effectiveness of focused psychosocial support interventions in children exposed to traumatic events in LMICs, compared with so-called inactive controls (waiting list, no treatment, treatment as usual, attention placebo, and psychological placebo). We excluded quasi-randomised trials, such as those trials allocating participants by using alternate days of the week, studies in which the intervention was not a focused psychosocial support interventions (eg, psychotherapies for the treatment of identified disorders delivered by clinicians), or that compared two active interventions without a control condition (eg, comparing different types of focused psychosocial support interventions). We included interventions delivered through any means—eg, face-to-face meetings, internet, radio, telephone, or self-help booklets between the participants and their helpers. Either individual or group-delivered focused psychosocial support interventions were eligible for inclusion, with no limit to the number of sessions.

For this IPD meta-analysis, we searched the Cochrane Central Register of Controlled Trials, MEDLINE, PubMed, PsycArticles, Web of Science, and the main local LMICs databases according to the list of databases relevant to LMIC developed collaboratively by Cochrane and WHO Library,¹⁴ up to November, 2016, with no limitations on year or language of publication. For standard international databases, we used the following key words: (prevention OR intervention*) AND (post traumatic OR posttraumatic OR post-traumatic OR PTSD OR trauma OR traumat* OR stress OR mental health OR depress* OR anxiety OR anxious OR neurotic OR neurosis OR mental disorder) AND (LMIC* OR LAMIC* OR low- and middle-income countr* OR low

and middle income countr* OR humanitarian OR emergen* OR violence OR abuse* OR torture OR displace* OR refugee* OR conflict OR war OR disaster OR earthquake OR catastrophe* OR drought* OR evacuation* OR famine* OR flood* OR hurricane OR cyclone* OR landslide* OR land slide* OR mass casual* OR tsunami* OR tidal wave* OR volcano*) AND (child* OR children OR childhood OR adolescent OR adolescence OR victim OR survivor) AND (random* OR controlled). We cross-checked our search results with the search strategy developed by the Cochrane Common Mental Disorders Group for two ongoing Cochrane reviews that have focused on similar topics.^{15,16}

We sought further studies by searching reference lists of relevant review papers, WHO mental health Gap Action Programme and Inter-Agency Standing Committee (IASC) guidelines,^{6,17} grey literature of a relevant systematic review published by Tol and colleagues⁷ in 2011, and references of included and excluded studies. The complete search strategy is provided in the appendix.

Study titles and abstracts were screened independently by two reviewers (MP and CG), and full-text papers were retrieved for all candidate studies. Studies were examined by two independent researchers (MP and CG), discrepancies were discussed with a third reviewer (CBa), and a consensus reached. We assessed all studies for eligibility against the review protocol. The review protocol was published in an open-access journal¹⁸ and is registered with PROSPERO, number CRD42013006960.

Data analysis

Data to be collected were agreed after consultation between MP, CBa, MvO, and WAT. We contacted corresponding authors of each included trial to request anonymised data for each of the prespecified variables for each child who was randomly assigned. Data were supplied in an Excel template specifically prepared and piloted for this purpose, and sent to study investigators by MP, CBa, and WAT. All data were revised and recoded

See Online for appendix

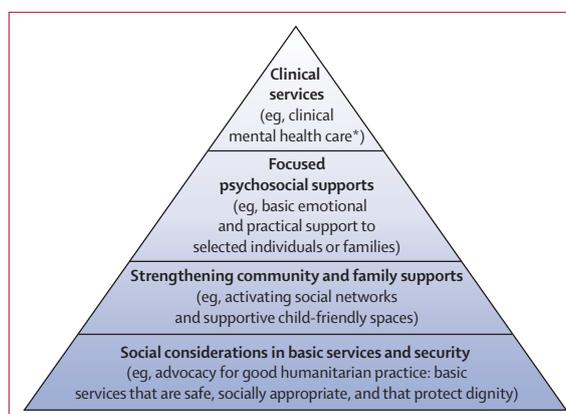


Figure 1: Intervention pyramid⁷

*By primary health-care staff or by mental health professionals.

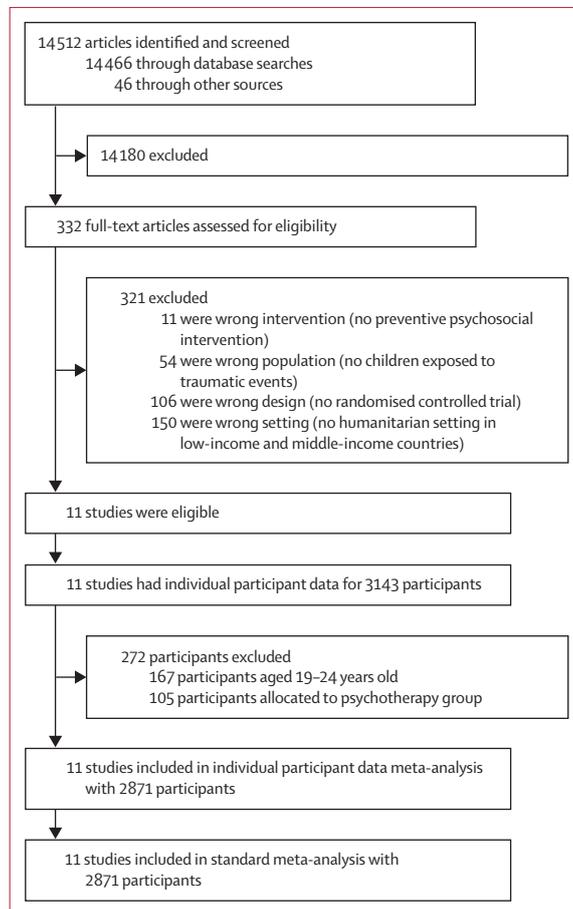


Figure 2: Studies included in systematic review and meta-analysis

For more on the Cochrane Risk of Bias Tool see www.handbook.cochrane.org

as necessary, and were thoroughly checked for internal consistency, consistency with the published reports, and for missing outcomes. Information about the trials—eg, randomisation, sample size, intervention and control characteristics, and aggregated outcomes data—were cross-checked for consistency with the published reports, trials protocols, and data collection sheets. Inconsistencies or missing data were discussed with relevant study investigators and corrected when necessary.

For primary analyses, we considered continuous scores in PTSD symptoms, depressive symptoms, and anxiety symptoms assessed with rating scales administered immediately (0–4 weeks) after the intervention. To measure improvement in PTSD symptoms the Child PTSD Symptom Scale,¹⁹ the 8-item Impact of Events Scale,²⁰ the Harvard Trauma Questionnaire,²¹ and the University of California Los Angeles Post-Traumatic Stress Disorder Reaction Index²² were used by study investigators. To measure improvement in depressive symptoms, study investigators used the 9-item Mini International Neuropsychiatric Interview for Children and Adolescents,²³ the Depression Self Rating Scale,²⁴ the African Youth Psychosocial Assessment Instrument, and

the Acholi Psychosocial Assessment Instrument (APAI)²⁵ depression-like syndrome items and the depression items of the Hopkins Symptoms Checklist (HSCL)²⁶ and of the Oxford Measure of Psychosocial Adjustment.²⁷ Anxiety symptoms were measured with the anxiety-like syndrome score of the APAI scale, the HSCL, the Oxford Measure of Psychosocial Adjustment,²⁷ and with the Screen for Child Anxiety Related Emotional Disorders-5 items.²⁸

Prespecified secondary outcomes included strengths (continuous scores at any rating scale measuring coping, hope, and social support); functional impairment; and PTSD symptoms, depressive symptoms, and anxiety symptoms assessed at follow-up (6 weeks after the end of the intervention or later).

To explore the effects by participant-level and environmental-level characteristics, we prespecified subgroups on the basis of each univariate variable: age groups (aged 7–10 years, 11–14 years, or 15–18 years), gender, displacement status (non-displaced vs displaced), household size (<6 people vs ≥6 people; 6 is the median for the whole sample), and the region in which the study was done (African region vs other regions). Moreover, we used post-hoc explorative analyses on subgroups identified by considering age groups associated with other individual characteristics.

Two reviewers (MP and DP) independently assessed the risk of bias and integrity of randomisation processes using the Cochrane Risk of Bias Tool and the quality of evidence using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) methodology.²⁹ Any discrepancies were resolved by consensus and arbitration by two other members of the review team (CBa and WAT). Details on the risk of bias assessment and GRADE Evidence Profiles are in appendix.

We did the IPD meta-analysis using both a pooled analysis, which combined all the IPD across studies in a single model for each outcome as if they belonged to a single trial, and a coordinated analysis approach, in which we analysed studies separately. The pooled analytic approach was feasible even if outcome summary scores differed: common items among scales were used to link outcomes from multiple studies to a common metric in pooled data. We accomplished this method using factor scores from confirmatory factor analyses of categorical observed indicators, a statistical approach consistent with two-parameter graded-response item response theory modelling.^{30–32} Questions for a domain in common across datasets were used to anchor the metric of each factor (eg, PTSD, coping) across datasets.³³ We used a maximum likelihood estimator with robust SE estimation in Mplus version 7. The Item Response Theory (IRT) approach enables questionnaire items to be weighted differently in deriving the factor; questions more strongly correlated with other questions within and across the datasets are given greater weight.

	Setting	Type of intervention and control	Number of sessions	Outcomes assessed in the trials
Betancourt et al (2014) ⁴¹	Freetown, Sierra Leone	Youth readiness intervention versus waiting list	10 (10 weeks)	Emotion regulation, functional impairment, psychological distress, prosocial attitudes or behaviour, social support, "PTSD symptoms were not a priority outcome of interest but were included as an exploratory outcome" ⁴¹
Bolton et al (2007) ⁴⁰	Gulu, Uganda	Creative play versus waiting list	16 (16 weeks)	Depressive symptoms; anxiety and conduct problems; and functioning
Gordon et al (2008) ⁴³	Suhareka, Kosovo	Mind-body skills group program versus waiting list	12 (6 weeks)	PTSD symptoms score
Jordans et al (2010) ³⁷	Gulariya, Nepalganj, Ghorahi, and Dhangadhi, Nepal	Class-based intervention versus waiting list	15 (5 weeks)	PTSD symptoms, depressive symptoms, anxiety symptoms, non-clinical psychological difficulties, physical aggression, functional impairment, hope, and prosocial behaviour
O'Callaghan et al (2014) ⁴²	Haut Uele, Democratic Republic of Congo	Family focused intervention versus waiting list	8 (3 weeks)	PTSD symptoms, depression and anxiety symptoms, conduct problems, and prosocial behaviour
Punamaki et al (2014) ⁴⁶	North Gaza, Gaza City, Gaza Strip	Teaching recovery techniques versus waiting list	8 (4 weeks)	PTSD symptoms, emotion regulation, depression symptoms, psychological distress, and psychosocial wellbeing
Richards et al (2014) ⁴⁴	Gulu, Uganda	Sport for development intervention versus waiting list	18 (9 weeks)	Cardiorespiratory fitness, muscle power and strength, height and weight, depressive symptoms, and anxiety symptoms
Tol et al (2008) ¹²	Poso, Indonesia	Class-based intervention versus waiting list	15 (5 weeks)	PTSD symptoms, trauma idiom, anxiety symptoms, depressive symptoms, functional impairment, hope, aggression, coping, social support, and family connectedness
Tol et al (2012) ³⁹	Jaffna, Sri Lanka	Class-based intervention versus waiting list	15 (5 weeks)	PTSD symptoms, anxiety symptoms, depressive symptoms, psychological difficulties, functional impairment, coping, conduct problems, and exposure to violence and daily stressors
Tol et al (2014) ³⁸	Bubanza, Cibitoke, Burundi	Class-based intervention versus waiting list	15 (5 weeks)	PTSD symptoms, anxiety symptoms, depressive symptoms, hope, functional impairment, coping, and social support
Unterhitzberger et al (2014) ⁴⁵	Rwamagana, Rwanda	Emotional writing and positive writing versus waiting list	3 (3 weeks)	Grief, depressive symptoms, and functional impairment

PTSD=post-traumatic stress disorder.

Table 1: Characteristics of included studies

Additionally, the model defines appropriate locations, or thresholds, for individual question responses on the latent variable metric based on the sample probability of the symptom or behaviour being endorsed. The effect of any particular test on the overall score is the same across studies with different numbers of tests, which provides a distinct advantage over approaches that standardise and average together different sets of items across different studies.³⁴ Previous studies have verified that this approach produces factor scores that are equivalent across studies with different sets of questions.^{34,35} In the two-stage approach, we analysed studies separately, and we combined the summary statistics using standard meta-analysis techniques.

We analysed continuous scores from different outcomes scales using standardised mean differences (SMD) with a 95% CI on the basis of a random-effects model because such a model takes into account differences between studies. We used forest plots and the I^2 statistic to investigate statistical heterogeneity among studies. We interpreted I^2 estimates according to Cochrane ranges: 0–40% might not be important, 30–60% might represent moderate heterogeneity, 50–90% might represent substantial heterogeneity, and 75–100% considerable heterogeneity.³⁶

We did the meta-analyses using the software STATA (version 13) and Review Manager (RevMan; version 5.3.5). Statistical analysis datasets are available upon request.

Role of the funding source

The funder of this study had no role in study design, collection, analysis, or interpretation of the data, report preparation, or in the decision to submit the paper for publication. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Overall, 14466 citations were identified by the database search and 332 potentially eligible articles were retrieved in full text (figure 2). We excluded 321 reports for several reasons, including psychotherapeutic treatment of diagnosed disorders instead of focused psychosocial support interventions, or the wrong population or study design (a full list of ineligible trials is available in the appendix). This exclusion resulted in 11 RCTs^{12,37–47} (3143 participants; 100% of requested data) published between 2007, and 2014, which compared focused psychosocial support interventions with waiting list conditions (figure 2). Depending on the outcome, the minimum and maximum number of trials and children available for individual analyses were between one RCT and ten RCTs and between 228 participants and 2672 participants. The number of sessions ranged from three to 18, with a mean dosage of 12 sessions. The mean study sample size was 250 participants [SD 148]. Children's age ranged from 7 years to 18 years.

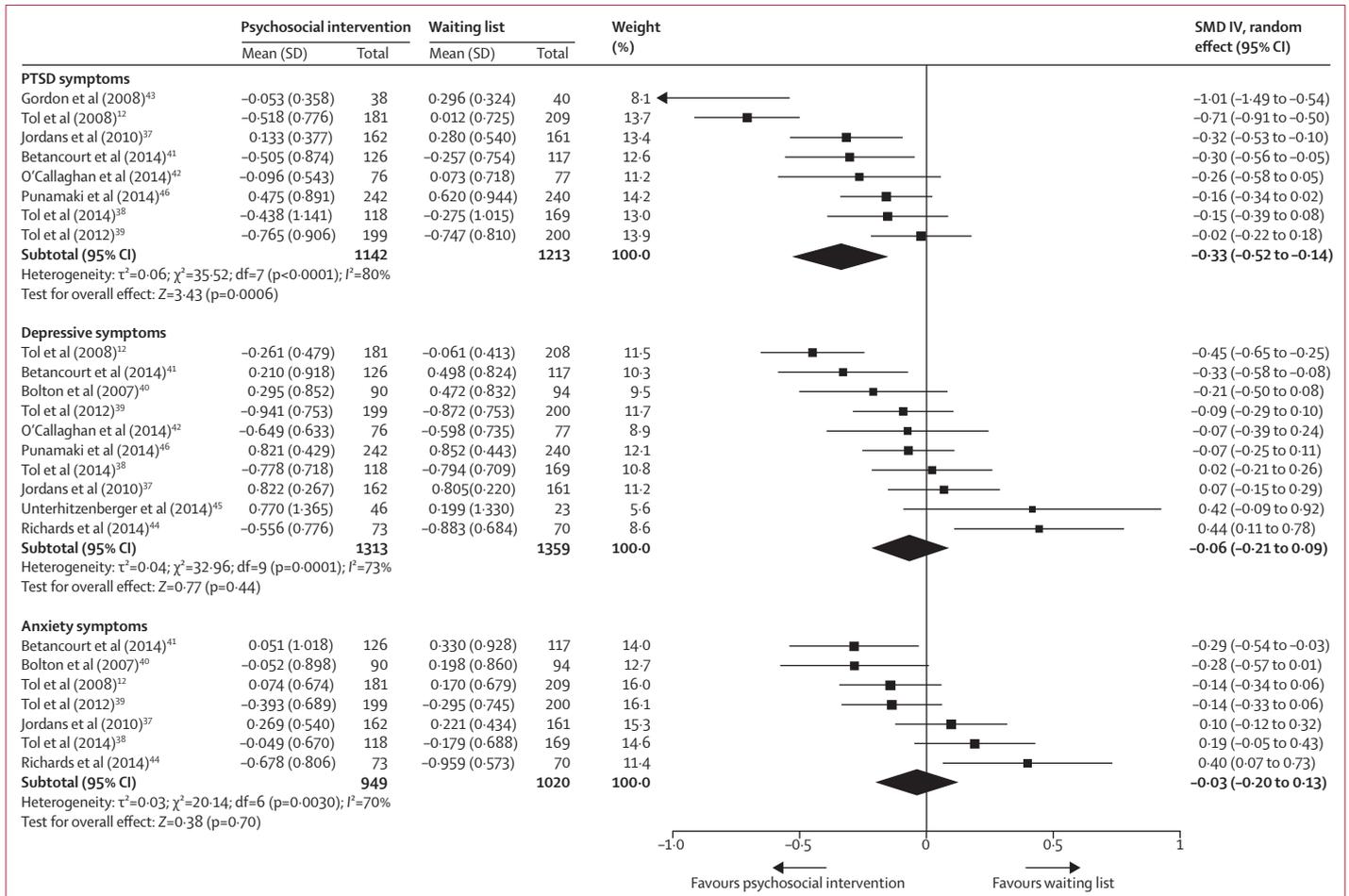


Figure 3: Random-effects meta-analyses of psychosocial interventions versus waiting list for primary outcomes
SMD=standardised mean difference. IV=inverse variance. PTSD=post-traumatic stress disorder. df=degrees of freedom.

Six studies recruited participants in Africa (one in Sierra Leone, two in Uganda, one in Rwanda, one in Burundi, and one in the Democratic Republic of the Congo), one study recruited participants in Kosovo, one in the Gaza Strip, one in Nepal, one in Sri Lanka, and one in Indonesia (table 1). Of these, we were able to trace the investigators for all 11 trials, and all agreed to participate. All interventions were group-based and classified as focused psychosocial support interventions, according to the characteristics of the target population and of intervention. Interventions were delivered at school, in camps for internally displaced people, or in other villages.

The meta-analysis of RCTs on PTSD symptoms showed a small, beneficial effect of focused psychosocial support interventions versus waiting list at 0–4 weeks after intervention (SMD -0.33, 95% CI -0.52 to -0.14; eight RCTs with 2355 participants; figure 3). This beneficial effect was reduced but still significant at follow-up at least 6 weeks after intervention completion (-0.21, -0.42 to -0.01; six RCTs with 1808 participants;

table 2). The meta-analyses that focused on depressive and anxiety symptoms highlighted no difference for control both at the end of intervention (figure 3) and at follow-up (table 2). We identified a substantial level of heterogeneity between studies (I^2 between 70% and 80%). For the secondary outcomes, we identified an effect for functional impairment (table 2). For strengths outcomes, we identified a significant effect of focused psychosocial support interventions over waiting list at 0–4 weeks after intervention for coping ($p=0.0030$), hope ($p=0.0040$), and social support ($p=0.0400$; table 2).

IPD meta-analysis by age groups showed that focused psychosocial support interventions were more effective than control on PTSD symptoms in all age ranges, with a stronger effect on the subgroup of children aged 15–18 years (393 participants; figure 4). No difference between interventions was identified for depressive symptoms and anxiety symptoms at endpoint and follow-up for the different groups (appendix).

IPD meta-analysis by gender showed that focused psychosocial support interventions were more effective

	Number of trials	Psychosocial intervention group (n)	Waiting list group (n)	SMD (95% CI)	I ²
PTSD at follow-up	6	885	923	-0.21 (-0.42 to -0.01)	78%
Depression at follow-up	6	885	923	-0.09 (-0.19 to 0.00)	10%
Anxiety at follow-up	4	606	658	-0.08 (-0.19 to 0.04)	0%
Coping at endpoint	5	747	779	-0.22 (-0.43 to -0.02)	75%
Coping at follow-up	3	447	473	-0.22 (-0.56 to 0.11)	84%
Hope at endpoint	3	460	539	-0.29 (-0.48 to -0.09)	57%
Hope at follow-up	2	289	350	-0.29 (-0.45 to -0.13)	0%
Social support at endpoint	1	126	117	-0.27 (-0.52 to 0.02)	NA
Social support at follow-up	1	119	109	0.03 (-0.23 to 0.29)	NA
Functional impairment at endpoint	7	922	973	-0.29 (-0.43 to -0.15)	57%
Functional impairment at follow-up	5	678	726	-0.09 (-0.23 to 0.05)	41%

PTSD=post-traumatic stress disorder. SMD=standardised mean difference. NA=not applicable.

Table 2: Random effects meta-analyses of secondary outcomes

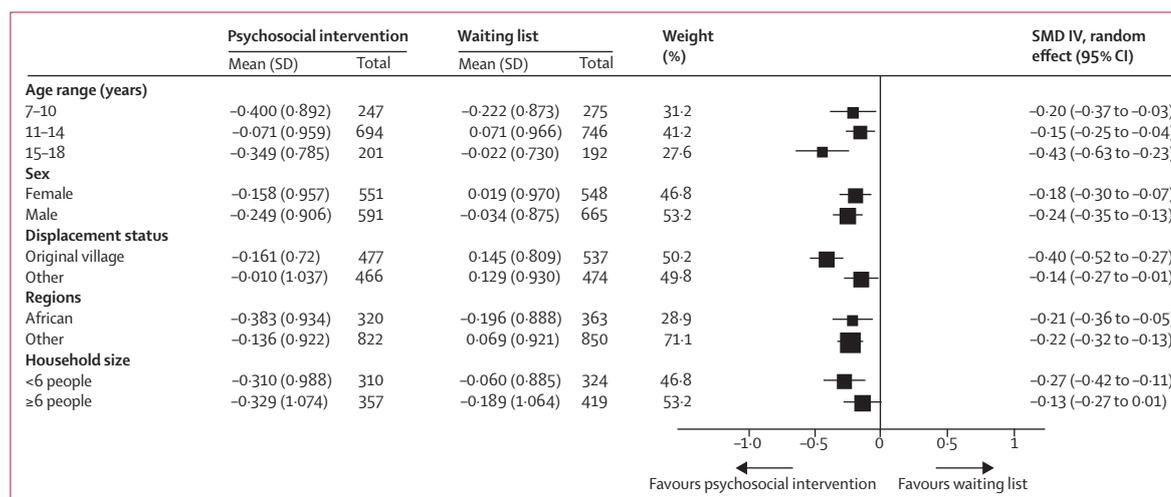


Figure 4: Random-effects individual participant data meta-analyses of psychosocial interventions versus waiting list for post-traumatic stress disorder symptoms

SMD=standardised mean difference. IV=inverse variance.

than control interventions on PTSD symptoms both in male participant and female participant subgroups (figure 4). For anxiety and depressive symptoms, we did not detect any significant difference between intervention and control in male participants or female participants (appendix).

IPD meta-analysis by displacement status identified a stronger effect of intervention in the non-displaced subgroup than the displaced group (figure 4). For depressive symptoms at endpoint, we did not identify differences between intervention and waiting list in both subgroups; however, focused psychosocial support interventions were associated with a significant improvement in anxiety symptoms at endpoint in the subgroup of displaced people (SMD -0.18, 95% CI -0.32 to -0.03; 696 participants; appendix).

In terms of region in which the study was done, we found that focused psychosocial support interventions were more effective than waiting list both in studies done in Africa and in other regions (figure 4). For depressive and anxiety symptoms at endpoint, outcomes for intervention and waiting list in both the subgroups did not differ (appendix).

IPD meta-analysis by household size (groups were identified by the whole sample median household size) identified a stronger effect of intervention in the group living in smaller households (<6 people; figure 4). No differences were found for depression and anxiety at endpoint in this analysis (appendix).

We used explorative analyses focused on PTSD symptoms to assess age bands in association with other characteristics. These analyses showed that older

	Intervention		Control		SMD (95% CI)
	Mean (SD)	Participants (n)	Mean (SD)	Participants (n)	
Males					
7–10 years	-0.34 (0.85)	137	-0.19 (0.91)	144	-0.17 (-0.40 to 0.07)
11–14 years	-0.14 (0.93)	347	0.03 (0.90)	421	-0.19 (-0.33 to -0.04)
15–18 years	-0.48 (0.85)	107	-0.08 (0.78)	100	-0.49 (-0.76 to -0.21)
Females					
7–10 years	-0.62 (0.92)	110	-0.25 (0.91)	131	-0.40 (-0.66 to -0.15)
11–14 years	-0.0003 (0.98)	347	0.12 (1.04)	325	-0.12 (-0.27 to 0.03)
15–18 years	-0.20 (0.68)	94	0.04 (0.67)	92	-0.35 (-0.64 to -0.06)
Original village					
7–10 years	-0.49 (0.80)	113	-0.11 (0.81)	126	-0.47 (-0.73 to -0.21)
11–14 years	-0.06 (0.69)	292	0.20 (0.84)	340	-0.34 (-0.49 to -0.18)
15–18 years	-0.07 (0.52)	72	0.34 (0.52)	71	-0.78 (-1.12 to -0.44)
Other village					
7–10 years	-0.05 (0.95)	68	0.07 (0.82)	89	-0.14 (-0.45 to 0.18)
11–14 years	0.24 (1.10)	269	0.32 (0.99)	264	-0.08 (-0.25 to 0.09)
15–18 years	-0.51 (0.86)	129	-0.23 (0.75)	121	-0.35 (-0.60 to -0.10)
African regions					
7–10 years	-0.50 (1.05)	18	-0.56 (0.91)	45	0.06 (-0.48 to 0.61)
11–14 years	-0.33 (1.02)	139	-0.18 (0.95)	166	-0.15 (-0.38 to 0.07)
15–18 years	-0.42 (0.84)	163	-0.11 (0.78)	152	-0.38 (-0.60 to -0.16)
Other regions					
7–10 years	-0.46 (0.88)	229	-0.16 (0.85)	230	-0.35 (-0.53 to -0.16)
11–14 years	-0.01 (0.93)	555	0.14 (0.96)	580	-0.16 (-0.28 to -0.04)
15–18 years	-0.05 (0.36)	38	0.31 (0.33)	40	-1.03 (-1.51 to -0.56)
Household ≥6 people					
7–10 years	-0.59 (0.94)	98	-0.38 (0.94)	108	-0.22 (-0.50 to 0.05)
11–14 years	-0.23 (1.11)	252	-0.13 (1.10)	304	-0.09 (-0.26 to 0.08)
15–18 years	-0.20 (0.79)	7	0.16 (0.95)	7	-0.39 (-1.45 to 0.68)
Household <6 people					
7–10 years	-0.46 (0.80)	127	-0.12 (0.77)	149	-0.43 (-0.67 to -0.19)
11–14 years	-0.19 (1.08)	161	-0.04 (0.97)	170	-0.15 (-0.36 to 0.07)
15–18 years	-1.44 (0.96)	2	0.83 (0.48)	5	-3.15 (-6.13 to -0.16)

SMD=standardised mean difference.

Table 3: Explorative individual participant data meta-analyses for primary outcome post-traumatic stress disorder at endpoint

children (15–18 years) reported a significant benefit from interventions regardless of their gender, displacement status, and region (table 3). Due to very low sample size, calculations considering household size were shown but not considered.

In general, included studies evaluated with the Cochrane risk of bias tool were of good quality (appendix). Randomisation procedures were properly described in all studies, even though authors did not report details on allocation concealment in some RCTs. Moreover, some studies had methodological shortcomings related to masking (of participants and personnel or of outcome

assessors), which might be a source of performance and detection bias. The quality of RCTs, assessed with the GRADE methodology, were rated as low to moderate, mainly because of the high levels of heterogeneity across studies.

Discussion

To our knowledge, this analysis of IPD from more than 3000 children and adolescents represents the largest synthesis of evidence with rigorous standards of systematic review and IPD meta-analysis comparing focused psychosocial support interventions versus control condition in children exposed to traumatic events in humanitarian settings in LMICs. Focused psychosocial support interventions appeared to have a beneficial effect on PTSD symptoms, which was maintained at follow-up.

Our findings have the following limitations. First, we included interventions with broadly similar aims and methods in countries with similar income status. However, the diversity of approaches and the different sociocultural and health-care system contexts in which these interventions were implemented might have contributed to the identified heterogeneity in results. For example, the sociocultural groups included in the 11 trials are likely to have used different cultural concepts of distress with a different overlap between cultural concepts of distress and the symptoms measured through checklists, resulting in differences in precision with which locally relevant symptoms were assessed. Second, there appears to be a mismatch between some of the stated aims of included studies and the chosen outcome measures. For instance, whereas several studies claim a central focus on prevention (eg, by targeting strengths hypothesised to protect children and adolescents against developing psychological symptoms at further exposure to adversity), most studies used a reduction in psychological symptoms as primary outcomes (instead of a reduction of incidence of symptoms). We would encourage evaluation of preventive interventions to measure incidence of new psychological distress and disorders over longer follow-up periods, as well as testing whether targeted strengths are associated with reduced incidence as hypothesised. Third, our meta-analysis included focused psychosocial support interventions, in accordance with consensus-based language commonly used by international humanitarian practitioners. However, the included studies evaluated interventions with different targeting procedures and content, defying easy categorisation and thus requiring some variability in boundaries. For example, some studies⁴³ have features of clinical interventions whereas others⁴⁴ have features of IASC pyramid level two interventions (family and community supports). Also, most studies^{12,37–41} evaluated interventions with populations screened for psychological distress, without excluding children scoring very high on symptom measures. Without comparing the focused psychosocial support interventions to more formalised psychotherapeutic clinical interventions, we cannot

directly determine what type of intervention might be more effective for children who are likely to meet formal diagnostic criteria. Fourth, due to the brevity of the RCTs, we are unable to draw conclusions regarding maintenance of symptom reduction in the long term after trial completion. Fifth, we did not collect data on fidelity to intervention protocols among treated participants that might have contributed to the observed statistical heterogeneity. Sixth, from a methodological point of view, the absence of masking in the included RCTs might be considered a source of bias and heterogeneity between studies, as no masking in RCTs is an important threat to the objectivity of the findings. In studies evaluating complex psychosocial interventions, maintaining masking to intervention allocation is challenging, and assessor independence needs to be considered when interpreting results. Finally, we cannot exclude investigator bias as some of the published reports of the RCTs have a co-author who helped develop the intervention.

Notwithstanding these limitations, this study resulted in important findings. A major finding of our analysis is that focused psychosocial support interventions are effective in reducing PTSD symptoms both at endpoint and at follow-up, whereas no effect was identified for depressive and anxiety symptoms. These results are consistent with results from a systematic review⁴⁸ that used standard meta-analysis to evaluate the effectiveness of a broad range of MHPSS interventions, including clinical interventions, for PTSD and depression in children exposed to mass violence.

Our work additionally analysed outcomes that focused on strengths, a focus prioritised by humanitarian practitioners⁴⁹ but often ignored in evaluation studies, including those studies in humanitarian settings. Our meta-analyses showed an effect of focused psychosocial support interventions over waiting list on coping, hope, and social support. We also found intervention benefits for reducing functional impairment.

Previous individual studies of focused psychosocial interventions in humanitarian settings in LMICs have shown complex and sometimes conflicting results. For example, in an RCT³⁹ of a classroom-based psychosocial intervention in Sri Lanka, post-hoc analysis found that subgroups of girls in the waitlist arm showed better trajectories on PTSD symptoms compared with the intervention arm, whereas in the post-hoc analysis of an RCT¹² of the same intervention in Indonesia girls in the intervention arm showed a larger improvement than boys for this outcome. To shed light on such inconsistent findings, we did IPD meta-analyses exploring subgroups defined by variables of gender, age, displacement, region, and household size. We found that interventions were effective across gender, age, and displacement status, but that they were more effective for particular subgroups, that is, children aged 15–18 years, non-displaced children, and children living in smaller households. Unlike previous single RCTs, we did not find different

intervention benefits by gender. These findings show the importance of not concluding prematurely from post-hoc subgroup analyses of single RCTs that are underpowered for identifying subgroup effects.

The finding that older children benefitted more from intervention deserves further research—eg, the analysis of qualitative process evaluations of younger and older participants or further quantitative analysis of associations of age with other characteristics, but might potentially be explained by the fact that most interventions had cognitive behavioural elements. These interventions might hypothetically be more easily implemented with cognitively more developed older youth. The finding with regard to lower effects of intervention in displaced populations is in line with socioecological theory. The ecological theory developed by Bronfenbrenner⁵⁰ examines child development within the context of different levels of the social environment, from macrosystem to microsystem—ie, considering influences on child development from the level of overall culture and society, to the smallest and immediate environment in which the child interacts regularly, comprising home and peer group. In accordance with this framework, it can be hypothesised that a focused psychosocial support intervention would have greater benefits for children that can rely on higher levels of protective factors (eg, smaller households might have more financial and social resources for each member) and who have to face lower levels of risk factors (eg, displaced children will be more likely to confront ongoing stressors).⁵¹

These findings raise important questions around intervention design. For example, developing focused psychosocial support interventions according to basic demographic characteristics of the target population (eg, age, displacement status, and household size) could possibly be useful in optimising scarce resources and maximising benefits. Simultaneously, restricting the intervention to particular subgroups has ethical implications and requires reliable and potentially complex targeting procedures. Additional research, aimed at unpacking the effective ingredients of focused psychosocial interventions would be helpful to identify which intervention components might be more likely to be universally effective and which more contextually dependent.

Our present work also has some important strengths. First, the focus on strengths as well as symptoms in the included intervention makes the review interesting from a public mental health perspective. The identified effects of focused psychosocial support interventions on children's strengths are promising, because these kind of interventions were developed to improve wellbeing broadly, in larger groups of children in accessible settings.

Second, a methodological strength of this study is the IRT approach, used for the first time in an IPD meta-analysis. Despite the analytic complexity of the approach, harmonisation of outcome scores based on factor analyses consistent with IRT is appropriate when questions

assessing the outcomes vary across studies because the approach facilitates, in an appropriate way, using all available questions. The approach does this in two ways. (i) Relative weights of questions for each outcome in the factor score are based on correlations with other items, thus upweighting questions more relevant to the construct of interest. (ii) The IRT approach simultaneously identifies an appropriate relative placement of thresholds of specific questions, as explained in the Methods. The approach is ultimately extendable not only to other studies that have some (but not necessarily all) questions in common for a domain, but also to differing assessments over developmental time periods.³² The use of the IRT approach and the inclusion of trials with a randomised design might have reduced the potential cultural biases related to the different sociocultural and health-care system contexts in which the interventions were delivered. Finally, we were able to collect individual participant's data from 100% of the included RCTs, a major strength for this methodology, because often IPD meta-analyses are able to collect participant data only for a fraction of the available evidence.

In conclusion, through the analysis of pooled data from more than 3000 children and adolescents affected by humanitarian crises, we were able to precisely estimate the intervention benefits of focused psychosocial support interventions across 11 RCTs in low-resource settings. We found broad intervention benefits for symptoms of PTSD (both at immediate follow-up and mid-term follow-up), for multiple strengths (coping, hope, and social support), and for functional impairment. Intervention effects were stronger for older, non-displaced children and for children living in smaller households.

Contributors

MP, CBa, and WAT designed the study. MP and CBa drafted the manuscript. WAT, TB, PB, DP, CG, JG, PO'C, KP, R-LP, JR, JKS, JU, and MJDJ contributed to the database preparation and double check. ALG and CBo analysed data. MP, DP, and CG assessed the quality of evidence. MvO and JdJ critically revised the manuscript. All authors commented on and approved the draft and final manuscripts. The authors alone are responsible for the views expressed in this Article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

Declaration of interests

We declare no competing interests.

Acknowledgments

MP was supported by the European Commission FP7th Framework Programme for Research (Marie Curie International Outgoing Fellowship [acronym CHILD TRAUMA IN LMIC], proposal number 626466). ALG was supported by K01-AG050699 from the National Institute on Aging.

References

- Melander E, Pettersson T, Themnér L. Organized violence, 1989–2015. *J Peace Res* 2016; **53**: 727–42.
- Tol WA, Barbui C, Galappatti A, et al. Mental health and psychosocial support in humanitarian settings: linking practice and research. *Lancet* 2011; **378**: 1581–91.
- Betancourt TS, Meyers-Ohki SE, Charrow AP, Tol WA. Interventions for children affected by war: an ecological perspective on psychosocial support and mental health care. *Harv Rev Psychiatry* 2013; **21**: 70–91.
- Betancourt TS, Borisova II, de la Soudiere M, Williamson J. Sierra Leone's child soldiers: war exposures and mental health problems by gender. *J Adolesc Health* 2011; **49**: 21–28.
- Scott KM, Von KM, Angermeyer MC, et al. Association of childhood adversities and early-onset mental disorders with adult-onset chronic physical conditions. *Arch Gen Psychiatry* 2011; **68**: 838–44.
- IASC. IASC guidelines on the mental health and psychosocial support in emergency settings. Geneva: Inter-Agency Standing Committee, 2007.
- UNHCR. Operational guidance mental health & psychosocial support programming for refugee operations. Geneva: United Nations High Commissioner for Refugees, 2013.
- Jordans MJ, Pigott H, Tol WA. Interventions for children affected by armed conflict: a systematic review of mental health and psychosocial support in low- and middle-income countries. *Curr Psychiatry Rep* 2016; **18**: 9.
- Ertl V, Neuner F. Are school-based mental health interventions for war-affected children effective and harmless? *BMC Med* 2014; **12**: 84.
- Tol WA, Komproe IH, Jordans MJ, et al. Mediators and moderators of a psychosocial intervention for children affected by political violence. *J Consult Clin Psychol* 2010; **78**: 818–28.
- Jordans MJ, Tol WA, Komproe IH, et al. Development of a multi-layered psychosocial care system for children in areas of political violence. *Int J Ment Health Syst* 2010; **4**: 15.
- Tol WA, Komproe IH, Susanty D, Jordans MJ, Macy RD, de Jong JT. School-based mental health intervention for children affected by political violence in Indonesia: a cluster randomized trial. *JAMA* 2008; **300**: 655–62.
- Stewart LA, Clarke M, Rovers M, et al. Preferred Reporting Items for Systematic Review and Meta-Analyses of Individual Participant Data: the PRISMA-IPD Statement. *JAMA* 2015; **313**: 1657–65.
- Cochrane Effective Practice and Organization of Care. A collection of databases, web sites and journals relevant to low- and middle-income countries (LMICs). 2013. <http://epoc.cochrane.org/sites/epoc.cochrane.org/files/public/uploads/LMIC%20Databases%20August%202013.pdf> (accessed Jan 26, 2018).
- Purgato M, Gastaldon C, Papola D, van Ommeren M, Barbui C, Tol WA. Psychological therapies for the treatment of mental disorders in low- and middle-income countries affected by humanitarian crises. *Cochrane Database Syst Rev* 2015; **10**: CD011849.
- Purgato M, Gastaldon C, Papola D, van Ommeren M, Barbui C, Tol WA. Psychological and social interventions for the prevention of mental disorders in people living in low- and middle-income countries affected by humanitarian crises. *Cochrane Database Syst Rev* 2016; **11**: CD012417.
- WHO. Intervention guide for mental, neurological and substance use disorders in non-specialized health settings: mental health Gap Action Programme mhGAP. Geneva: World Health Organization, 2010.
- Purgato M, Gross AL, Jordans MJ, de Jong JT, Barbui C, Tol W. Psychosocial interventions for children exposed to traumatic events in low- and middle-income countries: study protocol of an individual patient data meta-analysis. *Syst Rev* 2014; **3**: 34.
- Foa EB, Johnson KM, Feeny NC, Treadwell KR. The child PTSD symptom scale: a preliminary examination of its psychometric properties. *J Clin Child Psychol* 2001; **30**: 376–84.
- Yule W, Bruggencate ST, Joseph S. Principal components analysis of the impact of events scale in adolescents who survived a shipping disaster. *Pers Individ Dif* 1994; **16**: 685–91.
- Mollica RF, Caspi-Yavin Y, Bollini P, Truong T, Tor S, Lavelle J. The Harvard Trauma Questionnaire. Validating a cross-cultural instrument for measuring torture, trauma, and posttraumatic stress disorder in Indochinese refugees. *J Nerv Ment Dis* 1992; **180**: 111–16.
- Steinberg AM, Brymer MJ, Decker KB, Pynoos RS. The University of California at Los Angeles Post-traumatic Stress Disorder Reaction Index. *Curr Psychiatry Rep* 2004; **6**: 96–100.
- Sheehan DV, Sheehan KH, Shytle RD, et al. Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents MINI-KID. *J Clin Psychiatry* 2010; **71**: 313–26.
- Birleson P. The validity of depressive disorder in childhood and the development of a self-rating scale: a research report. *J Child Psychol Psychiatry* 1981; **22**: 73–88.

- 25 Betancourt TS, Bass J, Borisova I, et al. Assessing local instrument reliability and validity: a field-based example from northern Uganda. *Soc Psychiatry Psychiatr Epidemiol* 2009; **44**: 685–92.
- 26 Betancourt TS, Brennan RT, Rubin-Smith J, Fitzmaurice GM, Gilman SE. Sierra Leone's former child soldiers: a longitudinal study of risk, protective factors, and mental health. *J Am Acad Child Adolesc Psychiatry* 2010; **49**: 606–15.
- 27 MacMullin C, Loughry M. Investigating psychosocial adjustment of former child soldiers in Sierra Leone and Uganda. *J Refugee Stud* 2004; **17**: 460–72.
- 28 Birmaher B, Bren D, Chiapetta L, Bridge J, Monga S, Baugher M. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *J Am Acad Child Adolesc Psychiatry* 1999; **38**: 1230–36.
- 29 Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008; **336**: 924–26.
- 30 Wahl I, Lowe B, Bjorner JB, et al. Standardization of depression measurement: a common metric was developed for 11 self-report depression measures. *J Clin Epidemiol* 2014; **67**: 73–86.
- 31 Estabrook R, Neale M. A Comparison of factor score estimation methods in the presence of missing data: reliability and an application to nicotine dependence. *Multivariate Behav Res* 2013; **48**: 1–27.
- 32 Delis DC, Jacobson M, Bondi MW, Hamilton JM, Salmon DP. The myth of testing construct validity using factor analysis or correlations with normal or mixed clinical populations: lessons from memory assessment. *J Int Neuropsychol Soc* 2003; **9**: 936–46.
- 33 Zsembik BA, Peek MK. Race differences in cognitive functioning among older adults. *J Gerontol B Psychol Sci Soc Sci* 2001; **56**: S266–74.
- 34 Gross AL, Sherva R, Mukherjee S, et al. Calibrating longitudinal cognition in Alzheimer's disease across diverse test batteries and datasets. *Neuroepidemiology* 2014; **43**: 194–205.
- 35 Gross AL, Power MC, Albert MS, et al. Application of latent variable methods to the study of cognitive decline when tests change over time. *Epidemiology* 2015; **26**: 878–87.
- 36 Higgins JPT, Green S. *Cochrane handbook for systematic reviews of interventions* version 5.1.0 (updated March 2011). London: The Cochrane Collaboration, 2011.
- 37 Jordans MJ, Komproe IH, Tol WA, et al. Evaluation of a classroom-based psychosocial intervention in conflict-affected Nepal: a cluster randomized controlled trial. *J Child Psychol Psychiatry* 2010; **51**: 818–26.
- 38 Tol WA, Komproe IH, Jordans MJ, et al. School-based mental health intervention for children in war-affected Burundi: a cluster randomized trial. *BMC Med* 2014; **12**: 56.
- 39 Tol WA, Komproe IH, Jordans MJ, et al. Outcomes and moderators of a preventive school-based mental health intervention for children affected by war in Sri Lanka: a cluster randomized trial. *World Psychiatry* 2012; **11**: 114–22.
- 40 Bolton P, Bass J, Betancourt T, et al. Interventions for depression symptoms among adolescent survivors of war and displacement in northern Uganda: a randomized controlled trial. *JAMA* 2007; **298**: 519–27.
- 41 Betancourt TS, McBain R, Newnham EA, et al. A behavioral intervention for war-affected youth in Sierra Leone: a randomized controlled trial. *J Am Acad Child Adolesc Psychiatry* 2014; **53**: 1288–97.
- 42 O'Callaghan P, Branham L, Shannon C, Betancourt TS, Dempster M, McMullen J. A pilot study of a family focused, psychosocial intervention with war-exposed youth at risk of attack and abduction in north-eastern Democratic Republic of Congo. *Child Abuse Negl* 2014; **38**: 1197–207.
- 43 Gordon JS, Staples JK, Blyta A, Bytyqi M, Wilson AT. Treatment of posttraumatic stress disorder in postwar Kosovar adolescents using mind-body skills groups: a randomized controlled trial. *J Clin Psychiatry* 2008; **69**: 1469–76.
- 44 Richards J, Foster C, Townsend N, Bauman A. Physical fitness and mental health impact of a sport-for-development intervention in a post-conflict setting: randomised controlled trial nested within an observational study of adolescents in Gulu, Uganda. *BMC Public Health* 2014; **14**: 619.
- 45 Unterhitzberger J, Rosner R. Lessons from writing sessions: a school-based randomized trial with adolescent orphans in Rwanda. *Eur J Psychotraumatol* 2014; **5**: 24917.
- 46 Punamaki RL, Peltonen K, Diab M, Qouta S. Psychosocial interventions and emotion regulation among war-affected children: randomized controlled trial effects. *Traumatology* 2014; **20**: 241–52.
- 47 Qouta SR, Palosaari E, Diab M, Punamaki RL. Intervention effectiveness among war-affected children: a cluster randomized controlled trial on improving mental health. *J Trauma Stress* 2012; **25**: 288–98.
- 48 Morina N, Malek M, Nickerson A, Bryant RA. Psychological interventions for post-traumatic stress disorder and depression in young survivors of mass violence in low- and middle-income countries: meta-analysis. *Br J Psychiatry* 2017; **210**: 247–54.
- 49 Tol WA, Patel V, Tomlinson M, et al. Research priorities for mental health and psychosocial support in humanitarian settings. *PLoS Med* 2011; **8**: e1001096.
- 50 Bronfenbrenner U. *The ecology of human development*. Cambridge: Harvard University Press, 1979.
- 51 Tol WA, Song S, Jordans MJ. Annual research review: resilience and mental health in children and adolescents living in areas of armed conflict—a systematic review of findings in low- and middle-income countries. *J Child Psychol Psychiatry* 2013; **54**: 445–60.
- 52 McArdle JJ, Grimm KJ, Hamagami F, Bowles RP, Meredith W. Modeling life-span growth curves of cognition using longitudinal data with multiple samples and changing scales of measurement. *Psychol Methods* 2009; **14**: 126–49.