A systematic review of the mental health impacts of sport and physical activity programmes for adolescents in post-conflict settings

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Abstract

Children and adolescents exposed to violent conflict are at high risk of developing mental health problems. Sport and physical activity is increasingly incorporated in post-conflict assistance for young people. Implementing agencies make a broad array of health claims for which there is currently a fragmented evidence base. The purpose of this review was to summarise the impact evidence for sport and physical activity based programmes on the mental health of adolescents in post-conflict settings, and highlight the limitations of current practice. A systematic review of 12 electronic databases, 12 journals and leading humanitarian websites was conducted in August 2014. Studies were eligible for inclusion if they described a sports or physical activity based intervention for adolescents between the ages of 12-19 in a post-conflict setting. A total of 11,722 publications were initially identified, of which 3 met the inclusion criteria and were included in a narrative synthesis. Two studies described projects in northern Uganda; one reported a decline in intervention in boys' mental health when compared to controls, the other a non-significant improvement. The third study reported continual improvement in symptom presentation in ex-child soldiers in Sierra Leone. Common limitations were short study duration and follow-up, poor or unreported adaptation of methods and a lack of treatment mechanisms research. There is a shortage of high-quality and available information, which limits the strength of conclusions that can be drawn. Despite the international furore surrounding the use of sport for assisting conflict-affected populations, there is not yet convincing evidence of its efficacy as a mental health intervention. Future evaluation and research should aim to identify the mechanisms and processes behind the intended impact of interventions.

Background

Mental illness is recognised as a major contributor to the global burden of disease. [1] The common mental health disorders (for example, depression, generalised anxiety disorder and alcohol and substance abuse) account for 14% of the global burden of disease, about 7.4% of disability-adjusted life years worldwide and roughly a quarter of all health lost due to disability. [2-4] Mental disorders affect 10-20% of children worldwide [5] and roughly 20% of children experience a mental health issue in any given year. [6] Child and adolescent mental health disorders have wide-ranging social and economic impacts on individuals and states. [7] Research in this area is scant, yet results from longitudinal, clinical and population-based studies indicate that emotional and conduct disorders can impair normal development for age, and can influence subsequent quality of life for those affected and their families. [7, 8]

Estimating the global burden of child and adolescent mental disorders is complex and there are a number of barriers that

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limit accurate analyses. [5, 9, 10] There is inadequate provision of resources for assessing mental disorders worldwide upon considering the low awareness and priority of mental health in many countries. [9] In addition to this the definition, expression and diagnoses of mental disorders vary cross-culturally. [10] This limits the accuracy of global estimates and these difficulties are particularly prevalent in low- and middle-income countries and post-conflict settings.[3]
Exposure to conflict and conflict-related stressors is a risk factor for elevated levels of poor mental health. [11, 12] Conflict not only exposes people to violent and traumatic events which are known to increase mental health problems, but can also radically change the social and economic environment which can catalyse the emergence of psychiatric disorders. [13, 14] A lack of social support, prolonged displacement, breakdown of community structures and deprivation of basic needs are common. [15] Factors such as these contribute to poor levels of mental health among conflict-affected populations. [16, 17] Typically, populations suffer from, for example, elevated levels of post-traumatic stress disorder, anxiety-type disorders and increased substance and alcohol abuse. [18, 19]

In academic literature, mental health assistance to conflict-affected populations is often characterised as 'psychosocial' or 'medical.' The psychosocial approach aims to use non-intrusive methods to assist populations with their recovery. [20] Approaches are both formal (such as school-based cognitive behavioural therapy, narrative approaches and art therapy) and informal (typically education, play or story-telling activities) and aim to empower communities to recover without individual therapy or drug treatments. [21-23]

Sport is increasingly incorporated into psychosocial assistance programmes for conflict-affected populations and is a sub-category of a wider movement, known as Sport for Development and Peace (SDP). [24] SDP is defined as:

"The intentional use of sport, physical activity and play to attain specific development objectives in low-and middle-income countries and disadvantaged communities in high-income settings…" [25]

SDP and psychosocial healing agencies have commonalities and overlapping methods.[26] SDP covers a broad array of actors such as multilateral organisations (e.g. UN agencies), international non-Governmental Organisations (e.g. Right to Play), private entities and academic institutions, which implement a spectrum of program models and claim manifold cross cutting positive outcomes.[27]

Agencies and practitioners make a diverse array of claims relating to the impacts of SDP programs.[28] Of particular interest are the mental health-related claims of SDP and sport for psychosocial healing organisations. According to Coalter (2008), the majority fail to back up these up with convincing evidence, and the claims appear to outweigh the current evidence base. [29] Indeed, there is a growing body of evidence for various positive impacts of sport and physical activity (PA) on the physical, mental and social wellbeing of young people, including those 'at-risk' in developed, peaceful settings. [30-32] However, it is not certain that these outcomes can be replicated in a post-conflict setting.[26]

There has been a proliferation of SDP projects. Currently, 585 organisations and 213 projects are registered on the International Platform for Development and Peace, a number that has almost tripled since 2008 since the search was conducted on August 23rd, 2014. Consequently, it is necessary to take stock and identify what works, for whom and why.[28] There is a need to evaluate the success and failures of these programmes systematically to consolidate the efficiency, efficacy and sustainability in the face of limited resources.

Cronin et al (2011) discourage the wide-ranging reviews of evidence for SDP programs, since they are unlikely to provide meaningful results given the growth of the field. [33] There are several reviews that point to psychosocial and SDP interventions in general, but none that attempt to isolate the impact of sport and PA specifically. This review was an extension and development of a review performed by Richards that analysed all the health-related outcomes for adolescents of sport programmes in post-conflict zones, which identified a single publication relating to northern Uganda. As a result, few conclusions were drawn. [34] This review focused on the mental health impacts of programs for adolescents in post-conflict settings, which had clearly defined intervention sport or PA elements. The research objective was to collate and critique the available evidence for the mental health impact of sport and physical activity programmes on adolescents in post-conflict settings. This was in hope that the independent effects of sport and PA might be analysed as opposed to more general intervention methodologies.

Methods

Inclusion and exclusion criteria

The review followed the Preferred Reporting Items for

Systematic Reviews and Meta-Analyses (PRISMA) checklist and registered on Prospero (CRD42014010833). [35] A completed PRISMA checklist is attached in Appendix 1.

Articles considered in this study were screened for type, population, intervention, and outcome measure. To ensure that the maximum number of mental health publications was identified, no specific mental health outcome measure search terms were included. All articles found in academic literature and grey literature from international organisation archives were eligible for inclusion in the study. Conference abstracts and posters were not included and were not considered for review. All English publications from January 1980 (if available) to August 2014 were included.

Evidence related to adolescents aged 12-19 years living in a post-conflict region across a school or community setting was included in the study with no exclusion based on gender or ethnicity. The review used the WHO definition of an adolescent. [36] All articles that described an intervention in a post-conflict setting were eligible for inclusion and were not excluded based on study design in anticipation of a shortage of relevant literature. Articles describing interventions in high-income countries or in peaceful settings were excluded on the grounds that the socio-ecological environment influences the outcomes of interest. [37]

Studies were eligible for inclusion if they described an intervention that was sport or physical activity based. For the purpose of this review the WHO definition of physical activity was used. [38] Initially, publications were to be categorised based on the frequency, intensity and type of physical activity or sport that participants engaged in. However, it was clear from early on that this was not possible because many publications provided very little information on the nature of the use of physical activity or sport. There was also a shortage of information on the dose of physical activity or sport that people received in both excluded and included publications. Publications were included if the following criteria were met:

- Type of sport or physical activity clearly stated.
- The duration of the physical activity sessions was stated in the study.
- A minimum of an hour per week of sport or physical activity.

This review included interventions that specifically addressed mental health and those in which mental health was a secondary outcome. As a result, database search terms were broad and incorporated all sports-based programmes that might have mental health impacts in post-conflict settings. The primary outcomes of interest were indicators of negative mental health, such as post-traumatic stress disorder; depression or generalised anxiety disorder; and indicators of positive mental health and wellbeing such as self-efficacy, self-esteem or emotional wellbeing.

Search strategy

Academic online databases including Ovid, EBSCOhost, Education Resources Information Centre and PubMed were searched. Manual searches of several selected online journals were conducted including the 'African Journal of Physical Health Education, Recreation and Dance' and the 'Journal of Health and Sports Science and Child and Adolescent Mental Health.' Additional resources included humanitarian and other grey literature websites, including Google Scholar and Relief Web. Appendix 2 contains a full list of all searched websites and academic databases. All the relevant interventions across review publications were identified and cross-referenced with the primary articles retrieved through the electronic search.

The search terms are outlined in Appendix 3. A single researcher executed the search strategies and all references were stored in Endnote 7.1. Studies were then screened and included/excluded in three stages; based on titles (stage 1), abstracts (stage 2) and full-text articles (stage 3). After duplicate references were removed from the Endnote database, a single researcher reviewed each citation by title and abstract to see if it should be included in the review. After the first reviewer had screened the database, a second researcher reviewed the citations that were deemed ineligible to identify if any potentially relevant articles had been missed.

Humanitarian websites were screened for grey literature and important citations. Grey literature did not always conform to the 'title-abstract' format. Likewise, many websites and internal online search engines did not offer the exporting of citations. In this instance, titles and abstracts were screened online. Those that were relevant were imported into Endnote. The abstract/executive summary was reviewed online in later stages of the review process. In the absence of an abstract, the executive summary or introduction was read. All relevant articles that fitted the selection criteria were selected for data extraction.

Data extraction

A data extraction form was designed and used to collect

information on the following factors: study design and methodology, sample size, country of origin, age of participants, gender, study aim, programme duration, sport or physical activity type and mental health outcome. Two researchers conducted the data extraction process and compared their results. The bibliographies of those selected for full text review were screened to generate additional references if these were missed in the original searches. In the event that multiple publications on a single intervention were identified, one of the publications was excluded but gleaned for information on the study.

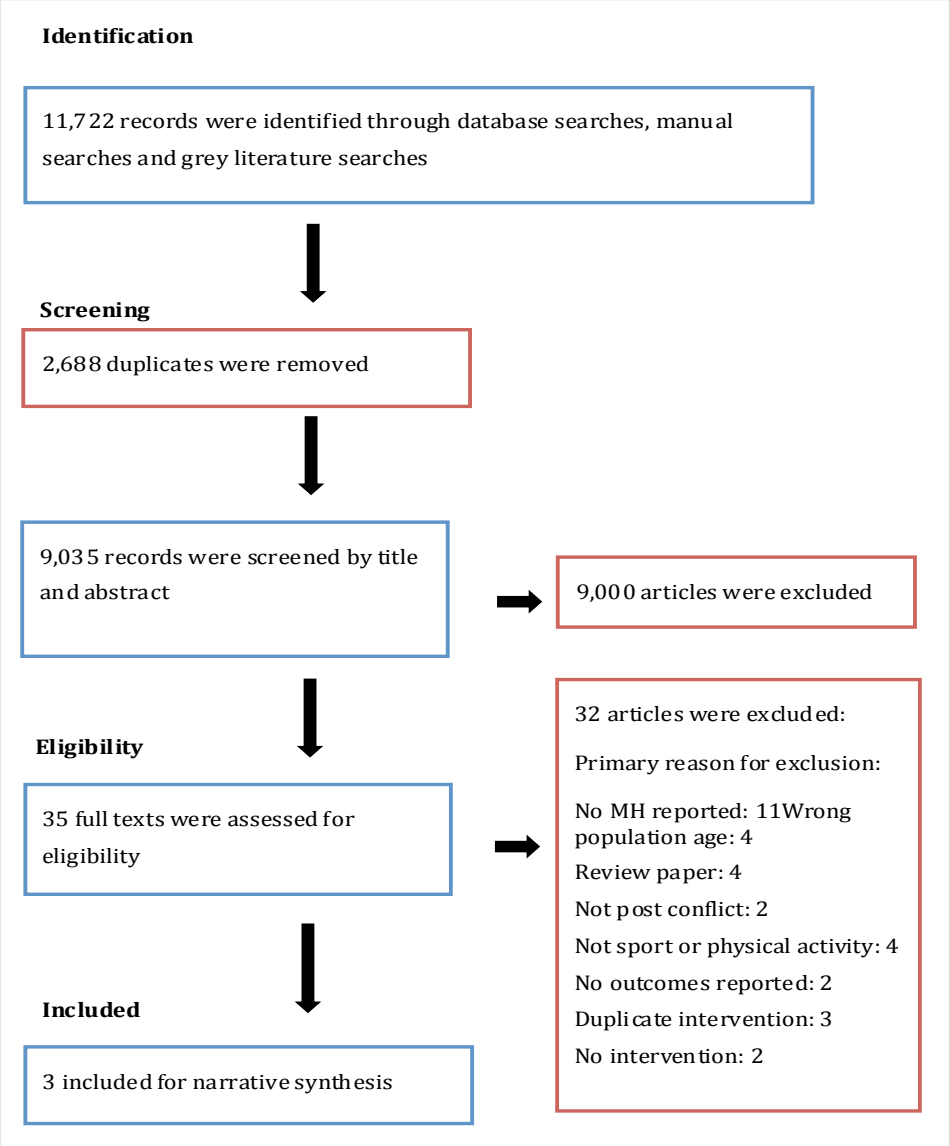
The Effective Public Health Practice Project Tool for Assessing Quantitative Studies' was used to assess studies. [39] Studies were assessed for study design, confounders, blinding, data collection, withdrawals and dropouts. Two researchers assessed the papers for quality and gave each publication a global rating of strong, moderate or weak. There were no disagreements regarding the quality of the included studies. Qualitative studies were assessed according to the National Institute of Health and Clinical Excellence guidelines for quality appraisal of qualitative studies. [40] Due to the heterogeneity of the studies, a meta-analysis was not possible and studies were included in a narrative synthesis.

Results

Results of the search

Figure 1 depicts the flow of citations throughout the study.

Figure 1: *Study's flow diagram*



The searches resulted in a total of 11,722 publications. After removing duplicates, 9035 remained. Of these, 9000 were excluded because they did not meet the inclusion criteria. The majority of articles were irrelevant to the review and did not report a sport or physical activity intervention or any mental health outcome. The full text of 35 studies was examined in greater detail. Three studies met the inclusion criteria and were included for narrative synthesis. [41-43] A list of the excluded studies with reasons for exclusion is available in Appendix 4.

Summary of included studies

A summary of the included studies is in Table 1. The studies are heterogeneous according to design, population and intervention method.

Included studies

Two of the three studies were randomised controlled trials evaluating interventions in Northern Uganda. The third study was a small cohort study assessing the impact of an intervention in Sierra Leone. Three additional publications concerning these projects met the inclusion criteria. [44-46] These publications were read and any additional information on the intervention was extracted for discussion.

Bolton et al conducted a 16-week three-armed randomised controlled trial designed to assess the impact of different interventions for depression-like symptoms among internally displaced adolescents in northern Uganda. [42] Participants in a 'Creative Play' arm of the RCT showed no significant improvement in depression-like symptoms when compared to the wait-list control group (difference in adjusted mean score change -3.90, 95% confidence intervals [-11.7 to 3.37]). There was no significant intervention effect on anxiety like symptoms (d = 0.2) or socially unacceptable behaviours (d = 0.4).

Richards et al (2014) conducted a 12-week three-arm RCT nested in a prospective observational study. [41] Richards reported that depression and anxiety-like symptoms scores deteriorated for boys in the intervention group, whilst the scores in the boys wait list and control groups significantly improved. For the boys, there were significant small effect sizes when comparing the intervention group to the wait-listed (depression-like symptoms: ES = 0.67 [0.33 to 1.00], anxiety-like symptoms: ES = 0.63 [0.30 to 0.96]) and control groups (depression-like symptoms: ES = 0.25 [0.00 to 0.49], anxiety-like symptoms: ES = 0.26 [0.01 to 0.50]). Girls in both groups appeared to experience improvements in anxiety and depression-like symptoms, but this was only significant for non-registered control group (depression-like symptoms p = 0.003, anxiety-like symptoms p <0.001). There were small and non-significant effect sizes when comparing the girls for all between group comparisons.

Harris (2007) evaluated the impact of a Dance and Movement Therapy (DMT) intervention for 12 former child soldiers in Sierra Leone.[43] Semi-structured interviews established baseline functional capacity indicators along with anxiety, aggression and PTSD symptoms. Repeat interviews were carried out at 1, 3, 6 and 12 months after initial intake. The authors report a continued drop in all outcome measures and the development of coping strategies in participants.

Risk of bias

The studies were assessed using the Effective Public Health Practice Project (EPHPP) Tool for Assessing Quantitative Studies'. [39] Richards et al and Bolton et al scored a strong rating and the Harris study scored a weak rating; see table 2 for a breakdown of the scores.

Richards et al and Bolton et al adequately described the method used to generate the allocation sequence. It was not possible to blind participants in these interventions because participation is active. Interviewers and assessors were blinded to participant intervention group and levels of subject retention throughout both RCTs were high, remaining above 80%. There was limited loss-to-follow-up, considering the difficult context.

The Richards et al study did not reach the calculated sample size and it is possible that the sample is non-representative for the outcome of interest. Participants in the Richards et al study were at risk of self-selection bias. As the intervention was sport and physical activity based, it was likely to attract more confident, healthy and fit children than those suffering from mental health issues.[47] In light of this, the external validity of the results is questionable.

Reporting in the Harris study was poor; it is worth noting that this is a rewritten version from a paper presentation; the majority of the details required for calculating an EPHPP score were not reported. The publication made claims that are not supported by any indication to measures, methods, quantitative data or statistical analyses. Further, given the small sample size in this study (n=12), statistical analyses would have been of little value. There was no consideration of confounding variables in the study. The lack of repeat measures, a control group, and consideration of

Table 1: *Summary characteristics of included studies*

Summary of included studies						
Study, country and author	**Target group**	**Sample (n)**	**Screening**	**Design and intervention**	**Measures**	**Outcomes**
Intervention for depressive symptoms among IDPs. Uganda. *Bolton et al 2007*[42]	Adolescents in an IDP camp. Uganda. 14-17 years	n =314 (Psychotherapy: boys = 48, girls = 57; creative play: boys = 47, girls = 58; control: boys =47, girls = 57)	Screened with the Acholi Psychosocial Assessment Instrument (APAI)	Psychotherapy and creative play interventions to improve clinical symptoms. 16 weekly 1.5-2 hour meetings. Sessions lead by paraprofessionals. Three arm RCT: Interpersonal group therapy (IPGT) creative play, wait list control). Creative play intervention aimed to develop resilience and verbal/non-verbal expression through creative activity (sport, drama, games)	APAI	Creative play showed no effect on: 1. Depression score 2. Anxiety score Girls in the IPGT showed significant improvement in depression score. Neither intervention improved conducts or function scores. Loss to follow up: psychotherapy = 10.5%, creative play = 6.66%.
SfD intervention for youth in post-conflict setting. Uganda. *Richards et al 2014*[41]	Able-bodied youth. 11-14	n =1,462 (intervention: boys = 74, girls = 81; wait list: boys = 72; comparison: boys = 472, girls = 763).	Voluntary participation	SfD football intervention: promoting physical fitness, mental health and community peacebuilding. 1.5 hour training session and 40min match for 9 weeks. Delivered by locally trained volunteers. Three-arm RCT nested in Observational study intervention, wait list and control groups. Follow up after four months.	APAI	**Boys**: No significant improvement in fitness A **negative** effect on intervention group depression like syndrome and anxiety like syndrome. **Girls** No significant change in girls for any outcomes. Loss to follow up: Int =1.9%; Wait-list = 1.5%
Dance therapy for adolescent survivors of war. Sierra Leone. *Harris 2007*[43]	Adolescent ex-child soldiers (under the age of 18)	n = 12 male only	Identified through psychological assessment, had involvement in the war, orphaned	Expressing trauma and experiences through dance and movement therapy to promote recovery. Delivered by trained professionals and counselors. Cohort study. Baseline, 1, 3, 6 and 12 month measurements. Symptom assessment through semi-structured interview.	Not specified	Continual drop in: 1. Symptom expression 2. Anxiety 3. Depression 4. Intrusive recollection 5. Arousal Development and implementation of coping strategies.

Table 2: *Summary table of quality assessment of RCTs according to EPHPP. Scoring: 1 = strong, 2 = moderate, 3 = weak*

Study	Selection bias	Study design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating
Richards et al [41]	2	1	1	2	1	1	1
Bolton et al [42]	2	1	1	2	1	1	1
Harris	3	2	3	3	3	3	3

confounding factors mean that observed differences over time may not be as a result of the intervention.

Synthesis of results

The studies are not suitable for meta-analyses and so are presented as a narrative synthesis. The studies vary in size, study design, outcome, population, intervention and context. This, along with the lack of included studies, complicates narrative synthesis and limits the strength of the conclusions that can be drawn.

The result of the creative play intervention was equivocal with no significant positive findings reported in the intervention arm of the study. The Sport for Development intervention by Richards et al, reported a significant negative effect on mental health in boys. In contrast, the results of the DMT intervention were positive and reported large reductions in participant symptom expression, as identified by semi-structured interview. The resounding success of the Harris study among adolescent former soldiers should be read with reservations, given the lack of information about the study. The value in the DMT study is the rich programmatic information provided in the additional publication concerning this study. [46]

In the included studies, gender may have influenced the strength of the intervention effects. This is in accordance with the results of other reviews that indicate the differential effects of sports and psychosocial programmes on girls and boys.[44, 48-50] Given the lack of included studies, it is not possible to make any assertions at this point.

There were notable differences in project implementation and design. Both the creative play intervention and the dance and movement intervention were psychosocial, curative interventions. The SDP intervention set up a competitive sports league that included skills training, even if this was secondary to the health and social goals. Three paraprofessional psychosocial counsellors delivered the dance intervention in conjunction with a professional DMT counsellor, while the two RCT interventions were delivered by paraprofessionals who had received limited training in relation to mental health. Furthermore, the DMT intervention took place over the course of 28 weeks, markedly longer than either of the other interventions. Perhaps most notable is the difference in group size between the interventions: the DMT intervention consisted of a total of 12 participants and 4 staff while the other interventions were much larger. Given the shortage of included publications, it is not possible to draw any conclusion regarding the impact of design and intervention implementation on the outcomes of interest.

A notable strength of the two RCT studies was the use of a locally developed and validated mental health assessment tool. There is debate as to the validity of using Western psychological assessment tools in different cultural settings. [51]

Discussion and comment

The principal finding in this review fails to support the broad claims of the positive effect of sport and physical activity programmes on the mental health of conflict-affected youth. [26, 52] The paucity of available high-quality information and the heterogeneity of intervention methods in this review mean that it is not possible to draw a firm conclusion either way at this time. The field of psychosocial assistance is broad; within it, actors implement related but different programme and intervention models. Sport and games are often involved in psychosocial interventions, but are not described in detail or clearly reported. [53, 54]

Neither the creative play intervention nor the sport for development intervention had a significant positive impact on participants' depression-like symptoms or anxiety-like symptoms when compared to wait-list or control groups. The studies assessing these outcomes were of good quality, suggesting a limited role for sports and physical activity in the reduction of anxiety or depression like symptoms in this context. The Harris study reports significant reductions in all outcomes measured, but the quality of the reporting is too poor to critically assess these claims.

Several publications have been published that review the field of psychosocial assistance for young people in post-war zones. [24, 52, 55-57] Typically, systematic reviews have not attempted to isolate the impact of one particular intervention method, rather addressing the field of psychosocial assistance at-large. [49, 50, 58] There are common problems highlighted by these publications, citing a shortage of evidence, small effect sizes and a lack of treatment modality research.[59]

Two of the three studies are of good methodological quality. Due to the reporting, it was not possible to assess the quality of the DMT intervention as no information about study design or outcome measures was provided. This illustrates a weakness in the SDP field at-large, in which the majority of evaluations are of poor design and typically implement pre-post methodologies without control populations.[28, 60] There

are notable exceptions to this, but these tend to be clinical studies in different areas, focusing on classroom-based interventions as opposed to physical activity and sport-based methods.[53, 54, 61]

The findings of this study support those of other reviews assessing mental health interventions for adolescents.[58, 62] Gendered differences may be important to consider in future programme designs. Similarly, previous publications have shown age to be an important moderator variable. [48] There were insufficient participant numbers in the studies included in this systematic review to independently examine the impact of gender or age on outcomes.

Post-conflict contexts are a difficult setting in which to conduct high-quality research. They are often characterised by instability, a lack of security and human resources and limited infrastructure.[63] Participant recruitment, engagement and tracking can be difficult in such settings. This can impede the development and management of evaluations and complicate long-term analyses. Formative and process evaluations are crucial as they help ensure the success of an intervention and provide valuable learning lessons for future practice. Formative evaluation should involve the pre-testing and adaptation of methods to ensure their cultural appropriateness and feasibility in the specific research context.

Best practice advice encourages both interventions and associated evaluations to be long-term to observe intervention effects over time.[56] Nesting studies in more permanent structures, such as schools, enables the tracking of participants over time for repeat measures to strengthen study designs and the evidence base. This practice is common in the field of psychosocial assistance. [48, 53, 61, 64] There is a lack of process evaluation and treatment mechanisms research in the included studies. Richards et al briefly elude to a process evaluation, but the results and insights of this are elementary and reported elsewhere.[65] Process evaluation is essential for identifying the 'active' components of the interventions, a key finding for practitioners. This is indicative of the field at large, in which research is typically 'impact'-oriented rather than process-oriented. This may be a product of asymmetrical donor-recipient relationships, in which donor preferences typically prevail. [66]

Limitations

The study could be criticised on its strict inclusion criteria. There are many borderline publications from which useful methodological information could be gleaned. [49, 59, 64] More lenient inclusion criteria may have affected the results of the review, as non-included studies reported improvements in participants' mental health. We did not contact authors, researchers and interventionists to request relevant literature in this systematic review. As a result, we may have missed important publications reporting the impact of SDP programmes on mental health.

There was significant difficulty in identifying the 'dose' of sport that individuals received, resulting in borderline publications that may have been informative being left out. The lack of good-quality evidence meant that the independent impact of sport or physical activity on mental health in post-conflict LMICs could not be identified from this review. Further, the results of this review are skewed geographically and by gender towards Ugandan, male youth. This may limit the generalizability of the review's findings. It does, however, provide useful reflection on the state of the SFD field at large.

Future recommendations

Despite the international furore surrounding the use of sport for assisting conflict-affected populations, there still exists a dearth of convincing evidence of its efficacy as a mental health intervention. Reviews of SDP evidence and best practice guidelines have been published in grey and academic literature. The contents of these review publications need to filter down into practice and be systematically tested. The role of sport in psychosocial assistance is unclear. Certain programmes implement sporting elements, but rarely is the sporting component measured effectively or in detail.

Currently, the majority of SDP evaluations are ad hoc and poorly designed. The SDP evidence base would benefit from more detailed investigations of how intended intervention effects are achieved and maintained over time. Such evaluations will allow the identification of the 'active' elements of programmes that can be bolstered and developed. However, in order for this to happen, investment in evaluation is needed at all stages: formative, process and impact. [67]

Given the results of many psychosocial interventions and reviews, there is a need to examine the differential effects of interventions on children across gender and age groups. Researchers should draw on the successes of other sectors to inform the design and evaluations of sports-based interventions. Sport and physical activity may be an

important tool for social development in post-conflict settings. Many organisations are implementing socially minded sports programmes that were not included in this study. It was not within the scope of this review to assess the broader social outcomes of sports programmes, but the results of such a review would be of considerable academic and practical interest.

In this review, of note is the use of locally validated mental health assessments to evaluate programme impacts in northern Uganda. Improved measurement tools with good psychometric properties that are culturally acceptable may help improve future longitudinal research. Additionally, the use of locally validated tools means that the results are useful for local stakeholders and may capture local idioms of distress more effectively than international mental health assessment tools. [51] It is worth noting that while potentially improving local relevance of studies, the use of emic mental health measures limits the external validity of results.

In summary, there is a shortage of contextually relevant information for sport in the assistance of conflict-affected populations. Future investment in evaluation and research in the area should aim to identify the mechanisms and processes behind the intended impact of interventions to ensure the efficient and effective use of finite resources in challenging settings.

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Appendices

Appendix 1: PRISMA Checklist

#	Section/topic	Checklist item	Reported on page
		TITLE	
1	Title	Identify the report as a systematic review, meta-analysis, or both.	1
		ABSTRACT	
2	Structured summary	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
		INTRODUCTION	
3	Rationale	Describe the rationale for the review in the context of what is already known.	3
4	Objectives	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
		METHODS	
5	Protocol and registration	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4
6	Eligibility criteria	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4
7	Information sources	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	5
8	Search	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	23
9	Study selection	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
10	Data collection process	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
11	Data items	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	5
12	Risk of bias in individual studies	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5
13	Summary measures	State the principal summary measures (e.g., risk ratio, difference in means).	N/A
14	Synthesis of results	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	N/A
15	Risk of bias across studies	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A

Appendix 1: PRISMA Checklist *continued*

14	Synthesis of results	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each meta-analysis.	N/A
15	Risk of bias across studies	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	N/A
16	Additional analysis	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A
RESULTS			
17	Study selection	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	6
18	Study characteristics	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	8
19	Risk of bias within studies	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	9
20	Risk of bias within individual studies	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	10
21	Synthesis of results	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	12
22	Risk of bias across studies	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
23	Additional analysis	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
24	Summary of evidence	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers)	14
25	Limitations	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	15
26	Conclusions	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	14-16
FUNDING			
27		Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	1

Appendix 2: Database search terms

Database Search

The following databases were searched: "Ovid", "EBSCOHost", "Dissertation Abstracts", "Applied Social Sciences Index and Abstracts" (ASSIA), "Cochrane Controlled Trial Register", "Education Resources Information Centre" (ERIC), "Institute of Development Studies" (accessed via OpenDocs), "International Bibliography of the Social Sciences", "Latin American and Caribbean Health Sciences Literature" (LILACS), "Medicins Sans Frontieres Field Research", "Web of Science".

Manual searches

"African Journal of Physical, Health Education, Recreation and Dance", "European Journal of Sport and Society", "International Journal of Sport and Society", "International Review of the Sociology of Sport", "Journal of Sport for Development", "Journal of Sport and Health Research", "Journal of Sport and Social Issues", "South African Journal for Research in Sport, Physical Education and Recreation", "Sport, Education and Society", "Sport in Society: culture, comment, media and politics", "Intervention", "Journal of Health and Sports Science and Child and Adolescent Mental Health".

List of Humanitarian and Grey Literature websites searched

- http://www.cadth.ca/en/resources/finding-evidence-is/grey-matters
- http://www.opengrey.eu/ (SIGLE)
- www.opendoar.org
- http://ssrn.com/
- Web Of Science Conference Proceedings Search
- National Registry of Evidence based programmes and practices
- PROSPERO
- WHO ICTR
- Forced Migration Online
- WHO
- UNICEF
- [UNHCR]
- International Platform of Sport for Development and Peace
- ReliefWeb
- United Nations Development Program (UNDP)
- United Nations Office on Sport for Development and Peace (UNOSDP)
- Right to Play
- Swiss Academy For Development

Appendix 3: Systematic review search terms

POP	[ADOLESCENT]	adolescen*, teen*, youth*, young people, boy, child*, college*, girl*, juvenile*, kid, kids, pube*, school*, student*, young male*, young female*, young person, young men, young people, youngster*, young women
	[CONTEXT – POST CONFLICT]	conflict* OR post-conflict OR peace OR post-war OR conflict affected OR conflict induced OR internally displaced OR displaced persons
INT	[SPORT FOR PEACE]	sport* OR football OR hockey OR tennis OR cricket OR athletics OR rugby OR tag rugby OR swimming OR volleyball OR netball OR basketball OR dodgeball OR boxing OR martial arts OR dance OR baseball OR softball OR rounders OR physical activity OR physical exercise OR recreation OR play OR run OR running
COMP	Any comparator	No search terms included
OUT	Any mental health outcome	No search terms included

Appendix 4: List of excluded studies

Author	Year	Title	Primary reason for exclusion
Adeniyi, A.F., Okafor, N. C. and Adeniyi, C.Y	2011	Depression and physical activity in a sample of Nigerian adolescents: Levels, relationships and predictors	No intervention
Ager, A., Akesson, B., Stark, L., Flouri, E., Okot, B., McCollister, F. and Boothby, N.	2011	The impact of the school-based Psychosocial Structured Activities (PSSA) program on conflict-affected children in Northern Uganda	Population too young
Betancourt, T. S., Meyers-Okhi, S. E., Charrow, A.P., and Tol, W. A.	2013	Interventions for children affected by war: An ecological perspective on psychosocial support and mental health care	Review paper
Betancourt, T. S., Newnham, E. A., Brennan, R. T. Verdeli, H., Borisova, I.Neugebauer, R., Bass, J., Bolton, P.	2012	Moderators of treatment effectiveness for war-affected youth with depression in northern Uganda	Duplicate study
de Jong, K., Prosser, S., Ford, N.	2005	Addressing psychosocial needs in the aftermath of the tsunami	No sport or PA reported
Dyck, C. B.	2011	Football and post-war reintegration: exploring the role of sport in DDR processes in Sierra Leone	No MH reported
Gupta, L., Zimmer, C.	2008	Psychosocial interventions for war-affected children in Sierra Leone	No sport reported
Harris, D.A	2007	Pathways to embodied empathy and reconciliation after atrocity: Former boy soldiers in a dance/movement therapy group in Sierra Leone	Duplicate study
Henley, R.	2005	Helping children overcome disaster trauma through post-emergency psychosocial sports programs: a working paper.	No outcomes reported.
Henley, R., Schweizer, I., de Gara, F., Vetter, S.	2007	How Psychosocial Sport and Play Programs Help Youth Manage Adversity: A Review.	No MH reported
Jordans, M. J. D., Tol, W. A., Komproe, I. H., De Jong J.V.T.M	2009	Systematic Review of the evidence and treatment approaches: psychosocial and mental health care for children in war.	Review paper
Kalksma-Van Lith, B	2007	Psychosocial interventions for children in war-affected areas: the state of the art.	Review paper
Kartakoullis, N. L., Karlis, G., Loizou, C., Lyras, A.	2009	Utilizing sport to build trust-The case of Cyprus.	No MH outcome reported
Kay, T., Dudfield, O.	2013	The Commonwealth guide to advancing development through sport.	No MH outcomes reported
Kunz, V.	2009	Sport as a post-disaster psychosocial intervention in Bam, Iran	Population too young

Appendix 4: List of excluded studies *continued*

Lawrence, S., De Silva, M., Henley, R.	2010	Sports and games for post-traumatic stress disorder (PTSD)	Not post-conflict context
Levy, F. J., Ranjbar, A., Dean, C. H.	2006	Dance Movement as a Way to Help Children Affected by War	Review, No MH outcomes reported
Ley, C., Rato-Barrio, M	2010	Movement, games and sport in psychosocial intervention: a critical discussion of its potential and limitations within cooperation for development	No MH outcomes reported
Loughry, M., Ager, A., Flouri, E., Khamis, V., Afana, A. H., Qouta, S.	2006	The impact of structured activities among Palestinian children in a time of conflict	Population too young
Lubans, D. R., Plotnikoff, R. C., Lubans, N. J.	2012	Review: A systematic review of the impact of physical activity programs on social and emotional well-being in at-risk youth	Not post-conflict context
Lyras, A	2007	Characteristics and psycho-social impacts of an inter-ethnic educational sport initiative on Greek and Turkish Cypriot youth	No MH outcomes reported
Biermann. M	2011	Claims and effects of sport-in-development project - A state of the art analysis	Review paper
Massao, B. P.,Straume, S.	2011	Urban Youth and Sport for Development	No MH reported
Patel, V., Araya, R., Chatterjee, S., Chisholm, D., Cohen, A., De Silva, M., Hosman, C. McGuire, H., Rojas, G.,van Ommeren, M.	2007	Treatment and prevention of mental disorders in low-income and middle-income countries	No sport or physical activity mentioned
Pink, M., Butcher, J. and Peters, C	2011	Psychological perspectives on development in and through community sport: The future in youth Soccer project, Bacau, East Timor	Supplement piece, no data reported
Purgato, M., Gross, Alden L., Jordans, M. J. D. De Jong, J., Barbui, C., Tol, W. A.	2014	Psychosocial interventions for children exposed to traumatic events in low- and middle-income countries: study protocol of an individual patient data meta-analysis	Proposed project, no outcome data reported
Richards, J.	2011	Evaluating the impact of a sport-for-development intervention on the physical and mental health of young adolescents in Gulu, Uganda-a post-conflict setting within a low-income country	Duplicate study
Sport for Development and Peace International Working Group	2008	Harnessing the Power of Sport for Development and Peace: Recommendations to Governments	No MH outcomes reported
Steyn, B.J.M., Roux, S	2009	Aggression and psychosocial well-being of adolescent taekwondo participants in comparison with hockey participants and a non-sport group	Cross sectional study

Appendix 4: List of excluded studies *continued*

Sugden, J	2010	Critical left-realism and sport interventions in divided societies	No MH outcomes reported
Van Hout, R.C.H., Young, M.E.M., Basset, S.H., Hooft, T	2013	Participation in sport and the perceptions of quality of life of high school learners in the Theewaterskloof Municipality, South Africa	Population too old
Zakus, D., Njelesani, D., Darnell, S	2007	The Use of Sport and Physical Activity to Achieve Health Objectives	No MH outcomes reported / Review paper