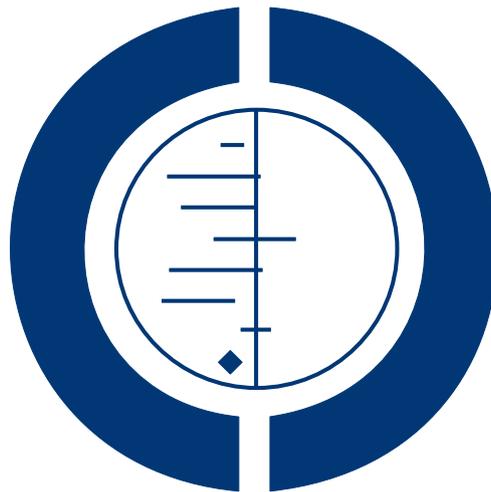


Sports and games for post-traumatic stress disorder (PTSD) (Review)

Lawrence S, De Silva M, Henley R



**THE COCHRANE
COLLABORATION®**

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2010, Issue 1

<http://www.thecochranelibrary.com>

WILEY

TABLE OF CONTENTS

HEADER	1
ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
BACKGROUND	2
OBJECTIVES	3
METHODS	3
RESULTS	5
DISCUSSION	5
AUTHORS' CONCLUSIONS	5
ACKNOWLEDGEMENTS	5
REFERENCES	6
CHARACTERISTICS OF STUDIES	8
DATA AND ANALYSES	10
APPENDICES	10
HISTORY	11
CONTRIBUTIONS OF AUTHORS	11
DECLARATIONS OF INTEREST	12
SOURCES OF SUPPORT	12
DIFFERENCES BETWEEN PROTOCOL AND REVIEW	12
INDEX TERMS	12

[Intervention Review]

Sports and games for post-traumatic stress disorder (PTSD)

Sue Lawrence¹, Mary De Silva², Robert Henley³

¹c/o Lifespan Research Group, Royal Holloway, University of London, London, UK. ²Nutrition & Public Health Intervention Research Unit, London School of Hygiene & Tropical Medicine, London, UK. ³Center for Disaster and Military Psychiatry, University of Zurich, Zurich, Switzerland

Contact address: Sue Lawrence, c/o Lifespan Research Group, Royal Holloway, University of London, 11 Bedford Square, London, WC1B 3RF, UK. sue.lawrence@lshtm.ac.uk. lawsue@googlegmail.com.

Editorial group: Cochrane Depression, Anxiety and Neurosis Group.

Publication status and date: New, published in Issue 1, 2010.

Review content assessed as up-to-date: 15 June 2008.

Citation: Lawrence S, De Silva M, Henley R. Sports and games for post-traumatic stress disorder (PTSD). *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD007171. DOI: 10.1002/14651858.CD007171.pub2.

Copyright © 2010 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

ABSTRACT

Background

Traumatic experiences evoke emotions such as fear, anxiety and distress and may encourage avoidance of similar situations in the future. For a proportion of those exposed to a traumatic event, this emotional reaction becomes uncontrollable and can develop into Post Traumatic Stress Disorder (PTSD) (Breslau 2001). Most of those diagnosed with PTSD fully recover while a small proportion develop a chronic PTSD a year after the event (First 2004). Sports and games may be able to alleviate symptoms of PTSD.

Objectives

Primary objective:

1. To assess the effectiveness of sports, and games in alleviating and/or diminishing the symptoms of PTSD when compared to usual care or other interventions.

Secondary objective:

2. To assess the effectiveness of different types of sports and games in alleviating and/or diminishing symptoms of PTSD.

Search methods

The Cochrane Collaboration Depression, Anxiety and Neurosis Controlled Trials Registers (CCDAN-CTR) were searched up to June 2008.

The following databases were searched up to June 2008: the Cochrane Central registry of Controlled Trials; MEDLINE; EMBASE; CINAHL; PsycINFO. Reference lists of relevant papers were searched and experts in the field were contacted to determine if other studies were available.

Selection criteria

To be included, participants had to be diagnosed with PTSD using criteria outlined in the Diagnostic and Statistical Manual for Mental Disorders (DSM IV) and/or ICD criteria. Randomised controlled trials (RCTs) that considered one or more well-specified sports or games for alleviating and/or diminishing symptoms of PTSD were included.

Sports, and games were defined as any organized physical activity done alone or with a group and non-physical activities such as computer games and card games done alone or with a group. Psychological interventions such as music therapy, art therapy and play therapy and behavioural therapy were excluded.

Data collection and analysis

Two reviewers (SL and MD) separately checked the titles and abstracts of the search results to determine which studies met the pre-determined inclusion criteria. A flow chart was used to guide the selection process. No studies met the inclusion criteria.

Main results

The search strategy identified five papers but none of the studies met inclusion criteria.

Authors' conclusions

No studies met the inclusion criteria. More research is therefore required before a fair assessment can be made of the effectiveness of sports and games in alleviating symptoms of PTSD.

PLAIN LANGUAGE SUMMARY

Sports and games for post-traumatic stress disorder

Traumatic events evoke strong feelings of fear, helplessness and anxiety. Many who experience a traumatic event overcome these strong emotions however a proportion does not and the emotional reaction may progress into Post-Traumatic Stress Disorder (PTSD). Pharmacological and psychological interventions are well known treatments for PTSD but little is known of the use of sports and games for the treatment of PTSD. This review sought to examine studies using sports and games to alleviate symptoms of PTSD.

No studies met the inclusion criteria.

BACKGROUND

Description of the condition

Traumatic experiences evoke emotions such as fear, anxiety and distress and serve to embed the incident in the memory and encourage avoidance of similar situations in the future. For a proportion of those exposed to a traumatic event, this emotional reaction becomes uncontrollable and can progress into post-traumatic stress disorder (PTSD) (Breslau 2001). PTSD symptoms include involuntary re-experiencing trauma (e.g. nightmares), physiological hyper-reactivity (e.g. sleep difficulties, irritability) and emotional numbing (Foa 1997; First 2004). The natural course of PTSD varies. Most of those diagnosed with PTSD fully recover while a small proportion (7 to 10%) (Kessler 1995; De Jong 2003; Kleber 1992) develop chronic PTSD a year after the event (First 2004). PTSD can be debilitating with long term impairments affecting the individual, their family, and society (Mezey 2001).

The significant proportion of people exposed to traumatic incidents and the subsequent high prevalence rates of PTSD means that PTSD is a major concern for public health. In a population survey in the United States, 60.7% of men and 51.2% of women reported experiencing a traumatic event in their lifetime (such as

witnessing someone being badly injured or killed, experiencing a flood, fire, a life threatening accident, rape or sexual assault). Within this group 7.8% had a lifetime prevalence of PTSD, with women being twice as likely to develop symptoms of PTSD as men (Kessler 1995; Kessler 2005).

Recovery from trauma is associated with the re-establishment of daily patterns of living that supply structure and support such as participation in work, school and community activities (WHO 2003; Amtson 2004). PTSD is most often treated with pharmacological and psychotherapeutic interventions. Pharmacological treatment of PTSD using selective serotonin reuptake inhibitors (SSRIs) seems to be effective in alleviating core symptoms of PTSD (Stein 2006). Psychological interventions include debriefing, cognitive behaviour therapy (CBT), group therapy, school based programs (Akhundov 1999; Ehrenreich 2001; Adler 2005; Gillies 2007) and community based interventions (Amtson 2004). These treatments vary in their effectiveness. While group and individual CBT and stress management therapy appear to be effective in treating PTSD (Bisson 2007), single session debriefing has not been found to reduce the risk of developing PTSD (Rose 2002). A recent review by Roberts et al. disputes effectiveness of the routine use of multiple session psychological interventions in preventing PTSD (Roberts 2009). The effectiveness of school and commu-

nity based interventions for the treatment of PTSD has not been systematically evaluated (Amaya-Jackson 2003; Jordans 2009).

Description of the intervention

Sports and games include any type of recreational activity undertaken individually or within a group. Such interventions may include activities such as athletics, yoga and non-physical activities such as computer games. Sports and games may be an effective way of treating PTSD. The use of sport as an intervention has received much attention (United Nations 2005). In non-randomised controlled studies, physical activity programs are associated with improved self-image (Kircaldy 2002), prevention of eating disorders (Elliot 2004), fewer symptoms of depression and anxiety (Pastor 2003; Salmon 2001) and decreased substance abuse (Elliot 2004; Moore 2005). In relation to PTSD, involvement in exercise programs has been associated with lowering PTSD symptoms (Manger 2005; Newman 2007). In post-conflict settings, sport has been reported to improve confidence, body image (Child Traumatic 2003), and to foster communication and attachment to positive role models (Guest 2005; Henley 2005).

How the intervention might work

Sports and games may be able to alleviate symptoms of PTSD and improve mood and confidence. Sports and games may help build self-confidence, self discipline, body awareness, teamwork and communication skills (Meier 2005).

Why it is important to do this review

Those suffering from PTSD may suffer from long term mental and/or physical disability (Foa 1997; Mezey 2001). This is the first systematic review to consider the effectiveness of sports and games for the treatment of PTSD. Moreover, these interventions can be implemented with minimal resources making it a viable option for resource poor areas. Effective pharmacological or psychological interventions can be expensive and therefore, out of reach for some populations.

OBJECTIVES

Primary Objective

1. To assess the effectiveness of sports and games in alleviating the symptoms of PTSD when compared to usual care or other interventions (e.g. pharmacological or psychological therapy interventions).

Secondary Objective:

2. To assess the effectiveness of different types of sports and games in alleviating and/or diminishing symptoms of PTSD.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised controlled trials that considered one or more sports or games for the treatment of PTSD were eligible for inclusion. It was planned to include crossover trials, cluster randomised trials and factorial trials, if identified. Non-randomised intervention studies were excluded.

Types of participants

Participants who have been diagnosed with Post Traumatic Stress Disorder using criteria outlined in the Diagnostic and Statistical Manual for Mental Disorder (DSM IV) and ICD criteria. The precipitating event to the diagnosis of PTSD is not important for inclusion. Age was not a criteria for inclusion, but if included studies covered different age groups, sub group analyses were planned for the following groups: children/adolescents (0 to 18 years of age) and adults (19 years of age and older) .

Types of interventions

Included interventions

Sport interventions are defined as any intervention which focuses on an organised physical activity done alone or with a group. Such interventions include competitive and non-competitive sports and games. We define physical activity as any movement involving large skeletal muscles. Sport is 'all forms of physical activity that contribute to physical fitness, mental well-being and social interaction. These include recreational, organised, casual or competitive sport, and indigenous sports or games' (UN inter-agency 2005). Games are defined as activities that may have rules and are undertaken for amusement e.g. computer games, board games (Creek 2008). Art, music or play therapy are excluded as they are considered psychological interventions.

Interventions could be administered by health professionals, teachers, coaches, community leaders or any other lay person. They could be administered in any form such as one on one (e.g. running with guidance by coach, yoga) group activities (e.g. football) or by written instructions (e.g. computer or video games with written instructions) and be of any duration or frequency.

Excluded interventions

Trials were excluded on the basis of the intervention if:

1. The intervention was complex and included pharmacological, biological and social components, and the results were not presented separately for the effect of the sports or game component of the intervention.
2. The intervention was aimed at the prevention rather than treatment of PTSD.

Sports and games were compared with:

1. usual care
2. pharmacological interventions
3. psychosocial interventions e.g. individual counselling, group therapy, or CBT.

Types of outcome measures

Primary outcomes

1. Change in PTSD symptoms as determined by a standardised structured interview or scale (e.g. the clinician administered PTSD Scale) or by self or observer report of PTSD symptoms using standardised questionnaires (e.g. the Child PTSD symptoms scale or the Impact of Events Scale).

Secondary outcomes

1. Self-report of anxiety and/or depression measured using validated instruments (e.g. the Beck Depression Inventory).
2. Global assessment of functioning including quality of life and physical and social functioning, measured using validated instruments (e.g. the Sheehan Disability Scale).
3. Self or observer report of PTSD symptoms using non-standardised questionnaires.

Outcome measures will not form part of the search or inclusion criteria for the review.

Search methods for identification of studies

Electronic searches

In June 2008 the Cochrane Collaboration Depression, Anxiety and Neurosis (CCDAN) Controlled Trials Registers were searched. CCDAN maintains two clinical trials registers at their editorial base in Bristol, UK. A references register containing reports of trials and a studies based register where these reports have been tagged to individual, coded studies. The CCDAN-CTR Registers are routinely updated through generic searches of MEDLINE, EMBASE, PsycINFO, PSYINDEX, LILACS, AMED, CINAHL, the Cochrane Central Register of Controlled Trials

(CENTRAL), international trials registers and other relevant resources.

Details of the generic search strategies can be found in the 'Specialized Register' section of the [Cochrane Depression, Anxiety and Neurosis Group's module text](#).

The CCDAN-CTR-Studies Register was searched using the following search terms:

Diagnosis = "Post-Traumatic Stress Disorders" and Intervention = art or sport* or music or exercise and not Notes = prevent*

The CCDAN-CTR-References Register was searched using the following free-text terms:

debrief* or "crisis intervention*" or "trauma* stress" or "trauma* event" or catastroph* or emergenc*

In addition, in June 2008 authors undertook broad searches of the following databases: MEDLINE, CENTRAL (the Cochrane Register of Controlled Trials), EMBASE, PsycInfo and CINAHL.

These searches involved the use of key terms for:

PTSD AND adolescents

PTSD AND sports

PTSD AND games

PTSD AND exercise

Searching other resources

Reference lists of relevant papers were scanned and experts in the field contacted to identify any additional published or unpublished trials.

Data collection and analysis

Selection of studies

Two review authors (SL and MDS) independently checked the titles and abstracts of the citations identified by the search to determine whether each study met the pre-determined inclusion criteria. A flow chart was used to guide the selection process. In case of doubt or disagreement, the full article was obtained for inspection. Full texts of all potentially relevant studies were obtained and independently assessed to determine whether they met inclusion criteria. None of the potential studies met inclusion criteria.

Assessment of risk of bias in included studies

No studies were identified for the current version of this review. Updates will be performed using methods described in the original protocol (see [Appendix 1](#)) with the exception of 'Assessment of risk of bias in included studies'. In a change to the published protocol for this review, those identified in future updates will be assessed for potential risk of bias using the Cochrane Collaboration's tool for assessing risk of bias, described in the Cochrane Handbook ([Higgins 2008a](#); [Higgins 2008b](#)).

Subgroup analysis and investigation of heterogeneity

See [Appendix 1](#). A post protocol change has been made and planned subgroups reduced.

RESULTS

Description of studies

See: [Characteristics of excluded studies](#).

No eligible studies were identified. See [Characteristics of excluded studies](#).

Excluded studies

Three studies were excluded as they were not randomised controlled trials ([Shelby 1994](#); [Volker 1997](#); [Walker 1983](#)). Two studies were play-therapy based, which is considered a psychological intervention and thus were excluded ([Chapman 2001](#); [Schreier 2005](#)) (see [Characteristics of excluded studies](#)).

Risk of bias in included studies

No studies identified met inclusion criteria.

Effects of interventions

No studies identified met inclusion criteria.

DISCUSSION

This review examines if sports and games help to alleviate symptoms of PTSD. The search identified five studies, none of which met the inclusion criteria. Currently, there are no randomly controlled trials comparing the effectiveness of interventions that utilise sports and games to alleviate PTSD symptoms. This is despite the growing number of organizations that are delivering a variety of sport and game programs to traumatised populations

([Akhundov 1999](#); [Bolton 2007](#); [Amtson 2004](#); [Gschwend 2007](#); [Jordans 2009](#); [Kunz 2007](#); [Henley 2005](#); [USAID 2007](#)). The financial, logistical and technical resources required for randomised evaluations of such programs may have precluded such evaluations to date. However, such evaluations are critical so that we can consider offering a wider scope of interventions than that currently offered by traditional trauma-related disciplines.

Summary of main results

The purpose of this review was to determine if sports and games improve symptoms of PTSD. No studies were included in this review.

AUTHORS' CONCLUSIONS

Implications for practice

Suggestions for practice cannot be made, in view of the lack of evidence.

Implications for research

Randomised controlled trials assessing the effect of sport and game interventions are needed to inform the current practice of using sports and games to improve symptoms of PTSD.

ACKNOWLEDGEMENTS

Sue Lawrence is supported by the Thomas Holloway award through Royal Holloway, University of London and One 2 One Children's Fund.

Mary De Silva is supported by an ESRC/MRC Interdisciplinary Post Doctoral Fellowship.

Robert Henly is supported by the University of Zurich, Switzerland.

The authors wish to thank the reviewers for their extensive and very helpful comments and the CCDAN editorial team for their support throughout the review process.

REFERENCES

References to studies excluded from this review

Chapman 2001 {*published data only*}

Chapman L, Morabito D, Ladakakos C, Schreier H, Knudson MM. The effectiveness of art therapy interventions in reducing post traumatic stress disorder (PTSD) symptoms in pediatric trauma patients. *Art Therapy* 2001;**18**(2): 100–4.

Lyshak-Stelzer 2007 {*published data only*}

Lyshak-Stelzer F, Singer P, St. John P, Chemtob CM. Art therapy for adolescents with posttraumatic stress disorder symptoms: a pilot study. *Art Therapy* 2007;**24**(4):163–9.

Schreier 2005 {*published data only*}

Schreier H, Ladakados C, Morabito D, Chapman L, Knudson M. Posttraumatic stress symptoms in children after mild to moderate pediatric trauma: a longitudinal examination of symptom prevalence, correlates, and parent-child symptom reporting. *Journal of Trauma Injury, Infection, and Critical Care* 2005;**58**(2):353–63.

Shelby 1994 {*unpublished data only*}

Shelby JS. *Crisis intervention with children following Hurricane Andrew: A comparison of two treatment approaches [PhD]*. Miami FL: University of Miami, 1994.

Volker 1997 {*unpublished data only*}

* Volker CA. *Treatment of sexual assault survivors utilizing cognitive therapy and art therapy [PhD]*. San Francisco: California Institute of Integral Studies, 1997.

Walker 1983 {*published data only*}

* Walker JI. Comparison of 'rap' groups with traditional group therapy in the treatment of Vietnam combat veterans. *Group* 1983;**7**(3):48–57.

Additional references

Adler 2005

Adler N, Manassis K. Psychosocial treatment of pediatric posttraumatic stress disorder: the neglected field of single-incident trauma. *Depression and Anxiety* 2005;**22**(4): 177–89.

Akhundov 1999

Akhundov N. Psychosocial rehabilitation of IDP children: using theatre, art, music and sport. *Forced Migration Review* 1999;**6**(December):www.fmreview.org/text/FMR/06/06.htm.

Amaya-Jackson 2003

Amaya-Jackson L, Reynolds V, Murray M, Nelson A, Cherney M, Lee R, Foa E, March J. CBT for pediatric PTSD: protocol for application in school and community based settings. *Cognitive and Behavioral Practice* 2003;**10**: 204–213.

Amtson 2004

Amtson L, Knudsen C. Psychosocial care and protection of children in emergencies: A field guide. Save the Children report 2004.

Bisson 2007

Bisson J, Andrew M. Psychological treatment of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews* 2007, Issue 3. [DOI: 10.1002/14651858.CD003388.pub3]

Bolton 2007

Bolton P, Bass J, Betancourt T. Interventions for depression symptoms among adolescent survivors of war and displacement in Northern Uganda. *JAMA* 2007;**298**(5): 519–27.

Breslau 2001

Breslau N. The epidemiology of posttraumatic stress disorder: what is the extent of the problem?. *Journal of Clinical Psychiatry* 2001;**62** Suppl(17):16–22.

Child Traumatic 2003

National Child Traumatic Stress Network. Review of Child and Adolescent Refugee Mental Health. National Child Traumatic Stress Network www.NCTSN.org Vol. 40.

Creek 2008

Creek J, Lougher L (editors). *Occupational Therapy and mental health*. 4. Philadelphia: Churchill Livingstone and Elsevier Health Sciences, 2008.

De Jong 2003

De Jong J, Kleber R. Early psychosocial interventions for war-affected populations. In: Orner, R, Schnyder U editor(s). *Reconstructing Early Intervention After Trauma. Innovations in the Care of Survivors..* Oxford: Oxford University Press, 2003:184–192.

Ehrenreich 2001

Ehrenreich J, McQuaide S. *Coping with Disasters: A guidebook to psychosocial intervention*. New York, NY: State University of New York, 2001.

Elliot 2004

Elliot DL, Goldberg L, Moe EL, Defrancesco CA, Durham MB, Hix-Small H. Preventing substance use and disordered eating: initial outcomes of the ATHENA (athletes targeting exercise and nutrition alternatives) program. *Archives of Pediatric and Adolescent Medicine* 2004;**158**(11):1043–9.

First 2004

First M, Tasman A. *DSM-IV-TR-Mental Disorders: Diagnosis, Etiology and Treatment*. Chichester: John Wiley and Sons, 2004.

Foa 1997

Foa E, Meadows E. Psychosocial treatments for post traumatic stress disorder: a critical review. *Annual Review of Psychology* 1997;**48**:449–80.

Gillies 2007

Gillies D, O'Brien L, Rogers P, Meekings C. Psychological therapies and treatment of PTSD in children and adolescents. *Cochrane Database of Systematic Reviews* 2007, Issue 3. [DOI: 10.1002/14651858]

Gschwend 2007

Gschwend A, Selvaraju U. *Psycho-social sport programmes to overcome trauma in post disaster interventions (Swiss Academy for Development Report)*. Biel/Bienne: Swiss Academy for Development, 2007.

Guest 2005

Guest A. Thinking both critically and positively about development through sport. *Sport and Development International* (www.sportanddev.org).

Henley 2005

Henley R. *Helping Children Overcome Disaster Trauma through post-emergency psychosocial sports programs (Swiss Academy for Development Report)*. Biel/Bienne: Swiss Academy for Development, 2005.

Higgins 2003

Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analysis. *BMJ* 2003;**327**: 557–60.

Higgins 2008a

Higgins JPT, Altman DG. 8: Assessing risk of bias in included studies. In: Higgins JPT, Green S (editors) editor(s). *Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.0 [updated February 2008]* Available from www.cochrane-handbook.org. The Cochrane Collaboration, 2008.

Higgins 2008b

Higgins JPT, Green S (editors). *Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.0 [updated February 2008]*. The Cochrane Collaboration, 2008. Available from www.cochrane-handbook.org, 2008.

Jordans 2009

Jordans M, Tol W, Komproe I, Jong J. Systematic review of evidence and treatment approaches: psychosocial and mental health care for children in war. *Child and Adolescent Mental Health* 2009;**14**(1):2–14.

Kessler 1995

Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National comorbidity survey. *Archives of General Psychiatry* 1995;**52**:1048–60.

Kessler 2005

Kessler R, Berglund P, Dember O, Jin R, Merikangas K, Walters, E. Lifetime Prevalence of Age of onset distributions of DSM-V Disorders in the National Comorbidity Survey Replication. *Archives General Psychiatry* June 2005;**62**: 593–603.

Kirkcaldy 2002

Kirkcaldy B, Shephard R, Siefen RG. The relationship between physical activity and self-image and problem behavior among adolescents. *Social Psychiatry and Psychiatric Epidemiology* 2002;**37**(11):544–50.

Kleber 1992

Kleber RJ, Brom D. *Coping with Trauma: Theory, Prevention and treatment*. Lisse, The Netherlands: Swets and Zeitlinger, 1992.

Kunz 2007

Kunz V. *Sport and Play for Traumatized Youth (Swiss Academy for Development Report)*. Biel/Bienne: Swiss Academy for Development, 2007.

Manger 2005

Manger T, Motta RW. The impact of an exercise program on PTSD. *International Journal of Emergency Mental Health* 2005;**7**:49–58.

Meier 2005

Meier M. *Gender Equity, Sport and Development (Swiss Academy for Development)*. Biel/Bienne: Swiss Academy for Development, 2005.

Mezey 2001

Mezey G, Robbins I. Usefulness and validity of post-traumatic stress disorders as a psychiatric category. *BMJ* 2001;**323**:561–3.

Moore 2005

Moore M, Werch C. Sport and physical activity participation and substance use among adolescence. *Journal of Adolescent Health* 2005;**36**:486–93.

Newman 2007

Newman C, Motta R. The effects of aerobic exercise on Childhood PTSD, Anxiety and Depression. *International Journal of Emergency Mental Health* 2007;**9**(2):133–58.

Pastor 2003

Pastor Y, Balaguer I, Pons D, Garcia-Merita M. Testing direct and indirect effects of sports participation on perceived health in Spanish adolescents between 15 and 18 years of age. *Journal of Adolescence* 2003;**26**(6):717–30.

Roberts 2009

Roberts NP, Kitchiner NJ, Kenardy J, Bisson J. Multiple Session early psychological interventions for the prevention of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews* 2009, Issue 3. [DOI: 10.1002/14651858.CD006869.pub]

Rose 2002

Rose S, Bisson J, Churchill R, Wessely S. Psychological debriefing for preventing post traumatic stress disorder (PTSD). *Cochrane Database of Systematic Reviews* 2002, Issue 2. [DOI: 10.1002/14651858.CD000560]

Salmon 2001

Salmon P. Effects of physical exercise on anxiety, depression, and sensitivity to stress: a unifying theory. *Clinical Psychology Review* 2001;**21**:33–61.

Schulz 1995

Schulz KF, Chalmers I, Hayes RJ, Altman DG. Empirical evidence of bias. Dimensions of methodological quality associated with estimates of treatment effects in controlled trials. *JAMA* 1995;**273**(5):408–12.

Stein 2006

Stein DJ, Ipser JC, Seedat S. Pharmacotherapy for posttraumatic stress disorder (PTSD). *Cochrane Database of Systematic Reviews* 2006, Issue 1. [DOI: 10.1002/14651858.CD002795.pub2]

UN inter-agency 2005

UN inter-agency task force on sport for development and peace. Sport as a Tool for Development and Peace: Towards Achieving the United Nations Millenium Development Goals. United Nations 2005; Vol. 30.

United Nations 2005

United Nations. Final Report: International Year of Sport and Physical Education. United Nations <http://www.un.org/sport2005/:24>.

USAID 2007

USAID. Incorporating resiliency into a sport focused program. Grassroots Soccer 2007; Vol. www.grassrootsoccer.org.

WHO 2003

World Health Organization. Mental Health in Emergencies: Mental and Social Aspects of Health of Populations Exposed to Extreme Stressors. World Health Organization http://www.who.int/mental_health/media/en/640.pdf.

** Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Chapman 2001	The Chapman study (Chapman 2001) was the initial study and the Schreier 2005 was the follow up study. This study looked at 57 children (average age 10.6 years) who had experienced a physical trauma and were diagnosed using the Children's Post Traumatic Stress Disorder Index (PTSD-1). Twenty-seven children received a single session of the Chapman Art Therapy Treatment intervention and 30 received standard hospital care. This study was excluded because it utilised art therapy.
Lyshak-Stelzer 2007	This study was a pilot study using play therapy thus was excluded from the review. This study looked at adolescents aged 13 to 18 years who had experienced a traumatic event, were diagnosed with PTSD using the UCLA PTSD reaction Index, and who were admitted into an inpatient facility and received 16 one hour group sessions of trauma focused art therapy. The control group received 16 one hour group sessions of general arts and crafts.
Schreier 2005	See Chapman study above.
Shelby 1994	This study was a pre-test/post-test of a art therapy. The study was excluded because participants were not diagnosed with PTSD and there was no control group.
Volker 1997	Random assignment to treatment and control group. Interventions were cognitive behavioral therapy compared to art therapy. This study was excluded because participants were not diagnosed with PTSD.
Walker 1983	Use of rap groups compared to those in formal group therapy. Study was excluded because participants were not randomly assigned to groups and there was no control group.

DATA AND ANALYSES

This review has no analyses.

APPENDICES

Appendix I. Methods archived for future updates

Assessment of risk of bias in included studies

The Cochrane Risk of Bias (RoB) tool will be used to determine risk of bias of selected trials.

The Cochrane Risk of Bias tool assesses the risk that a study over or under estimates the true effect of the intervention. This process involves a description and judgment on the adequacy of: sequence generation; allocation sequence concealment; blinding of outcome assessment; incomplete outcome data; selective outcome reporting and other potential sources of bias. Each criteria would have been judged using 'Yes', 'No', or 'Unclear'. 'Yes' indicates a low risk of bias, 'No' a high risk of bias and 'Unclear' that there was insufficient information or uncertainty over the risk of bias. This qualitative quality assessment of bias would not be used as a threshold for inclusion of studies, but as a possible explanation for differences in results between studies (Schulz 1995).

Measures of treatment effect

For dichotomous outcomes, such as the presence or absence of a diagnosis of PTSD, we will calculate the risk difference with 95% confidence intervals.

We will calculate the standardized mean differences for continuous outcomes if:

- a) means and standard deviations are available either in the original article or from the authors;
- b) there is no clear evidence of a skewed distribution (i.e. where there is minimum or maximum score, the mean minus this score and divided by the standard deviation should not be less than 2).

Differences in the direction of the scale between studies will be corrected by multiplying the mean of one set of trials by -1. Where measurements are comparable and on the same scale (such as using the same tool to measure depression) these will be combined to obtain weighted mean differences. Where different scales are used to measure the same clinical outcome in different ways, standardized mean differences will be used in order to combine results across scales.

Unit of analysis issues

Trials will be analysed at the level of participants. Where cross-over trials are identified (and cross-over design is thought to be appropriate), consideration will be given to whether serious carry-over may have occurred. If carry-over is not thought to be a problem, advice will be sought from a statistician about whether appropriate methods of analysis have been used. If so, the effect estimate will be included in a meta-analysis using the generic inverse variance method as described in the Cochrane Handbook.

Where cluster-randomized trials are identified (and cluster-randomisation is thought to be suitable), advice will be sought from a statistician about whether the appropriate methods of analysis have been used. Effect estimates and their standard errors from correct analyses of cluster-randomized trials will be meta-analysed using the generic inverse variance method in RevMan version 5.

Where appropriate, sensitivity analyses will be undertaken to investigate the effects of incorporating data from cross-over and cluster randomised trials in this review.

Dealing with missing data

Missing data and attrition rates will be assessed for each of the included studies, and the number of participants who are included in the final analysis will be reported as a proportion of all participants in the study. Trialists will be contacted to obtain missing data. Reasons given for missing data will be provided in the narrative summary and the extent to which the results are altered by missing data will be ascertained. Assessment will be made of the extent to which studies have conformed to an intention-to-treat analysis. The extent to which the results are altered by missing data will be determined by a sensitivity analysis for dichotomous data, as suggested by Deeks in the Cochrane Handbook, where it is firstly assumed that "all missing participants in the first group experienced the event and those in the second group did not and then assume the opposite".

Assessment of heterogeneity

Heterogeneity of results will be tested by comparing the confidence intervals of the studies (presented graphically) and by performing a chi-square test. To quantify the inconsistency in the results statistically, we will use I^2 (Higgins 2003). Values greater than 50% indicates

substantial heterogeneity and the reasons for such will be explored. Possible explanations could be clinical or methodological diversity. Possible causes of statistical heterogeneity are expected and pre-specified as follows:

- a) clinical heterogeneity due to variation in the participants, interventions and outcomes used by the studies;
- b) methodological heterogeneity due to variability in trial design and quality.

If there is substantial statistical heterogeneity, a random effects meta-analysis will only be performed where studies report similar interventions, and where data are available and sufficiently clinically and methodologically homogeneous. If statistical heterogeneity is not present, a fixed-effect meta-analysis will be performed, and potential differences between subgroups will be explored according to *a priori* criteria set out below.

Assessment of reporting biases

To determine if this review was likely to have been affected by reporting biases and, in particular, publication bias, a funnel plot will be prepared and checked for asymmetry.

Data synthesis

Prior to inspection for statistical heterogeneity (as described above), a fixed effect model will be used to synthesise the data. Where statistically significant heterogeneity is identified, a random effects model will be used, but only where trials appear to be clinically and methodologically homogeneous. Where data are available, sports, games and play-based interventions will be compared with usual care, pharmacological and psychosocial interventions. Different types of sports, games and play-based interventions will also be compared with one another.

Subgroup analysis and investigation of heterogeneity

Sub group analyses will be performed where data are available on:

- a. Adults versus children/adolescents (up to and including 18 years of age)
- b. Gender
- c. Self-administered versus clinician-administered scales

The first two factors have been identified as being important as they affect an individual's inclination or opportunity to engage with, and benefit from, sports, games and play interventions. The inclusion of the third factor is based on potential differences in the reliability and validity of self-administered questionnaires.

Sensitivity analysis

In order to assess the robustness of the review conclusions to decisions taken during the review process, sensitivity analyses will be performed according to whether allocation concealment was adequate vs. inadequate.

HISTORY

Protocol first published: Issue 2, 2008

Review first published: Issue 1, 2010

Date	Event	Description
12 June 2008	Amended	Converted to new review format.

CONTRIBUTIONS OF AUTHORS

SL was responsible for coordinating the overall review process including the collation of review papers, for communication with co-reviewers regarding their feedback and for drafting the manuscript. SL and MDS were jointly responsible for reviewing papers and writing the review. RH was responsible for offering a third opinion of any disputes between SL and MDS regarding their reviewing of papers and for commenting on all stages of the review process.

All authors were responsible for reviewing drafts of the manuscript.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- Royal Holloway, University of London, UK.
- University of Zurich, Switzerland.

External sources

- ESRC-MRC interdisciplinary Post-Doctoral Fellowship, UK.
- Thomas Holloway Award, UK.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The protocol included art, music and play therapy in order to capture all types of play-based interventions. These therapies were excluded from the review after considering their theoretical basis. The intention of the review was to examine interventions that were not theoretically based in psychology or psychiatry. Post-protocol, art, music and all play related interventions were considered to fall under these domains.

INDEX TERMS

Medical Subject Headings (MeSH)

*Sports; *Video Games; Chronic Disease; Stress Disorders, Post-Traumatic [psychology; *therapy]

MeSH check words

Humans