Children and Young People's Mental Health and Physical Activity

An Independent Evidence Review Commissioned by Sport England

Professor Andy Smith, Professor Stuart Fairclough, Professor Axel Kaehne, Dr Shaun Liverpool and Dr Michelle Maden

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Edge Hill University | Centre for Mental Health, Sport and Physical Activity Research

SPORT ENGLAND

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Table of Contents

List of Tables

List of Figures

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Glossary

Aerobic exercise - any activity that uses large muscle groups, can be maintained continuously, and is rhythmic in nature.

Heterogeneity - the variation or differences across studies, participants, or results. It is commonly discussed in the context of meta-analyses, systematic reviews, and other types of research that combine findings from multiple studies.

Intervention acceptability - how well an intervention is received and experienced by the target population and the extent to which the intervention, or its component parts, meets the needs of the target population.

Intervention fidelity - the degree to which an intervention is implemented or delivered as intended.

Mental health literacy - the knowledge, beliefs and attitudes about mental health, and the potential actions needed to support one's own and others' mental health through symptom recognition, management and prevention.

Meta-analysis - a statistical technique used to combine and analyse the results of multiple independent studies that address a similar research question. The goal is to derive a more precise and reliable estimate of the overall effect or outcome by pooling the data from these studies.

Randomised controlled trial - a study where similar people are randomly assigned to two (or more) groups to test an intervention and reduce bias. The experimental group has the intervention being tested. The other group (known as the comparison or control group) has an alternative intervention, a dummy intervention (placebo) or no intervention at all. These groups are followed up to see how effective the experimental intervention was, and outcomes are measured at specific times. Any difference in response between the groups is then assessed statistically.

Research study design - a set of methods and procedures use to generate and analyse data in a study.

Resistance exercise - any form of exercise that requires muscles to contract, including through pulling or lifting against an external resistance to improve muscle strength, endurance and mass.

Selection bias - when the participants or subjects included in a study or analysis are not representative of the target population due to the way they were selected. This bias arises when the selection process creates systematic differences between the groups being compared, leading to inaccurate or misleading results.

Executive Summary

Context

There is increasing concern about the mental health of children and young people in many countries, including England, with mid- to late-adolescence being an important life stage in which many mental health problems first emerge.[1,2] The promotion of sport and physical activity in government policy and practice in various community and mental health settings has been advocated as one way of addressing this.[3,4]

In 2021, Sport England launched its 10-year strategy, *Uniting the Movement*, which seeks to transform lives and communities through sport and physical activity.[5] Building upon the five key outcomes of *Sporting Future* [6] which were later reinforced in *Get Active* [7], the strategy seeks to promote the physical and mental health of the nation, including children and young people.

However, compared to adults, the benefits of sport and physical activity interventions for children and young people with diagnosed mental health conditions are less well established.[4] There is therefore an urgent need to review the existing evidence to help inform the development of sport and physical activity interventions for children and young people, and to inform future policy and practice in this area.

This review

In April 2024, Edge Hill University researchers were commissioned by Sport England to undertake an international evidence review on the use of sport and physical activity interventions for children and young people (aged 5-25) with a diagnosed mental health condition as well as those waiting for or on a mental health treatment pathway, as diagnosed by a GP or mental health specialist. The mental health conditions (and their symptoms) which were within the scope of this review included depression, anxiety, eating disorders, self-harm, bipolar disorder, and schizophrenia.

The objectives of the review were to:

1. Review and collate existing research and assess the strength of evidence for the role of sport and physical activity on the treatment and management of diagnosed mental health conditions in children and young people.
2. Increase the knowledge and awareness of best practice principles and themes of effective sport and physical activity interventions to support transferable and actionable learning for the sector/s.
3. Summarise, translate and make the evidence accessible to better inform decision making and influencing by Sport England and other stakeholders.

Methodology

To address these objectives, a scoping review of international evidence published between 1 January 2004 and 3 April 2024 was conducted. Following a review of 165 initially included studies, 22 were excluded for reasons including failure to assess mental health or intervention outcomes, involving participants aged over 25, or

including participants without a diagnosed mental health condition. 143 studies were therefore included in the final analysis.

A modified GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) approach was adopted to assess the quality of the body of evidence.[8] The evidence reviewed was assessed as being of strong, moderate, or weak quality in relation to:

- the consistency of the impact of interventions
- the amount of available research
- the timeliness and availability of up-to-date research
- the rigour and robustness of research designs
- the consistency with which interventions are delivered and evaluated.

The findings of the scoping review reflect the available evidence which met the study inclusion criteria. It is important to note that there were several limitations to the evidence base related to quality and breadth of studies which warrants some caution when interpreting the conclusions drawn. It is also important to note that the absence of evidence for certain intervention types or activities (e.g., team games) does not indicate that such approaches would be ineffective in improving the mental health of children and young people with diagnosed mental health problems.

Key findings

Based on the research included in the scoping review:

- There was **strong** and **consistent** evidence that sport and physical activity interventions had **positive effects** on the diagnosed mental health problems of children and young people. The **timeliness** and **amount** of evidence was rated as **strong**. (Figure 1.)

- The effects of Randomised Controlled Trials delivered in **group settings** were **strong**, particularly when compared to effects of programmes delivered on a one-to-one or individual basis, which demonstrated weak to medium effects on mental health.

- **Aerobic exercise** was the most common mode of intervention physical activity used, and this had a **moderate effect** on depression. **Aerobic plus resistance exercise interventions** were less common but these had **strong** effects on symptoms of depression. These forms of exercise, of at least moderate intensity, are also recommended in the Chief Medical Officer's physical activity guidelines for children and young people. [9]

- Physical activity of **moderate-to-high intensity** was **most effective in treating depression** in adolescents. The optimum intervention dose ranged from 4 x 30 mins/week for at least 6 weeks, through to 3 x 20-60 min/week for at least 12 weeks.

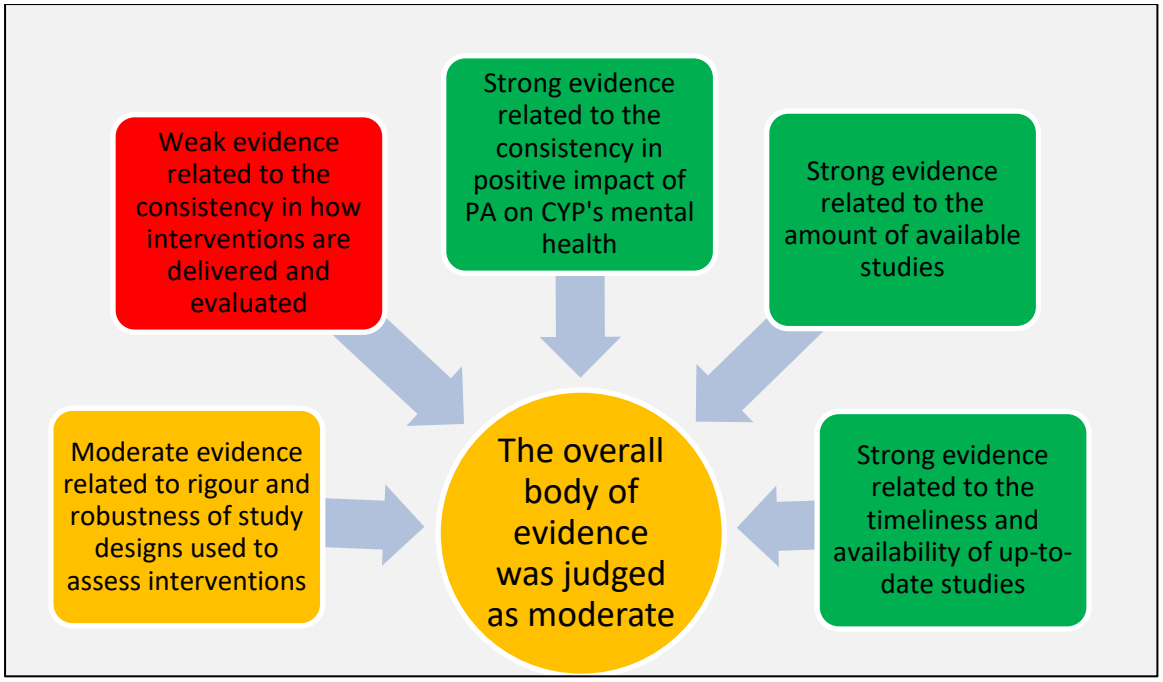

Figure 1: Overall strength of the body of evidence, based on the GRADE approach.

Overall, the **body of evidence** on the impact of sport and physical activity interventions on children and young people with diagnosed mental health conditions was assessed as **moderate**. This assessment was based on the following:

- There was a **good amount** of **up-to-date research** available that showed **consistency** on the positive impact of PA on CYP mental health, which were each judged to be **strong**.

- The **rigour and robustness** of the research approaches used to assess the **effectiveness** of sport and physical activity interventions was judged to be **moderate**. However, the evidence was **weak** in relation to the **consistency** with which interventions are **delivered and evaluated**.

- From a **methodological perspective** the quality of included studies in the meta-analyses was **typically low** (i.e., small sample sizes, lack of control groups, short duration, variable rigour in screening, poorly reported methods) and **heterogeneity (**i.e., variability) **was usually high**.

Future implications and recommendations

1. Promoting diverse forms of aerobic and resistance exercise of at least moderate intensity, particularly in group settings led by appropriately qualified staff, is particularly effective for children and young people with a diagnosis or symptoms of depression.

2. Given the positive effects of sport and physical activity interventions, policy makers, funders, and commissioners need to increase cross-sector investment in these to help tackle the increasing prevalence of mental health

problems, rising demand for mental health services, and lengthening waiting times.

3. There is a need to improve the amount and quality of research evidence on the use of different types of sport and physical activity interventions in real world (especially community) settings, for more diverse groups of children and young people, with a wider variety of mental health conditions.

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1.0 Introduction

In 2021, Sport England launched its 10-year strategy, *Uniting the Movement*, which seeks to transform lives and communities through sport and physical activity.[1] Building upon the five key outcomes of *Sporting Future* [2] which were later reinforced in *Get Active* [3], the strategy seeks to promote the physical and mental health of the nation, including children and young people. This is part of an increasing interdependence between sport and public health policy, and growing interest in how community sport and physical activity can contribute to positive mental and physical health outcomes.[4,5]

This report also builds upon the policy brief, *Moving for Mental Health*, which provides evidence-based recommendations to protect and enhance the contribution of physical activity and sport to mental health in the UK.[6] *Moving for Mental Health* concluded that for adults there is strong evidence of the mental health benefits of physical activity (including exercise) for preventing and treating mild to moderate mental health problems such as depression.[6,7] Stubbs et al. have also summarised the many benefits of physical activity for people living with mental illness:

- Physical activity can have a positive impact on the risk and outcomes of many physical health conditions (especially cardiometabolic diseases) often experienced by those living with mental illness
- Structured exercise can have positive cognitive effects on neuropsychiatric symptoms (e.g. depression, anxiety)
- Physical activity can promote life skills and social connectivity which help tackle high levels of social isolation and loneliness often experienced by those with mental illness
- Tackling low levels of physical activity, reduced cardiorespiratory fitness, and higher levels of sedentary behaviour[8]

Reflecting other evidence[4,9], *Moving for Mental Health*, also suggested that there is a potentially important role for community sport programmes which are deliberately designed to support mental health.[6]

Data from Sport England's Active Lives Survey (2020-2021) [10] suggested that, for children aged 5-16:

- Those who volunteer to support sport and physical activity, have better wellbeing scores across all mental wellbeing measures
- Active children and young people also have better life satisfaction and feeling their life is worthwhile scores
- Active children and young people also have lower rates of loneliness.
- Children who are more active are happier, more resilient, and more trusting of others
- There is an increase in the proportion of children exercising to relax and worry less, as well as socialising for fun with friends

For young adults aged 16-24, the evidence from Active Lives also revealed that:

- There is a positive association between activity levels (up to 150 minutes) and mental wellbeing

- Young adults with a mental health disability or condition are more likely to be inactive (i.e., doing less than an average of 30 minutes of moderate intensity physical activity per week)
- Young adults with a mental health condition have lower scores on all wellbeing measures. However, young adults with a mental health condition who are more active have lower rates of anxiety, greater life satisfaction and happiness scores, greater worthwhileness scores, greater resilience, and higher levels of trust in others, compared to young adults with a mental health condition who are inactive
- Active young adults with a mental health condition have lower rates of loneliness compared to those who are inactive with a mental health condition

Despite this evidence, the benefits of sport and physical activity interventions for children and young people with diagnosed mental health conditions are less well established.[6] There is therefore an urgent need to review the existing evidence to help inform the development of sport and physical activity interventions for children and young people with diagnosed mental health conditions, and to inform future policy and practice in this area.

1.1 The mental health of children and young people

International evidence suggests that the mental health of children and young people is of increasing concern in many countries. It has commonly been suggested that half of all mental health problems (excluding dementia) first occur before the age of 14, before rising to 75% before age 24.[11] More recent global evidence suggests that 34.6% of individuals first experienced a mental health problem before the age of 14 years.[12] This increased to 48.4% for before age 18 and 62.5% before age 25.[12] Although variations existed by mental health condition, the overall peak and median age onset for any mental health problem was age 14.5 and 18, respectively, emphasising mid to late adolescence as important life stages in which peak onset of adult mental health problems occur.[12]

In 2023, it was estimated that one in five 8 to 16-year-olds in England had a probable mental health disorder.[13] 11-16-year-olds boys (22%) and girls (23%) were more likely to report having a probable mental health disorder than those aged 8-10 years (boys, 18%; girls, 14%).[13] Rates of probable mental disorder were twice as high for young women aged 17-19 (32%) and 20-25 (30%) compared to young men of the same age (15% and 13%, respectively).[13] Although rates of probable mental health disorder among children and young people in England have stabilised since 2022, they remain above those reported before Covid-19.[13] Covid-19 has further widened the existing inequalities in the mental health of children and young people. Adolescent girls and young women, those living in poverty, and children and young people exposed to multiple adverse childhood experiences have been particularly impacted.[14-16]

Children and young people with mental health problems are at greater risk of engaging in behaviours which threaten their physical health, including alcohol consumption, tobacco smoking, unhealthy diets, and physical inactivity.[17] They are also particularly vulnerable to the symptoms of poor mental health, including low motivation, lack of energy, and increased anxiety and social withdrawal.[17]

The development of mental health problems and inequalities during childhood and youth is important because they can have lifelong impacts. Childhood and youth are also life stages where interventions which disrupt inequalities, and which tackle the social determinants of mental health (i.e. the conditions in which children and young people are born, grow, live and work), can be particularly effective.[18-20]

1.2 Brief review of existing research evidence: sport and physical activity for the treatment of mental health problems

Much of the existing academic (and other) evidence on the mental health benefits of sport, physical activity, and exercise for children and young people (including those with diagnosed mental health conditions) in mental health care, community settings, and other contexts including education, is much less substantial than it is for adults.[6,17,21] The largest volume of intervention evidence relates to the general population of children and young people (i.e., those without diagnosed mental health conditions). This is summarised below.

Physical activity and exercise interventions and mental health in children and young people without diagnosed mental health conditions

In an update of an earlier review of reviews [22], Biddle et al. reported that physical activity is causally associated with improved cognitive functioning, but only partial support existed for depression. [23] There was a lack of support for the impact of physical activity on self-esteem in children and young people without diagnosed mental health problems.[23] Evidence of the impact of physical activity and anxiety was said to be unclear, with more research needed on this relationship.[23] Other scoping reviews have concluded that exercise interventions of varying intensities can lead to a reduction in depression symptoms for young people (mean age 12-25.9), and that moderate-to-vigorous-intensity and light-intensity physical activity interventions may reduce anxiety symptoms.[24-25]

Any positive mental health benefits may depend on the experience of physical activity and the context it takes place in, as well as the many interrelated (but currently not well understood) neuro-biological, psychological, and social (e.g. social relationships) mechanisms which explain changes in mental health because of changes in physical activity.[23,26]

Physical activity and exercise interventions and mental health in children and young people receiving mental health care

A narrative review of exercise interventions in child and adolescent mental health care concluded that there is ‘an increasingly strong evidence base for the benefits of using physical activity interventions to improve physical and mental health outcomes in children and young people with mental health conditions, with the strongest evidence suggesting that exercise can protect against depression’.[17] More work is needed on how to embed physical activity and exercise interventions in mental health care, and on the long-term impact and cost-effectiveness of these in clinical practice.[17] However, it was suggested that exercise interventions should be offered as a potential adjunct to standard treatments for children and young people in mental health services, and that their implementation should be supported by:

- The development of guidelines to embed such interventions into mental health services
- Adopting a prevention-focused approach (e.g., embedding exercise or physical activity across all mental health services, delivering sports programmes in schools or via community outreach services)
- The delivery of intervention by accredited exercise professionals where possible
- The provision of flexible interventions tailored to the needs and motivations of the individual
- The delivery of interventions in settings which suit the needs of the intended beneficiary. [17]

Physical activity mental health interventions in schools / community settings

Community settings such as schools, and subjects such as physical education, are considered key environments for health and wellbeing promotion initiatives, including mental health.[27-32] A 2020 systematic review and meta-analysis of international school-based physical activity mental health interventions concluded that among mainstream school students, physical activity interventions may reduce anxiety, and increase resilience, positive mental health, and wellbeing.[33] The strongest effects were observed for wellbeing and resilience. The authors highlighted the considerable heterogeneity that was evident among the included studies, which suggests caution should be used in the interpretation of the findings.[33]

Another study using data from the Global Student Health Survey explored frequency of physical education attendance, suicidality-related indicators, loneliness, bullying, and anxiety among 276,169 participants from 71 countries. [34] Hu and Yang concluded that physical education attendance was not significantly associated with any of the mental health indicators.[34] That being said, school-based physical activity mental health interventions (whether provided universally for all children and young people, or targeted at those with clinically diagnosed conditions) are most likely to be effective when they are included as part of multi-component whole-school approaches which are well-embedded into school practice, and which are long-term.[35]

Sport and mental health interventions in community settings

Compared to interventions using physical activity and exercise, evidence of the impact of community sport interventions on children and young people with diagnosed mental health conditions is less developed.[4,6,21] In 2016, Faulkner and Tamminen concluded that it is 'difficult to draw clear conclusions regarding youth sport participation and mental health based on the existing evidence'.[36] For example, they suggested that while 'there is good evidence that sport participation, particularly team sport participation, may have a protective effect against depressive symptoms' [36], evidence of the impact of engaging in sport on self-esteem in young people is inconsistent.

More recently, community sport participation has been associated with more favourable mental health outcomes [9,37], and there has been an international growth in community sport interventions which target the mental health (including mental health literacy) of children and young people.[9,35,38,39] One recent review found mixed evidence of the effects of sport-based interventions on mental health and mental

health literacy outcomes. Moderate to strong favourable effects were reported for interventions on stigmatising attitudes, knowledge of mental health, and help seeking.[38] Small favourable effects were also found for anxiety, psychological distress, and wellbeing, but no significant synthesised effect sizes were found for depressive symptoms.[38] The review concluded that there is substantial variability in the design and quality of community sport mental health interventions, and more evidence is needed on whether increased mental health literacy has positive effects on participants' mental health symptoms.[38]

Despite the growth of community sport-based mental health interventions, such interventions are not always targeted at those children and young people with diagnosed mental health conditions. It also appears that while engaging in these interventions may make a positive contribution to aspects of mental health, and may be a helpful component in the prevention, treatment and recovery from mental illness (e.g. depression, anxiety), this is likely only to occur under specific circumstances which are not yet well understood.[6,21]

1.3 Scope and objectives of the review

In April 2024, Edge Hill University researchers were commissioned to undertake an international evidence review on the use of sport and physical activity interventions for children and young people (aged 5-25 years) with a diagnosed mental health condition as well as those waiting for, or on, a mental health treatment pathway, as diagnosed by a GP or mental health specialist. The mental health conditions (and their symptoms) which were within the scope of this review included depression, anxiety, eating disorders, self-harm, bipolar disorder, and schizophrenia.

The objectives of the work were to:

1. Review and collate existing research and assess the strength of evidence for the role of sport and physical activity on the treatment and management of diagnosed mental health conditions in children and young people.

2. Increase the knowledge and awareness of best practice principles and themes of effective sport and physical activity interventions to support transferable and actionable learning for the sector/s.

3. Summarise, translate and make the evidence accessible to better inform decision making and influencing by Sport England and other stakeholders.

2.0 Methodology

2.1 Scoping review

To address the objectives of the work as defined by Sport England, a scoping review which is an increasingly popular and systematic approach to evidence synthesis was completed.[40] Scoping reviews are particularly useful when the aim of the work is to identify and map the scope of a body of literature, and to explore the emerging evidence base in relatively new areas of interest, including the use of sport and physical activity interventions for children and young people with diagnosed mental health conditions.[40] This approach is also particularly valuable for identifying and analysing knowledge gaps, identifying key concepts used in the literature (e.g.

'diagnosed' or 'symptomatic' mental health condition), and for identifying recommendations to inform the work of policy makers and practitioners [40] such as those working in the sport and physical activity sector.

2.2 Search strategy

The researchers searched MEDLINE, CINAHL, PsycINFO, SportDISCUS, the Cochrane Database of Systematic Reviews (CDSR) and the Cochrane Central Register of Controlled Trials (CENTRAL) and Web of Science (all databases). Key concepts searched were 'sports' and 'mental disorders' and 'children/adolescents/young adults' and qualitative/quantitative/mixed-methods empirical study designs. Searches were restricted to English language publications from 1 January 2004 to the 3 April 2024. Full search strategies can be found in Appendix A. Search results were downloaded into Endnote and duplicates were removed.

2.3 Eligibility criteria

Given the scope of the review, Table 1 presents the inclusion and exclusion criteria that was used to inform the search strategy adopted when reviewing the available international literature on the use of sport and physical activity interventions for children and young people with diagnosed mental health conditions.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Children and young people aged 5-25yrs Diagnosed mental disorder (MD) population or in a population with MD symptomatology (e.g. 'depressive symptoms' - can include self-reported and clinical assessment) or populations on a MD service waitlist Any sport or physical activity intervention with or without a control group Any intervention using sport and physical activity (with or without a control group) alongside other activities (e.g. mindfulness, psychoeducation) Quantitative, qualitative or mixed-method empirical study designs	Mixed age populations or studies with unclear age groups where adults (25+) could be involved MD population focus only on ADHD, autism and intellectual disabilities Addiction populations with no association with a MD Associational studies without a clear sport or exercise intervention Conference abstracts, posters, theses, case studies and other non-peer-reviewed publications

Peer reviewed publications English language 1 January 2004 onwards	

2.4 Screening and data extraction

Search results were uploaded into the screening software Rayyan.[41] One reviewer screened all title and abstracts against the eligibility criteria. Studies which clearly met at least one of the exclusion criteria were excluded. The remaining studies were put through to full-text screening. The other reviewers screened all full-text against the eligibility criteria. Any disagreements between the reviewer of the title and abstracts and the reviewer of the full-text were resolved by discussion with a second reviewer. Although free-text terms were restricted to title fields only, relevant subject headings were also searched to improve the sensitivity of the search.

2.5 Assessment of study quality

A modified GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) approach was adopted to assess the quality of the body of evidence.[42] For this review, the body of evidence was judged as weak, moderate or strong based on the amount of evidence (i.e., number of available studies), consistency of findings (i.e., similar outcomes), relatedness (i.e., similar interventions and populations of interest), rigour of the study designs (i.e., randomised controlled trials and large sample sizes (e.g., >50 participants) and timeliness (i.e., updated research within the last 5 years). See Table 2 for a further description and explanation of each unit of assessment which was rated weak, moderate or strong.

Judgements were discussed and revised until consensus was achieved. If the available evidence was judged as strong on all the five units of assessment, then the overall body of evidence was judged as strong. The body of evidence was rated down to moderate if up to two units of assessment were judged as weak or moderate. The body of evidence was rated as weak if three or more units of assessment were judged as weak or moderate.

Table 2. Quality assessment of the body of evidence

Unit of assessment	Weak	Moderate	Strong
Amount of the available/accessible evidence	Limited or insufficient evidence to draw confident conclusions. For example, less than 10 studies available or less than 10% of the available evidence contributes to our understanding of this area.	Some evidence is available to draw conclusions with some level of confidence. However, only 10 to 20 studies are available or between 10% and 40% of the available evidence contributes to our understanding of this area.	A wealth of evidence is available to draw conclusions confidently. More than 20 studies are available or 50% or more of the available evidence contributes to our understanding of this area.
Consistency of key findings	Inconsistent findings within and between studies. For example, some suggest positive outcomes while others suggest negative outcomes after using an intervention.	Mostly consistent findings within and between studies. For example, most studies suggest positive outcomes while only one or two others suggest negative outcomes after using an intervention.	All of the available evidence suggests consistent findings within and between studies.
Relatedness/similarities among the different studies (i.e., reliability)	Inconsistent outcome measures used to assess mental health conditions, or the types of mental health problems vary widely across studies.	Mostly consistent outcome measures are used to assess mental health conditions, or the studies mainly targeted the same mental health problem.	Consistent outcome measures are used to assess mental health conditions, and the studies targeted the same mental health problem.
Rigour in terms of study designs and sample sizes	Limited or no available intervention trials such as randomised controlled trials with very small sample sizes	More than half the available evidence includes intervention trials such as randomised controlled trials but some of the	All of the available evidence derives from robust controlled studies with larger sample sizes (>50 participants)

	(<20 participants).	available evidence derives from weaker sources of evidence with small sample sizes (>20 but <50 participants).	
Timeliness (i.e., how current/up-to-date is the available evidence)	Most or all the available studies were conducted more than 10 years.	Most or all the available studies were conducted between 5 to 10 years ago.	Most or all the available studies were conducted within the last 5 years.

2.6 Data set and included studies

The number of records retrieved from the databases searched totalled 12,581. Of these, 4,900 were duplicates and therefore removed before screening. The titles and abstracts of 7,681 articles were then screened. The full text of 796 of these were screened for their eligibility. 165 studies met the inclusion criteria, but 22 were excluded for reasons including failure to assess mental health or intervention outcomes, involving participants aged over 25, or including participants without a diagnosed mental health problem. 143 studies were therefore included in the final analysis.

Fifty-seven percent (n=81) of the studies were published from 2020 **(**Figure 1**),** suggesting that research exploring the use of sport and physical activity interventions for children and young people with diagnosed mental health problems is relatively recent. A full list of the included studies is presented in Appendix B.

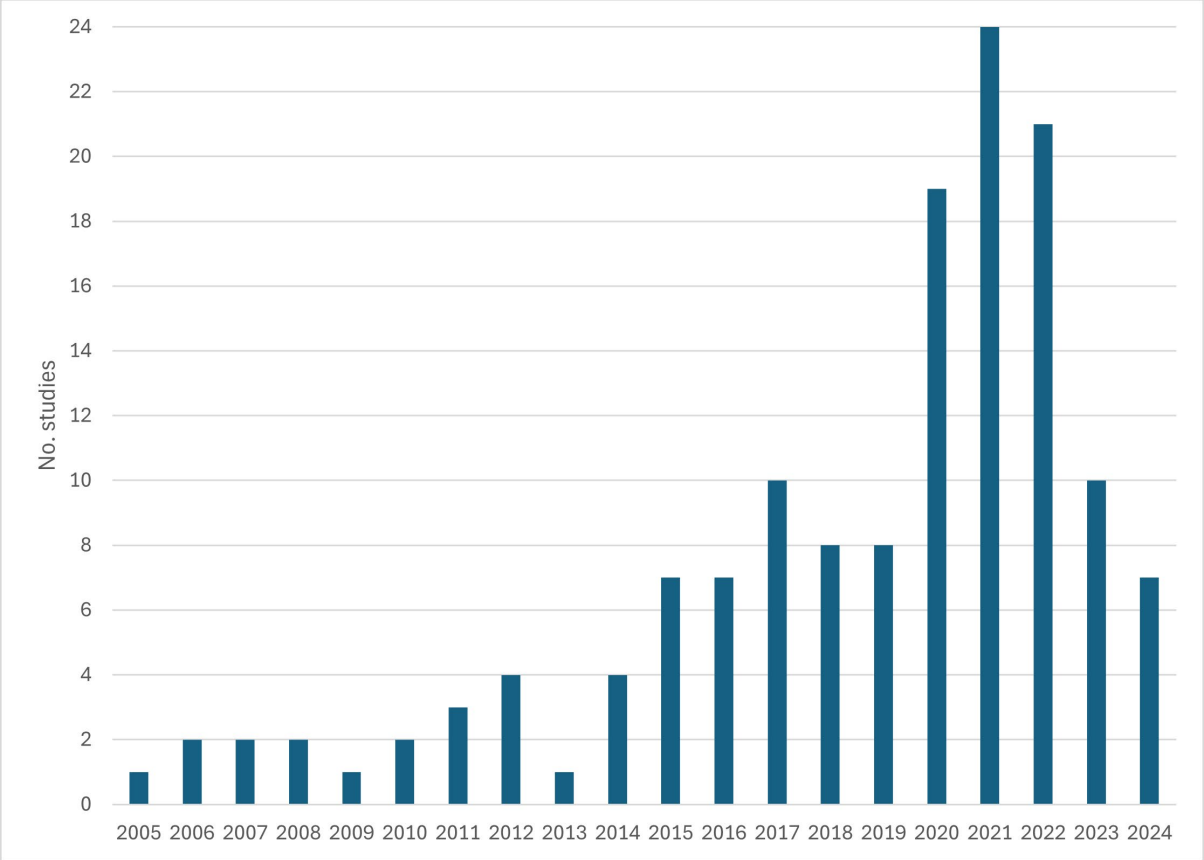

Figure 1. Publication year of included studies

2.6.1 Study design

The most common study design (29%) was a Randomised Controlled Trial (RCT), followed by systematic reviews and meta-analyses (12%), pre-post studies (12%), and qualitative evaluations (10%) (Figure 2). Other less commonly used study designs included controlled studies (non-randomised), pilot studies, quasi-experimental designs, cohort studies and cross-sectional or prospective studies. The quality of reporting study design details was often weak, which is demonstrated by 24% of included studies providing insufficient information for a study classification to be made. A complete list of the categorisation of study designs and their contents are listed in Appendix C.

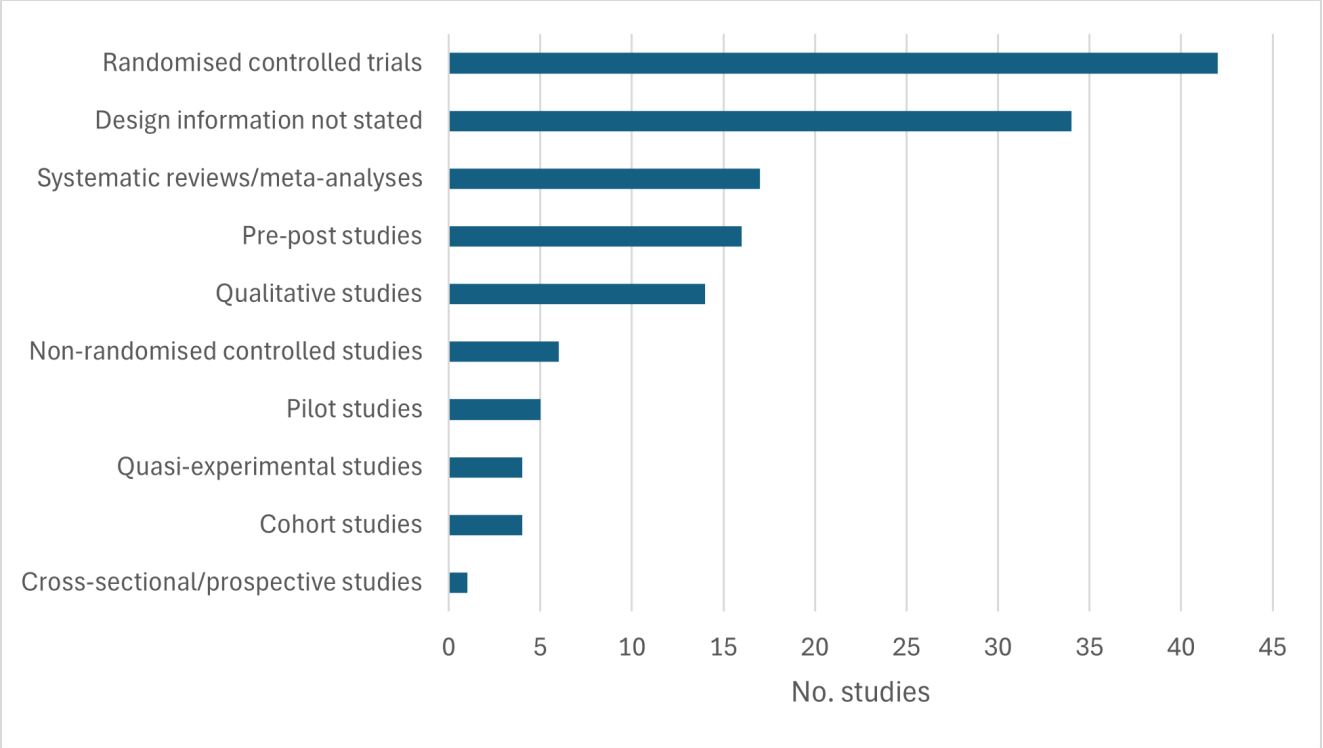

Figure 2. Number of publications with specific study designs

2.6.2 Location of study

Evidence reported in the studies included in the review were published in 24 countries (Figure 3). Most of the studies were conducted in the United States (17%), Australia (7%), China (8%) and the UK (7%). In almost one-third of studies (32%), it was unclear where the research had been conducted. This was often due to the inclusion of meta-analyses and reviews in the sample of studies reviewed.

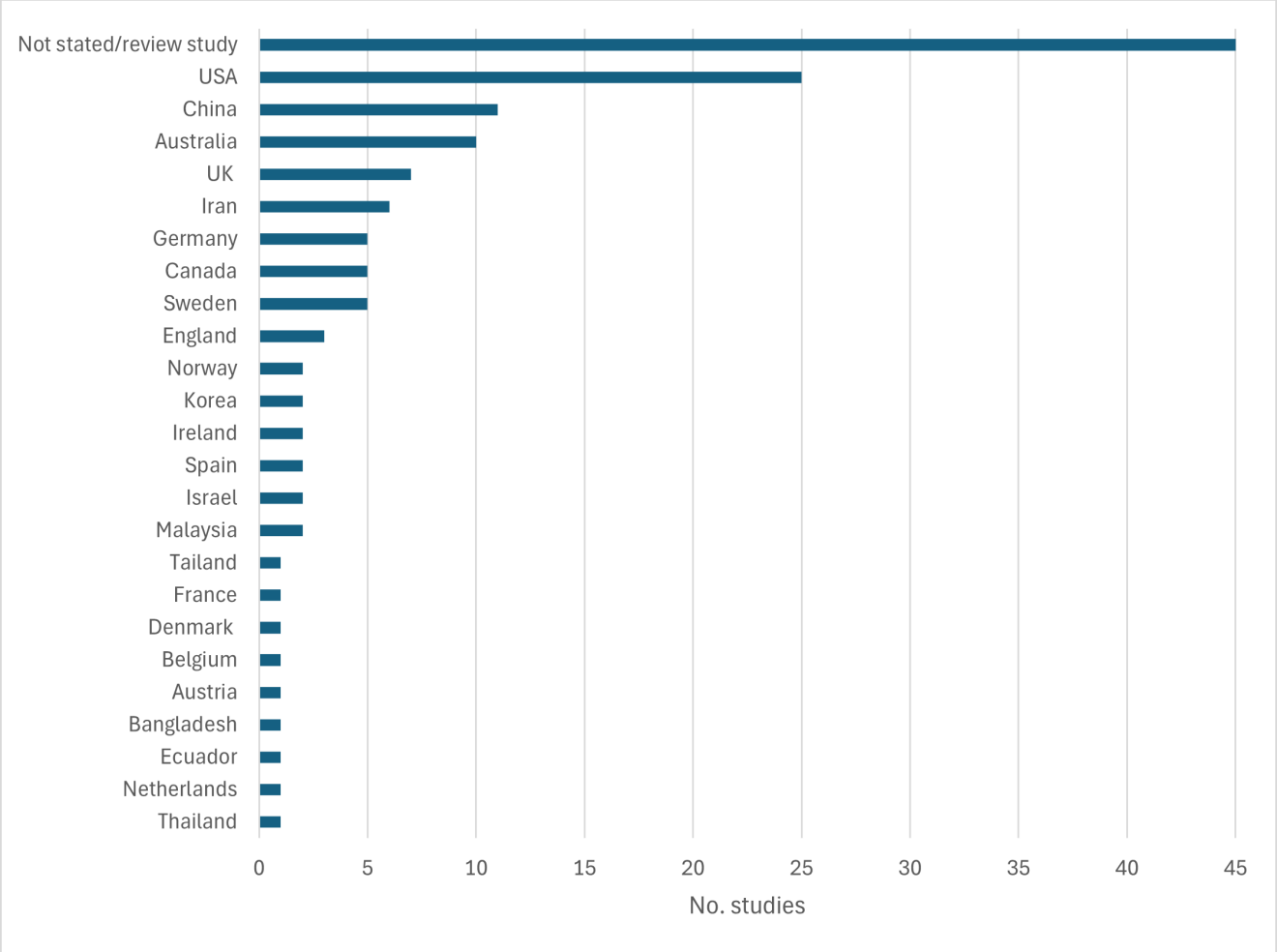

Figure 3. Number of studies conducted in specific countries

2.6.3 Study setting

The most common settings in which the studies included here were conducted were hospital or health care (e.g., inpatient) settings (28%), education (e.g. universities) settings (19%), and community settings (7%). It was unclear where the studies had been conducted in 36% of cases. As with the study location, this was often because some meta-analyses and reviews were included in the sample of studies reviewed.

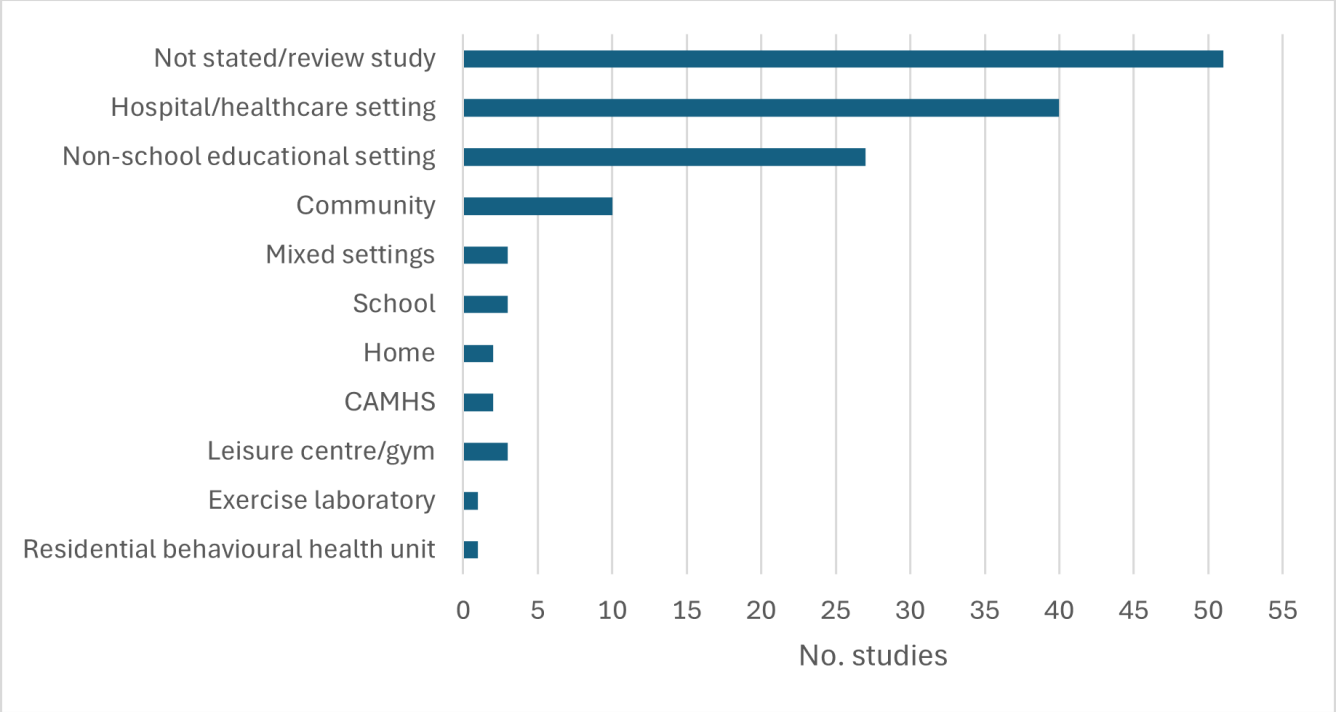

Figure 4. Number of studies conducted in specific settings

2.6.4 Demographic information of sample

The most common diagnosed mental health problems reported were depression (23%), anxiety (12%), multiple conditions (8%), eating disorders (4%), behavioural and cognitive disorders (4%), and severe mental illness (3%) (Figure 5). In 39% of the studies the mental health problem being targeted by the intervention described was either not reported or could not be categorised. Excluding review and meta-analysis studies, the median participant sample size was 36 (inter-quartile range = 48), ranging from 5 to 417 participants).

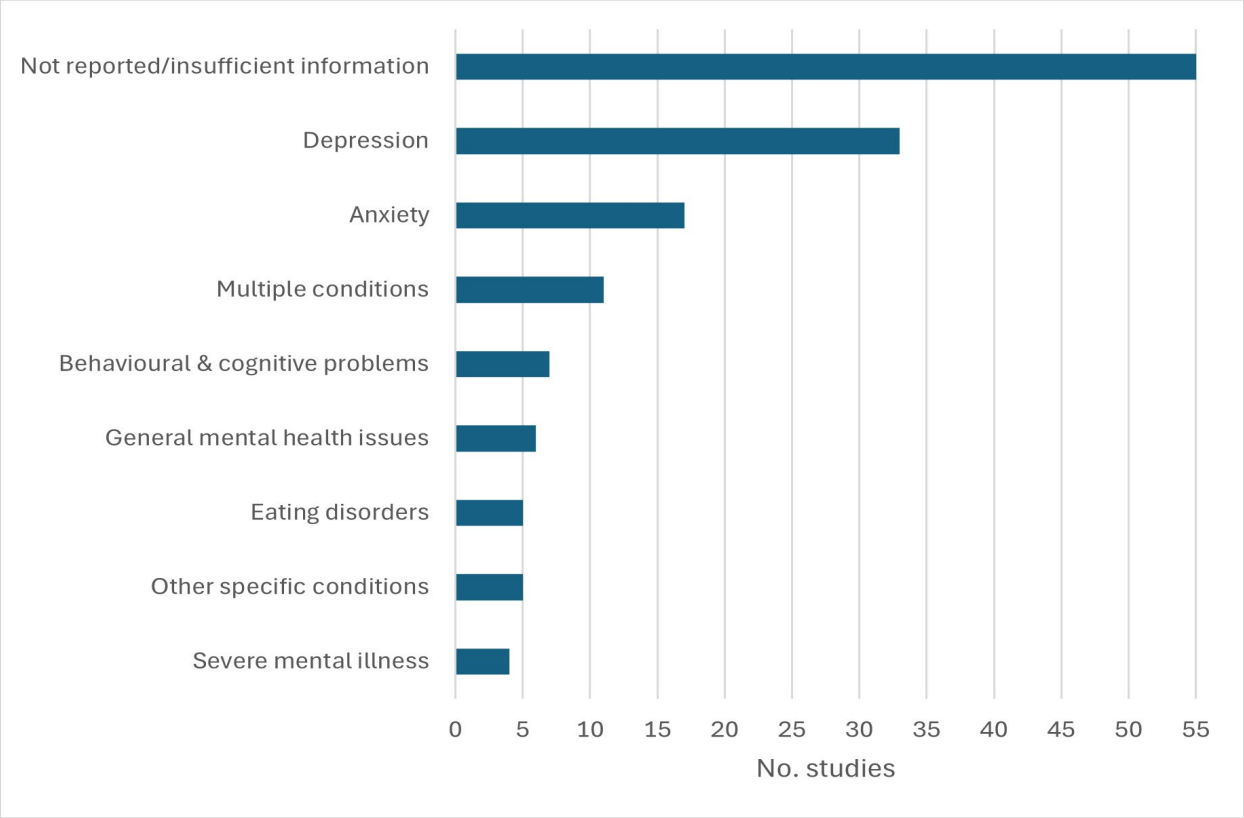

Figure 5. Number of studies with participants with specific mental health problems

Almost all the studies focused on adolescents, and some included pre-adolescents (typically those under 10 years) in the sample, but where this was the case the participant samples and results were seldom reported by age group. Participants' demographic characteristics, including sex, ethnicity and socio-economic status were reported inconsistently, and sometimes not at all, which makes it difficult to report results according to these.

2.7 Final data set

143 studies were included in the final analysis and the findings presented below are based on these. It should be noted that the findings of the scoping review which are presented next reflect the available evidence which met the study inclusion criteria. It is important to note that there were several limitations to the evidence base related to the quality and breadth of studies which warrants some caution when interpreting the conclusions drawn. The absence of evidence for certain intervention types or activities (e.g., team games) also does not indicate that such approaches would be ineffective in improving the mental health of children and young people with diagnosed mental health problems.

3.0 Findings

3.1 Strength of the existing evidence base

Based on the research included in the scoping review, there was strong and consistent evidence that sport and physical activity interventions had positive effects on the diagnosed mental health problems of children and young people (Figure 6). The timeliness and amount of evidence was rated as strong since more than 50% of the studies were published from 2020 onwards.

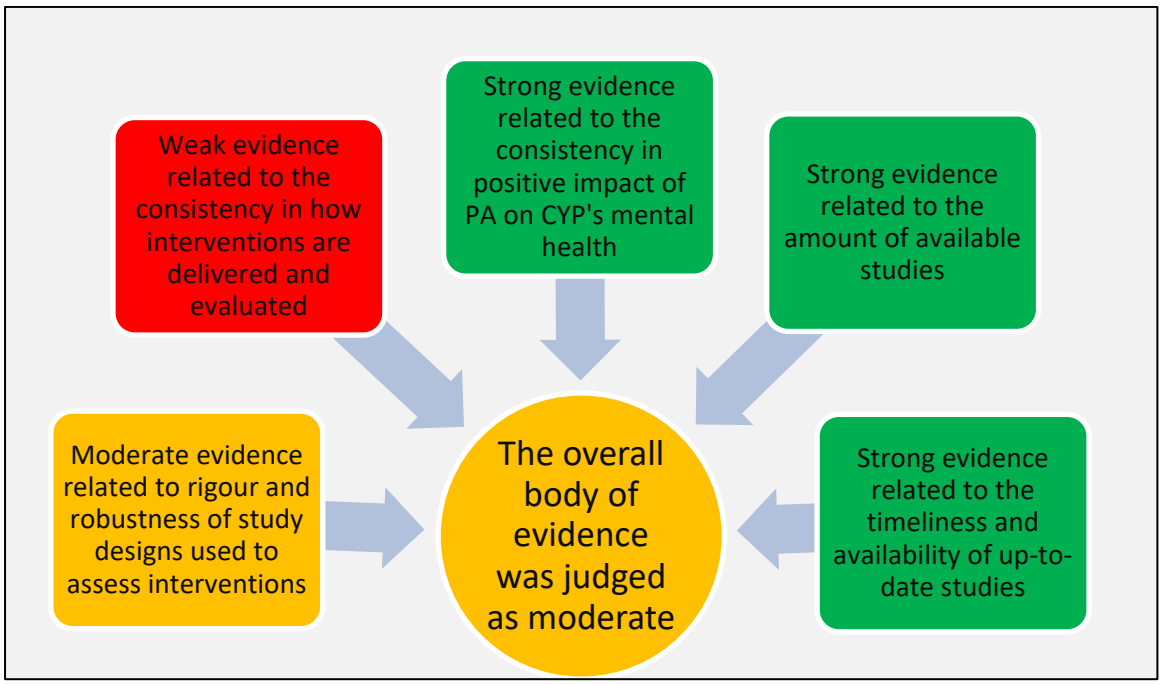

Figure 6. Overall strength of the body of evidence, based on the GRADE approach.

The rigour and robustness of evidence was rated as moderate, with more than 40 studies adopting an RCT design and over 15 systematic reviews of the evidence. The average sample size of the reviewed studies was 298 (Range: N=2 to N=4887).

However, the body of evidence was judged as weak in relation to the consistency with which interventions are delivered and evaluated since intervention types varied substantially and incorporated different types of sports and physical activities of varying intensities. Similarly, the interventions often targeted a wide range of mental health problems, were delivered by diverse groups of practitioners in a variety of settings, and adopted different formats and modalities.

Overall, the **body of evidence** on the impact of sport and physical activity interventions on children and young people with diagnosed mental health conditions was assessed as **moderate**.

3.2 Meta-analysis evidence

Meta-analyses combine the results of a systematic review of studies based on clearly defined and rigid inclusion criteria. They are considered as the highest quality level of scientific evidence. The quantitative intervention results are converted to a common effect size outcome metric (e.g., standardised mean difference (SMD)) and combined within a meta-analysis to investigate the pooled effects of interventions on the mental health outcomes of interest. The magnitude of these pooled effects is typically described as being low/weak (effect size=0.2 to 0.5), medium/moderate (effect size=0.5 to 0.8), or high/strong (effect size=0.8 or greater).

In the review period reported here, nine meta-analyses were published between 2011 and 2023. [43-51] There was a significant overlap in included studies in some meta-analyses from 2020, and most of the more recent analyses have been conducted in China, with some including a disproportionate volume of Chinese interventions.[44,45,48,50,51] To some extent, this reflects the methodological approaches (e.g., network meta-analysis [44,45]) and range of activities reported. All meta-analyses included results for adolescents and two included results for children and adolescents combined.[43,49] However, results were not typically presented by age/stage of development group, hence in most cases it was not possible to make separate conclusions related specifically to children or adolescents

Types of mental health conditions

Most meta-analyses defined a diagnosed mental health condition based on scores above a critical threshold on recognised depression scales. Depression was the most reported mental health condition, but one analysis also reported intervention effects for anxiety [52], and another for cognitive impairment and Post-Traumatic Stress Disorder.[43]

The most recent meta-analysis of RCT evidence on the effects of exercise interventions on depression among adolescents is from 2022 and 2023. The overall effect of exercise interventions on depression was moderate (SMD=-0.65 to -0.57).[48,50] In one meta-analysis the four studies which focused on patients with a clinical diagnosis of depression the effects were smaller (SMD=-0.32), and conversely were strong in the five studies involving participants without a clinical diagnosis (e.g., in school settings) (SMD=-0.89). [50] It was suggested that this result may have been related to bias in the screening process of some participants and the resultant inclusion of some false positive participants in the study samples (i.e., the screening suggested the presence of a mental disorder in participants who were, in fact, mentally healthy). Such false positives in mental health screening can inflate the perceived effects of interventions due to misinterpretation of baseline scores, and placebo effects. Three out of the RCTs included in the meta-analyses showed sustained effects on depression outcomes 40 weeks after the interventions ended.[50]

Types of intervention activities, intensities and settings

Aerobic exercise was the most common mode of intervention physical activity, and this had a moderate effect on depression (SMD=-0.59).[48] Aerobic plus resistance exercise interventions were less common but these had strong effects on symptoms of depression (SMD=-1.25).[48]

Physical activity of moderate-to-high intensity was most effective in treating depression in school-aged adolescents. The optimum intervention dose ranged from 4 x 30 mins/week for at least 6 weeks[48], through to 3 x 20-60 min/week for at least 12 weeks.[50]

In terms of physical activity modality, strong-to-moderate effects were evident for resistance exercise (SMD=-1.30), aerobic exercise (SMD=-0.83), mixed exercise (SMD=-0.67), and mind-body exercise (SMD=-0.61) interventions compared to usual care for treating depression in depressed adolescents aged 15-22 years.[51] In this older adolescent age group, the length of recommended intervention based on efficacy effects was at least 6 weeks duration, with 3-4 sessions/week of 30-60 duration.[51]

The effects of RCTs delivered in group settings were strong (SMD=-1.06), particularly when compared to effects of programmes delivered on a one-to-one or individual basis (SMD=-0.32), which were weak to medium.[50]

One meta-analysis of predominantly Chinese RCTs focused on university students with diagnosed depression (although a rather 'loose' definition of depression was used which did not allow for very detailed interrogation of the results). [44] Nevertheless, this analysis reported strong overall effects of interventions compared to usual care (SMD=-1.13). The authors also compared effect sizes between selected activities ranked in order of effectiveness. The strongest effects compared to badminton (as the least effective activity) were observed for tai-chi (SMD=-9.4) and yoga (SMD=-7.7). [44] However, it is important to note that of the 14 RCTs in this meta-analysis, just two included yoga or tai-chi, and only one included running as a purely aerobic activity. Hence, these results should be interpreted with caution and it is important to keep in mind that limited evidence currently exists on the types of activities which have been used to support CYP with diagnosed mental health conditions.

One systematic review of evidence in 10-19 year olds with 'mild-to-moderate' mental health problems (but not explicitly clinically diagnosed conditions) was included.[52] Although no quantitative evidence of effectiveness could be provided, the authors concluded that physical activity interventions could be beneficial for clinical improvements in depression and anxiety. The most effective interventions included in this systematic review used structured group-based sport and exercise, including team sports, relaxation exercises, and aerobic/anaerobic circuits training.

Quality of evidence from meta-analyses

From a methodological perspective the quality of included studies in the meta-analyses was typically low and heterogeneity was usually high. Moreover, mental health outcomes were reported inconsistently with varying levels of rigour (e.g., lack of clarity on criteria for depression diagnoses), and often there was limited information on intervention delivery, content, and dose. Lastly, the meta-analyses did not acknowledge the importance of participants' habitual physical activity levels as an unmeasured confounder that was rarely reported in contributing studies.

3.3 Most commonly reported intervention sports and physical activities

The sports and physical activities which were most commonly used in the reported interventions varied (Table 3). Aerobic exercise (13%) was the most reported intervention activity, followed by multi-sports/various activities (7%), and yoga (6%). Other interventions incorporated mindfulness-related exercise (3%) and resistance training (2%). Some effective interventions used specific sporting activities like basketball, kick-boxing, surfing, and running (all 1%).

Table 3. Most reported intervention sports and physical activities

Activity	Number of Studies
Aerobic Exercise (all forms)	22
Multi-Sports / Various Activities	11
Yoga	10
Mindfulness-related exercise	5
Exercise (incl. peer supported)	4
Resistance Training	4
Tai Chi	2
Basketball	2
Kick-boxing	2
Running	2
Surfing	2
Whole body vibration	2

Some of the named interventions were referred to as “Your Shape”, “Headspace Active”, “Junior LEAP” and “Mood Vibes”. Although these activities were mostly offered as part of group-based interventions, some interventions were also offered as one-to-one/individual support or were flexible in that they varied based on the number of young people who showed up on the day. Most interventions lacked a psychological theoretical base, but some effective interventions were informed by cognitive behavioural therapy or dance and movement therapy, while others used motivational interviewing, mindfulness, or psychoeducation, mainly to influence behaviour change.

3.4 Intervention delivery: personnel, length and duration

The most effective interventions were delivered by certified or qualified physical activity practitioners, including fitness instructors/personal trainers, yoga teachers and coaches. However, in some instances, the interventions were delivered by other professionals including researchers, therapists or other mental health practitioners.

Most interventions were structured in that they were offered weekly ranging from 1 to 3 sessions with a total of 20 sessions, or were offered for up to 8 weeks. In fewer studies, some physical activity interventions, were offered as a single session, daily or as much as 5 times per week. This also meant that the intensity of the physical activities varied from low intensity to moderate and high intensity.

Most interventions lasted up to an hour, with some interventions being as brief as 10 minutes and others as long as 90 mins or 2 hours. Most interventions were offered face-to-face, however, a small number of recent interventions were offered online or hybrid.

3.5 Intervention fidelity, acceptability and drop out

Only 6 studies reported on intervention fidelity, with session supervision and compliance monitoring of participants by research staff mentioned in half of those studies. [53-58] One study reported on fidelity of mental illness principles but not exercise fidelity, one reported using an online diary, and one reported on the review of a random selection of 20% of audio recordings to assess inter-instructor reliability of the protocol. 115 studies also did not report on intervention acceptability. Those that did included studies which pointed to the importance of aerobic exercise, group activity, social support, mentoring and supervision, selection of preferred exercise intensity, enjoyment, and provision of a supportive environment.

Drop-out rates were often not reported, or reported inconsistently, with variations observed by study design. Drop-out ranged between 2 and 29% in RCTs (one study reported 51% drop out at the final time point) and 7-33% in single-arm study designs. In the three qualitative studies where drop out was reported, two involved participants who had all dropped out of their intervention [59], or did so in high numbers [60], and in one study 35% did so[61]; the remaining seven studies did not report on drop-out.

3.6 Main limitations of intervention delivery

There were several reported limitations of delivering sport and physical activity interventions for children and young people with diagnosed mental health problems. These included:

- Small sample sizes and lack of control groups
- Dominance of convenience samples (resulting in selection bias) and little/no sample randomisation
- Dominance of short-term interventions with lack of long-term follow-ups, and cross-sectional research designs
- Lack of information on intervention delivery, diagnosis (clinical, symptomology), and participant demographic characteristics
- Difficulties in establishing causality (e.g. exercise effects from changes in mental health, quality of life, sleep quality, and engagement in other activities such as psychotherapy pharmacotherapy, or a combination of these)
- Inconsistency in reporting of mental health and primary outcome data, and reliance on self-reported outcomes or outcomes attributed by others (e.g. parents, intervention staff)
- Limitations of memory recall (especially for qualitative studies)
- Population-specific interventions can limit generalizability, but this is important for targeted population- and condition-specific interventions
- Lack of intervention engagement linked to experience of poor mental health (e.g. anxiety, low mood, medication effects), and context/setting of intervention (e.g. natural environment, sports clubs, inpatient / residential, community, leader characteristics) which can act as barriers and facilitators.

Given these limitations, below we make a series of evidence-based recommendations on the need to improve the quality of future research evidence. We also consider the implications of the findings of the coping review for future practice and policy.

4.0 Future implications and recommendations

What do the findings mean for practice?

1. **Increase Access to Aerobic and Resistance Exercise Programmes:** In line with the Chief Medical Officer's physical activity guidelines for children and young people, there is a need to increase the promotion and delivery of aerobic and combined aerobic and resistance exercise programmes, especially in the community. These forms of exercise have shown the most substantial benefits for children and young people, especially those with a diagnosis or experiencing symptoms of depression.

2. **Integrate Physical Activity into Mental Health Services:** There is a need to encourage mental health services to incorporate structured and supervised group-based sport and physical activity interventions delivered by appropriately qualified staff as part of treatment protocols. The safe and effective delivery of these interventions can be further supported by developing partnerships with other appropriately qualified professionals, including fitness instructors, personal trainers, and sports coaches. Measuring the impact of these interventions is important.

3. **Support and Invest in the Development of an Appropriately Qualified Workforce:** All interventions, wherever they are provided, should be delivered safely and effectively by appropriately qualified clinical and non-clinical personnel. The continuing professional development of, and support (including specialist supervision arrangements) for, these personnel is an important part of the duty of care providers have for participants and those who support them. This training might include the principles and benefits of physical activity promotion for health professionals, and mental health training for nonclinical physical activity professionals.

4. **Tailor Group-Based Interventions to Individual Needs:** Ensure that sport and physical activity interventions are flexible and tailored to the specific needs, motivations and experiences of the participants. This includes offering diverse activities, for diverse groups children and young people, in the intervention setting. Group settings, with peer support, can enhance social support, trust, and improve engagement among children and young people. This is particularly important in local community spaces and other settings where children and young people wish to engage with trusted people and organisations.

5. **Responsible Messaging:** All intervention messaging should be responsible and focus on developing participants' healthy relationship with sport and physical activity, as well as addressing their mental health needs.

6. **Promote Long-Term Engagement:** Develop strategies to sustain long-term engagement, and tackle inequalities, in sport and physical activity among children and young people with diagnosed mental health problems. This can involve creating supportive environments, providing continuous motivation, and addressing barriers to participation such as mental health symptoms or lack of access.

What do the findings mean for policy, funders and commissioners?

1. **Acknowledge the Positive Impact of Cross-Sector Sport and Physical Activity Investment:** Given the positive effects of sport and physical activity interventions, policy makers, funders, and commissioners need to better align and use resources across diverse sectors. This will help tackle the increasing prevalence of mental health problems, rising demand for mental health services, and lengthening waiting times.

2. **Prioritise the Insights from Lived Experience in Decision-Making:** It is important to recognise, value and prioritise the insights children and young people with lived experience of mental health problems can bring to the design, delivery and evaluation of sport and physical activity interventions intended to benefit them.

3. **Prioritise Collaborative and Integrated Approaches to Systems Change:** There is a need to further prioritise integrated systems change and collaborative cross-sector partnership working if sport and physical activity interventions are to reach and benefit more children and young people.

4. **Embed Sport and Physical Activity Interventions in Services for Children and Young People:** There is a need to embed appropriate sport and physical activity interventions into diverse services intended for children and young people, including those across the health, social care and education ecosystems.

5. **Address the Complex Determinants of, and Inequalities in, Mental Health Problems:** Alongside the provision of sport and physical activity interventions, there is an urgent need to address the underlying social determinants (i.e., the conditions in which people are born, grown, work, live, and age) of mental health problems and the various inequalities which give rise to these.

What do the findings mean for future research?

1. **Improving the Amount and Quality of the Evidence Base:** There is a need to improve the amount and quality of research evidence on the use of different types of sport and physical activity interventions in real world (especially community) settings, for more diverse groups of children and young people, with a wider variety of mental health conditions.

2. **Broaden the Focus of Interventions and Body of Evidence:** Given the lack of good quality evidence, further research and investment is needed for interventions which engage a wider group of participants (e.g., children aged under 11, those from minoritised communities, and those who have more than one form of inequality), and those experiencing a broader range of and comorbid mental health conditions (beyond depression and anxiety).

3. **Improve Intervention Fidelity and Reporting:** There is a need to standardise the design, delivery and reporting of sport and physical activity interventions for children and young people with diagnosed mental health problems to ensure consistency and improve the quality of evidence. This includes more detailed and consistent documentation of intervention protocols, participants' characteristics (including habitual physical activity levels and adherence, with analyses adjusted accordingly), and outcome measures. These should be included as part of more robust study designs with clearly defined and strictly applied inclusion criteria for participants who ideally will have received a clinical diagnosis/clinician screening.

4. **More Research on Large-Scale Implementation Trials for Depression:** As Stubbs et al. (2024: 1) have also argued, there is a need for 'more investment, effort, and incentive toward producing high-quality, large-scale implementation trials' to advance research on the benefits of exercise for those experiencing depression.

5. **Increase Investment in Translational Research and Work on Long-Term Impacts of Interventions:** More research is needed on the real world translation of research findings and the evaluation and long-term impact of culturally specific interventions on diagnosed mental health problems (Stubbs et al., 2024).

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Appendix A

Search strategies used with specific search engines

MEDLINE Ovid

1. exp *Sports/ or Sports/
2. exp *Exercise/ or Exercise/ or exp *Exercise Therapy/
3. sport*.ti.
4. exercis*.ti.
5. physical activit*.ti.
6. weight training.ti.
7. strength training.ti.
8. Resistance Training/ or resistance training.ti.
9. crossfit.ti.
10. gym.ti.
11. HIIT.ti.
12. high intensity interval.ti.
13. Physical fitness/ or fitness.ti.
14. Football/ or Soccer/ or football.ti.
15. soccer.ti.
16. cricket.ti.
17. Golf/ or golf.ti.
18. Rugby/ or rugby.ti.
19. netball.ti.
20. Basketball/ or basketball.ti.
21. Yoga/ or yoga.ti.
22. dance.ti.
23. Dancing/ or dancing.ti.
24. movement behavio?rs.ti.
25. walk.ti.
26. Walking/ or walking.ti.
27. hike.ti.
28. hiking.ti.
29. climb.ti.
30. climbing.ti.
31. run.ti.
32. Running/ or running.ti.
33. athletics.ti.
34. swim.ti.
35. Water Sports/ or Swimming/ or swimming.ti,kw. or water sport*.ti.
36. kayak*.ti.
37. canoe*.ti.
38. paddle*.ti.
39. SUP.ti.
40. (surfing or wind-surfing).ti.
41. Bicycling/ or cycling.ti.
42. biking.ti.
43. bicycling.ti.
44. Martial Arts/ or martial art*.ti.
45. Boxing/ or boxing.ti.

46. kick-boxing.ti.
47. cheerleading.ti.
48. Tai Ji/ or Tai Chi.ti.
49. skateboarding.ti.
50. Skating/ or skating.ti.
51. "Physical Education and Training"/ or physical education.ti.
52. Racquet Sports/
53. Tennis/ or tennis.ti. or "table tennis".ti. or squash.ti.
54. badminton.ti.
55. Hockey/ or hockey.ti.
56. or/1-55
57. exp *Mental Disorders/ or Mental Disorder/
58. mental illness*.ti.
59. (mental adj2 disorder*).ti.
60. *Mental Health/
61. mental health.ti,kw.
62. mental wellbeing.ti.
63. mental ill-health.ti.
64. mood disorder*.ti.
65. conduct disorder*.ti.
66. emotional* disturb*.ti.
67. emotion disregulation.ti.
68. psychological.ti.
69. psychotic.ti.
70. psychopathology.ti.
71. psychiatry.ti.
72. Psychotic Disorders/ or psychosis.ti.
73. Psychological Well-Being/
74. Depressive Disorder/ or Depression/ or Depressive Disorder, Major/
75. (depression or depressed or depressive).ti.
76. Anxiety Disorder/ or Anxiety/
77. anxiety.ti.
78. Stress, Psychological/
79. stress.ti.
80. Suicide/
81. suicid*.ti.
82. behavio?r disorder*.ti.
83. Self-Injurious Behavior/
84. self-harm.ti.
85. Bipolar Disorder/ or bipolar.ti.
86. Schizophrenia/ or schizophrenia.ti.
87. Social Communication Disorder/
88. social communication disorder.ti.
89. disruptive mood dysregulation disorder*.ti.
90. Stress Disorders, Post-Traumatic/ or post-traumatic stress disorder.ti.
91. PTSD.ti.
92. major depressive disorder*.ti.
93. panic disorder*.ti.
94. Agoraphobia/ or agoraphobia.ti.
95. oppositional defiant disorder.ti.
96. "Feeding and Eating Disorders"/

97. eating disorder*.ti.
98. Anorexia Nervosa/ or anorexi*.ti.
99. Bulimia Nervosa/ or bulimi*.ti.
100. Binge-Eating Disorder/ or binge-eat*.ti.
101. Avoidant Restrictive Food Intake Disorder/ or food intake disorder*.ti.
102. Body Dysmorphic Disorders/ or body dysmorphi*.ti.
103. Obsessive-Compulsive Disorder/ or Obsessive compulsive disorder*.ti.
104. internet gaming disorder*.ti.
105. prolonged grief disorder*.ti.
106. Tourette Syndrome/
107. tourette*.ti.
108. Substance-Related Disorders/ or addiction.ti.
109. or/57-108
110. 56 and 109
111. limit 110 to ("preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)" or "young adult (19 to 24 years)")
112. (child* or adolescen* or teen* or school-aged or student* or youth* or boy* or girl* or "young people" or "young adult*" or "young person" or "young women" or "young men" or pre-teen* or pupil* or junior* or kids).ti.
113. 110 and 112
114. 111 or 113
115. limit 114 to english language
116. limit 115 to clinical trial
117. limit 115 to comparative study
118. limit 115 to evaluation study
119. limit 115 to meta analysis
120. limit 115 to observational study
121. limit 115 to pragmatic clinical trial
122. limit 115 to randomized controlled trial
123. limit 115 to "systematic review"
124. 116 or 117 or 118 or 119 or 120 or 121 or 122 or 123
125. exp Qualitative Research/
126. 115 and 125
127. (trial or RCT or systematic review or scoping review or evidence synthesis or mixed-methods or observational study or evaluation or comparative study or meta-analysis or qualitative or cohort study or pre-post).ti,kw.
128. 115 and 127
129. limit 115 to ("therapy (maximizes specificity)" or "qualitative (maximizes specificity)")
130. (effect* or impact* or benefit* or outcome*).ti.
131. 115 and 130
132. 124 or 126 or 128 or 129 or 131
133. exp animals/ not human/
134. 132 not 133
135. limit 134 to yr="2004 - 2024"
136. (letter or editorial or comment).pt.
137. 135 not 136

CINAHL EbscoHost

S1 (MH "Sports+")
S2 (MH "Exercise+")
S3 TI sport*
S4 TI exercis*
S5 (MM "Physical Activity")
S6 TI "physical activit*"
S7 TI "weight training"
S8 TI "strength training"
S9 (MM "Resistance Training")
S10 TI "resistance training"
S11 TI crossfit
S12 TI gym
S13 TI HIIT
S14 TI "high intensity interval"
S15 TI fitness
S16 (MM "Football") OR (MM "Soccer")
S17 TI football
S18 TI soccer
S19 (MM "Cricket (Sports)")
S20 TI cricket
S21 (MM "Golf")
S22 TI Golf
S23 (MM "Rugby")
S24 TI Rugby
S25 TI netball
S26 (MM "Basketball")
S27 TI basketball
S28 (MM "Yoga")
S29 TI Yoga
S30 (MM "Dancing")
S31 TI (dance or dancing)
S32 TI ("movement behaviours" or "movement behaviors")
S33 (MM "Walking")
S34 TI (walk or walking)
S35 TI (hike or hiking)
S36 TI (climb or climbing)
S37 (MM "Running")
S38 TI (run or running)
S39 (MM "Athletic Training")
S40 TI athletics
S41 (MM "Swimming")
S42 TI (swim or swimming or "water sport*")
S43 (MM "Aquatic Sports")
S44 TI kayak*
S45 TI canoe*
S46 TI paddle*
S47 TI SUP
S48 TI (surfing or wind-surfing)
S49 (MM "Cycling")
S50 TI (Bicycling or cycling)
S51 TI biking

S52 (MM "Martial Arts")
S53 TI "martial art*"
S54 (MH "Boxing")
S55 TI Boxing
S56 TI kick-boxing
S57 TI cheerleading
S58 (MM "Tai Chi")
S59 TI "Tai Chi"
S60 (MM "Skateboarding")
S61 TI skateboarding
S62 (MM "Skating") OR (MM "Ice Skating")
S63 TI skating
S64 (MM "Physical Education and Training")
S65 TI "Physical Education"
S66 (MM "Tennis")
S67 TI (tennis or "table tennis" or squash)
S68 (MM "Racquet Sports")
S69 TI badminton
S70 (MM "Hockey")
S71 TI hockey
S72 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71
S73 (MH "Mental Disorders+") OR (MM "Behavioral and Mental Disorders")
S74 TI "mental illness*"
S75 TI mental N2 disorder*
S76 (MM "Mental Health")
S77 TI "mental health"
S78 TI "mental wellbeing"
S79 TI "mental ill-health"
S80 (MM "Affective Disorders") OR (MM "Affective Disorders, Psychotic")
S81 TI "mood disorder*"
S82 TI "conduct disorder*"
S83 TI "emotional* disturb*"
S84 TI "emotion disregulation"
S85 TI psychological
S86 TI psychotic
S87 TI psychopathology
S88 TI psychiatry
S89 (MM "Psychotic Disorders") OR TI psychosis
S90 (MM "Psychological Well-Being")
S91 (MM "Depression+")
S92 TI (depression or depressed or depressive)
S93 (MM "Anxiety+") OR (MM "Anxiety Disorders)
S94 TI anxiety
S95 (MM "Stress, Psychological+")

S96 TI stress
S97 (MM "Suicide+")
S98 TI suicid*
S99 TI ("behaviour disorder*" or "behavior disorder*")
S100 (MM "Self-Injurious Behavior")
S101 TI self-harm
S102 TI bipolar
S103 TI schizophrenia
S104 (MM "Bipolar Disorder+")
S105 (MM "Schizophrenia+")
S106 TI "Social Communication Disorder"
S107 TI "disruptive mood dysregulation disorder*"
S108 (MM "Stress Disorders, Post-Traumatic+")
S109 TI "post-traumatic stress disorder"
S110 TI PTSD
S111 TI "major depressive disorder*"
S112 (MM "Panic Disorder")
S113 TI "panic disorder*"
S114 (MM "Agoraphobia")
S115 TI agoraphobia
S116 TI "oppositional defiant disorder"
S117 (MM "Eating Disorders+")
S118 TI "eating disorder*"
S119 MM ("Anorexia Nervosa") OR TI anorexi*
S120 MM ("Bulimia Nervosa") OR (TI bulimi*
S121 MM ("Binge Eating Disorder") OR TI binge-eat*
S122 TI "food intake disorder*"
S123 MM ("Body Dysmorphic Disorder") OR TI "body dysmorphi*"
S124 (MM "Compulsive Behavior") OR TI "Obsessive compulsive disorder*"
S125 TI "internet gaming disorder*"
S126 TI "prolonged grief disorder*"
S127 (MM "Tourette Syndrome")
S128 TI tourette*
S129 (MM "Behavior, Addictive") OR TI addiction
S130 S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR S81 OR S82 OR S83 OR S84 OR S85 OR S86 OR S87 OR S88 OR S89 OR S90 OR S91 OR S92 OR S93 OR S94 OR S95 OR S96 OR S97 OR S98 OR S99 OR S100 OR S101 OR S102 OR S103 OR S104 OR S105 OR S106 OR S107 OR S108 OR S109 OR S110 OR S111 OR S112 OR S113 OR S114 OR S115 OR S116 OR S117 OR S118 OR S119 OR S120 OR S121 OR S122 OR S123 OR S124 OR S125 OR S126 OR S127 OR S128 OR S129
S131 S72 AND S130
S132 S72 AND S130 Limiters - Age Groups: Child, Preschool 2-5 years, Child, 6-12 years, Adolescence, 13-18 years
S133 TI ((child* or adolescen* or teen* or school-aged or student* or youth* or boy* or girl* or "young people" or "young adult*" or "young person" or "young men" or "young women" or pre-teen* or pupil* or junior* or kids))
S134 S131 AND S133
S135 S132 OR S134
S136 S132 OR S134 Limiters - Clinical Queries: Therapy - High Specificity, Qualitative - High Specificity

S137 S132 OR S134 Limiters - Publication Type: Clinical Trial, Meta Analysis, Meta Synthesis, Randomized Controlled Trial, Systematic Review
S138 (MH "Qualitative Studies") OR TI (trial or RCT or "systematic review" or "scoping review" or "evidence synthesis" or "mixed-methods" or "observational study" or evaluation or "comparative study" or "meta-analysis" or qualitative or "cohort study" or pre-post)
S139 S135 AND S138
S140 TI (effect* or impact* or benefit* or outcome*)
S141 S135 AND S140
S142 S136 OR S137 OR S139 OR S141
S143 S136 OR S137 OR S139 OR S141 Limiters - Publication Year: 2004-2024
S144 S136 OR S137 OR S139 OR S141 Limiters - Publication Year: 2004-2024 Narrow by Language: - english

PsycINFO
S1 DE "Sports"
S2 DE "Exercise"
S3 TI sport*
S4 TI exercis*
S5 MM "Physical Activity"
S6 TI "physical activit*"
S7 TI "weight training"
S8 TI "strength training"
S9 TI "Resistance Training"
S10 TI crossfit
S11 TI gym
S12 TI HIIT
S13 TI "high intensity interval"
S14 TI fitness
S15 MM "Football" OR MM "Soccer"
S16 TI Football
S17 TI soccer
S18 TI cricket
S19 TI Golf
S20 TI Rugby
S21 TI netball
S22 MM "Basketball"
S23 TI basketball
S24 MM "Yoga"
S25 TI Yoga
S26 MM "Dance"
S27 TI (dance or dancing)
S28 TI ("movement behaviours" or "movement behaviors")
S29 MM "Walking"
S30 TI (walk or walking)
S31 TI (hike or hiking)
S32 TI (climb or climbing)
S33 MM "Running"
S34 TI (run or running)

S35 MM "Athletic Training"
S36 TI athletics
S37 MM "Swimming"
S38 TI (swim or swimming)
S39 TI "water sport*"
S40 TI kayak*
S41 TI canoe*
S42 TI paddle*
S43 TI SUP
S44 TI surfing OR TI wind-surfing
S45 MM "Cycling"
S46 TI (Bicycling or cycling or biking)
S47 MM "Martial Arts"
S48 TI "martial arts"
S49 TI Boxing
S50 TI kick-boxing
S51 TI cheerleading
S52 TI "Tai Chi"
S53 TI skateboarding
S54 TI "skating"
S55 MM "Physical Education"
S56 TI "Physical Education"
S57 MM "Tennis"
S58 TI (tennis or "table tennis" OR squash)
S59 TI badminton
S60 TI hockey
S61 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60
S62 DE "Mental Disorders" OR MM "Chronic Mental Illness" OR MM "Serious Mental Illness"
S63 TI "mental illness*"
S64 TI mental N2 disorder*
S65 MM "Mental Health"
S66 TI "mental health"
S67 TI "mental wellbeing"
S68 TI "mental ill-health"
S69 MM "Affective Disorders"
S70 TI "mood disorder*"
S71 TI "conduct disorder*"
S72 TI "emotional* disturb*"
S73 TI "emotion disregulation"
S74 TI psychological
S75 TI psychotic
S76 TI psychopathology OR TI psychiatry
S77 MM "Psychosis" OR TI psychosis

S78 MM "Major Depression" OR MM "Depression (Emotion)" OR MM "Recurrent Depression"
S79 TI ((depression or depressed or depressive))
S80 MM "Anxiety Disorders" OR MM "Anxiety"
S81 TI Anxiety
S82 MM "Stress"
S83 TI stress
S84 MM "Suicide"
S85 TI suicid*
S86 TI (("behaviour disorder*" or "behavior disorder*")
S87 MM "Nonsuicidal Self-Injury" OR TI "self-harm"
S88 MM "Personality Disorders" OR MM "Bipolar Disorder"
S89 TI bipolar
S90 MM "Schizophrenia"
S91 TI schizophrenia
S92 TI "Social Communication Disorder"
S93 TI "disruptive mood dysregulation disorder*"
S94 MM "Posttraumatic Stress"
S95 TI "post-traumatic stress disorder"
S96 TI PTSD
S97 TI "major depressive disorder*"
S98 MM "Panic Disorder"
S99 TI "panic disorder*"
S100 MM "Agoraphobia"
S101 TI agoraphobia
S102 TI "oppositional defiant disorder"
S103 MM "Eating Disorders" OR MM "Anorexia Nervosa" OR MM "Avoidant/Restrictive Food Intake Disorder" OR MM "Binge Eating Disorder" OR MM "Bulimia" OR MM "Feeding Disorders"
S104 TI anorexi*
S105 TI bulimi*
S106 TI binge-eat*
S107 TI "food intake disorder*" OR TI "body dysmorphi*"
S108 MM "Obsessive Compulsive Disorder" OR TI "Obsessive Compulsive Disorder"
S109 TI "internet gaming disorder*"
S110 TI "prolonged grief disorder*"
S111 MM "Tourette Syndrome"
S112 TI tourette*
S113 MM "Substance Related and Addictive Disorders" OR TI addiction
S114 S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR S81 OR S82 OR S83 OR S84 OR S85 OR S86 OR S87 OR S88 OR S89 OR S90 OR S91 OR S92 OR S93 OR S94 OR S95 OR S96 OR S97 OR S98 OR S99 OR S100 OR S101 OR S102 OR S103 OR S104 OR S105 OR S106 OR S107 OR S108 OR S109 OR S110 OR S111 OR S112 OR S113
S115 S61 AND S114
S116 S61 AND S114 Limiters - Age Groups: Preschool Age (2-5 yrs), School Age (6-12 yrs), Adolescence (13-17 yrs)
S117 S61 AND S114 Limiters - Age Groups: Young Adulthood (18-29 yrs)
S118 S116 AND S117

S119 TI (child* or adolescen* or teen* or school-aged or student* or youth* or boy* or girl* or "young people" or "young adult*" or "young person" or "young men" or "young women" or pre-teen* or pupil* or junior* or kids)
S120 S115 AND S119
S121 S116 OR S118 OR S120
S122 S116 OR S118 OR S120 Limiters - Methodology: CLINICAL TRIAL, -Followup Study, -Longitudinal Study, ---Prospective Study, ---Retrospective Study, INTERVIEW, -Focus Group, -Systematic Review, META ANALYSIS, METASYNTHESIS, QUALITATIVE STUDY, QUANTITATIVE STUDY
S123 (TI (trial or RCT or "systematic review" or "scoping review" or "evidence synthesis" or "mixed-methods" or "observational study" or evaluation or "comparative study" or "meta-analysis" or qualitative or "cohort study" or pre-post)) OR (TI (effect* or impact* or benefit* or outcome*))
S124 S121 AND S123
S125 S122 OR S124
S126 S122 OR S124 Limiters - Published: 20040101-20241231 Narrow by Language: - english (2,375)

SportsDISCUS
S1 DE "SPORTS"
S2 TI sport*
S3 DE "EXERCISE"
S4 TI exercis*
S5 DE "PHYSICAL activity"
S6 TI "physical activit*"
S7 DE "WEIGHT training"
S8 TI "weight training"
S9 (DE "STRENGTH training")
S10 TI "strength training"
S11 DE "RESISTANCE training"
S12 TI "Resistance Training"
S13 TI crossfit
S14 TI gym
S15 TI HIIT
S16 DE "HIGH-intensity interval training"
S17 TI "high intensity interval"
S18 DE "PHYSICAL fitness for children"
S19 TI fitness
S20 (DE "FOOTBALL") OR (DE "SOCCER")
S21 TI (football or soccer)
S22 (DE "CRICKET (Sport)") OR (DE "CRICKET for children")
S23 TI cricket
S24 DE "GOLF"
S25 TI golf
S26 DE "RUGBY Union football" OR DE "RUGBY football"
S27 TI rugby
S28 DE "NETBALL"
S29 TI netball
S30 DE "BASKETBALL" OR DE "BASKETBALL for children"
S31 TI basketball
S32 DE "YOGA"

S33 TI yoga
S34 DE "DANCE"
S35 TI (dancing or dance)
S36 TI ("movement behaviors" or "movement behaviours")
S37 DE "WALKING"
S38 TI (walk or walking)
S39 DE "HIKING"
S40 TI (hike or hiking)
S41 DE "ROCK climbing" OR DE "INDOOR rock climbing"
S42 TI (climbing or climb)
S43 DE "RUNNING"
S44 TI (run or running)
S45 DE "ATHLETICS"
S46 TI athletics
S47 DE "SWIMMING"
S48 TI (swimming or swim)
S49 DE "AQUATIC sports"
S50 TI "water sport*"
S51 DE "KAYAKING"
S52 TI kayak*
S53 DE "CANOEING training"
S54 TI canoe*
S55 DE "STAND-up paddle surfing"
S56 TI paddle*
S57 TI SUP
S58 DE "SURFING" OR DE "WINDSURFING"
S59 TI (surfing or wind-surfing)
S60 DE "CYCLING" OR DE "MOUNTAIN biking"
S61 TI (Bicycling or cycling or biking)
S62 DE "MARTIAL arts"
S63 TI "martial art*"
S64 DE "BOXING"
S65 TI Boxing
S66 DE "KICKBOXING"
S67 TI kick-boxing
S68 DE "CHEERLEADING"
S69 TI cheerleading
S70 DE "TAI chi"
S71 TI "Tai Chi"
S72 DE "SKATEBOARDING"
S73 TI skateboarding
S74 DE "ICE skating" OR DE "ROLLER skating"
S75 TI Skating
S76 DE "PHYSICAL education"
S77 TI "Physical Education"
S78 DE "RACKET games" OR DE "BADMINTON (Game)" OR DE "SQUASH (Game)" OR DE "TABLE tennis" OR DE "TENNIS"
S79 TI (tennis or table-tennis or badminton or squash)
S80 DE "HOCKEY"
S81 TI hockey

S82 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 O ...
S83 DE "MENTAL illness"
S84 TI "mental illness*"
S85 TI mental N2 disorder*
S86 DE "MENTAL health"
S87 TI "mental health"
S88 TI "mental wellbeing"
S89 TI "mental ill-health"
S90 DE "AFFECTIVE disorders"
S91 TI "mood disorder*"
S92 TI "conduct disorder*"
S93 TI "emotional* disturb*"
S94 TI "emotion disregulation"
S95 TI psychological
S96 TI psychotic
S97 TI psychopathology
S98 TI psychiatry
S99 TI psychosis
S100 DE "MENTAL depression"
S101 TI (depression or depressed or depressive)
S102 DE "ANXIETY"
S103 TI Anxiety
S104 DE "PSYCHOLOGICAL stress"
S105 TI stress
S106 DE "SUICIDE"
S107 TI suicid*
S108 TI ("behavior disorder*" or "behaviour disorder*")
S109 DE "SELF-destructive behavior"
S110 TI "self-harm"
S111 TI bipolar
S112 DE "SCHIZOPHRENIA"
S113 TI "Social Communication Disorder"
S114 TI "disruptive mood dysregulation disorder*"
S115 DE "POST-traumatic stress disorder"
S116 TI ("post-traumatic stress disorder" or PTSD)
S117 TI "panic disorder*"
S118 TI agoraphobia
S119 TI "oppositional defiant disorder"
S120 (DE "EATING disorders") AND (DE "BINGE-eating disorder" OR DE "ANOREXIA nervosa")
S121 TI (anorexia or bulimia or "eating disorder*" or "food intake disorder*" or binge-eat*)
S122 TI body dysmorphi*
S123 DE "COMPULSIVE behavior" OR TI "Obsessive compulsive disorder*"

S124 TI "internet gaming disorder*"
S125 TI "prolonged grief disorder*"
S126 TI tourette*
S127 TI addiction
S128 S83 OR S84 OR S85 OR S86 OR S87 OR S88 OR S89 OR S90 OR S91 OR S92 OR S93 OR S94 OR S95 OR S96 OR S97 OR S98 OR S99 OR S100 OR S101 OR S102 OR S103 OR S104 OR S105 OR S106 OR S107 OR S108 OR S109 OR S110 OR S111 OR S112 OR S113 OR S114 OR S115 OR S116 OR S117 OR S118 OR S119 OR S120 OR S121 OR S122 OR S123 OR S124 OR S125 OR S126 OR S127
S129 S82 AND S128
S130 TI ((child* or adolescen* or teen* or school-aged or student* or youth* or boy* or girl* or "young people" or "young adult*" or "young person" or "young men" or "young women" or pre-teen* or pupil* or junior* or kids)) OR AB ((child* or adolescen* or teen* or school-aged or student* or youth* or boy* or girl* or "young people" or "young adult*" or "young person" or "young men" or "young women" or pre-teen* or pupil* or junior* or kids))
S131 S129 AND S130
S132 S129 AND S130 Limiters - Published: 20040101-20241231
S133 S129 AND S130 Limiters - Published: 20040101-20241231 Narrow by Language: - english
Limiters - Peer Reviewed Journals (1,848)

Cochrane
Cochrane Database of Systematic Reviews Issue 4 of 12, April 2024
Cochrane Central Register of Controlled Trials Issue 3 of 12, March 2024

ID Search Hits
#1 MeSH descriptor: [Sports] explode all trees 22029
#2 MeSH descriptor: [Exercise] explode all trees or MeSH descriptor: [Exercise Therapy] explode all trees 38590
#3 (sport* or exercise*):ti 57531
#4 (physical NEXT activit*):ti 10653
#5 ("weight training" or "strength training" or "resistance training"):ti 5600
#6 MeSH descriptor: [Resistance Training] this term only 5650
#7 (crossfit or gym or HIIT or "high intensity interval" or fitness):ti 5184
#8 MeSH descriptor: [Physical Fitness] this term only 3802
#9 MeSH descriptor: [Football] this term only 399
#10 MeSH descriptor: [Soccer] this term only OR MeSH descriptor: [Golf] this term only
#11 (football or soccer or cricket or rugby or netball or golf):ti 2154
#12 MeSH descriptor: [Rugby] this term only 30
#13 MeSH descriptor: [Basketball] this term only 300
#14 (basketball):ti 473
#15 MeSH descriptor: [Yoga] this term only 1211
#16 (yoga):ti 3831
#17 MeSH descriptor: [Dancing] this term only 289
#18 (dance or dancing or "movement behaviors" or "movement behaviours"):ti 792
#19 MeSH descriptor: [Walking] this term only 5960
#20 MeSH descriptor: [Running] this term only 2677

#21 (walk or walking or run or running or climb or climbing or hike or hiking):ti 8373
#22 (athletics):ti 19
#23 MeSH descriptor: [Swimming] this term only 529
#24 MeSH descriptor: [Water Sports] this term only 79
#25 (swim or swimming or kayak* or canoe* or paddle* or SUP or surfing or wind-surfing):ti 594
#26 (water NEXT sport*):ti 2
#27 MeSH descriptor: [Bicycling] this term only 2125
#28 (Bicycling or cycling or biking):ti 1824
#29 MeSH descriptor: [Martial Arts] this term only 219
#30 (martial NEXT art*):ti 62
#31 MeSH descriptor: [Boxing] this term only 38
#32 MeSH descriptor: [Tai Ji] this term only 582
#33 (boxing or kick-boxing or cheerleading or Tai Chi):ti 1379
#34 MeSH descriptor: [Skating] this term only 29
#35 (skating or skateboarding):ti 31
#36 MeSH descriptor: [Physical Education and Training] this term only 1908
#37 ("physical education"):ti 313
#38 MeSH descriptor: [Racquet Sports] this term only 55
#39 MeSH descriptor: [Tennis] this term only 113
#40 (tennis or "table tennis" or squash or badminton or hockey):ti 854
#41 MeSH descriptor: [Hockey] this term only 95
#42 {OR #1-#41} 108924
#43 MeSH descriptor: [Mental Disorders] explode all trees 106232
#44 (mental NEXT illness*):ti 1484
#45 (mental NEAR2 disorder*):ti 49653
#46 MeSH descriptor: [Mental Health] this term only 3235
#47 ("mental health" or "mental well-being" or "mental ill-health"):ti 5406
#48 (mood NEXT disorder*):ti 381
#49 (conduct NEXT disorder*):ti 168
#50 (emotional* NEXT disturb*):ti 81
#51 (emotion disregulation):ti 0
#52 (psychological or psychotic or psychopathology or psychiatry or psychosis):ti 12984
#53 MeSH descriptor: [Psychotic Disorders] this term only 3866
#54 MeSH descriptor: [Psychological Well-Being] this term only 35
#55 MeSH descriptor: [Depressive Disorder] this term only 9741
#56 MeSH descriptor: [Depression] this term only 18110
#57 MeSH descriptor: [Depressive Disorder, Major] this term only 7144
#58 (depression or depressed or depressive):ti 37388
#59 MeSH descriptor: [Anxiety Disorders] this term only 6128
#60 MeSH descriptor: [Anxiety] this term only 11836
#61 (anxiety):ti 18890
#62 MeSH descriptor: [Stress, Psychological] this term only 7937
#63 (stress):ti 22756
#64 MeSH descriptor: [Suicide] this term only 1004
#65 (suicid*):ti 2502
#66 (behavior NEXT disorder* or behaviour NEXT disorder*):ti 227
#67 MeSH descriptor: [Self-Injurious Behavior] this term only 518
#68 (self-harm):ti 257

#69 MeSH descriptor: [Bipolar Disorder] this term only 3579
#70 MeSH descriptor: [Schizophrenia] this term only 9804
#71 (bipolar or schizophrenia):ti 16852
#72 MeSH descriptor: [Social Communication Disorder] this term only 15
#73 ("social communication disorder"):ti 4
#74 ("disruptive mood dysregulation disorder" or "disruptive mood dysregulation disorders"):ti
#75 MeSH descriptor: [Stress Disorders, Post-Traumatic] this term only 4048
#76 ("post-traumatic stress disorder" or ptsd):ti 2810
#77 ("major depressive disorder" or "major depressive disorders"):ti 3872
#78 (panic NEXT disorder*):ti 1389
#79 MeSH descriptor: [Agoraphobia] this term only 506
#80 (agoraphobia):ti 370
#81 ("oppositional defiant disorder"):ti 58
#82 MeSH descriptor: [Feeding and Eating Disorders] this term only 1199
#83 (eating NEXT disorder* or anorexi* or bulimi* or binge-eat*):ti 3585
#84 MeSH descriptor: [Anorexia Nervosa] this term only 761
#85 MeSH descriptor: [Bulimia Nervosa] this term only 363
#86 MeSH descriptor: [Binge-Eating Disorder] this term only 486
#87 MeSH descriptor: [Avoidant Restrictive Food Intake Disorder] this term only 16
#88 (food NEXT intake NEXT disorder*):ti 22
#89 MeSH descriptor: [Body Dysmorphic Disorders] this term only 104
#90 (body NEXT dysmorphi*):ti 125
#91 MeSH descriptor: [Obsessive-Compulsive Disorder] this term only 1409
#92 (Obsessive-Compulsive NEXT Disorder*):ti 1761
#93 internet NEXT gaming NEXT disorder* 76
#94 (prolonged NEXT grief NEXT disorder*):ti 31
#95 MeSH descriptor: [Tourette Syndrome] this term only 343
#96 (tourette*):ti 417
#97 MeSH descriptor: [Substance-Related Disorders] this term only 5429
#98 (addiction):ti 1148
#99 {OR #43-#98} 208436
#100 #42 AND #99 10015
#101 (child* or adolescen* or teen* or school-aged or student* or youth* or boy* or girl* or "young people" or young NEXT adult* or "young person" or "young women" or "young men" or pre-teen* or pupil* or junior* or kids):ti 129605
#102 MeSH descriptor: [Child] this term only 72038
#103 MeSH descriptor: [Child, Preschool] this term only 39429
#104 MeSH descriptor: [Adolescent] this term only 136681
#105 MeSH descriptor: [Young Adult] this term only 95423
#106 {OR #101-#105} 304037
#107 #100 AND #106 2252

968 (Embase)
36 (CINAHL)
1653 (PubMed)

Web of Science
sport* OR exercis* OR "physical activit*" OR "weight training" OR "strength training" OR "resistance training" OR crossfit OR gym OR HIIT OR "high intensity" OR fitness

OR football OR soccer OR cricket OR golf OR rugby OR netball OR basketball OR yoga OR dance OR dancing OR "movement behaviors" OR "movement behaviours" OR walk OR walking OR hike OR hiking OR climb OR climbing OR run OR running OR athletics OR swim OR "Water Sport*" OR swimming OR kayak* OR canoe* OR paddle* OR SUP OR surfing OR wind-surfing bicycling OR cycling OR biking OR bicycling OR "martial art*" OR boxing OR kick-boxing OR cheerleading OR "Tai Chi" OR skateboarding OR "skating" OR "physical education" OR tennis OR "table tennis" OR squash OR badminton OR hockey (Title) and "mental illness*" OR "mental disorder*" OR "mental health disorder*" OR "mental health" OR "mental wellbeing" OR "mental ill-health" OR "mood disorder*" OR "conduct disorder*" OR "emotional* disturb*" OR "emotion disregulation" OR psychological OR psychotic OR psychopathology OR psychiatry OR psychosis.ti OR depression OR depressed OR depressive OR anxiety OR stress OR suicid* OR "behavior disorder*" OR "behaviour disorder*" OR self-harm OR bipolar OR schizophrenia OR "social communication disorder" OR "disruptive mood dysregulation disorder*" OR "post-traumatic stress disorder" OR PTSD OR "major depressive disorder*" OR "panic disorder*" OR agoraphobia OR "oppositional defiant disorder" OR "eating disorder*" OR anorexi* OR bulimi* OR binge-eat* OR "food intake disorder*" OR "body dysmorphi*" OR "Obsessive compulsive disorder*" OR "internet gaming disorder*" OR "prolonged grief disorder*" OR tourette* OR addiction (Title) and child* OR adolescen* OR teen* OR school-aged OR student* OR youth* OR boy* OR girl* OR "young people" OR "young adult*" OR "young person" OR "young men" or "young women" OR pre-teen* OR pupil* OR junior* OR kids (Title) and trial or RCT or systematic review or scoping review or evidence synthesis or mixed-methods or observational study or evaluation or comparative study or meta-analysis or qualitative or cohort study or pre-post (Topic)

OR

sport* OR exercis* OR "physical activit*" OR "weight training" OR "strength training" OR "resistance training" OR crossfit OR gym OR HIIT OR "high intensity" OR fitness OR football OR soccer OR cricket OR golf OR rugby OR netball OR basketball OR yoga OR dance OR dancing OR "movement behaviors" OR "movement behaviours" OR walk OR walking OR hike OR hiking OR climb OR climbing OR run OR running OR athletics OR swim OR "Water Sport*" OR swimming OR kayak* OR canoe* OR paddle* OR SUP OR surfing OR wind-surfing bicycling OR cycling OR biking OR bicycling OR "martial art*" OR boxing OR kick-boxing OR cheerleading OR "Tai Chi" OR skateboarding OR "skating" OR "physical education" OR tennis OR "table tennis" OR squash OR badminton OR hockey (Title) and "mental illness*" OR "mental disorder*" OR "mental health disorder*" OR "mental health" OR "mental wellbeing" OR "mental ill-health" OR "mood disorder*" OR "conduct disorder*" OR "emotional* disturb*" OR "emotion disregulation" OR psychological OR psychotic OR psychopathology OR psychiatry OR psychosis.ti OR depression OR depressed OR depressive OR anxiety OR stress OR suicid* OR "behavior disorder*" OR "behaviour disorder*" OR self-harm OR bipolar OR schizophrenia OR "social communication disorder" OR "disruptive mood dysregulation disorder*" OR "post-traumatic stress disorder" OR PTSD OR "major depressive disorder*" OR "panic disorder*" OR agoraphobia OR "oppositional defiant disorder" OR "eating disorder*" OR anorexi* OR bulimi* OR binge-eat* OR "food intake disorder*" OR "body dysmorphi*" OR "Obsessive compulsive disorder*" OR "internet gaming disorder*" OR "prolonged grief disorder*" OR tourette* OR addiction (Title) and child* OR adolescen* OR teen*

OR school-aged OR student* OR youth* OR boy* OR girl* OR "young people" OR "young adult*" OR "young person" OR "young men" or "young women" OR pre-teen* OR pupil* OR junior* OR kids (Title) and effect* or impact* or benefit* or outcome* (Title)

Appendix B

List of studies included in the final analysis

Ahn, S. and Fedewa, A.L. (2011). A meta-analysis of the relationship between children's physical activity and mental health. *Journal of Pediatric Psychology,* 36, 385-397.

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Appendix C

Categorisation of study designs and their contents

1. Randomized Controlled Trials (RCTs)
   - RCT
   - Randomized within-subjects crossover design
   - single-blinded RCT
   - unblinded, two-phase, pilot RCT
   - RCT three arms but says groups not randomised
   - semi-randomized 2y longitudinal study - feasibility study
   - randomised pilot study

2. Quasi-Experimental Designs
   - Quasi-experiment
   - quasi-experimental
   - quasi-experimental (pre-post)
   - Quasi-experimental, pretest–posttest type with a control group

3. Pre-Post Studies
   - pre-post
   - Pre-post evaluation
   - pre-post feasibility
   - pre-post feasibility/pilot study
   - Pre-post pilot evaluation
   - pre-post single arm
   - pre-post test study
   - pre-post, mixed-methods
   - single arm pre-post evaluation
   - single cohort pre post
   - Single arm pre-post evaluation

- single-arm pre- and post-intervention

4. Cohort Studies
   - cohort
   - longitudinal cohort
   - unclear but looks like cohort study

5. Systematic Reviews and Meta-Analyses
   - systematic review
   - Systematic review
   - Systematic Review
   - sys review
   - sys review and meta-analysis
   - systematic review & meta-analysis
   - systematic review and meta-analysis
   - systematic review of meta-analyses
   - Umbrella Systematic Review
   - systematic review of RCT and non-RCT studies
   - systematic scoping review
   - mesh meta-analysis
   - meta-analysis
   - Meta-analysis (1974 to 2009)
   - meta-analysis of RCTs
   - network of meta-analysis - RCTs comparing efficacy of 7 exercise interventions
   - Scoping review

6. Qualitative Studies
   - qual
   - Qualitative
   - qualitative study

- Qualitative study

- qualitative impact & implementation evaluation

- Qualitative study

- qualitative study of teen's acceptability of yoga intervention

- EXCLUDE? qual study of 9 ex physiology students on placement

- post-intervention quali follow-up (preceding study to #67)

- 12m post-intervention quali follow-up

- EXCLUDED; STUDY FOCUSES ON THERAPISTS PERCEPTIONS OF USINGDANCE THERAPTY WITH CBT; NO YOUTH MH OUTCOMES REPORTED

7. Pilot Studies

- pilot

- pilot with pre-post-test design

- pilot ecological momentary assessment

- pilot, single cohort

- Open-label Pilot

- intervention mapping

- intervention review

- open intervention study without a control group

8. Controlled Studies (Non-Randomized)

- controlled clinical trial

- Controlled clinical trial

- controlled study

- 3-arm intervention

- comparison of sport and non-sport participants disordered eating and compulsive exercise cognitions

- Not clear but looks like cluster randomised study (classroom is cluster)

- parallel group design

- part RCT three arm

9. Cross-Sectional and Prospective Studies

- cross-sectional

- prospective trial

10. Excluded Studies (for various reasons)

- EXCLUDED; NO MH OUTCOMES

- EXCLUDED FOR SAME REASONS AS #74

- EXCLUDED AS NO MH OUTCOMES ASSESSED

- EXCLUDED; PARTICIPANTS NOT CLINICALLY DIAGNOSED WITH ANXIETY DISORDER OR IN A TREATMENT PROGRAMME

- EXCLUDED; PARTICIPANTS HAD ELEVATED DEPRESSIN SYMPTOMS BUT NOT A CLINICAL DIAGNOSIS OR ON A TREATMENT PATHWAY (THEY WERE RECRUITED BY SOCIAL MEDIA AND COMMUNITY ADS

- EXCLUDED; PARTICIPANTS WERE ADULTS (MEAN AGE=30Y)

- EXCLUDED; PARTICIPANTSS NOT CLINICALLY DIAGNOSED; 1ST AUTHOR ACCOUNT OF THEIR OWN LOGS DOCUMENTING DANCE THERAPY TREATMENT OF CHILDREN REFERRED BY SCHOOL PSYCHOLOGIST FOR ANXIETY

- EXCLUDED; PRIMARY OUTCOME WAS CARDIORESPIRATORY FITNESS; NO INTERVENTION EFFECTS ON ANY MH-RELATED SECONDARY OUTCOMES

- EXCLUDED; LAB-BASED EXPERIMENT INVOLVING A SINGLE CYCLE ERGOMETER EXERCISE BOUT & EFFECTS ON NEURAL CORRELATES OF COGNITIVE FUNCTION; NOT AN INTERVENTION WITHIN OUR REMIT

- EXCLUDED; STUDY DOESN'T REPORT ON EFFECTIVENESS, ACCEPTABILITY, OR FEASIBILITY OF STREET SOCCER. IT IS AN EXPLORATORY STUDY TO EXAMINE WHY PEOPLE ATTEND THE PROGRAMME

- EXCLUDED; NOT AN INTERVENTION PROGRAMME AS STUDY ONLY INVOLVED ONE 20-MINUTE EXERCISE BOUT ON A CYCLE ERGOMETER WITH PRE AND POST BD ASSESSMENTS

- EXCLUDED. NO INTERVENTION OUTCOMES OR ACCEPTABILITY DATA REPORTED

- EXCLUDED. THIS THE METHODS PAPER FOR STUDY #62

Frequency

1. Randomized Controlled Trials (RCTs) - 43
2. Quasi-Experimental Designs - 4
3. Pre-Post Studies – 16
4. Cohort Studies - 4
5. Systematic Reviews and Meta-Analyses - 17
6. Qualitative Studies - 16
7. Pilot Studies - 5
8. Controlled Studies (Non-Randomized) - 6
9. Cross-Sectional and Prospective Studies - 1
10. Excluded Studies (for various reasons) – 15
11. Missing information – 24
12. Not categorised – 33