

INPLASY

THE IMPACT OF PHYSICAL ACTIVITY ON THE MENTAL HEALTH OF YOUNG PEOPLE: A SYSTEMATIC REVIEW

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ADMINISTRATIVE INFORMATION

Support - None.

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 January 2025 and was last updated on 17 January 2025.

INTRODUCTION

Review question / Objective In recent years, there has been a significant increase in mental health problems among young people, including high levels of anxiety, depression, and stress. This trend has raised concerns and highlighted the need to identify effective interventions to prevent and address these issues. Considering the existing evidence on the benefits of physical activity, this systematic review aims to explore the specific impact of physical activity on the mental health of young people. What is the relationship between physical activity and mental health indicators, and how can this relationship contribute to the development of evidence-based strategies to promote psychological well-being in young people?

Rationale Physical activity is widely recognized in the scientific literature as an effective strategy for promoting both physical and mental health. Studies have shown that regular physical activity improves cardiovascular function, strengthens

muscles and bones, regulates body weight, and reduces the risk of chronic diseases. Furthermore, physical activity is associated with psychological benefits, such as stress reduction, improved mood, and increased self-esteem. It also plays an important role in social and emotional development, especially among young people. However, it is essential to shift the perspective on physical activity, moving away from viewing it solely as a means to achieve aesthetic standards and instead valuing it as a healthy habit, rooted in the awareness that it promotes a longer, healthier, and happier life. Incorporating physical activity as an integral part of a balanced and preventive lifestyle can have a positive impact on mental health and overall well-being.

Condition being studied This systematic review focuses on the impact of physical activity on mental health outcomes in young people. The conditions being studied include mental health indicators, such as: Anxiety; Depression; Stress; Self-esteem; Mood disturbances; Psychological well-being.

The primary aim is to evaluate whether regular physical activity can positively influence these mental health conditions, contributing to improved psychological resilience and overall well-being in youth populations.

METHODS

Search strategy Electronic databases (PubMed (Medline), SPORTDiscus (EBSCOhost), PsycINFO (APA), Scopus, Web of Science (Clarivate Analytics), ScienceDirect (Elsevier), Dialnet) were searched for relevant publications. Keywords and synonyms were entered in various combinations in all fields: (“physical activity” OR “exercise” OR “sports”) AND (“mental health” OR “anxiety” OR “depression” OR “psychological well-being”) AND (“youth” OR “adolescents” OR “children”). Filters were applied to refine the search results, including: (i) Time Frame: Articles published in the last 10 years; (ii) Publication Type: Clinical Trials, Meta-analyses, Randomized Controlled Trials (RCTs), Systematic Reviews, and Observational Studies; and (iii) Population: Children and adolescents (6–18 years).

Participant or population Children and adolescents aged 6 to 18 years, from any geographical, cultural, or socioeconomic background. The population includes individuals participating in school-based physical education programs, organized sports, or structured physical activity interventions aimed at improving mental health outcomes. No restrictions will be placed on gender, health status, or baseline fitness level.

Intervention The intervention includes any form of physical activity, such as organized sports, structured exercise programs, recreational activities, or school-based physical education. The focus is on activities that aim to improve mental health outcomes, including reducing anxiety, depression, and stress, or enhancing psychological well-being in children and adolescents. Interventions may vary in duration, intensity, and setting.

Comparator The comparator includes young male and female soccer athletes.

Study designs to be included This systematic review will include randomized controlled trials (RCTs), longitudinal studies, and observational studies.

Eligibility criteria The inclusion criteria for this systematic review are: (i) studies involving children and adolescents aged 6 to 18 years; and (ii)

studies evaluating the impact of physical activity on mental health outcomes, including anxiety, depression, stress, self-esteem, and psychological well-being.

The exclusion criteria for this systematic review are: (i) studies involving adults or populations outside the specified age range; (ii) studies not evaluating physical activity as the primary intervention; and (iii) studies focusing solely on physical health outcomes without addressing mental health.

Information sources Electronic database (PubMed (Medline), SPORTDiscus (EBSCOhost), PsycINFO (APA), Scopus, Web of Science (Clarivate Analytics), ScienceDirect (Elsevier), Dialnet).

Main outcome(s) The primary outcomes assessed in this systematic review focus on mental health indicators in children and adolescents, as measured by validated tools, and include key findings reported across studies.

Anxiety levels, a frequent outcome, are commonly evaluated using the State-Trait Anxiety Inventory (STAI), the Revised Children’s Anxiety and Depression Scale (RCADS), and the Spence Children’s Anxiety Scale (SCAS). The studies reported significant reductions in anxiety levels among children and adolescents participating in physical activity interventions, particularly in structured exercise programs and team sports.

Depression levels were assessed through tools such as the Beck Depression Inventory (BDI), the Children’s Depression Inventory (CDI), and the Patient Health Questionnaire (PHQ-9). Results consistently showed a decrease in depressive symptoms, with greater improvements observed in interventions combining physical activity with social interaction or outdoor settings.

Stress levels were evaluated using the Perceived Stress Scale (PSS) and other adapted youth-specific questionnaires. Interventions involving regular physical activity demonstrated notable reductions in perceived stress, especially among participants in aerobic exercise programs and high-intensity interval training.

Psychological well-being was measured with instruments such as the Warwick-Edinburgh Mental Well-being Scale (WEMWBS), the Rosenberg Self-Esteem Scale (RSES), and the Positive and Negative Affect Schedule (PANAS). Studies highlighted improvements in well-being, self-esteem, and positive affect following participation in physical activity, with additional benefits for those in programs emphasizing personal goal-setting and group cohesion.

Quality of life, an overarching outcome, was evaluated using the Pediatric Quality of Life

Inventory (PedsQL) and WHOQOL-BREF. Findings revealed consistent enhancements in quality of life across physical, emotional, and social domains, particularly in programs that included both individual and team-based activities.

Additional outcome(s) Additional relevant outcomes include improvements in emotional regulation, coping strategies, and social skills, as well as reductions in behavioral issues such as hyperactivity and aggression. These findings underscore the multifaceted benefits of physical activity on the mental health and overall development of children and adolescents.

Quality assessment / Risk of bias analysis For randomized controlled trials (RCTs): The Cochrane Risk of Bias Tool 2 (RoB 2) and the PEDro Scale (Physiotherapy Evidence Database) will assess domains such as randomization, allocation concealment, blinding, and completeness of data. For observational studies: The Newcastle-Ottawa Scale (NOS) will evaluate selection, comparability, and outcomes. For systematic reviews and meta-analyses: The AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews) will be used to assess methodological rigor and reliability. An internal scale scores the study validity within a range of 0–3 (low methodological quality), 4–6 (moderate methodological quality), and 7–10 (high methodological quality). The score will be derived from criteria such as the appropriateness of the study design, control for confounders, and consistency of outcome measures. Each study will be classified as having low, moderate, or high risk of bias based on the assessment tools and the internal validity results. Two independent reviewers will conduct all assessments, including scale scoring. Results will be summarized in tables and graphs, showing risk of bias categories, internal validity results, and their influence on study outcomes.

Strategy of data synthesis We will follow a systematic approach for data synthesis, adapting the tools and methods to the characteristics of the included studies. Analyses and interpretation of results will only be conducted when at least three studies provide comparable baseline and follow-up data for the same mental health outcomes, such as anxiety, depression, or psychological well-being. Means and standard deviations (SD) will be extracted for pre-intervention and post-intervention measures to calculate effect sizes (ES; Hedge's *g*) for each outcome. A random-effects model will be applied to account for variability among the included studies, ensuring generalizability of the findings. The ES values will be presented with 95%

confidence intervals (CI) and interpreted using the following scale: 0.6–1.2 (moderate); >1.2–2.0 (large); >2.0–4.0 (very large); >4.0 (extremely large). Heterogeneity will be evaluated using the I^2 statistic, with thresholds interpreted as 0–40% (low heterogeneity), 30–60% (moderate heterogeneity), 50–90% (substantial heterogeneity), and 75–100% (considerable heterogeneity). The risk of bias will be assessed using the following tools: RoB 2 (Cochrane Risk of Bias Tool 2) for randomized controlled trials, focusing on randomization, blinding, and completeness of data; Newcastle-Ottawa Scale (NOS) for observational studies, assessing selection, comparability, and outcomes; COSMIN Checklist for studies utilizing psychological scales, to evaluate the quality and reliability of the instruments used to measure mental health outcomes; and AMSTAR 2 (A Measurement Tool to Assess Systematic Reviews) for included systematic reviews and meta-analyses. Publication bias will be examined using funnel plots, the Egger's test, and the trim-and-fill method to adjust for any detected bias. Sensitivity analyses will be conducted to assess the impact of high-risk studies and to explore heterogeneity in the results. If sufficient data are available, subgroup analyses will explore variations by age group, gender, type of physical activity, and intervention duration, and meta-regressions may also be performed to assess the influence of study characteristics on the outcomes. All analyses will be conducted using Jamovi or RevMan, and results will be summarized in tables and figures. Statistical significance will be set at $p < 0.05$.

Subgroup analysis Subgroup analyses will explore differences by age (6–12, 13–15, 16–18 years), gender, type of physical activity (e.g., team sports, individual sports), duration and intensity of activity, and baseline mental health status. If possible, geographical differences will also be analyzed. A random-effects model will be used, and results will be presented with 95% confidence intervals. If data are insufficient for subgroup analyses, this will be noted.

Sensitivity analysis Sensitivity analyses will be conducted to evaluate the robustness of the findings and the impact of key factors on the results. These will include excluding studies with high risk of bias, focusing on studies using validated mental health scales (e.g., DASS-21, HADS), exploring the effects of short- vs. long-term interventions, and assessing different subgroups (e.g., age groups or types of physical activity). Alternative statistical models (fixed-effects vs. random-effects) will also be tested to account for variability among studies. Additionally, the

impact of study publication date (recent vs. older) will be examined. Results will be summarized in tables and figures, highlighting any changes in effect sizes and confidence intervals. Significant variations identified through these analyses will be discussed in relation to the study conclusions.

Language restriction English.

Country(ies) involved Portugal.

Keywords Exercise; Sports; Fitness; Psychological well-being; Anxiety; Emotional regulation; Adolescents; Children; Social skills development.

Contributions of each author

Author 1 - Sara Faria - Lead the project, wrote and revised the original manuscript and analyzed and interpreted the data, wrote the statistical report and revised the original manuscript.

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