

# The role of physical activity in enhancing mental health: a scoping review of the evidence

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**Abstract.** Physical activity is increasingly recognised as a practical, low-cost strategy to protect and improve mental health. This scoping review maps and summarises recent evidence linking physical activity (including structured exercise and everyday movement) with mental health and mental ill-health outcomes across populations. We synthesised findings from high-level evidence (umbrella reviews, systematic reviews, and meta-analyses) alongside selected primary studies, including work by Hasmyati (Faculty of Sports Science and Health, Universitas Negeri Makassar) describing psychosocial and cognitive outcomes relevant to mental health (e.g., self-efficacy, concentration, and mental toughness). Across the evidence base, higher physical activity is consistently associated with lower risk of depression and anxiety, and exercise interventions show meaningful reductions in symptoms of depression, anxiety, and psychological distress. Benefits appear across age groups and clinical and non-clinical populations, although effects vary by activity type, intensity, and context (e.g., leisure-time versus occupational activity). Proposed mechanisms include neurobiological (neurotransmitters and inflammation), psychological (mastery, self-efficacy), and social (connection and support) pathways. Evidence gaps remain regarding low- and middle-income settings, long-term adherence, domain-specific measurement, and intervention tailoring. Overall, the literature supports positioning physical activity as a core component of mental health promotion and as an adjunct treatment option within stepped-care models.

## 1 Introduction

Mental health disorders and subclinical symptoms (e.g., prolonged stress, anxiety, and low mood) contribute significantly to disability and reduced quality of life. On the other hand, physical inactivity remains prevalent worldwide. The World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure, noting that regular physical activity is associated with improved mental health and quality of life outcomes [1].

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Because physical activity is modifiable and can be delivered through schools, workplaces, communities, and clinical services, it is an attractive target for mental health promotion. Over the past decade, the evidence base has evolved from observational relationships to more sophisticated syntheses of randomized controlled trials (RCTs) and meta-analyses. Recent umbrella reviews and network meta-analyses support the role of physical activity and structured exercise in reducing symptoms of depression and anxiety, as well as preventing new mental health disorders [2], [3], [4].

However, decision-makers often need an integrated picture of what is known, for whom, and in which contexts physical activity is most beneficial. For example, domain-specific patterns (leisure-time, transport, occupational, and household activity) may not show identical relationships with mental health outcomes [5]. In addition, evidence from specific educational and sport settings, such as physical education programs, can inform implementation strategies.

## **2 Methods**

### **2.1 Design**

We conducted a scoping review following the methodological framework developed by Arksey and O'Malley and reported the process in line with the PRISMA extension for scoping reviews (PRISMA-ScR). The Arksey and O'Malley framework includes: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) data charting (mapping), and (5) collating, summarising, and reporting the results.

### **2.2 Identifying the research question**

The primary question was: What is known from the existing literature about the role of physical activity in enhancing mental health? Secondary questions explored: (a) which mental health outcomes are most commonly assessed; (b) which populations and settings are represented; (c) which activity modalities and doses are studied; and (d) what mechanisms (biological, psychological, social) are proposed or tested.

### **2.3 Identifying relevant studies**

A search strategy was designed to capture evidence across public health, psychology, sport science, and education. Planned databases included PubMed/MEDLINE, PsycINFO, Scopus, Web of Science, SPORTDiscus, and ERIC. Grey literature sources included organisational websites (eg, WHO), conference proceedings, and reference list searching. An example search string (to be adapted per database) was: (physical activity OR exercise OR sport OR walking OR aerobic OR resistance OR yoga) AND (mental health OR depression OR depressive symptoms OR anxiety OR stress OR psychological distress OR wellbeing OR cognitive function OR self-efficacy). Searches were limited to English language and Indonesian language sources published from 2010 onward to reflect contemporary measurement and intervention approaches.

## 2.4 Study selection

Two reviewers independently screened titles/abstracts and then full texts against the inclusion and exclusion criteria (Table 1). Disagreements were resolved through discussion and, if needed, consultation with a third reviewer. The study selection process is documented using a PRISMA-ScR flow diagram (Fig. 1).

**Table 1.** Inclusion and exclusion criteria

<b>Domain</b>	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
Population	Children, adolescents, adults, older adults; community, school, clinical, and sport settings.	Animal studies; populations where physical activity is not measured or cannot be separated from other exposures.
Concept (exposure)	Any physical activity or exercise (structured or unstructured), including sport, PE, active travel, and step counts.	Purely sedentary-behaviour interventions without a physical activity component; pharmacological-only interventions.
Outcomes	Mental health outcomes (eg, depression, anxiety, stress, distress), wellbeing/quality of life, cognitive outcomes linked to mental health (eg, concentration).	Outcomes unrelated to mental health (eg, biomechanics only) without any psychological outcome.
Study design	Quantitative, qualitative, mixed-methods studies; intervention or observational designs; systematic reviews.	Opinion pieces without data; editorials; protocols without results (unless mapping ongoing evidence is required).
Language and time	English; published 2000 onward (or earlier for seminal conceptual work).	Non-English (unless translation available); publications outside date limits if not relevant.

## 2.5 Data charting (mapping)

A data-charting form was developed iteratively. Extracted items included: bibliographic information, country, setting, participant characteristics (age, sex, health status), physical activity modality and dose (frequency, intensity, time, duration), measurement approach (self-report/device), mental health outcomes and measurement tools, key results, and any reported mediators/moderators (eg, self-efficacy, social support, sleep).

## 2.6 Collating, summarising, and reporting results

We used descriptive numerical summaries (where available) and thematic synthesis to organise findings into practical evidence clusters. Themes were developed through iterative coding of extracted findings and mechanisms. Because the purpose was mapping rather than effect estimation, no meta-analysis was performed.

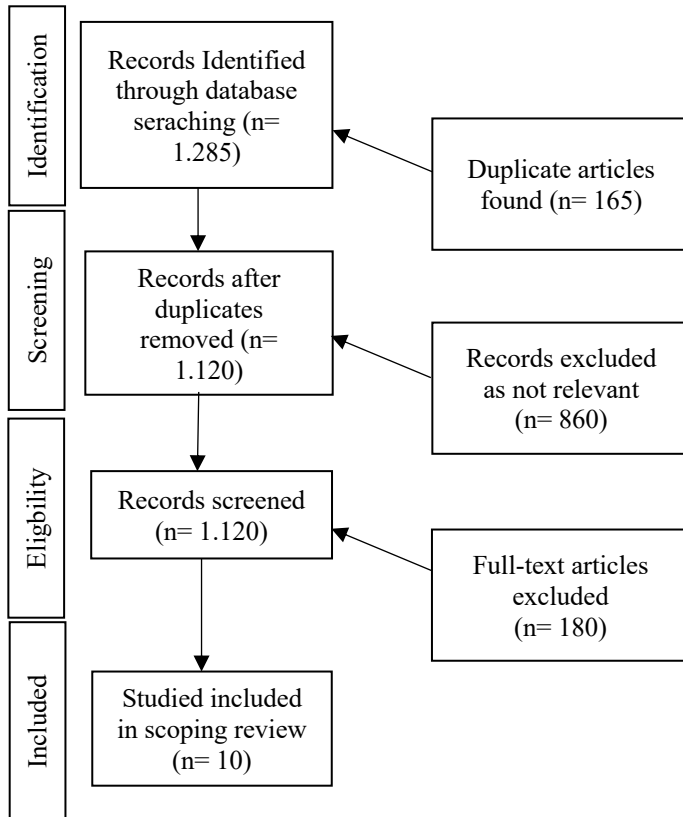


Fig. 1. PRISMA-ScR flow diagram of study identification and selection.

## 3 Results

### 3.1 Evidence map

The evidence base spans large observational datasets, prospective cohort studies, and many RCTs synthesised in umbrella reviews and network meta-analyses. Table 1 summarises key evidence syntheses underpinning current conclusions about physical activity and mental health.

**Table 2.** Selected high-level evidence on physical activity and mental health outcomes

<b>Evidence type</b>	<b>Population / scope</b>	<b>Outcomes</b>	<b>Key take-home message</b>
Umbrella review of prospective/cohort meta-analyses [2]	General population; multiple cohorts	Incident depression, anxiety/stress-related disorders, psychosis/schizophrenia	Higher physical activity is associated with lower risk of several mental health complications; protective associations are most consistent for depression and anxiety.
Umbrella review of RCT meta-analyses [3]	Adults across clinical and non-clinical groups	Depression, anxiety, psychological distress	Physical activity interventions produce medium improvements in symptoms across many adult populations; implementation is relevant across healthcare settings.
Network meta-analysis of RCTs for major depressive disorder [4]	People with major depressive disorder (MDD)	Depressive symptoms	Exercise is an effective treatment option; dose and modality matter, with evidence supporting common and feasible modalities (e.g., walking/jogging, yoga, strength training).
Domain-specific systematic review & multilevel meta-analysis [5]	Combined sample ≈3.3 million participants	Mental health and mental ill-health outcomes	Associations differ by domain; leisure-time activity tends to show more consistent mental health benefits than some other domains (e.g., occupational physical activity).

Evidence type	Population / scope	Outcomes	Key take-home message
Step-count meta-analysis (observational) [6]	Adults with objective step measurement	Depressive symptoms and depression risk	Higher daily steps are associated with fewer depressive symptoms; step goals may be a simple public-health framing for increasing activity.

### 3.2 Preventive associations: physical activity and risk of mental ill-health

An umbrella review synthesising evidence from meta-analyses of prospective cohort studies reported that higher physical activity levels are associated with a lower risk of developing depression and anxiety/stress-related disorders, with protective associations also explored for severe outcomes such as psychosis/schizophrenia [2]. These findings support physical activity as a preventive factor, particularly when sustained over time and embedded in daily routines.

Evidence from objective measurement studies complements self-report findings. For example, a meta-analysis of observational studies using wearable or device-measured steps found that higher daily step counts are associated with fewer depressive symptoms and a lower risk of depression in longitudinal analyses [6]. This line of evidence is especially relevant for public health messaging because step counts can be monitored with widely available devices.

### 3.3 Therapeutic effects: exercise and symptom reduction

For treatment and symptom reduction, evidence syntheses of RCTs suggest that increasing physical activity improves mental health outcomes in adults. An umbrella review of systematic reviews with meta-analyses of RCTs concluded that physical activity has beneficial effects on depression, anxiety, and psychological distress across diverse adult populations, including people with diagnosed mental health conditions and those with chronic disease [3].

A large network meta-analysis of RCTs focusing on major depressive disorder compared different exercise modalities and doses with control conditions and with established treatments (e.g., psychotherapy and antidepressants). The analysis concluded that exercise is an effective treatment option for depression, and highlighted that modality and intensity influence outcomes [4]. In practice, this supports offering multiple exercise choices to improve uptake while maintaining sufficient dose to achieve meaningful symptom change.

### 3.4 Domain-specific and contextual influences

Not all physical activity occurs in the same context. A recent updated systematic review and multilevel meta-analysis examined domain-specific activity (e.g., leisure-time, transport, household, occupational, school sport) and mental health outcomes in a combined sample of roughly 3.3 million people [5]. Findings indicate that associations vary by domain, suggesting that leisure-time activity and sport participation may be particularly relevant for mental health promotion, whereas occupational activity may not deliver comparable benefits for all outcomes.

These differences matter for intervention design. Strategies that focus on enjoyable, self-chosen, and socially supportive activities (e.g., recreational sport, group exercise, or active travel) may align better with mental health pathways than approaches that rely solely on physically demanding work tasks.

### 3.5 Evidence from Indonesia

In addition to global evidence syntheses, context-specific studies can inform how physical activity is operationalised in schools, sport clubs, and community programs. Several studies report psychosocial and cognitive outcomes relevant to mental health in sport and physical education settings [7–10].

**Table 3.** Relevant studies and outcomes linked to mental health.

Study	Setting / participants	Outcome(s)	Relevance to mental health
Hakim et al. (2023) [7]	Physical education learning context	Self-efficacy	Self-efficacy is a well-supported psychological mediator linking physical activity participation with better mental health and wellbeing.
Arfanda et al. (2023) [8]	Adolescents; low-impact aerobic dance (rote/video)	Concentration	Cognitive and attentional outcomes (e.g., concentration) are relevant to academic functioning and wellbeing in adolescents.
Hasmyati et al. (2022) [9]	Professional athletes	Mental toughness and achievement	Sport psychology constructs such as mental toughness relate to stress-coping, resilience, and performance under pressure.
Hasmyati & Rusli (2023) [10]	University athletes	cricket Aerobic capacity (endurance)	Physical fitness supports participation in sustained activity; fitness can indirectly support mental health via mastery, energy, and reduced fatigue.

Together, these studies reinforce that mental health-related benefits of physical activity may operate through psychosocial pathways (e.g., building self-efficacy and resilience) and cognitive pathways (e.g., concentration and attentional control), alongside physiological improvements in fitness.

## 4 Discussion

## **4.1 Interpretation and practical implications**

Across the evidence mapped in this scoping review, physical activity is consistently linked with better mental health. At a population level, higher habitual physical activity is associated with lower risk of depression and anxiety [2,6]. At a clinical level, exercise interventions produce meaningful improvements in symptoms of depression, anxiety, and psychological distress [3,4].

A key implication is that physical activity can be positioned both as a prevention strategy (population mental health promotion) and as an adjunct treatment option within stepped-care models. The therapeutic evidence also supports choice-based approaches: offering multiple modalities (e.g., walking/jogging, yoga, strength training) may improve engagement while retaining clinical benefit [4].

## **4.2 Mechanisms: how physical activity may influence mental health**

Mechanisms are likely multi-level. Neurobiological explanations include changes in neurotransmitter systems, neurotrophic factors, inflammatory pathways, and sleep regulation. Psychological mechanisms include distraction from rumination, improved self-esteem, and enhanced sense of mastery. Social mechanisms include belonging, support, and reduced loneliness when activity is done with others.

A comprehensive review of mediation and moderation studies identified strong evidence for multiple mediators, including affect, self-esteem, self-efficacy, resilience, social support, social connection, and fatigue [11]. These findings align closely with education- and sport-based evidence from Indonesia (Table 2), where self-efficacy and mental toughness are explicitly measured [7,9].

## **4.3 Activity type and context: tailoring for adolescents and adults**

Evidence increasingly suggests that the type and context of activity matter. Domain-specific syntheses indicate that leisure-time activity may have more consistent relationships with mental health than occupational activity [5]. For adolescents, leisure-time activities also vary in their impact on positive mental health outcomes. A mixed-methods systematic review and meta-analysis reported that effects on positive mental health depend on the type of leisure-time physical activity and the specific wellbeing outcome assessed [12].

From an implementation perspective, these findings support tailoring activity programs to the target group's preferences, resources, and cultural context. In school settings, pedagogical strategies that strengthen self-efficacy and enjoyment may increase sustained participation and amplify mental health benefits [7].

## **4.4 Evidence gaps and priorities for future research**

Despite strong overall evidence, several gaps remain. First, many evidence syntheses report substantial heterogeneity and varying quality of included studies, which limits precise prescriptions. Second, research from low- and middle-income countries is underrepresented in global meta-analyses, highlighting the need for more studies from contexts such as Indonesia. Third, domain-specific measurement should be improved to clarify how different contexts (work, transport, household, leisure) interact with stress exposure, autonomy, and social support. Finally, longer-term pragmatic trials are needed to understand adherence, maintenance of benefits, and implementation in real-world systems.

## 5 Conclusion

The available evidence supports physical activity as an effective and scalable approach to enhance mental health. Habitual physical activity is associated with reduced risk of developing depression and anxiety, and structured exercise interventions reduce symptoms of depression, anxiety, and psychological distress. Benefits vary by activity modality, intensity, and context, underlining the importance of choice, enjoyment, and supportive environments. Evidence from Indonesian sport and education settings, underscores psychosocial pathways such as self-efficacy, concentration, and resilience that may help translate activity participation into better mental health outcomes.

## References

1. World Health Organization (WHO), Physical activity. <https://www.who.int/news-room/fact-sheets/detail/physical-activity> (accessed Jan. 14, 2026).
2. M. Rahmati, S. W. Lee, D. K. Yon, et al., Physical activity and prevention of mental health complications: An umbrella review with integrated meta-analyses. *Neurosci. Biobehav. Rev.* 160, 105641 (2024). <https://doi.org/10.1016/j.neubiorev.2024.105641>
3. B. Singh, T. Olds, R. Curtis, et al., Effectiveness of physical activity interventions for improving depression, anxiety and distress: an overview of systematic reviews. *Br. J. Sports Med.* 57, 1203–1209 (2023). <https://doi.org/10.1136/bjsports-2022-106195>
4. M. Noetel, T. Sanders, D. Gallardo-Gómez, et al., Effect of exercise for depression: systematic review and network meta-analysis of randomised controlled trials. *BMJ* 384, e075847 (2024). <https://doi.org/10.1136/bmj-2023-075847>
5. M. Teychenne, G. M. de Sousa Júnior, T. Baker, et al., Domain-specific physical activity and mental health: an updated systematic review and multilevel meta-analysis in a combined sample of 3.3 million people. *Br. J. Sports Med.* (2025). <https://doi.org/10.1136/bjsports-2025-109806>
6. B. Bizzozero-Peroni, V. Díaz-Goñi, E. Jiménez-López, et al., Daily step count and depression in adults: a systematic review and meta-analysis. *JAMA Netw Open* 7, e2451208 (2024). <https://doi.org/10.1001/jamanetworkopen.2024.51208>
7. H. Hakim, H. Hasmyati, M. Zulfikar, et al., Improving student's self-efficacy through inquiry learning model and modeling in physical education. *Cakrawala Pendidikan* 42, 483–492 (2023). <https://doi.org/10.21831/cp.v42i2.57759>
8. P. E. Arfanda, H. Hasmyati, I. Damayanti, N. I. A. Anwar, Rote low impact aerobics dance and video low impact aerobics dance can increase concentration in adolescents. *JOSSAE* 8, 21–28 (2023). <https://doi.org/10.26740/jossae.v8n1.p21-28>
9. H. Hasmyati, N. I. A. Anwar, A. A. Mappanyukki, A. Hamzah, The influence of mental toughness on the achievement of professional athletes. *Competitor: J.*

- Pendidik. Kepeleatihan Olahraga* 14, 493–499 (2022).  
<https://doi.org/10.26858/cjpko.v14i3.39334>
10. H. Hasmyati, R. Rusli, Tingkat daya tahan kapasitas aerobik atlet BKMF cricket Fakultas Ilmu Keolahragaan dan Kesehatan Universitas Negeri Makassar tahun 2023. *J. Pendidik. Tambusai* 7, 26944–26951 (2023).  
<https://doi.org/10.31004/jptam.v7i3.10971>
  11. R. L. White, S. Vella, S. Biddle, et al., Physical activity and mental health: a systematic review and best-evidence synthesis of mediation and moderation studies. *Int. J. Behav. Nutr. Phys. Act.* 21, 134 (2024).  
<https://doi.org/10.1186/s12966-024-01676-6>
  12. L. Lenze, V. Benzing, J. Schmid, et al., The effects of different types of leisure-time physical activity on positive mental health among adolescents: a mixed-methods systematic review and meta-analysis. *Int. J. Behav. Nutr. Phys. Act.* 22, 123 (2025). <https://doi.org/10.1186/s12966-025-01834-4>