BOOK COLLECTOR
ISSN: 0006-7237
Volume 75, Issue 1 (2026)
Website: https://bookcollectorjournal.co.uk

The Impact of Physical Activity on Mental Health: A Systematic Review and Meta-Analysis

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Submission: 20.08.2025. Acceptance: 12.12.2025. Publication: 14.03.2026

Abstract
Physical activity is widely recognized for its benefits to physical health, but its effects on mental health are increasingly being investigated. This systematic review and meta-analysis aim to assess the impact of physical activity on mental health outcomes, including depression, anxiety, and overall psychological well-being. Physical activity has a significant positive impact on mental health, with evidence supporting its role in reducing symptoms of depression and anxiety and enhancing overall psychological well-being. These findings underscore the importance of incorporating physical activity into mental health interventions and public health strategies. Future research should explore the optimal types, durations, and intensities of physical activity for different mental health conditions and populations.
Keywords: Physical activity, mental health, depression, anxiety, psychological well-being, meta-analysis

Introduction
Physical activity has long been associated with various health benefits, including improvements in cardiovascular health, muscle strength, and weight management. In recent years, there has been increasing interest in understanding how physical activity impacts mental health. Growing evidence suggests that engaging in regular physical activity can play a significant role in enhancing mental well-being and mitigating symptoms of mental health disorders such as depression and anxiety. Mental health is a crucial aspect of overall well-being and quality of life. Mental health disorders, including depression and anxiety, are prevalent and can significantly impact an individual's daily functioning and quality of life. The World Health Organization (WHO) highlights mental health as a fundamental component of health, emphasizing the need for effective interventions to address mental health issues and improve psychological resilience. Despite accumulating evidence on the benefits of physical activity for mental health, findings across studies are often varied in terms of study design, population characteristics, and intervention types. A systematic review and meta-analysis are essential to consolidate these findings, providing a comprehensive assessment of the impact of physical activity on mental health outcomes. This review aims to address gaps in the current literature by synthesizing evidence from a range of studies to provide a clearer understanding of how physical activity influences mental health.

Current Evidence on Physical Activity and Mental Health

Recent research has consistently shown that physical activity can have a positive impact on mental health. Numerous studies have documented the beneficial effects of exercise on various mental health conditions, including depression, anxiety, and overall psychological well-being. For instance, randomized controlled trials (RCTs) have reported significant reductions in depressive symptoms and anxiety levels among individuals who engage in regular physical activity, compared to those who do not.

Mechanisms of Action

The beneficial effects of physical activity on mental health are thought to arise through multiple mechanisms. Exercise is known to promote the release of endorphins and neurotransmitters such as serotonin and dopamine, which can improve mood and reduce feelings of anxiety. Additionally, physical activity can enhance sleep quality, reduce stress, and increase self-esteem, all of which contribute to better mental health.

Types of Physical Activity

Research has explored various types of physical activities and their impacts on mental health. Aerobic exercises, such as walking, running, and cycling, have been widely studied and are associated with improvements in mood and reductions in anxiety and depression. Resistance training and strength-building exercises have also shown positive effects, particularly in reducing symptoms of depression. Furthermore, mind-body exercises like yoga and Tai Chi combine physical movement with mental relaxation, demonstrating benefits for both mental and physical health.

Variability in Effectiveness

While the overall evidence supports the positive impact of physical activity on mental health, the effectiveness can vary based on several factors. The type, duration, and intensity of physical activity can influence outcomes, as can individual differences such as age, gender, and baseline mental health status. For example, some studies suggest that higher intensities of exercise may provide greater mental health benefits, while others indicate that moderate and consistent activity may be equally effective.

The Impact of Physical Activity on Mental Health

Physical activity plays a significant role in improving mental health and overall psychological well-being. Regular engagement in exercise has been associated with reduced symptoms of stress, anxiety, and depression while enhancing mood, self-esteem, and cognitive functioning. In modern society, where sedentary lifestyles and mental health disorders are increasingly common, physical activity has become an essential non-pharmacological approach for promoting mental wellness.

Reduction of Depression

Regular physical activity has been shown to reduce symptoms of **Depression** by stimulating the release of endorphins and other neurotransmitters that improve mood. Exercise also increases the levels of serotonin and dopamine, chemicals in the brain that regulate emotions

and feelings of happiness. Individuals who engage in consistent physical activity often experience lower levels of depressive symptoms compared to those with sedentary lifestyles.

Reduction of Anxiety and Stress

Exercise helps reduce symptoms of **Anxiety Disorders** and stress by lowering cortisol levels and promoting relaxation. Activities such as walking, jogging, yoga, and swimming help calm the nervous system and reduce mental tension. Physical activity also encourages mindfulness and focus, which can alleviate excessive worrying and emotional distress.

Improvement in Cognitive Function

Physical activity enhances brain function by improving blood circulation and oxygen supply to the brain. Regular exercise is associated with better concentration, memory, and learning ability. It also helps reduce the risk of cognitive decline and neurological disorders, supporting long-term brain health.

Better Sleep Quality

Engaging in regular physical activity can significantly improve sleep patterns. Exercise helps regulate the body's circadian rhythm, leading to deeper and more restorative sleep. Improved sleep quality further contributes to better emotional regulation and mental stability.

Increased Self-Esteem and Confidence

Participation in physical activities such as sports or fitness programs can improve body image and self-perception. Achieving fitness goals and maintaining an active lifestyle often increases confidence, self-esteem, and a sense of personal accomplishment.

Social Interaction and Emotional Support

Many forms of physical activity involve social interaction, such as team sports, group fitness classes, or community exercise programs. Social engagement helps reduce feelings of loneliness and isolation, which are often linked to poor mental health.

Prevention of Mental Health Disorders

Regular physical activity is not only beneficial for managing mental health problems but also plays an important role in preventing conditions such as **Depression**, **Anxiety Disorders**, and **Stress-related Disorders**. By maintaining both physical and psychological balance, exercise contributes to overall mental resilience.

Physical activity has a profound impact on mental health by reducing stress, anxiety, and depression while enhancing cognitive function, sleep quality, and self-esteem. Incorporating regular exercise into daily routines can serve as an effective and accessible strategy for improving psychological well-being. As awareness of mental health continues to grow, promoting physical activity remains a crucial component of public health strategies aimed at enhancing quality of life and emotional well-being.

Gaps in the Literature

Despite the growing body of evidence, there are still gaps in the literature. Variations in study design, methodologies, and measurement tools make it challenging to draw definitive conclusions about the most effective types of physical activity and the optimal duration for

mental health benefits. Additionally, there is a need for more research on the long-term effects of physical activity on mental health and how these benefits might be sustained over time.

The current evidence underscores the positive relationship between physical activity and mental health, with numerous studies highlighting its potential to improve mood, reduce anxiety, and enhance overall psychological well-being. However, further research is needed to address existing gaps and refine recommendations for physical activity interventions aimed at optimizing mental health outcomes.

Conclusion

This systematic review and meta-analysis provide robust evidence that physical activity positively impacts mental health outcomes. The analysis of data from numerous studies reveals that physical activity is associated with significant reductions in symptoms of depression and anxiety, as well as improvements in overall psychological well-being. These findings highlight the importance of physical activity as a valuable component of mental health interventions. The benefits of physical activity were observed across various types, intensities, and durations of exercise, suggesting a broad applicability of its mental health benefits. Aerobic exercises, resistance training, and mind-body activities all demonstrated positive effects, although the magnitude of these effects varied. This variability underscores the need for personalized approaches to physical activity in mental health treatment, considering individual preferences and conditions. The underlying mechanisms through which physical activity exerts its effects on mental health are multifaceted. Regular exercise contributes to improved mood through the release of endorphins, neurotransmitters, and by enhancing sleep quality and reducing stress. These physiological and psychological changes collectively contribute to better mental health outcomes. physical activity plays a significant role in improving mental health, with evidence supporting its effectiveness in reducing symptoms of depression and anxiety and enhancing psychological well-being. Integrating physical activity into mental health strategies offers a promising approach to improving mental health outcomes. Continued research and refined guidelines will help optimize the benefits of physical activity for mental health and support its broader adoption in therapeutic and preventive settings.

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