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Outdoor activities and outdoor environments for fitness and mental health: a systematic review
Actividades al aire libre y entornos al aire libre para la forma física y la salud mental: una revisión sistemática

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Abstract. Outdoor activities and outdoor environments have been recognized as important factors in supporting fitness and mental health. This study aims to review the existing literature on the effects of outdoor activities and outdoor environments on fitness and mental health through a systematic review method. Mental health disorders are a leading cause of global disability, while physical fitness is important for activities without significant fatigue. Several studies have shown that physical activity provides significant benefits to physical, emotional and psychological well-being. The search strategy used Science Direct, Pubmed, and Scopus databases following PRISMA guidelines. The search yielded 4,917 publications, but after the selection process, only seven articles met the inclusion criteria. The studies analyzed also showed that regular engagement in outdoor activities can contribute to improved physical fitness, including increased muscle strength and cardiovascular fitness. In terms of mental health, outdoor activities are associated with reduced levels of anxiety and depression, as well as increased self-confidence and life satisfaction. This research highlights the importance of designing and implementing fitness programs that take advantage of the outdoor environment, as well as encouraging people to engage in regular outdoor activities. The study also highlights the importance of outdoor nature-based interventions to improve fitness and mental health in adults and adolescents. These conclusions provide a basis for policy makers and health practitioners to promote the use of outdoor environments as a means to improve fitness and mental health. The findings can serve as a basis for developing effective health promotion strategies through interactions with nature.
Keywords: Physical activity, outdoor activity, fitness, mental health

Resumen. Las actividades al aire libre y los entornos exteriores han sido reconocidos como factores importantes para favorecer la forma física y la salud mental. Este estudio pretende revisar la bibliografía existente sobre los efectos de las actividades al aire libre y los entornos al aire libre en la forma física y la salud mental mediante un método de revisión sistemática. Los trastornos de salud mental son una de las principales causas de discapacidad a nivel mundial, mientras que la forma física es importante para realizar actividades sin fatiga significativa. Varios estudios han demostrado que la actividad física proporciona beneficios significativos para el bienestar físico, emocional y psicológico. La estrategia de búsqueda utilizó las bases de datos Science Direct, Pubmed y Scopus siguiendo las directrices PRISMA. La búsqueda arrojó 4.917 publicaciones, pero tras el proceso de selección, sólo siete artículos cumplían los criterios de inclusión. Los estudios analizados también mostraron que la práctica regular de actividades al aire libre puede contribuir a mejorar la forma física, incluido el aumento de la fuerza muscular y la forma cardiovascular. En cuanto a la salud mental, las actividades al aire libre se asocian a una reducción de los niveles de ansiedad y depresión, así como a un aumento de la confianza en uno mismo y de la satisfacción vital. Esta investigación pone de relieve la importancia de diseñar y poner en práctica programas de acondicionamiento físico que aprovechen el entorno al aire libre, así como de animar a la gente a realizar actividades al aire libre con regularidad. El estudio también destaca la importancia de las intervenciones basadas en la naturaleza para mejorar la forma física y la salud mental de adultos y adolescentes. Estas conclusiones proporcionan una base para que los responsables políticos y los profesionales de la salud promuevan el uso de entornos al aire libre como medio para mejorar la forma física y la salud mental. Los resultados pueden servir de base para desarrollar estrategias eficaces de promoción de la salud mediante interacciones con la naturaleza.
Palabras clave: Actividad física, actividad al aire libre, forma física, salud mental.

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Introduction

Fitness and mental health are two important components of human well-being that are interrelated. Mental health disorders are one of the leading causes of disability in the world, with a prevalence of more than 10% (James et al., 2018), while fitness is the ability to perform activities without experiencing significant fatigue (Mashud et al., 2024; Rubiyatno et al., 2023). A study by Hughes et al., (2020) said physical activity makes an important contribution to physical, emotional, and psychological well-being. The major benefits offered are improving health and reducing the risk of disease (Meo et al., 2021). It is important to maintain fitness and mental health in order to carry out activities properly. Lack of physical activity causes physical fitness to decrease (Erliana & Hartoto, 2019), and even mental health disorders (James et al., 2018). It is suspected that this is a risk factor for various health complaints and perceived stress (Østerås et al., 2017). Other studies have shown that lack of physical activity can be a contributing factor to non-communicable diseases (Lavie et al., 2019), and even risk causing death (Vancampfort et al., 2019; Zhao et al., 2019). Furthermore, an article found that physical fitness, resilience, anxiety, and mental health are significantly correlated (Li et al., 2021). Therefore, various physical activities are highly recommended to be done to maintain physical fitness in order to have good resilience (Bile

& Suharharjana, 2019; Chrisly M. et al., 2015; Endrianto & Ma'mun, 2019; Hayudi & Pratama, 2019).

Based on the exposure of several studies, it has been shown that physical activity has a significant positive impact on mental health and wellness (Ryu et al., 2020). Outdoor activities, in particular, are considered more beneficial than indoor activities as they provide an opportunity to interact with nature and experience different environments (Hardinata et al., 2023; Mashud et al., 2023; Okilanda et al., 2023). More than a decade of research shows that outdoor environments, such as green spaces and blue spaces, have salutogenic effects that can improve the psychological and physical well-being of individuals (Sarkar et al., 2018). Green spaces, which include parks, forests and areas with natural vegetation, have been shown to reduce levels of stress, anxiety and depression (Beyer et al., 2014; Johnson et al., 2018). In addition, these environments can improve mood, increase attention, and support positive social interactions (Ulset et al., 2017; Umar et al., 2023).

Outdoor physical activities, such as walking, running and cycling, not only improve physical fitness but also provide additional mental health benefits (Donie et al., 2023; Juni Samodra et al., 2024; Suratmin et al., 2024). Studies show that people who exercise outdoors more often tend to have lower levels of depression and better overall mental health (Beyer et al., 2016; Song et al., 2016). In addition, physical activities carried out in nature are often more enjoyable and less tedious compared to indoor exercise (Suryadi, Komaini, Suganda, Rubiyatno, et al., 2024; Suryadi, Nasrulloh, Haryanto, et al., 2024; Suryadi, Nasrulloh, Yanti, et al., 2024; Suryadi, Okilanda, Nofrizal, Anggara Suganda, et al., 2024), which can increase motivation to participate in regular physical activity (Coon et al., 2011; Thompson Coon et al., 2011).

Given the importance of physical activity and outdoor environments for mental health and fitness, this systematic review aims to summarize the existing evidence on the effectiveness of outdoor nature-based interventions in improving fitness and mental health in adults and adolescents. By understanding these relationships more deeply, we can develop more effective strategies to improve fitness and well-being through interactions with nature. While there has been research on physical activity in outdoor natural environments (Thompson Coon et al., 2011), this research is relatively old. Even a few years ago an article with similar characteristics was published with a broader and more in-depth review (Ballester-Martínez et al., 2022), showing outdoor activities and outdoor environments for fitness and mental health. This study shows another novelty of outdoor activities and outdoor environments for fitness and mental health.

Materials and Methods

Search Strategy

The search in this study utilized the databases used were Science Direct, Pubmed, and Scopus. The search started using the Science Direct database then Pubmed and Scopus which is considered as one of the leading indexing systems for citations. Where these sources are most frequently visited by previous researchers around the world. The search strategy included a combination of keyword variations ("outdoor activity" AND "outdoor environment" AND "fitness" AND "mental health"). The search was conducted following the Preferred Reporting Items for System-atic Reviews and Meta-Analyses (PRISMA) guidelines. In addition, PRISMA emphasizes review reports evaluating randomized trials that can also be used as a basis in reporting systematic reviews for other types of research (Mohamed Shaffril et al., 2019).

Exclusion Criteria

The exclusion criteria applied were: (1) Articles not published in journals indexed by Scopus and Web of Science, (2) Articles not written in English, (3) Articles published in other than the last 5 years, namely 2019-2023, (4) Articles that did not specifically address outdoor activities and environments in relation to fitness and mental health.

Procedure

Initially, 4,917 publications were identified through database searches (ScienceDirect: 2,480 articles), then (Pubmed: 1,393 articles) and (Scopus: 1,094 articles). After following the exclusion criteria, only 7 articles remained. Most items were discarded because the articles did not address outdoor activities and outdoor environments for fitness and mental health. All articles were extracted from the source and analyzed through Mendeley software to remove duplicate articles. More details are shown in figure 1.

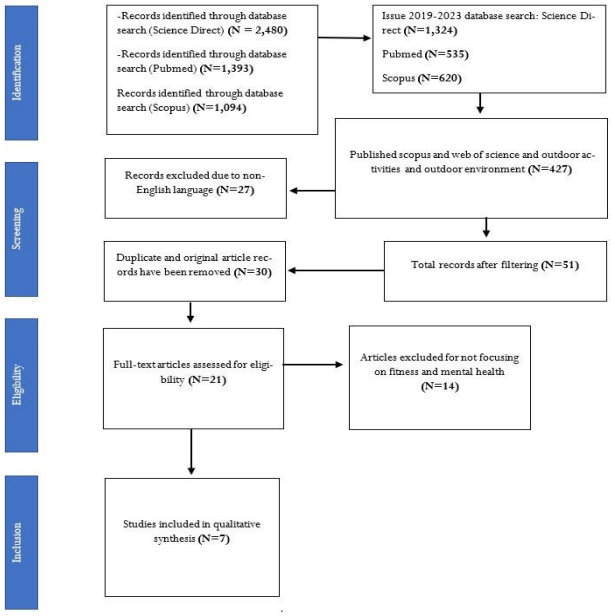

Figure 1. PRISMA chart

Results

The results in Table 1 provide an overview of the various studies that assessed the relationship between outdoor activity and fitness and mental health. Each study used different methods to explore how outdoor activities affect physical and psychological well-being.

Table 1.
Assessment for Fitness and Mental Health

Author and Year	Research Methods and Types	Content	Journal
(Bélanger et al., 2019)	quantitative correlational research	Physical activity and time outdoors	Preventive Medicine Reports
(Pasek et al., 2020)	educational experiment	Indoor and outdoor physical education lessons	International Journal of Environmental Research and Public Health
(Jackson et al., 2021)	Survey research	Outdoor Activities	International Journal of Environmental Research and Public Health
(Ryu et al., 2020)	randomized controlled trial	Cycling outdoors	Journal of Psychiatric Research
(Bustamante et al., 2022)	longitudinal mixed-methods study	The role of parks in neighborhoods, open spaces, and nature	Health & Place
(Furuyashiki et al., 2019)	physiological measurements and psychological surveys	Physiological and psychological effects of forest bathing (Shinrin-yoku)	Environmental health and preventive medicine
(Galle et al., 2023)	randomized controlled trial	Moderate physical activity intervention	Alzheimer's Research and Therapy

Table 2.
Summary of Articles on Outdoor Activities for Physical Fitness and Mental Health

Author and Year	Research Objectives	Research Results
(Bélanger et al., 2019)	to test whether physical activity moderates or mediates the relationship between outdoor time and positive mental health.	Physical activity is positively related to mental health among adolescents and physical activity mediates the positive effect of outdoor time on mental health.
(Pasek et al., 2020)	to clarify the relationship between student participation in outdoor and indoor learning activities and changes in physical fitness.	After two years of outdoor physical education lessons, there was revealed a considerable increase in the speed, jumping ability, and aerobic endurance of the students.
(Jackson et al., 2021)	To assess the impact of COVID-19 on adolescents' outdoor recreation participation and subjective well-being, and how participation in outdoor activities can mitigate declines in subjective well-being,	The results highlight the critical role that time outdoors and time in nature play in bolstering adolescents' resilience to stressors such as the COVID-19 pandemic and underscore the need to facilitate outdoor recreation opportunities for youth during times of crisis.
(Ryu et al., 2020)	To see the therapeutic effects of outdoor cycling (OC) and its benefits on physical activity (PA) investigated in people with schizophrenia.	Outdoor cycling significantly improved mental health and executive function in individuals with schizophrenia and significantly increased PA measured by the pedometers, suggesting that OC offers a safe and attrition-lowering intervention promoting mental health and PA.
(Bustamante et al., 2022)	This study uniquely highlights the importance of outdoor engagement for older adults during a global public health crisis	Access to small green spaces, private gardens and other natural environments improves the mental health and well-being of older adults and contributes to their coping mechanisms during the first wave of the COVID-19 pandemic.
(Furuyashiki et al., 2019)	investigated the physiological and psychological effects of "forest bathing" on working-age people with and without depressive tendencies.	Examining the physiological and psychological effects of a day-long session of forest bathing on a working age group demonstrated significant positive effects on mental health, especially in those with depressive tendencies.
(Galle et al., 2023)	to increase step count, in older adults with low physical activity levels on measures of strength, balance, aerobic capacity, and cognition	Analysis of the respondents showed improved physical fitness and cognition in those who achieved an increase in physical activity of at least 35%.

Description: PA (Physical Activity), OC (Outdoor cycling)

Based on a review of research methods and types, one article exclusively utilized quantitative correlational research (Bélanger et al., 2019), another conducted an educational experiment (Pasek et al., 2020), one used survey research (Jackson et al., 2021), another employed a longitudinal mixed-methods study (Bustamante et al., 2022), and one involved physiological measurements and psychological surveys (Furuyashiki et al., 2019). Additionally, two articles pertained to randomized controlled trials (Galle et al., 2023; Ryu et al., 2020).

The research findings cover a range of content involving outdoor activities for fitness and mental health, such as: physical activity and outdoor time published in Preventive Medicine Reports (Bélanger et al., 2019)physical education lessons indoors and outdoors (Pasek et al., 2020), outdoor activities (Jackson et al., 2021) published in the International Journal of Environmental Research and Public Health. Furthermore, outdoor cycling content was published in the Journal of Psychiatric Research (Ryu et al., 2020), the role of local parks, open spaces, and nature was published in Health & Place (Bustamante et al., 2022), the physiological and psychological impacts of forest bathing (Shinrin-yoku) were published in Environmental Health and Preventive Medicine (Furuyashiki et al., 2019), and moderate physical activity interventions were published in Alzheimer's Research and Therapy (Galle et al., 2023).

Discussion

Based on this review, we can see that the research objectives and outcomes they developed are divided into two groups:

These studies examined the relationship between outdoor physical activities and physical fitness. The first study involved three articles discussing various aspects: the therapeutic effects of outdoor cycling for individuals with schizophrenia (Ryu et al., 2020), comparisons of indoor and outdoor physical education classes (Pasek et al., 2020), and interventions involving moderate physical activity (Galle et al., 2023). The first article investigated how outdoor cycling impacted people with schizophrenia, finding that it significantly enhanced mental health, executive function, and physical activity levels (Ryu et al., 2020). The second article explored the effects of indoor versus outdoor physical education on students, revealing that two years of outdoor lessons significantly improved their speed, jumping ability, and aerobic endurance (Pasek et al., 2020). The third article aimed to increase the physical activity of elderly individuals with low activity levels by promoting walking. Analysis showed that those who increased their physical activity by at least 35% experienced improvements in physical fitness and cognitive function (Galle et al., 2023).

Furthermore, these studies explored the link between outdoor physical activity and mental health: In this second group, there were four articles that addressed the relationship between physical activity and time outdoors (Bélanger et al., 2019), outdoor recreation (Jackson et al., 2021), outdoor engagement for older adults (Bustamante et al., 2022), and the physiological and psychological effects of forest bathing (Shinrin-yoku) (Furuyashiki et al., 2019). The first article aimed to test whether physical activity moderates or mediates the relationship between outdoor time and positive mental health. The results showed that physical activity was positively associated with mental health in adolescents and mediated the positive effect of outdoor time on mental health (Bélanger et al., 2019). The second article assessed the impact of COVID-19 on adolescents' outdoor recreation participation and subjective well-being. Results suggest that participation in outdoor activities plays an important role in increasing adolescents' resilience to stress during the pandemic (Jackson et al., 2021).

Next, the third article aims to highlight the importance of outdoor engagement for older adults during the global public health crisis. Access to small green spaces and private gardens improves mental health and well-being, and aids coping mechanisms during the COVID-19 pandemic (Bustamante et al., 2022). Finally, the fourth article aimed to investigate the physiological and psychological effects of forest bathing on working-age people with and without depressive tendencies. Results showed significant positive effects on mental health, especially in individuals with depressive tendencies (Furuyashiki et al., 2019). The impact of outdoor activities and environments on fitness and mental health has been a topic of interest in recent research. Previous research by (Wicks et al., 2022) revealed that physical activity in natural environments was more beneficial for anxiety, anger/hostility, energy, affect and positive engagement compared to urban environments.

The purpose of this article is to review the existing literature on the effects of outdoor activities and outdoor environments on fitness and mental health through a systematic review method. For that purpose, only research articles that addressed fitness and mental health were looked at. Based on this review, it was divided into six categories namely (i) Author and Year, (ii) Research Method and Type, (iii) Content, (iv) Journal, (v) Research Objectives, (vi) Research Results. The country category was not shown, as all articles focused on outdoor activities and outdoor environments on fitness and mental health. The review was divided into two groups, (i) exploring between outdoor physical activity and fitness, (ii) exploring between outdoor physical activity and mental health.

Participants who engaged in outdoor physical activity reported more positive emotions and well-being, with connectedness to nature being a significant predictor of well-being (Loureiro & Veloso, 2014b, 2014a). Strategies such as acclimatization, shading, optimization of clothing properties, and planned breaks were identified as key factors in mitigating the impact of climate change on the prevalence of heat stress among outdoor workers (Habibi et al., 2024). Another study revealed that outdoor water exercise interventions, such as dragon boat rowing and stand-up paddle, showed positive effects on antioxidant action, cardiovascular function, balance, posture control, and flexibility in individuals with chronic diseases (Cugusi et al., 2024). (Cugusi et al., 2023).

Based on several literature reviews highlighting the importance of outdoor activities and environments for improving fitness and mental health. Engaging in physical activity in natural environments, promoting outdoor sports, implementing effective coping strategies for outdoor workers in the face of climate change, and exploring the therapeutic potential of outdoor water sports for chronic disease populations are important areas for further research and development. (Wicks et al., 2022).

Conclusion

This systematic review shows that outdoor physical activity and outdoor environments have a significant positive impact on physical fitness and mental health. Several studies confirmed that interaction with nature through physical activities such as walking, running and cycling can reduce levels of stress, anxiety and depression, and improve psychological and physical well-being. Outdoor environments such as green spaces and blue spaces offer salutogenic benefits that support individuals' mental and physical health. This research also highlights the importance of access to green spaces and other natural environments, especially during public health crises

such as the pandemic. By understanding this relationship more deeply, we can develop more effective strategies to promote fitness and well-being through interactions with nature. These findings provide strong evidence for policymakers and health practitioners to promote outdoor physical activity and maintain and develop green spaces as part of public health strategies. Future researchers can add other keywords and databases such as ERIC, EBSCO (SPORTDiscus and Psychology & Behavioral Sciences Collection) and other databases in the article search. These findings can guide researchers and policymakers in promoting healthy lifestyles and improving well-being through outdoor activities and environments.

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