

A Narrative Review: The Multi-Mechanistic Impact of Sedentary Lifestyle on Mental Health and the Targeted Role of Recreational Sport as a Mitigation Strategy

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ABSTRACT

In an effort to address contemporary public health challenges, this literature review aims to present a synthesis of evidence demonstrating the link between physical inactivity (sedentary lifestyle) and the deterioration of mental health, while simultaneously validating the potential of recreational sport as a sustainable mitigation solution. The trend of sedentary behavior—defined as time spent in a sitting or reclining position—continues to escalate alongside rapid global digitalization. Literature was searched on Scopus, Web of Science, PubMed, and Google Scholar using a combination of keywords such as "Sedentary Behavior," "Mental Health," and "Recreational Sport". A total of 20 primary articles, predominantly cross-sectional and cohort studies, met the review's inclusion criteria. This increasing duration of inactivity consistently shows a significant negative correlation with a decline in the quality of both physical and mental health. This article reviews several studies focusing on outcomes such as depression and anxiety. The synthesis of empirical evidence indicates a significant positive correlation between prolonged sedentary behavior and the increased risk and severity of depression and anxiety symptoms. Conversely, it is found that participation in recreational sport, which is structured, enjoyable, and voluntarily undertaken, can serve as an effective protective strategy. Recreational sport mediates negative impacts through the release of endorphins, improved sleep quality, and increased social interaction. As a primary recommendation, the findings of this review suggest that public health policies must proactively incorporate and prioritize recreational sport as an effective approach for the mitigation and management of mental health issues, given its significant role in enhancing well-being in the digital age.

1. Introduction

The 21st century is marked by significant changes in human daily activity patterns, where the advancement of technology and automation has driven a substantial increase in the time spent in sedentary behavior. This behavior is defined as any activity performed in a lying, sitting, or reclining position with a very low energy expenditure (≤ 1.5 Metabolic Equivalents (METs)) (Mandriyarini et al., 2017). Alongside the widespread use of digital devices and passive transportation, the daily duration of sedentary behavior has become an urgent public health issue. Historically, the majority of initial research concentration regarding the consequences of sedentary behavior (prolonged physical inactivity) predominantly focused on identifying the causal link between a lifestyle dominated by long sitting hours and the increased risk of obesity and the pathophysiology of cardiovascular disease (Dobbie et al., 2022). Currently, however, mental health has become a widely discussed issue. Physical inactivity is known to be associated with declining mental health, making this topic crucial for public health research agendas (Fochesatto et al., 2024).

Mental health, defined by the World Health Organization (WHO) as a state of well-being in which an individual realizes their own abilities, can cope with the normal stresses of life, can work productively, and is able to make a contribution to their community, is threatened by chronic physical inactivity. Numerous studies have found a bidirectional correlation: a sedentary lifestyle can be a risk factor for the onset of mental disorders, and conversely, mental disorders such as depression can drive an increase in sedentary behavior. Although the urgency of the issue and the general relationship are well-established, a critical gap exists in the contemporary literature. This gap includes the lack of a comprehensive synthesis that specifically bridges the adverse impact of sedentary lifestyle on mental health and the validation of the multi-mechanistic role of recreational sport as a targeted and sustainable mitigation strategy. Furthermore, few studies specifically highlight this role within the context of mental health in the young adult population, even though this group represents the most dominant users of digital devices and practitioners of sedentary behavior. The mechanisms causing the correlation between the two are highly complex, involving neurobiological dysregulation, chronic inflammation, poor sleep quality, and reduced opportunities for meaningful social interaction (You et al., 2022).

Addressing this problem, recreational sport emerges as a promising non-pharmacological intervention strategy (Deviana & Savitri). Recreational sport plays a vital role in maintaining psychological well-being by activating specific neurobiological pathways. This benefit primarily stems from the secretion and increased circulation of neurochemical compounds that regulate mood and stress, which are released during physical activity sessions (Chen et al., 2025). The crucial role of recreational sport is as an effective counter-balance to the negative impacts of prolonged sedentary behavior. The significance of its mitigation lies in its ability not only to directly reduce sitting time but also because this activity biologically and psychologically triggers a series of beneficial responses (Smith & Merwin, 2021). These responses include healthy physiological stimulation and the release of advantageous nerve chemicals that collectively contribute to the promotion of holistic health and well-being. Among these responses are the release of neurotransmitters such as serotonin and dopamine, increased blood flow to the brain, and the strengthening of neural circuits related to mood and stress regulation (Liu & Nusslock, 2018). Therefore, this literature review becomes highly relevant in synthesizing cutting-edge evidence regarding the magnitude of the negative impact of a sedentary lifestyle on mental health parameters, and how recreational sport can be specifically utilized, both as a preventive tool and as an effective therapeutic component. This analysis aims to provide a theoretical foundation for the formulation of public health policies that encourage increased public participation, particularly in Indonesia, in recreational physical activity as an integral part of maintaining psychological well-being (Sijabat, 2024).

2. Methodology

This literature review was conducted using a narrative systematic synthesis approach to identify, evaluate, and summarize findings from primary studies relevant to the research question. The review process was based on three stages: planning, execution of literature search, and data synthesis. Execution of Literature Search: The search was conducted on reputable scientific databases such as Scopus, Web of Science, PubMed, and Google Scholar. The combination of keywords used included: "Gaya Hidup Sedentari," "Sedentary Behavior," "Kesehatan Mental," "Mental Health," "Depresi," "Kecemasan," "Anxiety," and "Olahraga Rekreasi," utilizing Boolean operators (AND and OR) to expand and refine the results. Screening Process and Criteria: The initial search yielded 1,232 relevant articles. After screening titles and abstracts, 41 articles were selected for full-text review. A total of 18 articles ultimately met the review's inclusion criteria. The publication range used was 2015 to 2025 to ensure the currency of the evidence.

The inclusion and exclusion criteria were rigorously applied to ensure the relevance and quality of the evidence synthesized in this review. Inclusion Criteria encompassed primary empirical studies, both quantitative and qualitative, that explicitly examined the relationship between sedentary behavior and mental health outcomes, or those that tested the effectiveness of recreational sport/physical activity interventions on improving mental health outcomes. Conversely, Exclusion Criteria strictly ruled out articles such as review articles, editorials, opinions, book chapters, and studies using animal populations. This exclusion was enforced to focus the review solely on human-centered primary evidence with methodological quality that could be reliably assessed using the JBI and CASP checklists. Quality Assessment: To ensure internal validity, the included primary studies were assessed for quality using the standard JBI (Joanna Briggs Institute) checklists for cross-sectional studies and CASP (Critical Appraisal Skills Programme) for qualitative studies. Only studies with high to moderate methodological quality were retained in the synthesis process.

3. Result

The literature synthesis of the 20 cutting-edge primary studies that met the inclusion and quality assessment criteria demonstrates a strong and consistent relationship between sedentary behavior and mental health decline, while confirming the significant role of recreational sport as an effective intervention strategy. Analysis of the included study designs shows a dominance of cross-sectional and cohort methods (approximately 70%), which provides robust evidence regarding long-term correlation and association, supported by several interventional (experimental) studies. As a summary of the key findings from the reviewed articles, these studies collectively support the main thesis of this review. Specifically, Sun et al. (2024), who examined 1,241 college students, found that increased awareness and habits of physical activity significantly lowered anxiety levels. Conversely, on the negative side, Bishop et al. (2023) explained that prolonged sedentary behavior triggers chronic low-grade inflammation, which is a critical mechanism in the pathophysiology of depression. Regarding mitigation, Samsudin et al. (2024) affirmed the role of physical activity as an effective non-pharmacological drug for depression, and Yulianti et al. (2023) highlighted the role of recreational sport in improving cognitive function and opportunities for supportive social interaction. Furthermore, Sari et al. (2023), in an interventional study, showed that a combination of aerobic exercise and progressive muscle relaxation effectively

improved sleep quality and duration. The findings from these primary studies were then further synthesized into thematic dimensions to provide a comprehensive understanding of the mechanisms involved. This comparative thematic synthesis is presented in Table 1: Comparative Synthesis of Sedentary Impact and the Role of Recreational Sport, to facilitate the comprehension of the two poles of the variables examined.

Table 1. Comparative Thematic Synthesis: Comparison of the Mechanism of Sedentary Lifestyle Impact and the Mitigation Role of Recreational Sport.

Dimension/Factor	Impact of Sedentary Lifestyle on Mental Health (Negative Impact)	Role of Recreational Sport as a Mitigation Strategy (Positive Impact)
Depression & Anxiety	Increased levels of anxiety and depression, linked to a lack of physical activity awareness and habits (Sun et al., 2024).	Physical activity can act as an effective non-pharmacological treatment for depression mitigation (Samsudin et al., 2024).
Neurobiological Mechanism	Triggers low-grade chronic inflammation through increased pro-inflammatory cytokines, which play a key role in the pathophysiology of depression (Bishop et al., 2023).	Triggers the release of neurotransmitters that regulate mood (such as endorphins, serotonin, and dopamine) and produces neurotrophic proteins (BDNF) that support brain plasticity and neurogenesis (Liu & Nusslock, 2018).
Social & Cognitive Factors	Causes social isolation because interaction is often replaced by passive digital media consumption, and reduces executive cognitive function.	Provides positive and supportive social interaction opportunities (social connection), which are a strong buffer against stress and loneliness. Recreational sport also enhances focus and executive function (Yulianti et al., 2023).
Sleep Quality	Sedentary lifestyle is often associated with poor sleep patterns, which is a major risk factor for mood disorders (You et al., 2022).	Recreational sport, especially when done outdoors and at moderate intensity, effectively improves sleep quality and duration, which is a key mechanism for mental health recovery (Sari et al., 2023).

Overall, Table 1 systematically summarizes the consistent pattern of findings. This pattern underscores the multi-mechanistic nature of the relationship studied: the negative impact of a sedentary lifestyle is not only physiological but also manifests through psychological and social pathways. Conversely, recreational sport-based interventions are effective due to their ability to mediate these negative impacts across the same dimensions. A detailed analysis of the implications and significance of these findings will be further discussed in the Discussion section.

4. Discussion

A sedentary lifestyle acts as a predictor of mental health risk through pathways involving behavioral, social, and biological aspects (Guerriero et al., 2025). From a behavioral perspective, excessive sedentary duration requires deep scrutiny, especially when this inactive time is spent on passive digital media consumption. Activities such as prolonged viewing or aimless screen scrolling, which are often described as autopilot, meaning they are performed without full cognitive awareness (Anderson, 2024), are now very common practices. Substantially, these activities are characterized by a lack of motor movement and active mental interaction, intrinsically differentiating them from productive physical or cognitive activities. It is crucial to distinguish this from sedentary behavior that involves active and productive mental engagement, such as reading academic literature, writing, or intensive work, as these activities do not always exhibit the same negative correlation with mental health. The failure to obtain varied and challenging input from passive digital activities has significant consequences because it fundamentally fails to provide adequate and meaningful cognitive stimulus or social interaction (Huang et al., 2024). This failure to receive varied input creates a hypoactive or under-stimulated mental environment.

This condition ultimately leads to a less challenging psychological state and triggers increased vulnerability to negative psychological symptoms, including the onset of unwarranted anxiety and the development of feelings of emptiness or existential dissatisfaction (Takiguchi et al., 2023). Biologically, inflammation is known to occur due to a lack of regular muscle contraction, which can reduce the release of anti-inflammatory myokines, ultimately triggering the chronic inflammatory state often observed in individuals experiencing depression (Kantawala et al., 2023). Conversely, excessive muscle contraction resulting from high-intensity exercise can also negatively impact health (Al-Ghifari et al., 2023). Recreational sport, as an intervention, addresses this problem from multiple angles. First, it directly breaks the sedentary cycle, which is the initial mitigation step (Rhodes et al., 2025). Second, it activates protective neurobiological pathways (Ren & Xiao, 2023). The increase in Brain-Derived Neurotrophic Factor (BDNF) following physical exercise, for instance, has long been recognized as a factor promoting nerve cell growth and stable mood. Third, the recreational aspect of this activity is paramount. Because it is undertaken for pleasure rather than obligation, recreational sport tends to boost intrinsic motivation and mastery, which are essential components in building low self-esteem in individuals experiencing depression (Roche et al., 2020). While this narrative systematic review successfully synthesized robust evidence, it is important to acknowledge several methodological limitations. The main limitation lies in the high variation of study designs among the 20 included articles, which prevented quantitative meta-analysis and limits statistical generalization. The majority of included studies were cross-sectional and cohort studies, which, while providing strong evidence of association, cannot definitively prove causality between sedentary behavior and mental disorders. Furthermore, there may be a risk of publication bias, where studies with significant findings are more likely to be published. These limitations underscore the need for future research focused on large-scale Randomized Controlled Trials (RCTs) designed to test the specific effectiveness of varying recreational sport programs.

Based on the synthesis of findings and considering the limitations above, within the Indonesian context, as a nation rich in natural resources and communal culture, the promotion of community-based recreational sport (e.g., communal walking, outdoor yoga, or traditional games) holds great potential. Interventions proven effective are those that focus not only on intensity but also on the frequency and social context of the activity (Naswa et al., 2024). Due to the effectiveness shown by non-physiological dimensions, ideal policy recommendations must undergo a substantive paradigm shift. Policy should no longer focus solely on the minimal target of "performing physical activity" as an obligation. The emphasis must be directed towards encouraging participation in recreational activities that are intrinsically enjoyable and, most importantly, possess meaningful social value. To translate these findings into tangible actions, the integration of recreational sport programs focusing on the fun and social aspects is recommended within the PJOK curriculum or Healthy School programs. Furthermore, local governments need to optimize Public Spaces such as City Parks and open public facilities designed for non-competitive and inclusive recreational sports. Finally, public health campaigns should be launched emphasizing the benefits of social connection and mood enhancement from recreational sports, rather than solely focusing on physical disease prevention. This policy reorientation is crucial because by facilitating the dimension of enjoyment and social connection, the potential to maximize mental health benefits and ensure sustained, long-term engagement will be far more achievable.

5. Conclusions

This literature review consistently affirms that a sedentary lifestyle constitutes a significant independent risk factor for the decline of mental health, particularly the manifestation of depression and anxiety. Conversely, structured and regular participation in recreational sport proves to be a highly effective mitigation strategy. Its effectiveness stems from a dual working mechanism: supporting physiological recovery, including neurobiological modulation and improved sleep quality, as well as enhancing subjective well-being through social factors.

Despite providing strong evidence, it must be acknowledged that the majority of included primary studies (cross-sectional and cohort) could only demonstrate a strong association and not causality between sedentary behavior and mental disorders. These limitations should be addressed in future interventional research (RCTs). However, the ultimate efficacy of recreational-based interventions lies in their ability to engage with the supportive social dimension. Therefore, public health policy must shift to prioritize the provision of environments and recreational sport programs that emphasize social aspects and enjoyment (e.g., through Healthy Campus programs and the optimization of city parks) to ensure sustained engagement and maximal protective benefits.

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