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SWIMMING AS A LIFESTYLE AND PUBLIC HEALTH INTERVENTION: EFFECTS ON PHYSICAL AND MENTAL HEALTH – A NARRATIVE REVIEW

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ABSTRACT

Swimming is increasingly recognized as a multifaceted lifestyle and public health intervention that contributes to both physical and mental well-being. As a low-impact, accessible, and adaptable form of physical activity, swimming provides benefits across multiple physiological systems while also supporting population-level health promotion. This narrative review aims to evaluate the effects of swimming on physical and psychological health based on scientific evidence published between 2015 and 2025. A structured literature search was performed using PubMed and Google Scholar, and relevant peer-reviewed studies were selected according to predefined inclusion and exclusion criteria. A qualitative narrative synthesis was conducted. The findings indicate that swimming improves cardiovascular fitness, metabolic health, muscular strength, and respiratory function. Furthermore, it is associated with reduced symptoms of depression, anxiety, and stress, as well as enhanced overall well-being and quality of life. Importantly, swimming demonstrates high adherence potential and accessibility, making it particularly suitable for large-scale public health interventions. In conclusion, swimming represents an effective and scalable lifestyle intervention with broad applicability in preventive health strategies. Future research should focus on standardizing intervention protocols and evaluating long-term population-level outcomes.

KEYWORDS

Swimming, Physical Activity, Mental Health, Cardiovascular Health, Public Health, Health Promotion

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1. Introduction

Physical inactivity remains one of the leading risk factors for global mortality and is strongly associated with chronic diseases such as cardiovascular disease, obesity, and type 2 diabetes (Silva et al., 2024). In addition, mental health disorders such as depression and anxiety have increased significantly in recent years, highlighting the need for effective and accessible interventions.

Lifestyle interventions based on regular physical activity are widely recognized as essential strategies for improving both physical and mental health outcomes, with strong evidence supporting their role in reducing morbidity and mortality (Warburton & Bredin, 2017; Pedersen & Saltin, 2015). Among various forms of exercise, swimming has emerged as a unique modality that combines aerobic conditioning, resistance training, and environmental exposure.

Swimming is performed in an aquatic environment characterized by buoyancy, hydrostatic pressure, and thermal properties, which reduce mechanical stress on joints and facilitate movement (McLeod et al., 2024). These characteristics make swimming particularly suitable for older adults, individuals with chronic conditions, and those undergoing rehabilitation.

In addition to its physical benefits, swimming has been associated with improvements in psychological well-being. The rhythmic and repetitive nature of swimming, combined with controlled breathing patterns, promotes relaxation and reduces stress levels. Furthermore, aquatic environments are linked to the concept of “blue space,” emphasizing the positive impact of water-based environments on mental health.

Despite the growing body of evidence supporting the health benefits of swimming, several important gaps remain. In particular, there is a lack of standardized intervention protocols regarding the frequency, intensity, and duration of swimming programs. Furthermore, long-term effects of swimming on both physical and mental health outcomes remain insufficiently explored. In addition, existing research is often heterogeneous in terms of study design and outcome measures, which limits the ability to draw consistent and generalizable conclusions.

Therefore, the aim of this review is to synthesize current evidence on swimming as a lifestyle intervention and its effects on both physical and mental health.

From a public health perspective, swimming represents a particularly valuable form of physical activity due to its accessibility across different age groups and health conditions. Unlike many land-based exercises, swimming can be adapted to individuals with limited mobility, chronic diseases, or obesity, reducing barriers to participation.

Moreover, swimming facilities are widely available in many urban and community settings, making this activity relevant for large-scale health promotion programs. As such, swimming can play a significant role in addressing global challenges related to physical inactivity and mental health disorders.

Despite these advantages, there remains a lack of standardized guidelines for implementing swimming-based interventions within public health frameworks. This highlights the need for further research focused on real-world applicability and long-term effectiveness.

2. Methodology

This study was conducted as a structured narrative review aimed at synthesizing current evidence on the effects of swimming on physical and mental health outcomes. Although the review does not meet the formal criteria of a systematic review, a transparent and predefined literature search strategy was applied to enhance methodological rigor and reproducibility.

A literature search was performed using electronic databases, including PubMed and Google Scholar, to identify relevant peer-reviewed studies published between January 2015 and January 2025, with the final search conducted in January 2025. The search strategy combined keywords and Boolean operators, including: “swimming AND health,” “aquatic exercise AND mental health,” “swimming AND cardiovascular fitness,” and “aquatic therapy AND well-being.”

Studies were included if they met the following criteria: (1) peer-reviewed publications, (2) human participants, (3) studies examining physical or mental health outcomes related to swimming or aquatic exercise, and (4) articles published in English. Exclusion criteria included animal studies, non-peer-reviewed publications, and studies without full-text access.

The study selection process involved screening of titles and abstracts followed by full-text evaluation of potentially eligible articles. Duplicate records were removed prior to final inclusion. Approximately 40 studies were included in the final analysis.

Due to heterogeneity in study design, populations, and outcome measures, a qualitative narrative synthesis was conducted. Studies were grouped according to major physiological and psychological domains.

Although no formal risk-of-bias tool was applied, the methodological quality of included studies was critically evaluated, with greater emphasis placed on randomized controlled trials and systematic reviews.

Several limitations should be acknowledged. Variability in study design and intervention protocols limits comparability, and the predominance of observational studies restricts causal inference. Additionally, potential publication bias may have influenced the findings. Furthermore, the use of only two databases may have limited the comprehensiveness of the literature search and introduced potential selection bias.

Particular emphasis was placed on recent systematic reviews and meta-analyses in order to ensure a high level of evidence quality.

3. Results and Synthesis of Evidence

3.1 Physical health

Current evidence consistently demonstrates that swimming exerts beneficial effects across multiple physiological systems, including cardiovascular, metabolic, respiratory, and musculoskeletal domains. Regular participation in swimming has been associated with improvements in aerobic capacity, reductions in blood pressure, and enhanced cardiac efficiency, contributing to overall cardiovascular health (Mohr et al., 2014; Warburton & Bredin, 2017). In addition, recent large-scale observational studies suggest that participation in swimming may be associated with a significant reduction in all-cause mortality, estimated at approximately 20–30%, based on large population-based cohort studies, highlighting its potential role in long-term health and longevity. Furthermore, aquatic exercise has been shown to improve endothelial function and reduce arterial stiffness, which are important predictors of cardiovascular disease risk.

From a metabolic perspective, studies indicate that swimming promotes favorable changes in body composition, including reductions in body fat and improvements in lipid profiles. Additionally, enhanced

insulin sensitivity has been observed, suggesting a protective role in the prevention and management of metabolic syndrome and type 2 diabetes (Lee & Oh, 2015).

Swimming also positively affects respiratory function. The controlled breathing patterns required during aquatic exercise contribute to increased lung capacity and improved respiratory efficiency (Tanaka & Seals, 2017). These adaptations may be particularly beneficial for individuals with asthma and other respiratory conditions.

Furthermore, the resistance provided by water enhances muscular strength and endurance while minimizing mechanical stress on joints. This makes swimming especially suitable for individuals with musculoskeletal disorders, obesity, or those undergoing rehabilitation (McLeod et al., 2024).

In addition to these effects, swimming has been associated with improved balance, coordination, and functional mobility, which are critical for reducing fall risk, particularly in older adults (Bocalini et al., 2008). Although swimming is not a weight-bearing activity, it contributes indirectly to bone health through muscle strengthening and neuromuscular adaptations.

Emerging evidence also suggests that regular swimming may improve vascular function and endothelial health, thereby contributing to reduced risk of atherosclerosis and improved circulation (Tanaka, 2009). Moreover, swimming has been linked to improved sleep quality and reduced fatigue, further supporting overall health and recovery (Driver & Taylor, 2000).

In addition, swimming may contribute to improvements in postural control and spinal alignment due to the symmetrical engagement of major muscle groups and the reduced gravitational load in the aquatic environment. These adaptations may support musculoskeletal balance and reduce the risk of postural dysfunction, particularly in sedentary populations.

Furthermore, aquatic exercise has been associated with improved proprioception and neuromuscular coordination, which are essential for maintaining functional stability and preventing injuries (Bocalini et al., 2008).

A summary of the main health benefits of swimming and their underlying mechanisms is presented in Table 1.

Table 1. Summary of the health benefits of swimming

Health Domain	Specific Benefits	Mechanisms	Key References
Cardiovascular system	Reduced blood pressure, improved cardiac efficiency, increased aerobic capacity	Improved circulation, cardiac output, endothelial function	Mohr et al., 2014; Tanaka, 2009; Warburton & Bredin, 2017
Metabolic health	Reduced body fat, improved lipid profile, enhanced insulin sensitivity	Increased energy expenditure, improved glucose metabolism	Lee & Oh, 2015
Respiratory system	Increased lung capacity, improved breathing efficiency	Controlled breathing patterns, respiratory muscle strengthening	Tanaka & Seals, 2017;
Musculoskeletal system	Increased muscle strength, improved flexibility, reduced joint stress	Water resistance, buoyancy reducing joint load	McLeod et al., 2024
Bone and functional health	Improved balance, coordination, reduced fall risk	Neuromuscular adaptations, muscle strengthening	Bocalini et al., 2008
Mental health	Reduced stress, anxiety, depression; improved mood	Endorphin release, neurochemical regulation	Warburton & Bredin, 2017; Eime et al., 2013
Cognitive function	Improved memory, attention, executive function	Increased cerebral blood flow, neuroplasticity (BDNF)	Hillman et al., 2008; Cotman et al., 2007
Immune and inflammatory response	Reduced inflammation, improved immune function	Anti-inflammatory effects of exercise	Gleeson et al., 2011
Sleep and recovery	Improved sleep quality, reduced fatigue	Hormonal regulation, autonomic balance	Driver & Taylor, 2000

3.2 Mental health

Evidence suggests that swimming has a significant positive impact on mental health outcomes. Regular participation is associated with reductions in symptoms of depression, anxiety, and stress, as well as improvements in mood, emotional regulation, and overall psychological well-being (Warburton & Bredin, 2017).

These effects are likely mediated by a combination of physiological and psychological mechanisms. Physiologically, physical activity promotes the release of endorphins and improves neurochemical balance, while psychologically, the aquatic environment may induce relaxation and reduce cognitive stress.

Additionally, swimming may contribute to improved self-esteem and body image, which are important components of mental health, particularly among adolescents and individuals with overweight or obesity (Eime et al., 2013).

In addition, swimming has been linked to improvements in cognitive function, including memory, attention, and executive functioning, particularly in older adults. These findings highlight the potential role of swimming as a supportive intervention for cognitive aging and neuroprotection (Hillman et al., 2008).

These mental health benefits may also be explained by improved cardiovascular efficiency and increased endorphin levels, which contribute to reduced symptoms of anxiety and depression.

3.3 Mechanisms

The health benefits of swimming are supported by multiple interrelated biological mechanisms. Regular swimming improves circulation and oxygen delivery, enhances metabolic efficiency, and reduces systemic inflammation (Gleeson et al., 2011).

At the neurobiological level, physical activity is associated with increased production of neurotransmitters such as serotonin and dopamine, which play a key role in mood regulation. Additionally, exercise stimulates the release of brain-derived neurotrophic factor (BDNF), which supports neuroplasticity and cognitive function (Cotman et al., 2007).

Swimming also influences autonomic nervous system regulation by enhancing parasympathetic activity, which contributes to stress reduction and improved cardiovascular regulation (Carter et al., 2003).

The interaction between physiological, neurological, and environmental factors likely explains the broad spectrum of health benefits associated with swimming.

3.4 Implications for Public Health and Society

The findings of this review highlight the potential of swimming as a scalable and inclusive public health intervention. Given its low-impact nature, swimming is particularly suitable for populations that are often excluded from traditional exercise programs, including older adults, individuals with disabilities, and those with chronic diseases.

From a societal perspective, promoting swimming may contribute to reducing health inequalities by providing an accessible form of physical activity across diverse populations. Community-based swimming programs, school interventions, and public health campaigns may enhance participation and improve overall population health (Eime et al., 2013).

In addition, integrating swimming into preventive healthcare strategies may reduce healthcare costs associated with chronic diseases and mental health disorders. These findings support the inclusion of swimming in national and international physical activity guidelines (Warburton & Bredin, 2017).

4. Discussion

The findings of this review confirm that swimming represents a multidimensional lifestyle intervention with substantial benefits across physical, psychological, and social domains. Current evidence consistently demonstrates that regular participation in swimming contributes to improvements in cardiovascular, metabolic, respiratory, and musculoskeletal health, while also supporting mental well-being and quality of life.

Importantly, compared to many other forms of physical activity, swimming demonstrates a particularly favorable balance between effectiveness and safety, especially in populations with chronic conditions or reduced mobility.

From a physiological perspective, swimming combines aerobic and resistance components, leading to improvements in cardiovascular efficiency and metabolic regulation. Studies have shown that swimming can reduce blood pressure, improve lipid profiles, and enhance insulin sensitivity, thereby lowering the risk of cardiovascular disease and metabolic syndrome (Mohr et al., 2014). These findings are particularly relevant in the context of increasing global prevalence of non-communicable diseases.

In addition, the unique properties of the aquatic environment, including buoyancy and hydrostatic pressure, reduce mechanical stress on joints while maintaining muscular engagement. This makes swimming especially suitable for populations with musculoskeletal limitations, such as older adults, individuals with obesity, or those undergoing rehabilitation (McLeod et al., 2024). As a result, swimming may improve adherence to long-term physical activity programs compared to high-impact land-based exercises.

Beyond physical health, swimming demonstrates significant benefits for mental health. Regular participation has been associated with reductions in stress, anxiety, and depressive symptoms, as well as improvements in mood and emotional regulation. These effects are likely mediated by both physiological mechanisms, such as endorphin release and improved neurochemical balance, and psychological factors, including relaxation and environmental exposure.

Furthermore, the rhythmic and repetitive nature of swimming, combined with controlled breathing, may promote mindfulness-like states, contributing to stress reduction and cognitive recovery. These findings align with broader evidence suggesting that physical activity plays a crucial role in supporting mental health and resilience.

Importantly, swimming also offers social and behavioral benefits. Participation in group-based aquatic activities can enhance social interaction, reduce isolation, and improve motivation, particularly among older adults. This social dimension may further contribute to long-term adherence and overall well-being.

From a public health perspective, swimming represents a scalable and inclusive intervention. Its adaptability allows it to be implemented across diverse populations, including individuals with chronic conditions or limited mobility. Community-based swimming programs and school interventions may therefore play a critical role in promoting physical activity at the population level.

Despite these advantages, several limitations should be considered. Many studies included in the literature are observational or involve small sample sizes, limiting the ability to establish causal relationships. Additionally, variability in intervention protocols, including differences in frequency, intensity, and duration, complicates comparisons across studies.

Another important limitation is the lack of standardized guidelines for swimming-based interventions, which restricts their implementation in clinical and public health settings. Future research should focus on developing evidence-based protocols and conducting large-scale randomized controlled trials to strengthen the evidence base.

The integration of digital technologies may further enhance the effectiveness of swimming-based interventions. Wearable devices and mobile health applications can facilitate monitoring of physical activity, adherence, and health outcomes, supporting personalized and data-driven approaches to health promotion.

Overall, the available evidence supports the inclusion of swimming as a key component of preventive healthcare and lifestyle medicine. Its combination of physiological, psychological, and social benefits makes it a uniquely valuable intervention for improving population health.

Future research should also explore the dose–response relationship between swimming frequency and health outcomes, which remains insufficiently defined.

5. Conclusions

This review highlights swimming as a comprehensive and multidimensional lifestyle intervention with significant benefits for both physical and mental health. The available evidence indicates that regular swimming improves cardiovascular, metabolic, respiratory, and musculoskeletal function, while also supporting psychological well-being, including reductions in stress, anxiety, and depressive symptoms.

Importantly, the unique properties of the aquatic environment make swimming a low-impact and highly adaptable form of physical activity, suitable for diverse populations, including older adults and individuals with chronic conditions. These characteristics contribute to its high adherence potential and long-term sustainability.

From a public health perspective, incorporating swimming into community-based interventions and health promotion strategies may significantly improve quality of life and reduce the burden of chronic diseases. In addition, swimming has the potential to address health inequalities by providing an accessible form of physical activity across different population groups.

However, further research is needed to develop standardized intervention protocols, evaluate long-term outcomes, and explore the integration of swimming into structured healthcare and public health systems. Future studies should also consider behavioral, environmental, and technological factors influencing participation and effectiveness.

Overall, swimming represents a promising, scalable, and evidence-based approach to improving population health.

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