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The Health Benefits of Nature Tourism: Enhancing Physical and Mental Well-Being

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Abstract

Nature tourism is recognized as a highly beneficial activity for both physical and mental health. This review article examines the impact of nature tourism on human well-being. Searches in Google Scholar, PubMed, Scopus, and Web of Science identified relevant sources from 2000 to 2025.Studies demonstrate that engaging in activities such as hiking, mountain climbing, and visiting natural environments can lead to significant health improvements. Nature-based experiences are linked to short-term emotional uplift, medium-term stress recovery, and long-term changes in worldview. Such experiences offer psychological rehabilitation for trauma survivors, comparable to clinical treatments. The cardiovascular benefits include improved heart health and enhanced immune function. Additionally, exposure to green spaces reduces heart rate and blood pressure, contributing to better cardiovascular function. Immersing oneself in natural settings supports muscle strength and endurance, promoting overall fitness. The therapeutic benefits of nature also extend to mental health, alleviating symptoms of anxiety and depression, and enhancing cognitive functions such as memory and attention. These findings highlight the potential of nature tourism not only to boost individual well-being but also to support sustainability and conservation efforts. Further research is necessary to optimize nature-based interventions across populations and settings for broad health benefits from tourism.

Keywords: Nature Tourism, physical health, mental health

Introduction

Nature tourism has been shown to have significant positive impacts on physical health and mental health. Research indicates that the majority of park visitors experience short-term emotional benefits, medium-term stress recovery, and long-term changes in worldview (Buckley, 2020). Nature-based experiences can provide psychological rescue and rehabilitation for individuals who have suffered trauma, comparable to clinical interventions (Buckley & Oam, 2021). The tourism sector is well-positioned to facilitate access to natural environments, offering potential for mental health recovery post-pandemic (Buckley & Cooper, 2022). Outdoor adventure tourism, in particular, can foster reconnection with nature, promoting pro-environmental attitudes and behaviors (Hanna et al., 2019).

Nature tourism offers significant health benefits beyond those of exercise alone. It improves cardiovascular health, boosts immunity, and enhances emotional well-being (Christiana et al., 2021; Maddock & Frumkin, 2024; Pasanen et al., 2014). Studies have shown that nature-based physical activity provides greater benefits to health and wellness compared to indoor exercise or exposure to nature without activity (Christiana et al., 2021). Regular physical activity in nature is particularly associated with better emotional well-being and perceived general health (Pasanen et al., 2014). During the COVID-19 pandemic, individuals meeting recommended physical activity levels in natural environments reported maintained overall well-being and increased feelings of connection to nature (O'Brien & Forster, 2021). Despite these known benefits, most Americans do not engage in sufficient physical activity or spend enough time outdoors (Christiana et al., 2021; Maddock & Frumkin, 2024). Promoting nature-based physical activity could be an effective strategy for improving public health outcomes. This review article aims to examine the positive effects of nature tourism on physical and mental health. The primary goal is to demonstrate how nature-based experiences can enhance overall well-being and improve individual health.

Methodology

In this study, relevant sources on the topic were identified through searches in the databases of Google Scholar, PubMed, Scopus, and Web of Science. Resources from 2000 to 2025 were reviewed. The keywords used in the search included "Nature Tourism," "physical health," and "mental health." Titles and abstracts of all articles were examined without language restrictions. Ultimately, articles focusing on "The Health Benefits of Nature Tourism" were selected for detailed examination.

Physical Health

Engaging in nature tourism, such as hiking in national parks, walking through forests, or cycling in scenic landscapes, significantly enhances physical fitness and boosts cardiovascular health. Nature tourism improves autonomic nerve system (Chang, 2014), cardiovascular function and circulation (Nugraha et al., 2024a), allowing immune cells to function more effectively, which strengthens the

immune system (Liisa Andersen et al., 2021; Li & Kawada, 2011). Regular exposure to green spaces lowers heart rate and blood pressure, promoting better cardiovascular function. Activities like hiking and exploring natural environments not only increase overall physical activity but also enhance muscular strength, contributing to improved endurance and fitness levels (Nugraha et al., 2024a). Additionally, nature tourism supports recovery from illnesses and fosters overall well-being by facilitating a strong connection to nature (Hansen-Ketchum et al., 2009). Incorporating nature tourism into daily life significantly enhances cardiovascular health, regulates blood pressure, and boosts muscular power, highlighting the need to include outdoor environments and activities in fitness and health promotion strategies (Nugraha et al., 2024b; Pretty, 2004).

Cardio-Respiratory System

Research indicates that nature-based activities, such as hiking and cycling in natural environments, can significantly improve cardiovascular health. Low-intensity aerobic exercise in these settings has been shown to reduce blood pressure, with one study reporting a decrease in diastolic blood pressure from 88.6 to 84.6 mmHg after intervention (Hosseiny et al., 2007). For children, a 12-week moderate-intensity aerobic exercise program in natural environments led to improvements in cardiac structural and functional parameters, potentially strengthening their cardiovascular system (Tartibian & Mohammad Amini khayat, 2021). The concept of "green and blue exercise," referring to physical activity in natural settings, has gained attention for its potential health benefits (Donnelly & MacIntyre, 2019). These findings suggest that engaging in aerobic activities, especially in natural environments, can have positive effects on cardiovascular health across different age groups. However, more research is needed to fully understand the specific mechanisms and optimal approaches for different populations.

The immune system

The immune system is a complex network of cells, tissues, and organs that work together to identify and neutralize harmful invaders such as bacteria, viruses, and toxins. (Sebastian & Nehra, 2024). However, factors such as stress, poor nutrition, lack of physical activity, and insufficient exposure to sunlight can weaken the immune system over time(Hasnain et al., 2020). Spending time in natural environments, known as "nature therapy" or "forest bathing," has been shown to boost the immune system and provide numerous health benefits, with enhanced immune functioning being a central pathway linking nature exposure to these benefits (Kuo, 2015). Nature contributes to immune health in several ways:

Inflammatory, Phytoncides, and Stress Levels

Nature exposure has demonstrated anti-inflammatory, anti-allergic, and anti-asthmatic effects, as well as increased NK cell activity (Liisa Andersen et al., 2021). Research suggests that exposure to natural environments can significantly boost immune health. Forest bathing trips have been shown to increase

natural killer (NK) cell activity and the number of NK cells, with effects lasting over 30 days (Li, 2010; Li & Kawada, 2011).

The forest environments and phytoncides, natural substances emitted by trees, can enhance human immune function, particularly natural killer (NK) cell activity (Li & Kawada, 2011). These benefits were not observed from city visits (Li, 2010). Phytoncides are natural compounds released by trees and plants to protect themselves from insects and microbes, and exposure to them can have beneficial effects on human physical and mental well-being (Nomura, 2011). Phytoncides, such as α-pinene and β-pinene, significantly increase NK cell cytolytic activity and the expression of anti-cancer proteins (Jo et al., 2021). Exposure to phytoncides in controlled environments also enhances NK activity and decreases stress hormone levels (Li & Kawada, 2011).

Chronic stress weakens the immune system by increasing cortisol production, but research has consistently shown that exposure to natural environments can reduce both psychological and physiological stress levels (Ewert & Chang, 2018; Kondo et al., 2018). This stress reduction is significant because chronic stress can suppress immune function through increased cortisol production, potentially leading to various health issues (Webster Marketon & Glaser, 2008). While acute stressors may have some adaptive immune effects, chronic stress tends to suppress both cellular and humoral immunity (Segerstrom & Miller, 2004). The stress-reducing benefits of nature exposure have been observed through various measures, including heart rate, blood pressure, and self-reported stress levels (Kondo et al., 2018). These findings suggest that spending time outdoors, particularly in natural environments, may be an effective strategy for managing stress and supporting overall health and immune function (Li & Kawada, 2011). While these studies provide promising evidence for nature's positive impact on immune health, further research is needed to determine optimal exposure durations and specific ecosystem contributions (Liisa Andersen et al., 2021).

Sunlight and Vitamin D

The health benefits of nature exposure are significant, as sunlight during outdoor activities helps the body produce vitamin D, which plays crucial roles in immune function, hormone regulation, and maintaining the health of bones, heart, and brain (Rajendran et al., 2022). It modulates the function of various immune cells, including macrophages, dendritic cells, T cells, and B cells, which express vitamin D receptors and can synthesize its active form (Kikuta & Ishii, 2015; Aranow, 2011). Vitamin D enhances innate immunity by promoting antimicrobial peptide production and stimulating autophagy in macrophages, thereby improving host defense against infections like tuberculosis (Kikuta & Ishii, 2015; Bikle, 2008). It also suppresses adaptive immune responses, which may be beneficial in autoimmune disorders but could potentially increase susceptibility to infections (Aranow, 2011; Myszka & Klinger, 2014). Vitamin D deficiency is associated with increased autoimmunity and susceptibility to infections (Aranow, 2011). While vitamin D supplementation may offer benefits beyond calcium homeostasis, its effects on immune function are complex, potentially enhancing protection against some infections while exacerbating inflammatory processes in others (Bikle, 2008; Myszka & Klinger, 2014). Vitamin D has anti-inflammatory properties that help regulate the immune system and prevent excessive inflammatory responses (Fenercioglu, 2024; Liu et al., 2018). Vitamin D

plays a crucial role in modulating immune and inflammatory responses. It binds to vitamin D receptors present in various immune cells, regulating gene expression and cytokine production (Fenercioglu, 2024). Vitamin D inhibits pro-inflammatory pathways like NF-κB and MAPK, while promoting anti-inflammatory mechanisms (Fenercioglu, 2024; Liu et al., 2018). This modulation affects the differentiation, activation, and proliferation of immune cells (Colotta et al., 2017). Epidemiological studies have linked vitamin D deficiency to increased risk of inflammatory and autoimmune diseases (Colotta et al., 2017; Yin & Agrawal, 2014). Vitamin D's anti-inflammatory properties may also contribute to cancer prevention by interfering with inflammation-related tumor development (Liu et al., 2018).

Improved Air Quality

Natural environments, with their cleaner air due to trees and plants filtering out pollutants and releasing oxygen, create a healthier atmosphere that improves lung function and supports overall respiratory health, closely linked to immune strength (L. Andersen et al., 2021).Recent studies have demonstrated the significant health benefits of improved air quality. Enhanced air quality also attenuated lung function decline, particularly in individuals with low to normal BMI (Schikowski et al., 2013). Long-term air quality improvement in late life was associated with reduced dementia risk in older women (Wang et al., 2022). These findings underscore the importance of clean air policies and their potential impact on various aspects of health, including cognitive function, respiratory health, workplace performance, and healthy aging. The studies collectively emphasize the far-reaching benefits of air quality improvement initiatives for public health (L. Andersen et al., 2021; Schikowski et al., 2013; Wang et al., 2022).

Muscular Strength and General Fitness

Musculoskeletal fitness, including strength, endurance, power, and flexibility, is positively linked to independence, quality of life, and overall health status (Warburton et al., 2001). Regular outdoor activities contribute to improved muscular strength, cardiovascular fitness, and overall physical well-being (Nugraha et al., 2024a). Hiking tourism can be integrated into wellness tourism products, offering a balance of physical activity, relaxation, weight management, and intellectual stimulation (Mitten et al., 2018; Rodrigues et al., 2010).

Mental Health

Spending time in nature and green spaces has been shown to significantly improve mental health by reducing stress, anxiety, and depression, enhancing cognitive function, and increasing overall well-being, self-confidence, and life satisfaction (Hansen-Ketchum et al., 2009; Lackey et al., 2019; Nugraha et al., 2024a; Oh et al., 2017; Passmore, 2011; Pearson & Craig, 2014). Nature tourism offers significant benefits for mental health and overall well-being, providing short-term emotional uplift, medium-term stress recovery, and long-term changes in worldview (Buckley, 2020). Natural environments in urban areas contribute to residents' psychological health and quality of life (Tavakoli

& Majedi, 2013). Nature-based tourism provides psychological benefits, enhances social life, and strengthens community bonds, although it may pose environmental threats such as littering and habitat destruction (Feizolahi et al., 2023). Serene environments reduce stress hormone levels and alleviate anxiety symptoms while also enhancing cognitive performance by improving memory, attention, creativity, and work capacity(Daniels et al., 2021).

A study in rural Ardabil found a significant relationship between tourism and social health indicators like social cohesion, acceptance, participation, and flourishing, with the exception of social adaptation (Heidari Sareban & Yasri Hesar, 2020). Natural environments, particularly parks and reserves, offer accessible and cost-effective health promotion interventions for populations, with potential applications in prevention, treatment, and care (Mygind et al., 2019). Studies suggest that park visits contribute to short-term emotional benefits, medium-term stress recovery, and long-term changes in worldview for many individuals (Buckley, 2020).

Studies have shown that nature-based experiences can provide psychological rescue and rehabilitation for individuals who have experienced trauma or stress (Buckley & Oam, 2021). Healing gardens have been shown to reduce anxiety and promote mental well-being in patients (Hashemin et al., 2020). A pilot study of a wetland-based intervention for individuals with anxiety and depression demonstrated significant improvements in mental wellbeing, anxiety, stress, and emotional wellbeing, while also addressing physical health and social isolation (Maund et al., 2019). However, further research is needed to optimize nature-based interventions, understand the impacts of different types of nature experiences, and explore the potential of commercial nature tourism in providing mental health services (Buckley, 2020; Buckley & Cooper, 2022).

The tourism sector can play a crucial role in facilitating nature experiences, especially in national parks, which may provide substantial mental health benefits (Buckley & Cooper, 2022; Buckley, 2020). Nature tourism enterprises have the potential to deliver nature therapies, offering carefully planned packages that promote nature contact and connectedness (Clissold et al., 2022).

Conclusion

Nature tourism offers a wealth of health benefits, making it an increasingly popular choice for individuals seeking physical and mental well-being. Immersing oneself in natural environments has been shown to reduce stress levels, lower blood pressure, and improve overall mood. Activities such as hiking, birdwatching, or simply walking through forests encourage physical exercise, which boosts cardiovascular health and strengthens muscles. Furthermore, exposure to natural sunlight helps regulate sleep patterns by supporting the production of melatonin and increasing vitamin D levels. Mental health also sees significant improvements, as spending time in nature can alleviate symptoms of anxiety and depression while enhancing cognitive function and creativity. The serene atmosphere of natural settings fosters mindfulness and a sense of connection to the environment, promoting emotional resilience. By combining recreation with the restorative power of nature, nature tourism not only enriches travel experiences but also contributes to a healthier and more balanced lifestyle.

Reference

Andersen, L., Corazon, S., & Stigsdotter, U. (2021). Nature Exposure and Its Effects on Immune System Functioning: A Systematic Review. *International Journal of Environmental Research and Public Health*, *18*, 1416. https://doi.org/10.3390/ijerph18041416

Andersen, L., Corazon, S. S. S., & Stigsdotter, U. K. K. (2021). Nature Exposure and Its Effects on Immune System Functioning: A Systematic Review. *Int J Environ Res Public Health*, *18*(4). https://doi.org/10.3390/ijerph18041416

Buckley, R. (2020). Nature tourism and mental health: parks, happiness, and causation. *Journal of Sustainable Tourism*, *28*, 1-16. https://doi.org/10.1080/09669582.2020.1742725

Buckley, R., & Oam, D. (2021). Women report that nature tourism provides recovery from psychological trauma. *Tourism Recreation Research*, *47*, 443-447. https://doi.org/10.1080/02508281.2021.1917892

Buckley, R. C., & Cooper, M.-A. (2022). Tourism as a Tool in Nature-Based Mental Health: Progress and Prospects Post-Pandemic. *International Journal of Environmental Research and Public Health*, *19*(20), 13112. https://www.mdpi.com/1660-4601/19/20/13112

Chang, L.-C. (2014). The Relationship Between Nature-Based Tourism and Autonomic Nervous System Function Among Older Adults. *Journal of Travel Medicine*, *21*. https://doi.org/10.1111/jtm.12108

Christiana, R. W., Besenyi, G. M., Gustat, J., Horton, T. H., Penbrooke, T. L., & Schultz, C. L. (2021). A Scoping Review of the Health Benefits of Nature-Based Physical Activity. *J Healthy Eat Act Living*, *1*(3), 154-172.

Clissold, R., Westoby, R., McNamara, K. E., & Fleming, C. (2022). Wellbeing outcomes of nature tourism: Mt Barney Lodge. *Annals of Tourism Research Empirical Insights*.

Daniels, S., Clemente, D. B. P., Desart, S., Saenen, N. D., Sleurs, H., Nawrot, T. S., Malina, R., & Plusquin, M. (2021). Introducing nature at the work floor: A nature-based intervention to reduce stress and improve cognitive performance. *International journal of hygiene and environmental health*, *240*, 113884.

Donnelly, A., & MacIntyre, T. (2019). Physical Activity in Natural Settings.

Ewert, A., & Chang, Y. (2018). Levels of Nature and Stress Response. *Behav Sci (Basel)*, *8*(5). https://doi.org/10.3390/bs8050049

Feizolahi, A., ghassemi, y., & sabzifard, f. (2023). Semantic reconstruction of the phenomenon of collective Nature-Based tourism among the people of Ilam City. *Social Studies in Tourism*, *11*, 49-74. https://doi.org/10.52547/journalitor.36056.11.22.49

Hanna, P., Wijesinghe, S. N. R., Paliatsos, I., Walker, C., Adams, M., & Kimbu, A. N. (2019). Active engagement with nature: outdoor adventure tourism, sustainability and wellbeing. *Journal of Sustainable Tourism*, *27*, 1355 - 1373.

Hansen-Ketchum, P. A., Marck, P. B., & Reutter, L. I. (2009). Engaging with nature to promote health: new directions for nursing research. *Journal of advanced nursing*, *65 7*, 1527-1538.

Hashemin, S., Bemanian, M. R., & Kazemi, A. (2020). Investigating the effect of the healing garden on patients' mental health with an emphasis on reducing anxiety. *Journal of Environmental Science and Technology*, *21*, 263-276.

Hasnain, A., Kabir, M., Siddiqui, M., Jafferi, A., & Rafi, U. (2020). Diet, Life Style and Immunity. *DIET FACTOR (Journal of Nutritional & Food Sciences)*, 09-12. https://doi.org/10.54393/df.v1i02.17

Heidari Sareban, V., & Yasri Hesar, A. (2020). Survey the Relationship of Tourism with Social Well-Being of Villagers, Case Study: the Sardabhe Dehestan Ardabil County. Rural Development Strategies,

Hosseiny, S.-M., Farahani, Z. B., Shiri, H., AbedSaeidi, Z., Alavimajd, H., & Hamidizadeh, S. (2007). The effects of low intensity aerobic exercise on blood pressur. *Journal of Shahrekord University of Medical Sciences*, *9*, 14-19.

Jo, H., Cha, B., Kim, H., Brito, S., Kwak, B. M., Kim, S. T., Bin, B.-H., & Lee, M.-G. (2021). α-Pinene Enhances the Anticancer Activity of Natural Killer Cells via ERK/AKT Pathway. *International Journal of Molecular Sciences*, *22*.

Kondo, M. C., Jacoby, S. F., & South, E. C. (2018). Does spending time outdoors reduce stress? A review of real-time stress response to outdoor environments. *Health & Place*, *51*, 136–150.

Kuo, M. (2015). How might contact with nature promote human health? Promising mechanisms and a possible central pathway. *Frontiers in Psychology*, *6*, 1093. https://doi.org/10.3389/fpsyg.2015.01093

Lackey, N. Q., Tysor, D. A., McNay, G. D., Joyner, L., Baker, K. H., & Hodge, C. J. (2019). Mental health benefits of nature-based recreation: a systematic review. *Annals of Leisure Research*, *24*, 379 - 393.

Li, Q. (2010). Effect of forest bathing trips on human immune function. *Environmental Health and Preventive Medicine*, *15*, 9-17.

Li, Q., & Kawada, T. (2011). Effect of forest environments on human natural killer (NK) activity. *International journal of immunopathology and pharmacology*, *24 1 Suppl*, 39S-44S.

Maddock, J. E., & Frumkin, H. (2024). Physical Activity in Natural Settings: An Opportunity for Lifestyle Medicine. *Am J Lifestyle Med*, 15598276241253211. https://doi.org/10.1177/15598276241253211

Maund, P. R., Irvine, K. N., Reeves, J., Strong, E., Cromie, R., Dallimer, M., & Davies, Z. G. (2019). Wetlands for Wellbeing: Piloting a Nature-Based Health Intervention for the Management of Anxiety and Depression. *Int J Environ Res Public Health*, *16*(22). https://doi.org/10.3390/ijerph16224413

Mitten, D., Overholt, J. R., Haynes, F. I., D'Amore, C. C., & Ady, J. C. (2018). Hiking: A Low-Cost, Accessible Intervention to Promote Health Benefits. *Am J Lifestyle Med*, *12*(4), 302-310. https://doi.org/10.1177/1559827616658229

Mygind, L., Kjeldsted, E., Hartmeyer, R. D., Mygind, E., Bølling, M., & Bentsen, P. (2019). Immersive Nature-Experiences as Health Promotion Interventions for Healthy, Vulnerable, and Sick Populations? A Systematic Review and Appraisal of Controlled Studies. *Front Psychol*, *10*, 943. https://doi.org/10.3389/fpsyg.2019.00943

Nomura, M. (2011). Phytoncide - its properties and applications in practical use.

Nugraha, H., Hernawan, H., Ali, M., Rahmat, A., Septianto, I., Aryati, A., & Suryadi, D. (2024a). Outdoor activities and outdoor environments for fitness and mental health: a systematic review. *Retos*, *59*, 642-648. https://doi.org/10.47197/retos.v59.108730

Nugraha, H., Hernawan, H., Ali, M., Rahmat, A., Septianto, I., Aryati, A., & Suryadi, D. (2024b). Outdoor activities and outdoor environments for fitness and mental health: a systematic review. *Retos*.

O'Brien, L., & Forster, J. (2021). Physical Activity Supporting Connection to Nature, and Helping to Maintain Wellbeing during the Covid-19 Restrictions in England. *Int J Environ Res Public Health*, *18*(9). https://doi.org/10.3390/ijerph18094585

Oh, B., Lee, K. J., Zaslawski, C., Yeung, A., Rosenthal, D., Larkey, L., & Back, M. (2017). Health and well-being benefits of spending time in forests: systematic review. *Environmental Health and Preventive Medicine*, *22*(1), 71. https://doi.org/10.1186/s12199-017-0677-9

Pasanen, T. P., Tyrväinen, L., & Korpela, K. M. (2014). The relationship between perceived health and physical activity indoors, outdoors in built environments, and outdoors in nature. *Appl Psychol Health Well Being*, *6*(3), 324-346. https://doi.org/10.1111/aphw.12031

Passmore, H.-A. (2011). Feeling Blue - Get Green: The Benefits of Nature on our Mental Health and Well-being.

Pearson, D. G., & Craig, T. (2014). The great outdoors? Exploring the mental health benefits of natural environments. *Front Psychol*, *5*, 1178. https://doi.org/10.3389/fpsyg.2014.01178

Pretty, J. (2004). How nature contributes to mental and physical health. *Spirituality and Health International*, *5*, 68-78.

Rajendran, H., Vasudevan, S., & Solomon, A. P. (2022). Vitamin D: How the “Sunshine Vitamin” Affects Our Health. *Frontiers for Young Minds*, *10*, 763513. https://doi.org/10.3389/frym.2022.763513

Rodrigues, A. M. P., Kastenholz, E., & Rodrigues, A. (2010). Hiking as a relevant wellness activity - results of an exploratory study of hiking tourists in Portugal applied to a rural tourism project. *Journal of Vacation Marketing*, *16*, 331 - 343.

Schikowski, T., Schaffner, E., Meier, F., Phuleria, H. C., Vierkötter, A., Schindler, C., Kriemler, S., Zemp, E., Krämer, U., Bridevaux, P. O., Rochat, T., Schwartz, J., Künzli, N., & Probst-Hensch, N. (2013). Improved air quality and attenuated lung function decline: modification by obesity in the SAPALDIA cohort. *Environ Health Perspect*, *121*(9), 1034-1039. https://doi.org/10.1289/ehp.1206145

Sebastian, R., & Nehra, R. (2024). Harnessing the power of adaptive immune response and crosstalk. *International Journal of Advanced Biochemistry Research*, *8*, 06-09. https://doi.org/10.33545/26174693.2024.v8.i1a.276

Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. *Psychol Bull*, *130*(4), 601-630. https://doi.org/10.1037/0033-2909.130.4.601

Tartibian, B., & Mohammad Amini khayat, S. (2021). The Response of Pediatrics' Cardiac Structure and Function Parameters to 12 Weeks Aerobic Exercise. *Journal of Sport and Exercise Physiology*, *13*(2), 23-31. https://doi.org/10.52547/joeppa.13.2.23

Tavakoli, N., & Majedi, H. (2013). INVESTIGATING THE FUNCTION OF NATURAL GREEN SPACES TO PROMOTE HUMAN'S PSYCHOLOGICAL-SPIRITUAL HEALTH. HOVIATESHAHR,

Wang, X., Younan, D., Millstein, J., Petkus, A. J., Garcia, E., Beavers, D. P., Espeland, M. A., Chui, H. C., Resnick, S. M., Gatz, M., Kaufman, J. D., Wellenius, G. A., Whitsel, E. A., Manson, J. E., Rapp, S. R., & Chen, J. C. (2022). Association of improved air quality with lower dementia risk in older women. *Proc Natl Acad Sci U S A*, *119*(2). https://doi.org/10.1073/pnas.2107833119

Warburton, D. E. R., Gledhill, N., & Quinney, A. (2001). Musculoskeletal fitness and health. *Canadian journal of applied physiology = Revue canadienne de physiologie appliquee*, *26 2*, 217-237.

Webster Marketon, J. I., & Glaser, R. (2008). Stress hormones and immune function. *Cellular immunology*, *252 1-2*, 16-26.