MARTA, Patrycja, OSSOLIŃSKA, Agata, HUZARSKI, Filip, FERFECKA, Gabriela, PAWEŁEK, Klaudia, STOLARSKA, Lucyna, ROSA-BOŃCZAK, Magdalena, MORAWIECKA, Natalia, CARLTON, Olivier and WERONIKA KŁOSOWICZ. Can Table Tennis Extend Lifespan? An Analysis of Its Impact on Physical Health, Brain Function, and Mental Well-being. Journal of Education, Health and Sport. 2025;78:57427. eISSN 2391-8306.
https://doi.org/10.12775/JEHS.2025.78.57427
https://apcz.umk.pl/JEHS/article/view/57427

The journal has had 40 points in Minister of Science and Higher Education of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of 05.01.2024 No. 32318. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical culture sciences (Field of medical and health sciences); Health Sciences (Field of medical and health sciences).
Punkty Ministerialne 40 punktów. Załącznik do komunikatu Ministra Nauki i Szkolnictwa Wyższego z dnia 05.01.2024 Lp. 32318. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu). © The Authors 2025;
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The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 30.12.2024. Revised: 07.02.2025. Accepted: 07.02.2025. Published: 10.02.2025.

Can Table Tennis Extend Lifespan? An Analysis of Its Impact on Physical Health, Brain Function, and Mental Well-being

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Abstract

Introduction:

In the context of an aging society, the importance of physical activity as a key element in supporting health and improving quality of life is growing. Table tennis, a sport played by millions worldwide, combines aerobic, coordination, and strategic exercises, making it unique in terms of its impact on physical and mental health.

Aim of the study:

Analyze the impact of regular table tennis play on life expectancy and physical, cognitive, and mental well-being.

Materials and Methods:

This analysis is based on a detailed review of studies and information related to table tennis, sourced from PubMed and Google Scholar databases.

Conclusions:

The literature review indicates that table tennis offers numerous health benefits, including improved body composition, enhanced coordination, reduced risk of cardiovascular disease, and better motor functions. The sport stimulates cognitive functions such as reflexes, anticipation, and memory, with studies confirming its positive effects on individuals with Parkinson's disease, dementia, or mild cognitive impairment. Table tennis also enhances mental well-being by reducing stress levels and improving quality of life through social integration and satisfaction from the game. The collected data suggest that table tennis should be included in rehabilitation programs and health promotion activities for all age groups. Its universal accessibility and health benefits—physical, cognitive, and social—highlight its potential as a vital form of physical activity to address contemporary health challenges.

Keywords: Table tennis, cognitive functions, physical activity, psychological skill trening

INTRODUCTION

In the face of an aging society, interest in physical activity as a key element in improving quality of life and health is growing. [1] Regular exercise positively affects not only physical fitness but also plays a crucial role in preventing chronic diseases and cognitive decline. [2] Table tennis, a racket sport regularly played by over 300 million people worldwide, including 40 million professional players, [3] owes its popularity to simple rules and accessibility regardless of age, gender, or fitness level. [4] For years, table tennis equipment has been a staple in public cultural, educational, and recreational institutions. [5] As a form of physical activity, table tennis combines elements of aerobic, coordination, and strategic exercises, making it an interesting subject for research on its effects on both physical and mental health. [6] The game requires high levels of anticipation, timing, and coordination. [7]

Table tennis offers a wide range of health benefits, encompassing both physical and mental aspects. Its positive effects on hand-eye coordination, reflexes, and balance, as well as

mental health, are well-documented. [4] Even recreational engagement in this sport provides benefits such as improved body composition and lipid profiles in older individuals. [8] Moreover, table tennis players report higher life satisfaction compared to non-exercising individuals. [4] Recent scientific findings indicate that table tennis has a greater impact on cognitive functions than other types of exercises. [9] It also has therapeutic benefits for individuals with chronic ischemic heart disease, Parkinson's disease, dementia, and mild intellectual disabilities. [10]

One of the leading causes of disability worldwide is dementia, resulting from various diseases and injuries affecting the brain. Over time, the progression of the disease leads to nerve cell destruction and brain damage, causing cognitive impairment. [11] The most common form of dementia is Alzheimer's disease, accounting for 60-70% of cases. [12] Recent studies have identified a transitional state between age-related cognitive changes and Alzheimer's disease, referred to as mild cognitive impairment (MCI). [13] With an aging society, the total population of individuals with dementia is increasing yearly. Studies have shown that regular physical activity, especially aerobic exercise, is crucial for maintaining and improving cognitive functions. [14] A particular type of physical activity that can help preserve mental acuity and prevent or delay dementia is table tennis. [15] Therefore, it is worth asking whether regular participation in a sport like table tennis can positively influence life expectancy.

AIM OF THE STUDY

The objective of this study is to determine whether regular table tennis participation can significantly influence lifespan extension and quality of life improvement. The analysis focuses on three main areas: its impact on physical health, brain function, and mental well-being. The study also aims to understand how the unique features of this sport, such as physical intensity, mental engagement, and social elements, contribute to improving overall societal well-being.

MATERIALS AND METHODOLOGY

This analysis is based on a detailed review of studies and information related to table tennis using PubMed and Google Scholar databases. Keywords such as "table tennis," "physical activity," "cognitive functions," "dementia," and "lifespan" were used to retrieve information. Additionally, the review included relevant clinical studies to ensure a comprehensive approach to the topic.

STATE OF KNOWLEDGE

Characteristics of Table Tennis

Table tennis, also known as ping-pong, is a dynamic game played by two or four players. It involves hitting a lightweight ball with a paddle so that it crosses over the net and lands on the opponent's side of the table. The game is played on a table measuring 2.74 m x 1.52 m, divided by a net 15.25 cm high. The ball is made of plastic, with a diameter of 40 mm and a weight of 2.7 g. [10] Table tennis demands high precision, reflexes, and motor coordination from players. Due to the speed of ball exchanges and the variety of shot techniques, the game is highly intense and engaging. Players must not only exhibit physical fitness but also the ability to make quick decisions and anticipate their opponent's moves. [6]

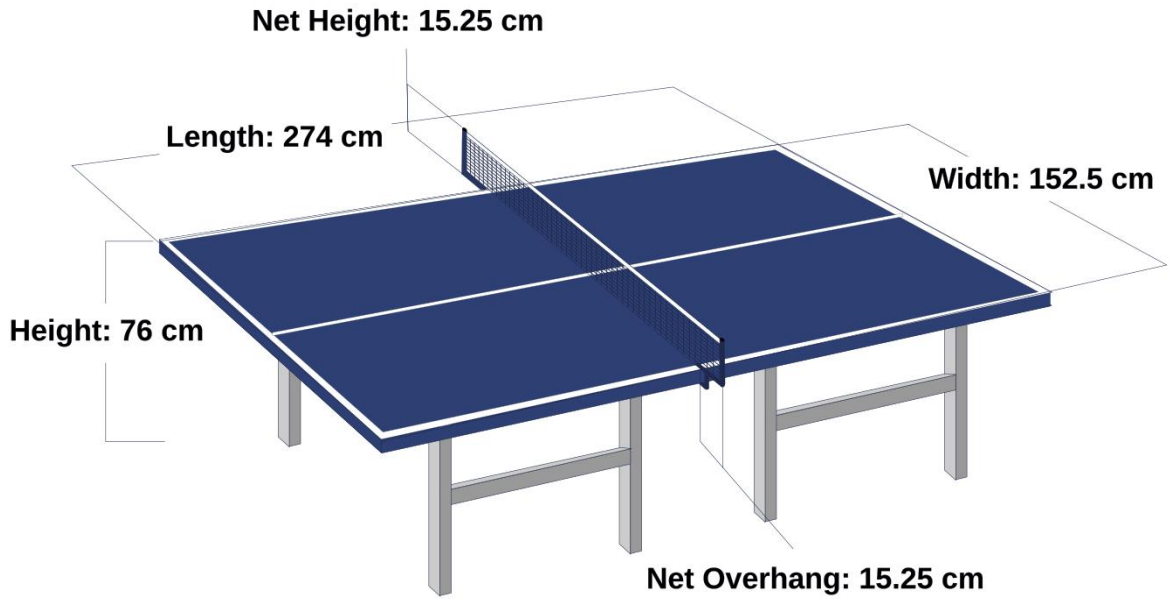

Figure 1. Illustration of a table tennis table. Source: Cmessineo. Table Tennis Table Blue.svg. Wikimedia Commons. Published in 2020. Available at: https://commons.wikimedia.org/wiki/File:Table_Tennis_Table_Blue.svg License: Creative Commons Attribution-Share Alike 4.0 International.

The History of Table Tennis Worldwide and in Poland

Table tennis originated in China and made its way to Europe at the end of the 18th century. Initially, it gained popularity in England, where it emerged as a parlor social game, serving as an alternative to lawn tennis during the winter. It subsequently spread to Austria-Hungary, Germany, and Sweden. [16] Today, it is one of the most popular sports globally, particularly in Asia, where countries such as China, South Korea, and Japan dominate on the international stage.

In Poland, table tennis initially became popular in academic and social circles. During the interwar period, the sport developed dynamically, and Polish players began achieving success on the international stage. [17] Today, table tennis enjoys significant interest in Poland and around the world, both at amateur and professional levels. The sport's versatility has made it accessible to people of all ages and physical abilities. Its dynamic nature and the

demands it places on players make it a fascinating and multifaceted form of physical activity. [18]

Impact on Physical Health

Table tennis, as a form of physical activity, offers numerous health benefits. It is an intermittent sport, with variable bursts of intense activity, resembling interval training. [5] A study conducted by Nederi et al. (2018) examined the benefits of regular table tennis play on body composition, physical fitness, and muscle strength in adult men of advanced age compared to their sedentary peers. [19] The findings provide an excellent basis for further analysis of the benefits of physical activity, such as table tennis, for an aging population. The authors demonstrated that playing table tennis positively affects muscle strength, flexibility, and balance. Notably, participants who trained had better health parameters, including a lower risk of cardiovascular disease and improved blood glucose control. [19]

As aging leads to muscle mass loss, impaired motor coordination, and increased fall risk, the study revealed that active participants had higher total and regional bone mineral density compared to the sedentary group. Therefore, regular table tennis play can contribute to maintaining physical fitness and preventing injuries. The study also showed that recreational play reduced body fat, thereby decreasing the risk of obesity and lifestyle diseases. The findings highlight that regular table tennis play can significantly improve the quality of life for older adults. [19]

In an era of digitalization and declining physical activity, there is increasing emphasis on creating programs to support children's physical development. For the pediatric population, physical growth during preschool years plays a crucial role in shaping motor skills and health in later life stages. Table tennis is a sport that engages both body and mind due to its dynamism and coordination demands. A study conducted among Chinese preschoolers of both genders (Gu et al., 2021) sheds light on the potential of this sport in preschool education, demonstrating its positive impact on children's development regardless of gender. [20]

The study aimed to analyze how regular table tennis sessions affect gross motor skill development in preschool children. The research group consisted of 104 children divided into an experimental group that participated in table tennis sessions three times a week for 12 weeks and a control group that did not participate in any additional activities. [20] The results showed significant improvement in gross motor development among those playing table

tennis. Importantly, no differences were observed between boys and girls, suggesting that table tennis is equally effective for both genders. [20]

The impact of physical activity on human health has long been a subject of scientific research, especially in the context of chronic diseases. In an era of an increasing number of cardiac patients, more attention is being paid to forms of rehabilitation that combine safety with effectiveness. A study by Shimomura et al. (2004), published in the *Journal of Japan Academy of Disability and Sport Sciences*, presented findings on the use of table tennis in the therapy of patients with ischemic heart disease. The analysis included 15 men participating in long-term rehabilitation, whose heart rate, oxygen consumption, and perceived exertion were monitored during play. [21] The results indicated that table tennis can serve as an attractive and motivating form of physical activity that promotes cardiovascular fitness and overall quality of life for patients. However, the authors emphasize the need to tailor exercise intensity to individual patient capabilities to ensure safety and efficacy. [21]

Table tennis significantly impacts physical health for both adults and children. Regular play benefits the cardiovascular system by improving circulation, lowering blood pressure, and reducing body fat. For pediatric populations, it supports the development of motor skills and fosters healthy habits from an early age. In the context of medical rehabilitation, table tennis offers the flexibility to adjust the intensity to meet the individual needs of each patient, making it a safe and versatile option for addressing various health challenges across age groups.

The Impact on Brain Function

Table tennis, often regarded as merely a recreational activity, is increasingly analyzed for its profound effects on brain health, cognitive function, and motor skills. The combination of rapid decision-making and strategic thinking makes table tennis exceptionally beneficial for mental health. According to research conducted by Yamasaki (2022), regular engagement in the game can help maintain brain health and serve as a preventive measure against cognitive decline and the development of dementia. [10]

The complexity of table tennis lies in the player’s need to rapidly process information, such as predicting the opponent's movements, the ball's trajectory, and reacting with precision. This leads to the activation and enhancement of numerous neural networks. Regular play engages various brain regions, including those responsible for movement planning, decision-

making, and memory, which are linked to motor control, decision-making, and executive functions. [10] Table tennis induces neuroplastic changes in areas related to motor skills, the visual cortex—particularly the visual motion area—and frontal regions, resulting in improved sensorimotor and executive functions. Hence, this sport is an excellent activity for maintaining brain health. [10]

Individuals who regularly play table tennis demonstrate remarkable neural efficiency, as shown in a study published in *Frontiers in Behavioral Neuroscience* (Goo et al., 2017). The analysis reveals that table tennis players exhibit increased brain activity in regions responsible for visuospatial processing and motor control during cognitive tasks. [22] This enhanced performance stems from the sport's demands for rapid visuomotor coordination and split-second decision-making, which strengthens the brain's ability to process information under pressure. Table tennis continuously exercises the brain by varying the pace and direction of play, fostering adaptive skills, improving overall coordination, and reinforcing neural pathways associated with motor skills. [22]

In recent years, table tennis has garnered special attention for its potential therapeutic effects on neurological disorders. Parkinson's disease, a neurodegenerative condition characterized by motor impairment and decreased dopamine levels, is one such example. [23] A study conducted by Inoue et al. (2020) found that a six-month regimen of table tennis sessions improved motor function, balance, and daily living activities in patients with Parkinson's disease. The repetitive, rhythmic movements characteristic of table tennis may stimulate neuroplasticity, thereby enhancing the brain's ability to compensate for neuronal deficits. [24] Additionally, older adults who regularly participate in table tennis show improved sensorimotor control and better cortical connectivity. [25] This suggests that table tennis not only benefits individuals with existing motor impairments but also serves as a preventive measure against motor decline in the aging population.

Table tennis exhibits unique characteristics. What sets it apart from other forms of exercise is the simultaneous engagement of cognitive and physical abilities. Unlike running or cycling, which primarily rely on repetitive and predictable movements, table tennis requires constant adaptation. [26] Players must process visual and spatial cues in real time, make strategic decisions, and execute precise movements—all within milliseconds. This combination of physical and mental engagement enhances cortical connectivity and improves the integration of sensory and motor pathways in the brain. [27]

The growing body of evidence highlights the need to incorporate table tennis into health and rehabilitation programs. For older adults, it offers an activity that supports both brain health and physical fitness, and for individuals with neurological disorders, it serves as a therapeutic intervention with proven benefits.

Impact on Mental and Social Well-being

Table tennis, commonly known as ping-pong, is a sport that offers much more than mere entertainment. Regular play positively impacts both mental and social health, making it an ideal activity for maintaining balance between body and mind. Table tennis engages the brain on multiple levels, stimulating cognitive functions, improving reflexes, memory, and concentration. [6] Additionally, it acts as an effective stress-relief tool and boosts overall well-being. Studies show that even moderate physical activity, including table tennis, lowers cortisol levels while increasing the release of endorphins. This makes table tennis an effective way to combat emotional tension, anxiety, and burnout. [28] The sport also contributes to enhancing self-esteem and building confidence. The ability to achieve success, even on a small scale, fosters a sense of agency and motivates further self-improvement. [29]

Playing table tennis requires the presence of another person, making it an activity conducive to building social relationships. The sport fosters connections among friends and family members, as shared training sessions or matches provide opportunities to spend time together, strengthen bonds, and create a sense of belonging to a community. [30] It promotes social integration by enabling people of different ages and physical abilities to play together, thus fostering cooperation and healthy competition. [31]

CONCLUSION

Regular table tennis practice can contribute to a longer life through the extensive benefits offered by this sport. It engages both body and mind, leading to improved physical fitness, cognitive function, and mental health. Table tennis is an effective form of activity that supports the cardiovascular system, enhances motor coordination and balance, and reduces the risk of obesity and lifestyle diseases. Particularly for older adults, it helps maintain muscle mass and bone density, thereby lowering the risk of falls and injuries.

Playing table tennis stimulates cognitive functions and enhances brain plasticity. The activation of multiple brain areas during play, such as the frontal cortex and regions responsible for visuospatial processing, supports motor skills and decision-making. Table tennis can delay the progression of dementia and aid in the treatment of neurological disorders. The competitive aspects and social interactions associated with the game strengthen interpersonal relationships and contribute to greater life satisfaction.

This sport is accessible to people of all ages and abilities, making it a universal tool for improving public health. Given its broad range of health benefits, table tennis should be promoted as a form of physical activity in various health and rehabilitation programs. It offers an effective, safe, and motivating form of exercise for individuals of all ages.

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Receiving founding - no specific funding;
All authors have read and agreed with the published version of the manuscript.

Funding statement

This research received no external founding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Conflict of interest

The authors deny any conflict of interest.

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