

What are physical exercise interventions in older age? Literature review for physical and cognitive function

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Abstract

Background and Study Aim The elderly represent a growing age group and an integral part of modern society. The aging process introduces significant health challenges, making exercise an essential component in maintaining quality of life and well-being among the elderly. This study reviews the impact of physical exercise interventions on the physical and cognitive functions of the elderly population.

Material and Methods The search for this study was conducted using the ScienceDirect and PubMed databases. The search strategy employed a combination of keywords (“Elderly Physical Exercise” AND “Physical Exercise Intervention” AND “Elderly Fitness and Cognitive” AND “Physical Exercise for Physical and Cognitive Functions” AND “Physical and Cognitive Benefits” AND “Elderly Physical Exercise Prevalence”). This search adhered to the PRISMA guidelines. Initially, 1,854 publications were identified through the database searches (ScienceDirect: 981 articles; PubMed: 873 articles). After applying the exclusion criteria, only 11 articles remained.

Results It has been found that physical exercise interventions for the elderly significantly impact their physical and cognitive functions. In the first group, exercises such as home-based e-Health programs, multicomponent exercises, moderate aerobic exercises, dance training, and balance training have been identified. All these have been shown to provide substantial benefits. These programs enhanced not only physical function but also cognitive performance and the overall quality of life for older adults without physical and cognitive health complaints. This showcases the potential of physical exercise interventions to prevent morbidity and reduce disability. The second group focused on physical exercise interventions for older adults with degenerative disease complaints, such as type 2 diabetes and multiple sclerosis. Dual-task exercise programs and tai chi chuan exercises have demonstrated improvements in cognitive function for this demographic. They also improved physical fitness. The research also points out some limitations related to the implementation and budgeting for these programs.

Conclusions The literature review suggests that physical exercise interventions play a crucial role in maintaining physical and cognitive functions in older adults. Exercise programs tailored to the specific health conditions of individuals can significantly improve the quality of life and reduce the risk of declining physical and cognitive functions in the elderly population.

Keywords: physical exercise, physical function, cognitive function, older age

Introduction

Understanding the critical role of physical and mental health maintenance with aging is vital for both individual well-being and the sustainability of healthcare systems and societies. These issues

underscore the necessity of finding effective ways to support healthy aging. With the backdrop of aging-related challenges, the importance of targeted exercise interventions becomes more pronounced, offering a lens through which the potential of physical activity in fostering a healthier, more vibrant aging population is understood.

Maintaining physical and mental health is crucial as individuals age, supported by evidence that regular, age-appropriate exercise is effective

in achieving this goal [1, 2]. The elderly, defined as those 65 years of age or older, encounter aging-related health challenges, including diminished strength, flexibility, and mobility, necessitating the need for tailored exercise programs [3, 4, 5]. Research, such as the study by Yarmohammadi, demonstrates that physical activity can significantly enhance the strength and flexibility of older adults, underlining the importance of selecting the right exercise to maintain these attributes [6].

Moreover, proper exercise and physical activity are recognized not only as methods to maintain physical capabilities but also as sources of strength and vitality. Ruegsegger's findings further emphasize that exercise and physical activity serve as powerful tools in preventing and treating various chronic diseases due to their ability to improve whole-body health [7]. The role of exercise extends beyond mere physical health maintenance, playing a crucial part in fostering healthy aging by developing and preserving the functional abilities vital for well-being in old age [8]. Acknowledging the benefits of exercise, alongside the identification of suitable types of physical activities for this age group, is essential for raising awareness and encouraging fitness among older adults. This encouragement could lead to longer, healthier, and more active lives. Given the more complex healthcare needs arising from additional functional decline, physical illnesses, and psychosocial needs, older adults require specialized attention [9]. The onset of aging in the elderly often results in reduced skeletal muscle mass, strength, and function, which highlights the critical need for targeted exercise interventions designed to counteract these effects.

Continuing from the emphasis on targeted exercise interventions for the elderly, recent data underscores the health challenges this demographic faces, particularly with non-communicable diseases. According to Riskesdas, hypertension, dental and joint disorders, oral health issues, diabetes mellitus, heart disease, stroke, and infectious diseases like acute respiratory infections, diarrhea, and pneumonia are notably prevalent among the elderly [10]. This situation is exacerbated by a high occurrence of type 2 diabetes mellitus (T2DM) and hypertension (HTN) within this age group, especially those aged 60 and above, pointing towards a critical need for preventive measures [11, 12].

With aging comes a natural decline in functional capacity, which is further impacted by lifestyle factors contributing to the rising incidence of hypertension and, subsequently, an increase in degenerative illnesses [13, 14]. Recognizing these challenges, the World Health Organization (WHO) advocates for a combination of physical activity and a nutritious, well-balanced diet as essential components of a healthy lifestyle for the elderly.

Such practices are not only crucial for disease prevention but also for promoting successful aging, enhancing quality of life, and extending healthy life years [15].

The importance of physical activity extends beyond disease prevention. Andrieieva highlights the role of physical exercise in improving overall health, increasing functional capacity in daily tasks, slowing the aging process, and delaying the onset of age-related decline among the elderly [16]. Engaging in physical activity, therefore, is presented as a multifaceted approach to combatting the health challenges faced by the aging population, underscoring its significance in fostering a healthier, more vibrant aging community.

Building on the significance of physical activity in addressing health challenges among the elderly, it's imperative to pinpoint the kinds of exercises that are both suitable and beneficial for this demographic. Engaging in activities like walking, cycling, gymnastics, and yoga has proven to be immensely advantageous for older adults, enhancing muscle strength, maintaining balance, and boosting cardiovascular health [17]. Thomas et al.'s research supports this, demonstrating that adapted physical activities and Wii Fit training significantly improve balance in elderly individuals, with improvements ranging between 16% and 42% [18].

Moreover, strength training, such as lifting light weights, plays a critical role in preventing the loss of muscle mass—a common occurrence as one ages [19, 20, 21]. It is crucial to recognize that with advancing age comes a natural decline in performance, which can be mitigated through consistent physical activity. Such activity not only enhances the quality of life for the elderly but also contributes to their physiological resilience, reducing their vulnerability to health issues and enhancing overall well-being [22]. This suggests that a tailored, multifaceted approach to physical activity can significantly contribute to successful aging, highlighting the need for inclusive fitness programs that cater to the diverse needs of the elderly population.

Further emphasizing the importance of physical activity for the elderly, guidelines suggest older adults should engage in regular physical activity, totaling at least 150 minutes of moderate intensity or 75 minutes of high intensity per week. This recommendation aligns with the guidelines set forth by the American College of Sports Medicine (ACSM) and the World Health Organization (WHO), which advocate for 150-300 minutes of moderate intensity aerobic activities weekly, alongside two sessions dedicated to muscle strength training [23, 24, 25]. Additionally, engaging in 30 minutes of light activity daily, coupled with 20 minutes of moderate to vigorous physical activity, has been shown to positively affect overall health, reducing the risk of various diseases [26, 27].

Such physical activities encompass cardiovascular exercises, strength training, and exercises aimed at improving flexibility and balance, presenting a comprehensive approach to maintaining and enhancing physical fitness in the elderly [25]. The inclusion of aerobic exercises and moderate to high-intensity strength training not only improves physical fitness but also contributes significantly to the overall well-being and health of older adults, reinforcing the critical role of a well-rounded physical activity regimen in the process of healthy aging [28]. This holistic approach to exercise underscores the potential of regular, structured physical activity to serve as a cornerstone in the promotion of longevity and quality of life among the aging population.

Physical activity extends beyond the preservation of physical health, exerting a significant positive influence on the mental well-being of the elderly. Engaging in regular physical activity can mitigate the risk of depression, elevate mood, and bolster cognition and brain function. This correlation is supported by findings indicating that heightened levels of physical activity can alleviate some of the adverse symptoms associated with depression and anxiety in the elderly population [29]. Furthermore, physical activity serves as a protective measure against non-communicable diseases, including those related to cardiovascular health, stroke, diabetes, and delayed onset of dementia. It also plays a crucial role in enhancing mental health, quality of life, and overall well-being among the elderly [30, 31, 32].

With the aim of fostering a deeper comprehension of the multifaceted benefits of exercise for older adults, this systematic review is dedicated to examining the recommended types of physical exercise, identifying the benefits achievable through regular engagement, and understanding the significance of physical exercise in sustaining an optimal quality of life in old age. This exploration seeks to inspire both society at large and older adults to adopt and maintain active lifestyles throughout their senior years.

Materials and Methods

Search Strategy

In this study, the databases Science Direct and PubMed were utilized for the literature search. The search commenced with Science Direct, followed by PubMed, which is recognized as one of the premier indexing systems for citations and is the most frequently consulted source by researchers worldwide. The search strategy employed a combination of keyword variations, including “Elderly Physical Exercise” AND “Physical Exercise Intervention” AND “Elderly Fitness and Cognitive” AND “Physical Exercise for Physical and Cognitive” AND “Physical and Cognitive” AND “Elderly Physical Exercise Prevalence.” This search was conducted in

accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [33, 34, 35]. Furthermore, PRISMA is known for emphasizing review reports that evaluate randomized trials, which can also serve as a foundation for reporting systematic reviews of other types of studies [36].

Exclusion Criteria

The exclusion criteria for this systematic review were delineated to ensure the relevance and quality of the included studies. The criteria applied were:

- 1) Articles not indexed in Scopus or Web of Science, to ensure the inclusion of only those studies recognized for their academic credibility;
- 2) Articles not written in English, given the need for accessibility and standardization in reviewing the literature;
- 3) Articles published outside the designated timeframe of the last five years, from 2019 to 2024, to focus on the most current research and developments in the field;
- 4) Articles that did not directly address the impact of physical exercise interventions on both the physical and cognitive functions of the elderly population, to maintain a clear focus on the review’s objectives.

Procedure

The initial search through the databases yielded a total of 1,854 publications, with ScienceDirect contributing 981 articles and PubMed adding another 873 articles. Upon applying the exclusion criteria, the pool of potential articles was significantly narrowed down to just 11 articles that met the study’s stringent requirements. The predominant reason for excluding articles was their lack of mention or focus on physical exercise interventions aimed at enhancing physical and cognitive functions in the elderly. To streamline the review process and eliminate any redundancies, all identified articles were meticulously extracted and analyzed using Mendeley software, which facilitated the removal of duplicate entries. The systematic filtration and selection process, including the dramatic reduction from the initial search results to the final selection of articles, is detailed in Figure 1. This provides a clear visualization of the methodological rigor applied throughout the study.

Results

The five categories identified, apart from “Author” and “Year,” are detailed in Table 1. Omission of the “Country” category is due to the uniform focus across all articles on physical exercise interventions aimed at enhancing both physical and cognitive functions in the elderly. The comprehensive results of this categorization are meticulously presented in Table 1. Upon reviewing the methodological approaches and types of research employed, it was found that eleven articles utilized experimental research designs. This

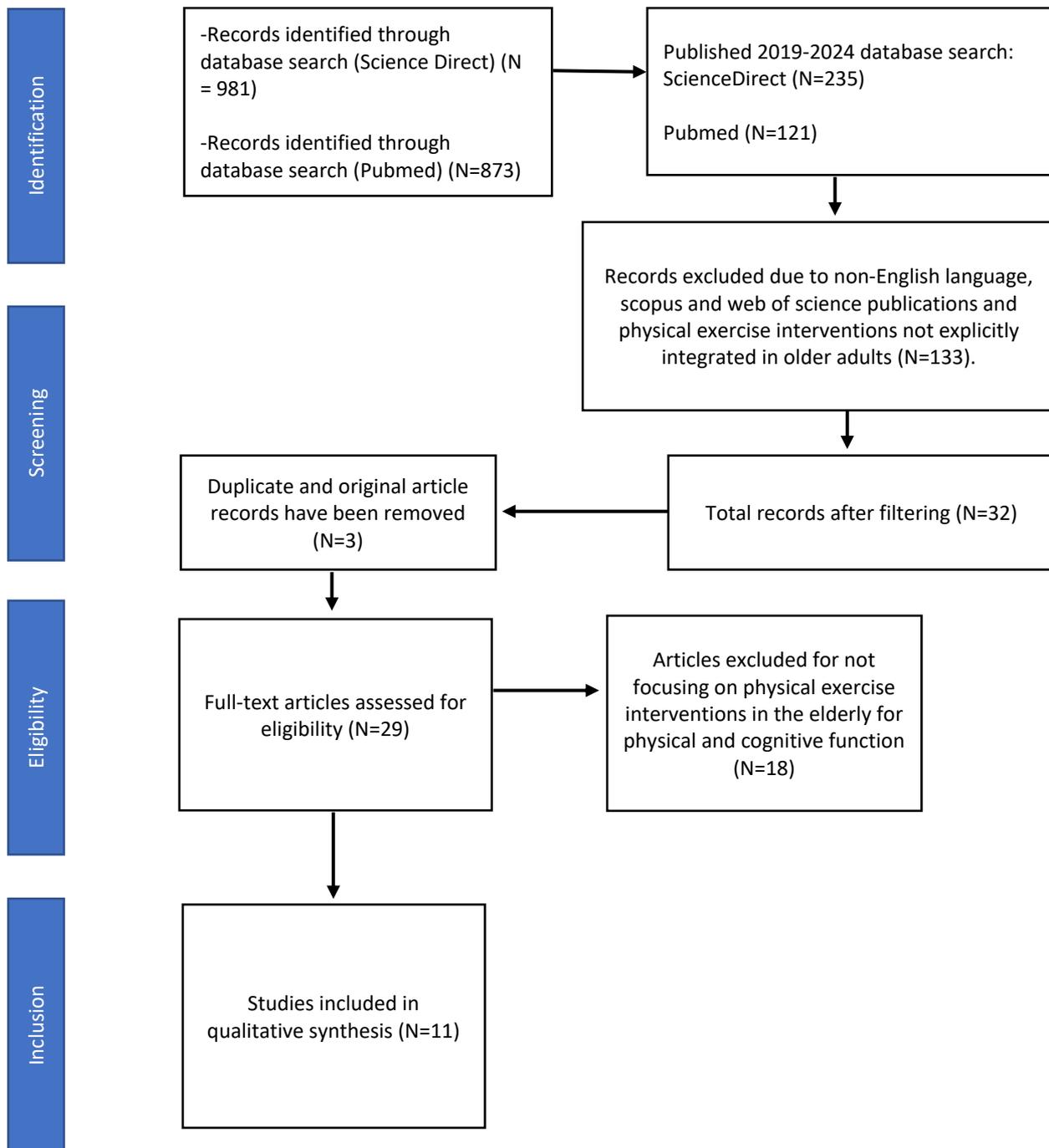


Figure 1. PRISMA Research Flowchart

includes various types of randomized controlled trials: four articles reported on simple randomized controlled trials [37, 40, 44, 47], one on randomized and single-blind controlled trials [42], another on a double-blind multicenter randomized controlled trial with two arms [38], a double-blind randomized clinical trial [39], a standard randomized clinical trial [46], randomized selection criteria [41], and one article where participants were randomly divided into three groups [43]. Predominantly, the reviewed articles adopted experimental research methods and utilized various measurement instruments for collecting data.

Discussion

The primary aim of this article was to investigate the effectiveness of physical exercise interventions among older adults, distinguishing between those with and without degenerative diseases. Initial findings from our comprehensive review reveal a diverse range of exercise programs that demonstrate beneficial impacts on both physical and cognitive health outcomes. This will further delve into the significance of these results, comparing them with existing literature to highlight the contributions of our study to the field of health and exercise science.

Table 1. Summary of Articles About

Author and Year	Research Methods and Types	Content	Research Objectives	Research Results
[37]	Experimental research (a randomized controlled trial)	Home-based e-Health intervention involving cognitive	Describes the protocol of the MOVI-ageing randomized controlled trial, a home-based e-Health intervention of cognitively engaging exercises for older adults with the aim of improving global cognitive function and baseline cognitive function, cardiorespiratory fitness, and muscular fitness.	The results of the program of activities carried out have an impact on the quality of life and welfare of community groups, especially the elderly through the prevention of morbidity and the reduction of years lost due to disability. These results are reflected in reduced economic expenditure by reducing demand for health and social services.
[38]	Experimental research (a two-arm single-blinded multicenter randomized controlled trial)	Muticomponent exercise intervention in nursing home residents	Determine the feasibility and effectiveness of a multicomponent exercise intervention in improving physical and cognitive function and quality of life in nursing home residents.	The results showed positive effects of a structured exercise program during long-term care on physical function, cognition, and psychosocial well-being.
[39]	Experimental research (a double-blind randomized clinical trial)	Exercise program to strengthen cognitive and physical health in the elderly	Identified two 24-week aerobic and cognitive exercise programs in older adults at risk of aerobic decline and balance.	Results show two low-cost exercise programs can improve physical and cognitive function in older adults with active participation.
[40]	Experimental research (a randomized controlled trial)	Combined exercise and cognitive training intervention in individuals with RRMS	Studying the effects of combined cognitive and physical rehabilitation (dual task) compared to physical exercise on walking and cognitive performance in individuals with relapsing-remitting multiple sclerosis (RRMS).	Results showed that a combination of exercise training and cognitive training (dual task) resulted in a significant improvement in cognitive ability and walking in individuals with relapsing-remitting multiple sclerosis (RRMS).
[41]	Experimental research (a random selection criteria)	Moderate aerobic exercise in improving cognitive performance	Analyzing the neuro-protective and anti-inflammatory activities of moderate aerobic exercise in improving cognitive performance in adults and the elderly.	Results showed that 12 weeks of aerobic exercise had a positive effect on cognitive performance of older adults through modulation of stress and pro-inflammatory cytokines.
[42]	Experimental research (a single-blinded, randomized controlled trial)	Training for people with osteoarthritis	To determine the therapeutic effect of WBV training on the neuromuscular function of KOA patients.	Results indicated that 8 weeks of WBV training had an improved effect on knee extensor isokinetic strength compared to ST or DIA, as well as a positive effect on improved physical function.

Table 1 (continued)

[43]	Experimental research (randomly divided into three groups)	Dance training and balance training	(1) To compare 12 weeks of dance training with balance training on fall risk, physical and cognitive functioning. (2) To evaluate the relationship between physical and cognitive function and markers of neurodegeneration and cognitive impairment in the elderly.	Results explained that the dance training intervention provided multiple benefits to physical and cognitive function in the elderly. However, the training altered the concentration of distributed proteins associated with neurodegenerative and cognitive disorders.
[44]	Experimental research (a randomized controlled trial)	Community-based exercise with action observation therapy in the elderly	To investigate the effect of community-based gymnastics with action observation therapy (AOT) on the physical and cognitive performance of older adults experiencing isolation during the pandemic.	Results showed that community-based exercise enhanced with action observation therapy improved physical and cognitive performance among the elderly.
[45]	Experimental research (randomized control trial)	Aerobic exercise, endurance, and balance in elderly women with type 2 diabetes (T2D)	To determine the effect of combined exercise on blood biomarkers, physical fitness, and cognitive function in elderly women with type 2 diabetes (T2D).	The results showed that a combination of aerobic, resistance, and balance training could improve physical fitness and diabetes-related surrogate factors, as well as cognitive function, but had no significant effect on cognition-related biochemical factors (BDNF) in elderly women with type 2 diabetes (T2D).
[46]	Experimental research (a randomized clinical trial)	Exercise tai chi chuan	To compare the effectiveness of tai chi chuan, a mind-body exercise in improving cognitive function in elderly people with type 2 diabetes (T2D) and mild cognitive impairment (MCI), by walking.	Results showed tai chi chuan had a better effect on improving global cognitive function in older adults with type 2 diabetes (T2D) and mild cognitive impairment (MCI).
[47]	Experimental research (a randomized controlled trial)	Low physical activity exercise	To increase the number of steps in the elderly with low physical activity levels on strength, balance, and aerobic capacity, as well as cognition.	Results showed that there was an improvement in physical fitness and cognition in the elderly who achieved an increase in physical activity of at least 35%.

The results revealed a broad spectrum of content relating to physical exercise interventions for the elderly. In one categorization, exercises were grouped by the type of activity and its relation to specific diseases. This group included home-based e-Health physical exercise [37], multicomponent exercise [38], moderate aerobic exercise [41], 12 weeks of dance and balance training [43], community-based gymnastic training combined with action observation therapy (AOT) [44], and activities ranging from low to moderate physical activity [47]. The second categorization encompassed a variety of programs such as a 24-week dual-task aerobic and cognitive exercise program [39], ai chi chuan training [46], walking-based physical exercise [40], and whole-body vibration (WBV) exercise.

Objectives and Results of the Physical Training

Intervention Study in the First Group

This summary categorizes the research findings into two primary groups based on the nature of physical exercise interventions for the elderly, particularly distinguishing between those with and without physical and cognitive health complaints. The first group comprises six articles that explore a range of physical exercises designed for elderly individuals without complaints or a history of disease. These exercises include home-based e-Health physical exercise [37], multicomponent exercise [38], moderate aerobic exercise [41], 12 weeks of dance and balance training [43], community-based gymnastic training incorporating action observation therapy (AOT) [44], and activities classified as low to moderate physical activity [47]. Specifically, the first article investigates the effects

of eHealth virtual physical exercise on cognitive guidance for older adults, aiming to improve basic and global cognitive functions, cardiorespiratory fitness, and muscular fitness. The findings indicate that a virtual eHealth home-based physical exercise program can significantly benefit the elderly and their relatives by preventing morbidity and reducing disability [37].

The second article evaluates the efficacy of a multicomponent exercise program tailored for nursing home residents, with an emphasis on enhancing physical and cognitive functions as well as quality of life. This comprehensive program, incorporating strength, balance, and dual-task exercises, was found to effectively support cognitive-motor maintenance, thereby aiding in the preservation of mental and physical functions among elderly individuals in nursing homes [38].

The third article investigates the neuroprotective and anti-inflammatory benefits of 12 weeks of moderate aerobic exercise for elderly individuals without disease complaints, specifically its impact on cognitive performance. The study concluded that moderate aerobic exercise positively influences cognitive performance in the elderly, potentially through the modulation of stress levels and pro-inflammatory cytokines, which are implicated in cognitive decline [41].

The fourth article explores the comparative effects of 12 weeks of dance training versus balance training on fall risk, physical and cognitive functions. It also examines the relationship between physical and cognitive functions and markers of neurodegeneration and cognitive impairment in the elderly. Findings suggest that both dance and balance training significantly enhance physical and cognitive functions. Importantly, these forms of exercise might influence the levels of circulating proteins related to neurodegenerative and cognitive disorders, presenting a promising avenue for further research [43].

These articles collectively underscore the multifaceted benefits of physical exercise in the elderly, highlighting its significant impact not only on physical health but also on cognitive function, thereby contributing to an improved quality of life and enhanced well-being for older adults.

The fifth study focused on assessing the effects of minimal physical activity interventions aimed at improving step frequency among the elderly, with a special emphasis on strength, balance, aerobic capacity, and cognition. The findings suggest that while there was an increase in physical activity levels, significant improvements in cognitive and physical fitness were not observed across the board. Notably, participants who managed to increase their physical activity by 35% or more exhibited noticeable improvements in aerobic capacity, walking speed, verbal memory, executive function,

and overall cognition, compared to those who did not achieve this level of increased activity [47].

The sixth and final study reviewed aimed to investigate the outcomes of a community-based, multi-component exercise program designed for elderly individuals experiencing reduced levels of physical activity due to the Covid-19 pandemic. The study's results highlighted improvements across two groups. The first group, which participated in action observation therapy (AOT) alongside physical exercise, showed more significant improvements in various physical performance measures, including the Five Times Sit-to-Stand Test (5XSST), Tinetti Balance and Gait Scale, and the Timed Up and Go test. The second group, engaged in exercise alone, also saw significant improvements but particularly in the Tinetti Balance and Gait Scale and the Activity-Specific Balance Confidence Scale [44].

These studies collectively affirm the potential of targeted physical exercise interventions to not only enhance physical capabilities among the elderly but also to make meaningful improvements in cognitive functions and overall quality of life, especially when tailored to the individual's current activity level and health status.

Objectives and Results of the Physical Training Intervention Study in Group Two

The first article in this category evaluates the efficacy of a 24-week dual-task program combining aerobic and cognitive exercises, specifically designed for older adults at risk of cognitive decline. The program's comprehensive approach aimed at stretching and balance exercises demonstrated significant positive outcomes across several dimensions. These included improvements in both general and specific cognitive functions, gait stability, blood pressure levels, and carotid intima-media thickness, which collectively contributed to an enhanced quality of life for the elderly participants. Despite its promising findings, the study acknowledges limitations related to its budget, suggesting the need for further research with potentially more resources [39].

The second study delves into the impact of a combined exercise regimen on elderly women with type 2 diabetes, focusing on its effects on blood biomarkers, physical fitness, and cognitive function. Although no significant changes were observed in the levels of brain-derived neurotrophic factor between the exercise and control groups at the mid-point of the study, the exercise group showed notable improvements in several health markers by its conclusion. These included reductions in fasting blood sugar levels and glycated hemoglobin, alongside enhancements in cardiorespiratory fitness, dynamic balance, and strength in both upper and lower body regions. Additionally, a significant improvement was noted in the Montreal

cognitive assessment index for the exercise group, indicating a potential benefit to cognitive function, despite the absence of differences in other cognitive assessments when compared to control groups [48].

These studies underscore the nuanced and multifaceted benefits of carefully designed physical exercise programs for the elderly, especially those battling degenerative diseases. They highlight the importance of incorporating physical activity as a cornerstone in the holistic management and improvement of physical and cognitive health conditions in aging populations.

The third article in the discussion centers on the effects of tai chi chuan, a form of mind-body exercise, on cognitive function among elderly individuals with type 2 diabetes and mild cognitive impairment, in comparison to fitness walking. This study strategically divided participants into three groups: those practicing tai chi chuan, those participating in fitness walking, and a control group with no specific intervention. The outcome indicated that individuals in the tai chi chuan group experienced more significant improvements in their Montreal Cognitive Assessment (MoCA) scores than those in the fitness walking group, showcasing an average difference of 0.84 in the intention-to-treat analysis. Further detailed analysis, both per protocol and within sub-groups, aligned with these findings. Despite reporting 37 non-serious adverse events in the tai chi chuan group—higher than in the fitness walking (8 events) and control (16 events) groups—these incidents were determined to be unrelated to the study interventions, with no statistically significant differences in safety outcomes observed across the groups [46].

The fourth study explores the comparative effects of combined cognitive and physical rehabilitation versus exercise training alone on walking ability and cognitive function in individuals diagnosed with relapsing-remitting multiple sclerosis (RRMS). The findings illustrate that although the control group, which likely received standard exercise training, showed improvements in the Mini-Mental State Examination (MMSE), concentration tests, and the 10-meter walking test, the study group subjected to combined rehabilitation exhibited enhancements across all evaluated parameters. This included improvements in the Expanded Disability Status Scale (EDSS), MMSE, logical reasoning, concentration, and walking ability. This suggests that a holistic approach encompassing both cognitive and physical rehabilitation exercises could offer more comprehensive benefits to individuals with RRMS compared to traditional exercise training alone [40].

These studies further validate the potential of tailored physical activity regimens, including traditional exercises like tai chi chuan and innovative combined rehabilitation programs, to significantly

improve cognitive and physical functions in elderly populations, even among those with specific health challenges.

The fifth article delves into evaluating the therapeutic effects of whole-body vibration (WBV) training over a period of 8 weeks, comparing it against lower extremity strength training and health education in terms of muscle strength and proprioception impact on neuromuscular function in patients with knee osteoarthritis (KOA). The study's findings revealed no significant differences among the groups in aspects such as pain levels, proprioception accuracy, performance in the Timed Up and Go (TUG) test, and distances covered in the 6-minute walking distance test (6MWD). However, a notable interaction effect was observed concerning isokinetic muscle strength, with the WBV group demonstrating a more significant increase in extensor peak torque (PT) isokinetic muscle strength compared to both the health education and strength training groups. This suggests that while WBV training might not influence all aspects of knee osteoarthritis symptoms, it could offer specific benefits in enhancing muscle strength, potentially contributing to improved neuromuscular function in KOA patients [42].

This investigation underscores the nuanced benefits of different physical intervention strategies in managing symptoms and improving the quality of life for individuals with KOA, highlighting the need for a tailored approach based on specific therapeutic goals and patient conditions.

In conclusion, the discussion has illuminated the vast spectrum of physical exercise interventions and their significant impact on the elderly, especially those with and without specific degenerative diseases. From enhancing cognitive function and physical fitness to mitigating symptoms of chronic conditions, the evidence underscores the multifaceted benefits of tailored physical activity programs. These findings not only reinforce the importance of incorporating physical exercise into the daily regimen of the elderly but also highlight the potential for such interventions to improve overall quality of life and health outcomes.

Future studies could explore more diverse populations and longer-term impacts of physical exercise interventions to understand their sustained effects better. Additionally, investigating the mechanisms behind the therapeutic benefits of different types of exercise could provide insights into developing more effective, personalized exercise programs. The integration of technology in monitoring and enhancing the efficacy of exercise routines presents another promising avenue for research, potentially leading to innovative solutions that could further improve the health and well-being of the elderly population.

Conclusions

Physical exercises, encompassing aerobic, strength, balance, dance, and multicomponent routines, have been underscored as beneficial for improving the well-being of older adults across various health spectrums.

For those without health complaints, exercise interventions have been instrumental in enhancing cardiorespiratory fitness, muscle strength, balance, and cognitive performance. Similarly, in older adults facing degenerative diseases, such exercises have contributed to better blood sugar control, physical fitness, and cognitive functioning. Notably, dual-task exercises, incorporating both aerobic and cognitive training, alongside tai chi chuan, have demonstrated promising outcomes in augmenting cognitive function, balance, and overall quality of life.

The insights gained from this review advocate for the personalized development of exercise programs, tailored to the unique needs and conditions of the elderly, to optimize their efficacy. The imperative for such targeted interventions highlights the potential of physical exercise as a key strategy in preserving

and enhancing the physical and cognitive functions of older individuals. Ensuring the adaptation and specificity of these programs can significantly elevate the quality of life and independence among the elderly population.

Looking forward, the field stands to benefit from expanded research endeavors, employing a wider array of keywords and databases to deepen the understanding of physical exercise's impacts. A comprehensive global exploration, potentially incorporating bibliometric and scientometric analyses, alongside in-depth investigations into health-oriented sports activities for older adults, represents a pivotal direction for future studies. This ongoing research is essential for refining exercise interventions, making them more accessible and effective for aging populations worldwide.

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Conflict of interests

There is no conflict of interest.

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