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# Effect of physical activity and exercise on mild cognitive impairment and dementia: a literature review

*Efeito da atividade física e do exercício sobre o comprometimento cognitivo leve e a demência: uma revisão da literatura*

*Efecto de la actividad física y el ejercicio sobre el deterioro cognitivo leve y la demencia: una revisión de la literatura*

1 Victor Oliveira Araújo ORCID - Lattes

2 Maria Carolina Marinho de Andrade Gonçalves - ORCID - Lattes

3 André Felipe Costa Alves - ORCID - Lattes

4 Ingrid Arruda Castro - ORCID – Lattes

5 Maria Isabel Sobreira Cavalcante - ORCID - Lattes

6 Ana Beatriz de Queiroz Büchler de Magalhães - ORCID - Lattes

7 Guilherme Dourado Aragão Sá Araujo - ORCID – Lattes

8 Caio Sérgio Gomes Sá - ORCID - Lattes

9 Lara Maria Fujita Vieira Lima - ORCID - Lattes

10 Lúcio Ibiapina Lima Maia Filho - ORCID – Lattes

11 Halisson Rodrigues de Andrade - ORCID - Lattes

12 Luciano Barroso de Albuquerque Filho - ORCID - Lattes

13 Camilla Costa Sallem - ORCID – Lattes

14 Lavínnya Yáskara de Aquino Matoso - ORCID - Lattes

15 Pedro Iughetti Morais - ORCID - Lattes

16 Júlio César Claudino dos Santos - ORCID – Lattes

**Affiliation of authors: 1-2**, **4-10**, **12-13**, **15** [Graduandos, Medicina, Centro Universitário Christus, UNICHRISTUS, Fortaleza, CE, Brasil]; **3** [Graduando, Medicina, Centro Universitário de Brasília, UNICEUB, Brasília, DF, Brasil]; **11** [Residente, Faculdade de Ciências Médicas da Santa Casa de São Paulo, FCMSCSP, São Paulo, SP, Brasil] **14** [Enfermeira, Universidade Potiguar, UNP, Mossoró, RN, Brasil] **16** [Professor e Pesquisador, Universidade Federal do Ceará, UFC, Fortaleza, CE, Brasil; Centro Universitário Unifacvest, UNIFACVEST, Lages, SC, Brasil]
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**Authors contributions according to the Taxonomia CRediT:** Araújo VO, Gonçalves MCMA, Alves AFC, Castro IA, Cavalcante MIS, Magalhães ABQB, Araujo GDAS, Sá CSG, Lima LMFV, Maia Filho LIL, Andrade HR, Albuquerque Filho LB, Sallem CC, Matoso LYA, Morais PI [2,5,11-14], Santos JCC [1-2,3,5-8,10-14]
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**ABSTRACT:**
**Introduction**: The rising global prevalence of cognitive disorders, including mild cognitive impairment (MCI) and dementia, necessitates effective interventions. This literature review examines the impact of physical activity and exercise on individuals with MCI and dementia. **Objective and Method**: A comprehensive literature search and narrative review were conducted to explore the influence of physical activity on cognitive health, emphasizing mechanisms like enhanced cerebral blood flow and neurotrophic factors. **Results and Discussion**: Reviewed studies suggest that regular physical activity can positively affect cognitive function and may serve as a valuable component in comprehensive strategies for cognitive disorder prevention and management. Evidence

highlights the potential role of physical activity in reducing dementia risk and slowing cognitive decline. **Conclusion**: Integrating physical activity and exercise into daily routines and healthcare strategies is crucial for addressing the growing challenge of cognitive disorders, potentially enhancing the quality of life for affected individuals and reducing the societal burden associated with them.

**Keywords:** Alzheimer disease, disease prevention, therapeutics, Alzheimer, dementia, exercise, physical activity, prevention, treatment

**RESUMO:**
**Introdução**: O aumento da prevalência global de distúrbios cognitivos, incluindo o comprometimento cognitivo leve (CCL) e a demência, exige intervenções eficazes. Esta revisão da literatura examina o impacto da atividade física e do exercício em indivíduos com CCL e demência. **Objetivo e método**: Foi realizada uma pesquisa abrangente da literatura e uma revisão narrativa para explorar a influência da atividade física na saúde cognitiva, enfatizando mecanismos como o aumento do fluxo sanguíneo cerebral e fatores neurotróficos. **Resultados e discussão**: Os estudos revisados sugerem que a atividade física regular pode afetar positivamente a função cognitiva e pode servir como um componente valioso em estratégias abrangentes para a prevenção e o gerenciamento de distúrbios cognitivos. As evidências destacam o papel potencial da atividade física na redução do risco de demência e na diminuição do declínio cognitivo. **Conclusão**: A integração da atividade física e do exercício nas rotinas diárias e nas estratégias de saúde é fundamental para enfrentar o desafio crescente dos distúrbios cognitivos, potencialmente melhorando a qualidade de vida dos indivíduos afetados e reduzindo a carga social associada a eles.

**Palavras-chave:** doença de Alzheimer, prevenção de doenças, terapêutica, Alzheimer, demência, exercício físico, atividade física, prevenção, tratamento

**RESUMEN:**
**Introducción**: La creciente prevalencia mundial de trastornos cognitivos, incluidos el deterioro cognitivo leve (DCL) y la demencia, exige intervenciones eficaces. Esta revisión bibliográfica examina el impacto de la actividad física y el ejercicio en individuos con DCL y demencia. **Objetivo**

**y método**: Se realizó una búsqueda bibliográfica exhaustiva y una revisión narrativa para explorar la influencia de la actividad física en la salud cognitiva, haciendo hincapié en mecanismos como el aumento del flujo sanguíneo cerebral y los factores neurotróficos. **Resultados y discusión**: Los estudios revisados sugieren que la actividad física regular puede afectar positivamente a la función cognitiva y puede servir como un componente valioso en las estrategias integrales para la prevención y el tratamiento de los trastornos cognitivos. Las pruebas destacan el papel potencial de la actividad física en la reducción del riesgo de demencia y la ralentización del deterioro cognitivo. **Conclusión**: Integrar la actividad física y el ejercicio en las rutinas diarias y en las estrategias de salud es clave para afrontar el creciente reto de los trastornos cognitivos, mejorando potencialmente la calidad de vida de los individuos afectados y reduciendo la carga social asociada a ellos.

**Palabras clave:** enfermedad de Alzheimer, prevención de enfermedades, terapia, Alzheimer, demencia, ejercicio físico, actividad física, prevención, tratamiento

## Introduction

Dementia is a multifactorial syndrome resulting from alterations in the central nervous system, which imply deficits in one or more cognitive domains, such as memory, learning, language, executive function, complex attention, social cognition and perceptual-motor function [1]. Alterations in these domains must be severe enough to interfere with the individual's autonomous ability to carry out their professional and/or social activities [2] [Table 1]. In 2015, around 46.8 million people had some degree of dementia, and it is estimated that this figure could reach 131.5 million by 2050 [3]. This situation is elucidated by the increase in the number of people over 65 in this period, which leads to an increase in the incidence and prevalence of dementia in the world population [4]. Therefore, as the population ages, the clinical, financial and social impact of dementia intensifies worldwide.

In addition, dementia is caused by neurodegenerative diseases such as Alzheimer's disease (AD) and frontotemporal dementia (FTD) or by non-neurodegenerative conditions such as vascular dementia (VaD) [5]. AD is the most common type; its cause stems from a double proteinopathy, with the coexistence of extracellular aggregates of different types of fibrils, which form amyloid plaques [6]. The most common initial symptoms

include impairment of memory, executive function and perception [7]. VaD refers to dementia caused by atherosclerotic small vessel disease, with prominent cognitive impairment in executive function and information processing speed [7, 8]. FTD presents early personality and behavioral changes, as well as language alterations [5]. It originates from the degeneration of cortical and subcortical structures in the frontal and temporal regions of the brain [5, 8].

In terms of symptoms, dementia syndromes are mainly characterized by short-term memory loss. They also have difficulties in one or more of the following: retaining new information, performing complex tasks, reasoning, language (finding words), behavior and complex attention [7]. In addition, for cognitive impairment to be classified as dementia, it must be acquired, not justified by another mental disorder, such as depression or schizophrenia, and interfere with the individual's autonomy in carrying out daily activities [9].

Another cognitive deficit of considerable clinical and epidemiological relevance is mild cognitive impairment (MCI), which consists of an intermediate state between age-related cognitive decline and dementia, but which can progress to the latter in 5 to 17% of cases [10]. The diagnostic criteria used for MCI consist of the presence of abnormal cognitive functions in one or more domains, the individual's perception of these impairments, the maintenance of daily activities and the absence of dementia [10]. It is estimated that its prevalence ranges from 14 to 18% in the population over 70, a figure that can vary due to the existence of various screening scales [11, 12]. With advancing age, these figures tend to increase, with male involvement being more common [12]. There are risk factors that can favor the development of this cognitive deficit at an earlier age, such as diabetes mellitus and hypertension; low educational level; breathing disorders during sleep and vitamin D deficiency [12]. It can also be caused by non-degenerative conditions, for example vascular or secondary to systemic diseases, as well as psychiatric illnesses, depression being the most common example [11].

In recent years, the search for drugs to reverse dementia syndrome (DS) and MCI or even slow down the progression of cognitive impairment has intensified [13]. Nevertheless, changing lifestyle habits in order to eradicate risk factors has proved extremely necessary for the prevention

and treatment of patients with these conditions [13] [Table 1]. Among the possible actions that can be taken to reduce the risk of developing dementia are: not smoking, living with family members, reducing alcohol consumption and practicing physical exercise, which prevent the onset of diabetes, hypertension, obesity and sleep disorders, which are some of the risk factors [4].

In this context, physical exercise has the potential to improve cognitive function in healthy elderly people and to minimize behavioral and psychological symptoms in dementia, by improving cognition, agitation, mood, mobility and functional capacity [14, 15]. Proof of this is that around 3% of dementia cases could have been avoided if individuals did outdoor activities [16]. This association can be explained by the neural and cognitive benefits fostered by physical activity, such as an increase in the volume of the prefrontal cortex, which is a region with a relevant function in memory, cognition and control [17], as well as inducing hippocampal neurogenesis, a structure responsible for transforming short-term memory into long-term memory [18]. However, the correlation between physical activity and dementia has not yet been fully elucidated, since some patients have not shown a significant improvement in cognitive functions after implementing this habit [19].

In addition, patients with MCI who underwent physical exercise had positive effects on attention, executive function and memory [20]. However, as with dementia, there is still no concrete association between physical activity and MCI, since in some patients, sedentary behavior had no effect on the transition to dementia [21]. Therefore, the aim of this study is to carry out a review of the general effect of physical exercise on cognitive function in individuals with dementia or MCI.

## Methods

This article presents a descriptive literature review based on the analysis of scientific articles published from 2017 to 2022 in the PubMed (Medline) and ScienceDirect databases. The keywords used were "dementia", "mild cognitive impairment", "cognition", "physical activity" and "exercise". In addition, only review articles available in full were included in the selection of materials.

When applying the first set of criteria, titles that did not mention the topic "effect of physical activity and exercise on cognitive function in individuals with MCI or dementia", articles not included in the research period,

duplicate articles and those not found in English were excluded. In the PubMed database, 154 articles were found using the Mesh descriptor "(physical activity) AND (exercise) AND (cognition) AND (mild cognitive impairment) AND (dementia)", of which 43 were selected. Following the same criteria, 686 articles were identified in the ScienceDirect database, of which 76 were selected. At the end of the first exclusion criterion, 119 references were chosen [Frame 1].

The second criterion was used, from which abstracts that did not discuss dementia or MCI and physical activity were excluded, which led to the exclusion of 86 articles. Seventeen articles were then added manually from the list of references of eligible articles. At the end of the selection, 50 articles originally in English remained.

## Discussion

### Aging and neurocognitive functions

One of the components of the central nervous system is the brain, which is the most complex organ in the human body. Anatomically, it passes through a longitudinal fissure dividing it into right and left hemispheres, with some distinct regions: frontal lobe, parietal lobe, temporal lobe, occipital lobe and insula. The interaction between these areas through the neural pathways enables numerous activities to be carried out, including neurocognitive functions, which are responsible for processing speed, attention, memory, language, visuospatial skills and executive functioning/ reasoning [30].

Motor functions, the ability to plan, reason, memorize and express oneself are attributed to the frontal lobe [47]. The parietal lobe is responsible for attention and spatial orientation, perception and visuospatial processing. The temporal lobe is related to memory, language comprehension and hearing. Vision and balance are attributed to the occipital lobe. In the area where the insula lobe is located, it has the function of coordinating emotions and is responsible for taste [30].

As the brain ages, certain changes are observed. Around the age of 35, a change in physical structure begins, with a gradual reduction of 0.2% per year in total brain volume. As a result, there is a decrease in the number and structural changes of neurons, involving a reduction in the number of dendrites and demyelination of axons, shrinkage of neuronal bodies and a

decrease in synaptic density due to a reduction in the number of synapses [32].

These changes interfere with cognitive functions, with a decline in their domains resulting in difficulty in remaining attentive, learning new information, maintaining verbal fluency and an increase in reaction time to external stimuli [31, 32]. These changes are physiological and do not compromise the elderly person's ability to carry out their daily activities, but in many cases these changes progress and become pathological [32].

**Pathophysiology of cognitive decline**

Ageing causes expected physiological changes such as a reduction in brain volume, especially in the frontal and temporal lobes. Contributing to this atrophy is a decrease in cerebral blood flow, as well as changes in cerebral self-regulation mechanisms, which are also altered by normal ageing [22]. There is a correlation between neuronal loss in the basal nucleus of Meynert, cortical cholinergic deficits and the degree of cognitive impairment in Parkinson's disease. This results in a reduction in choline acetyltransferase activity in the frontal and temporal regions, correlating with cognitive déficits [32].

Even individuals over the age of 85 with preserved cognition show deposition of fibrillary tangles and senile plaques, but generally to a lesser extent than individuals with Alzheimer's disease (AD). This may explain the genesis of the decline in some cognitive functions expected with normal ageing [23]. Autopsy studies show that up to 50% of non-demented patients meet the pathological criteria for AD according to the NIA-Regan criteria [24]. A characteristic of AD is cognitive impairment, even in the early stages of the disease, and there may be variation and severity of cognitive involvement and the risk of progressing to Parkinson's disease dementia, as studies show that dementia affects 50% of AD patients within 10 years of diagnosis [32].

In addition to the neuropathological changes mentioned above, astrocytes play an important role in the pathophysiological process of cognitive decline. The role of astrocytes in the neural network is plastic and subject to alterations. In pathological conditions, such as the deposition of beta-amyloid protein, astrocyte-neuron interaction can undergo alterations that impact the synaptic connections of memory and cognition [25].

These astrocyte alterations lead to an increase in the expression of receptors at the sites of beta-amyloid protein deposition, which can alter the synapses and lead to both upregulation and downregulation of cholinergic receptors, glutamate-dependent receptors and calcium-dependent receptors [26, 27]. Alterations in calcium-dependent receptors can affect the adenosine A2A receptor, which are receptors that participate in the removal of irrelevant memories during sleep, so if activated in excess they can contribute to a more pronounced loss of memory, accelerating the process of cognitive decline [28]. In astrocytes altered by the beta-amyloid protein, there is also greater synthesis and release of GABA, which contributes to greater inhibition of granule cells with a consequent impact on memory processing [29]. In addition to the above, it is proposed that parenchymal inflammation caused by CNS diseases causes alterations in astrocyte regulation, further contributing to the process of synaptic deregulation [29].

**Physical Activity and Cognitive Function**

The action of physical exercise on cognitive function can be direct or indirect. The mechanisms that act directly by increasing the speed of cognitive processing would be an improvement in cerebral circulation and changes in the synthesis and degradation of neurotransmitters. In addition to the direct mechanisms, others such as lowering blood pressure, decreasing LDL and triglyceride levels in the blood plasma and inhibiting platelet aggregation seem to act indirectly, improving these functions as well as general functional capacity, thus increasing quality of life [42]. Resistance exercise has been proposed as a new adjuvant rehabilitation strategy in populations suffering from neurological or neurocognitive impairments (i.e. Parkinson's and Alzheimer's dementia) or even to attenuate age-related declines in cognitive [43].

In this sense, several studies have observed improvements in cognitive functions with exercise and a strong correlation between increased aerobic capacity and improved motor functions. Therefore, non-pharmacological treatment is an attractive option [43, 44]. However, some evidence suggests that certain types of sedentary behavior may be positively associated with cognitive function, such as reading or computer use. As a preventative tool, resistance exercise improves memory, attention, spatial awareness, reaction time, planning and information processing. Improvements in cognitive performance following resistance exercise and

training may be mediated by peripheral elevations in physiological biomarkers (i.e. neural and vascular) [44].

Despite the controversies, epidemiological studies confirm that moderately active people have a lower risk of being affected by mental dysfunctions than sedentary people, demonstrating that participation in physical exercise programs also has benefits for cognitive functions [21, 38 – 40]. There has also been a significant increase in physical and cognitive performance and a positive change in the behavior of elderly people with cognitive impairment and dementia. This confirms that physical exercise can be effective in protecting against the loss of the ability to carry out activities that are directly related to daily life [44].

Cognitive decline, like other neurodegenerative disorders, is characterized by abnormal protein processing, which leads to the accumulation of amyloid plaques and neurofibrillary tangles [45]. This disorder is now recognized as a common non-motor symptom of Parkinson's disease and has been the subject of increasing research in recent decades. Cognitive deficits in Parkinson's disease can be distinguished as dopaminergic-mediated executive dysfunction observed in the milder stages versus a global dementia syndrome that can occur with the progression of the disease. However, neurotransmitter alterations other than dopamine, including the noradrenergic, serotoninergic and cholinergic systems, are being recognized for their contribution [43, 45].

In short, physical exercise can reduce overall cognitive decline and reduce behavioral problems in people with MCI or dementia. Its benefits on cognitive function can be attributed mainly to its effects on working memory. Aerobic exercise of moderate intensity or higher and a total duration of training > 24 hours can lead to a more pronounced effect on global cognition [45, 46]. These functional benefits emphasize the clinical relevance of combined physical and cognitive training strategies [46].

**Physical activity and dementia**

Dementia affects various cognitive domains, such as executive function, attention, learning, memory, language, perception, motor and social cognition. Thus, the need for alternative non-pharmacological interventions is imperative, and structured physical activity is increasingly seen as an effective non-pharmacological treatment in the management of neuropsychiatric symptoms in patients with dementia and in the prevention of future symptoms [33 - 35].


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In this sense, regular physical activity has positive effects on the cardiovascular system and also contributes to cognitive functioning, including the functioning of cognitive processes used in complex tasks such as planning, strategy, decision-making and memory in the general elderly population. Thus, studies show that individuals who are more physically active show improvements in neurocognitive functioning compared to more sedentary individuals, in addition to preventing cognitive decline in people with a higher degree of exercise [36] [Table 1]. Similarly, chronic aerobic exercise can increase the volume of the prefrontal cortex and modulate task-related activation of prefrontal areas. In this context, exercise-induced prefrontal activation may improve cognitive performance with a consequent improvement in gait control. Furthermore, exercise is associated with neuromolecular, vascular and structural changes in the brain, which should play a role in improving cognitive, physical and behavioral functions. Therefore, exercise does not slow down ageing, but it does alleviate the systemic and cellular diseases that result from ageing, producing therapeutic benefits [37].

Therefore, physical activities in general and exercise interventions in particular can help improve behavioral and psychological systems in dementia36. However, although the results found prove the effectiveness of physical activity in improving cognitive function, they do not provide strong evidence to suggest that physical exercise can prevent the progression of MCI to dementia, although early intervention for patients who are in the MCI stage among the high-risk group can maintain and improve cognitive function [21].

In view of the above, randomized controlled trials of the effects of exercise in elderly people with MCI and the effect of cognitive function report that aerobic exercise increases brain volume in domains associated with the decline in cognitive function due to ageing, and a positive correlation has also been reported between hippocampus volume and aerobic capacity and spatial memory. Consequently, physical exercise, regardless of its type, is positively related to cognitive function as well as physical health, suggesting its contribution to the late decline in cognitive function [38]. As well as being a possible therapy for cognitive decline in dementia, physical activity has been examined as a method of delaying or preventing the onset of the disease, given that physical activity can increase the

expression of growth factors that promote dendritic branching, which in turn results in volumetric changes that can mediate improvements in sleep quality, resulting in cognitive improvements [39].

Therefore, there are various types of exercise that can be part of physical practice. Aerobic exercise refers to physical activity that uses large muscle groups to maintain continuous, rhythmic movements to improve aerobic fitness. Aerobic exercises are those that require movement and depend on the generation of aerobic energy. They can be of various types, such as walking, running, dancing, cycling and swimming. In addition, muscle development exercises include anaerobic exercises, resistance and strength training, which is a type of exercise that doesn't use oxygen to break down glucose molecules in the body. This type of exercise is more intense and shorter in duration and is usually performed with dumbbells, weight lifting and gym equipment [41]. In addition, we can mention stretching exercises, which aim to improve the flexibility perceived by the muscle and achieve a comfortable muscle tone. Yoga is an example of a methodical stretching and breathing regime that relieves anxiety and muscle tension, while expanding the range of movement [40, 41] [Table 1].

Thus, the advantages of higher levels of cardiovascular fitness related to different types of physical activity have been associated with beneficial cognitive effects, such as better executive function and lower rates of cognitive decline. In addition, better cardiovascular fitness has also been associated with the structural integrity of the brain, including greater superior cortical thickness and surface area and greater subcortical gray matter volume in areas such as the hippocampus formation, which has its cognition and memory processes affected in age-related dementias [48]. Therefore, the effect of aerobic exercise on cognition or risk of AD can be explained by the relationship between aerobic activity, physical fitness and brain integrity, and may explain the association of high aerobic fitness with reduced brain atrophy and functional connectivity throughout the brain in older adults with intact cognition or early AD. In view of the above, aerobic exercise increases aerobic fitness, which in turn improves brain structure and function [41].

Through the articles selected, a table that presents many conditions associated with the effect of physical activity and exercise on mild cognitive impairment and dementia was produced. Also, the identification of pertinent information on the topic under study helps to support the


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relevance of the review. Thus, the table consists of data referring to the authorship of the article, the title of the productions, the diseases correlated to the current topic and the conclusions of each research. Accordingly, the analysis of the results found was more effective, making it possible to visualize better the considerations exposed in the discussion.

## Conclusion

Ageing causes physiological changes in the nervous system which, when exacerbated, can become pathological, leading to mild cognitive impairment and later dementia. It is therefore clear that regular physical activity improves cognitive function in general, leading to mild cognitive impairment and dementia. It is therefore imperative to provide non-pharmacological treatment to this type of patient, with the prescription of regular physical activity, preferably aerobic, since there is a relationship between this modality, physical conditioning and brain integrity, with a view to increasing their life expectancy and quality of life, as well as preventing comorbidities due to its positive effects on cardiovascular health.

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**Table 1.** Effect of physical activity and exercise on mild cognitive impairment and dementia

| Author/year | Title | Objective | Correlated Disorders | Results/Conclusion |
|---|---|---|---|---|
| Vargas et al., 2014 [2] | Prevalence of dementia in Colombian populations | To study the high prevalence of Dementia in Latin America and the Caribbean countries and it's risk factors. | Dementia, Alzheimer Disease | The high prevalence of dementia in Latin America and the Caribbean (8.5%) could be associated with the confluence of genetic or environmental risk factors such as low education and poverty. |
| Elahi e Miller, 2017 [3] | A clinicopathological approach to the diagnosis of dementia | To highlight key elements that distinguish the most common dementia subtypes and to do an overview of dementia classification and diagnosis, with an emphasis on salient clinical features and neuropathology. | Dementia, Alzheimer Disease | Genetic factors promote specific proteinopathies, and modifier genes can influence variability in phenotypic presentation. Currently, among the clinically available biomarkers, those for prion disease and AD have the highest predictive values. |
| Lopez e Kuller, 2019 [4] | Epidemiology of aging and associated cognitive disorders: Prevalence and incidence of Alzheimer's disease and other dementias | To study the incidence and prevalence of dementia to detect possible causes of these disorders and also to analyse the high prevalence of dementia in elderly individuals around the world, | Dementia, Alzheimer Disease | The changes in these lifestyle variables over time may result in a decrease in incidence of AD. Better treatment may lead to reduced case fatality and case morbidity without changing incidence and may result in an increase in prevalence because of improved survival. |
| Dominguez et al., 2021 [13] | Nutrition, Physical Activity, and Other Lifestyle Factors in the Prevention of | Study the effects of dietary patterns, dietary components, and supplements on | Dementia, Alzheimer Disease, | Compelling evidence has accumulated on the critical role that adequate nutrition together with other |


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| | | | | |
|---|---|---|---|---|
| | Cognitive Decline and Dementia | cognitive function decline and dementia and also review non-dietary lifestyle factors like physical activity, sleep quality, and socialization, which can contribute in association with dietary factors. | Cardiovascular diseases | lifestyle factors can play in the maintenance of cognitive health and in the prevention of cognitive decline and its progression to dementia. |
| Brett, Traynore Stapley, 2016 [15] | Effects of Physical Exercise on Health and Well-Being of Individuals Living With a Dementia in Nursing Homes: A Systematic Review | Report evidence from randomized controlled trials and cluster randomized control trials that evaluated the effects of physical exercise interventions on individuals living with a dementia in nursing homes. | Dementia, Alzheimer Disease | There is emerging evidence that physical exercise significantly benefits individuals living with dementia in nursing homes. Higher quality research, including longer interventions and larger samples to determine optimum parameters of the physical exercise interventions evaluated are also required. |
| Liang et al., 2020 [16] | Contributions of Modifiable Risk Factors to Dementia Incidence: A Bayesian Network Analysis | To determine and compare the contributions of modifiable risk factors (RFs) with the prevention of dementia in older adults. | Dementia | The findings provide reliable support for the hypothesis that modifiable somatic and lifestyle factors are strong predictors of all-cause dementia. |
| Lu et al., 2018 [21] | Patterns of Physical Activity and Sedentary Behavior for Older Adults with Alzheimer's Disease, Mild Cognitive Impairment, and Cognitively Normal in Hong Kong | This study aimed to compare patterns of PA and sedentary behavior among individuals with AD, MCI, or normal cognition living in Hong Kong. | Alzheimer Disease, Mild Cognitive Impairment | The pattern of PA and sedentary behavior was different between individuals with AD and the others. Cognitive status may alter the purpose and type of PA intervention for AD individuals. |
| Sui et al., 2020 [34] | Skeletal Muscle Health and Cognitive Function: A Narrative Review | This study aimed to provide a critical appraisal of the literature on the relationship between skeletal | Dementia, sarcopenia | The literature suggests that sarcopenia and cognitive decline share pathophysiological pathways. Ageing plays a role in both skeletal muscle deterioration and cognitive decline. Furthermore, lifestyle |

| | | | | |
|---|---|---|---|---|
| | | muscle health and cognition. | | risk factors, such as physical inactivity, poor diet and smoking, are common to both disorders. |
| Wang et al., 2021 [40] | Exercise Dosage in Reducing the Risk of Dementia Development: Mode, Duration, and Intensity-A Narrative Review | To study the effect of light to moderate physical activity in the progression of dementia and Alzheimer's disease. | Dementia, Alzheimer Disease | All studies emphasize on changing eating and exercise habits, as well as increasing mental training. It has been shown effective to both prevent and delay the progression of dementia. Aerobic exercise and muscle-strengthening exercises are preferable. |
| Nuzum et al., 2020 [36] | Potential Benefits of Physical Activity in MCI and Dementia | To characterize the utility of physical activity, especially aerobic exercise, in preventing or lessening the impact of declines in cognition, daily functioning, and psychological health among individuals with MCI and dementia. | Mild cognitive impairment (MCI), Dementia | Specifically, physical activity improves cognition, especially executive functioning and memory in MCI, independent functioning in MCI and dementia, and psychological health in dementia. |


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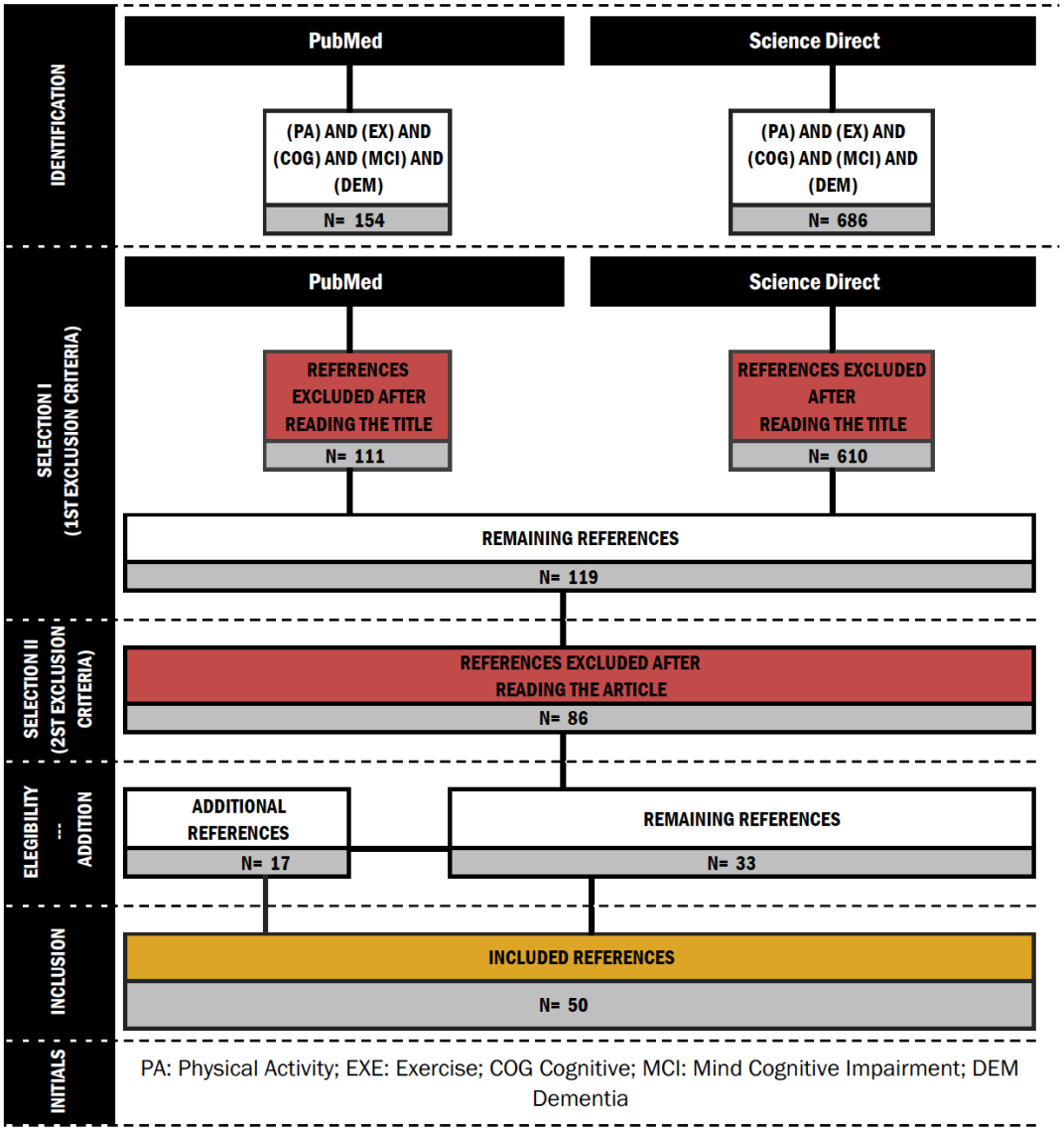


**Frame 1.** Flowchart of article selection


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