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SYSTEMATIC REVIEW

Effects of physical and cognitive exercise on the independence of older adults in the period 2013-2023. Systematic review

Efectos del ejercicio físico y cognitivo en la independencia del adulto mayor en el periodo 2013-2023. Revisión sistemática

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ABSTRACT

The aging of the population is an increasingly relevant reality in modern society, which implies the need to understand how to extend the functionality and independence of older adults, aspects related to quality of life. The best known factors are physical and cognitive exercise. This article aimed to conduct a systematic review on the effects of physical and cognitive exercise on the independence of older adults during the period 2013-2023. The methodology employed was the systematic review of the literature, limited to original studies conducted on older adults as study subjects. It was found that most articles focused on physical exercise, even some used physical exercise as an activity to improve the cognitive status of older adults. The results were based on the analysis of 13 selected articles, most of which were published in Spanish and focused on Spanish and Latin American populations. Physical exercises demonstrated the best results in terms of independence, showing significant improvements in participants' abilities and skills. Similarly, the importance of cognitive stimulation in older adults was recognized. In conclusion, both physical and cognitive exercise have positive effects on the functional independence in older adults.

Keywords: Physical Exercise; Cognitive Exercise; Older Adult; Independence.

RESUMEN

El envejecimiento de la población es una realidad cada vez más relevante en la sociedad moderna, lo cual implica la necesidad de entender cómo extender la funcionalidad e independencia de los adultos mayores, aspectos relacionados con la calidad de vida. Los factores más conocidos son el ejercicio físico y cognitivo. Este artículo tuvo como objetivo realizar una revisión sistemática sobre los efectos del ejercicio físico y cognitivo en la independencia del adulto mayor durante el periodo 2013-2023. La metodología empleada fue la revisión sistemática de la literatura, limitada a estudios originales realizados en adultos mayores como sujetos de estudio. Se encontró que la mayoría de artículos se enfocaron en el ejercicio físico, incluso algunos usaron el ejercicio físico como actividad para mejorar el estado cognitivo de los adultos mayores. Los resultados se basaron en el análisis de 13 artículos seleccionados, la mayoría de los cuales fueron publicados en español y enfocados en poblaciones de España y Latinoamérica. Los ejercicios físicos demostraron los mejores resultados en términos de independencia, mostrando mejoras significativas en las capacidades y habilidades de los participantes. De manera similar, se reconoció la importancia de la estimulación cognitiva en el adulto mayor. En conclusión, tanto el ejercicio físico como el cognitivo tienen efectos positivos sobre la independencia funcional del adulto mayor.

Palabras clave: Ejercicio Físico; Ejercicio Cognitivo; Adulto Mayor; Independencia.

INTRODUCTION

Aging is one of the natural stages of human life and is currently much more important than in the past centuries due to the increasing life expectancy in most countries around the world. The physical and cognitive decline that accompanies aging has been studied from various perspectives, one of which examines how to reduce decline to a level that allows the elderly to enjoy quality of life and functional independence. In this area, a variety of studies have been conducted to analyze the activities that can be developed to strengthen the functional independence of the elderly, especially those who have not developed chronic and/or degenerative diseases, exercise being one of the aspects that has gained the most reputation for preventing decline and recovering functionality in the elderly. This review article aimed to understand the effect of exercise on the elderly, considering this factor as a key to improving functionality and independence. Owing to the multitude of possible exercises, a search for physical and cognitive exercises will be conducted. The search guidelines are described in detail in the following sections.

Guiding questions

General

What are the effects of physical and cognitive exercise on the functional independence of older adults during the period 2013-2023?

Specific

1. What physical and cognitive exercises do older adults perform to achieve functional independence?
2. What are the effects of physical exercise on the functional independence of the elderly?
3. What are the effects of cognitive exercise on the functional independence of the elderly?

Investigation aims

General

A systematic review of the effects of physical and cognitive exercise on the independence of older adults in the period 2013-2023.

Specific

1. Recognize physical and cognitive exercises performed by older adults to generate independence.
2. Verify the effects of physical exercise on the independence of the elderly.
3. Verify the effects of cognitive exercise on the independence of the elderly.

METHOD

The research method was a systematic review of the literature. The review is conducted to "generate new and important ideas for the development of new research, which are either strengthened or discarded based on the state of the art and the advancement of existing scientific knowledge."[1] To perform the systematic review, a delimited period was considered, specifically between 2013 and 2023. The search was limited to original studies conducted on elderly study subjects, but excluded those with specific diseases or health conditions, as the aim was to understand the effectiveness of the two types of exercises in healthy older adults with typical age-related decline. The key descriptors used to retrieve the articles were effects of physical exercise independence in the elderly, effects of cognitive exercise independence, exercise in the elderly, effects of exercise aging, independence, and functionality. These descriptors were used in both Spanish and English. The databases used to locate the articles for the review were PEDro, Medigraphic, Dialnet, and the scientific work search engines, Google Scholar and Semantic Scholar.

Inclusion and Exclusion Criteria for the Search

Table 1. Inclusion and exclusion criteria for the article search

Inclusion Criteria	Exclusion Criteria
• Articles published between 2013 and 2023. • Articles published in health and geriatric journals. • Articles in Spanish and English. • Articles linked or located in databases for scientific articles. • Studies conducted on individuals over 60 years of age, of both sexes.	• Articles that are not original research (systematic reviews, editorials or reflection articles). • Articles whose methodology for obtaining the results is unclear or not defined. • Studies conducted on elderly adults with specific conditions or diseases and hospitalized patients. • Studies aiming to understand the effect of physical and/or cognitive exercises in elderly adults on specific diseases or conditions.

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RESULTS

Search Results

The search process applied in the databases and scientific work search engines generated 223 results, which were screened and analyzed, yielding 13 high-quality articles. The details of this process are specified in the PRISMA flow diagram shown in figure 1.

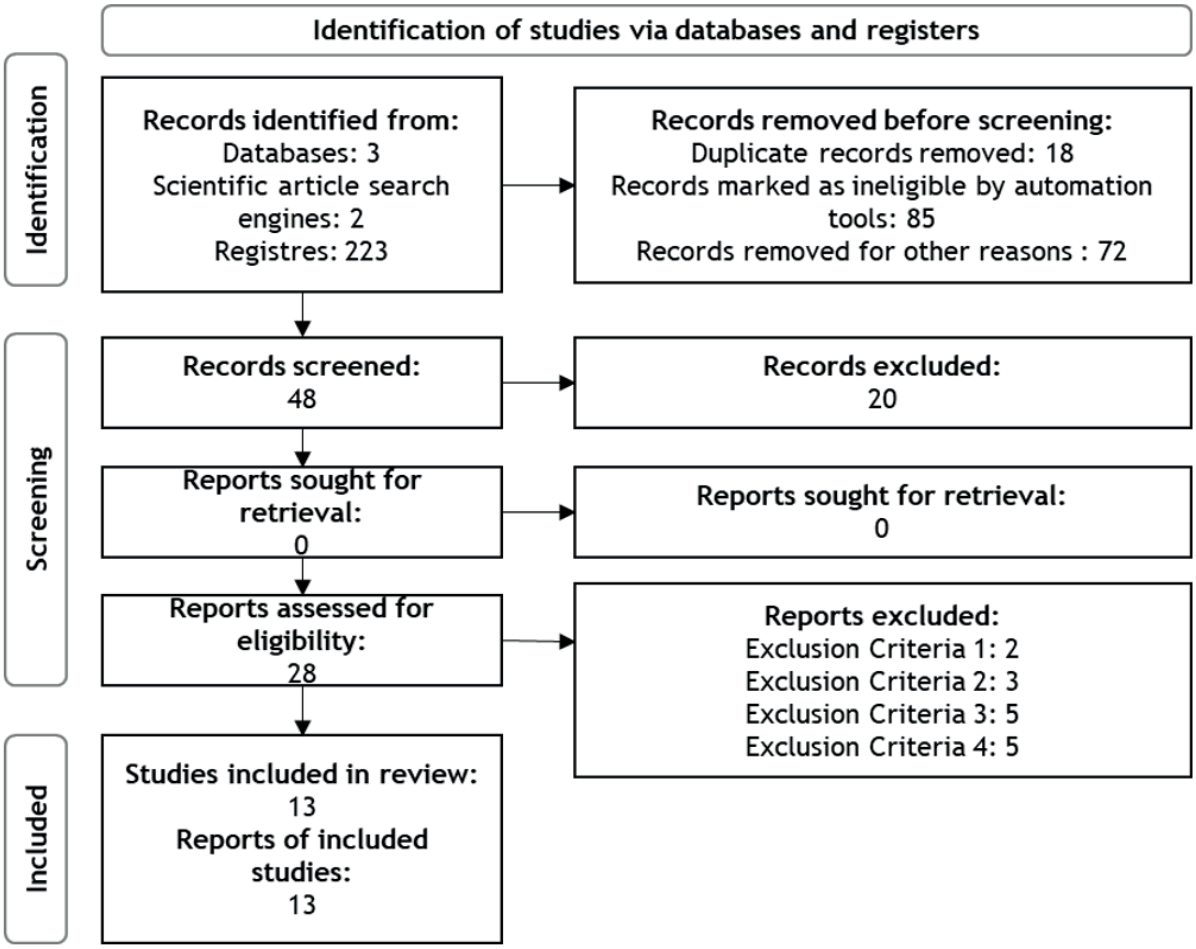

Figure 1. PRISMA Flow Diagram of the Search
Source: Own elaboration based on the recommendations of the PRISMA method [2].

Details of the included items are as follows.

Table 2. Search articles

Author, year and country	Sample	Method	Conclusion
Belmonte el al., 2021 [3], Spain.	49 older adults, 60 years or older.	Physical exercise. Cross-sectional quantitative study. 12 weeks of intervention under the Vivifrail methodology.	Improvement was observed in the participants' functionality, as well as a decrease in blood pressure, sleep disturbances, improvement in walking speed and increase in pressure pain threshold, improvement in quality of life and general physical well-being.
Salazar-Pérez et al., 2020 [4], Cuba.	18 older adults, 60 years or older.	Cognitive exercise. Pre-experimental study with application of cognitive stimulation.	Improvement in the cognitive performance of the participants was evident in the areas of regression, memory, conversational skills, reading, calculation and hand movements.
Vega et al., 2016 [5], Colombia.	40 older adults, 60 years or older.	Cognitive exercise. Comparative-descriptive, quasi-experimental study, design with non-equivalent study group and comparison group.	A statistically significant difference was found regarding cognitive improvements compared to the control group.

Tarducci et al, 2020 [6], Argentina.	91 older adults, 60 years or older.	Physical exercise. Study is descriptive and correlational.	Older adults who perform daily physical activities have better physical condition, which benefits their functionality and independence.
Holguín et al., 2020 [7], Colombia.	15 older adults, average age of 65,64 years old.	Physical exercise. Empirical-Analytical approach study.	After a physical conditioning program, it was found that there was no significant difference between the pre and post physical training data.
González & Dias, 2018 [8], Cuba.	137 older adults over 60 years old.	Physical exercise. Group methods and attention techniques.	Exercise can have prophylactic benefits, but very specific methodologies must be used to avoid over-demanding the elderly.
Quintero et al., 2018 [9], not specified.	Not specified.	Physical and cognitive exercise. Qualitative of a descriptive nature, direct observation was used to collect the data.	The authors observed significant improvement in memory and mental processes. The most accepted physical activities were dancing and exercises.
Vieria et al., 2018 [10], Brazil.	30 older adults over 60 years old.	Cognitive exercise. Randomized, controlled, parallel group feasibility trial study.	Improvement was observed in posture and gait, but there were no cognitive changes regarding mood, mental processes and fear of falling.
Plaza-Carmona et al., 2022 [11], Spain.	118 older adults, average age of 79,15 years old.	Physical exercise. Analytical cross-sectional quantitative study with a 12-week training program.	The application of multicompetent exercises improves the physical capacity of older adults and reduces their fragility, thereby gaining independence and quality of life.
Smolarek, 2016 [12], Brazil.	29 older adult women over 65 years old.	Physical exercise. Quasi-experimental, randomized trial with control group.	After the physical training program, the elderly women showed a significant increase in strength and it is estimated that important improvements can be achieved at a cognitive level and with both aspects, an improvement in quality of life is obtained.
Varela et al., 2018 [13], Spain.	39 older adults over 65 years old.	Evaluation of cognitive improvements from physical exercise. Multicenter longitudinal intervention study of cognitive function.	From the bicycle training, the participants showed improvements at a cognitive level, such as attention, visual scanning and processing speed.
Reid et al., 2016 [14], United States.	52 older adults over 65 years old.	Physical exercise. Single-blind, multicenter, randomized controlled trial.	The cognitive level of older adults has no direct relationship with adherence to physical activity. Therefore, all types of elderly can carry out physical activity, even with cognitive impairment.
Wadsworth et al., 2020 [15], Australia.	117 older adults with an average age of 82,5 years.	Evaluation of cognitive improvements from physical exercise. Quasi-experimental, randomized trial with control group.	The analysis of functionality and confidence showed an increase in the index compared to the control group, the benefits were maintained six months after the intervention. 16 weeks of exercise improved the elderly's independence.

DISCUSSION

Physical and cognitive exercises performed by the elderly to promote independence

Most articles focused on physical exercise, with some even using physical exercise as an activity to improve the cognitive state of the elderly. Articles on cognitive exercise accounted for only 23 % of the findings. The exercises used in the studies varied. For physical exercise, in all cases, it was a low- to moderate-intensity exercise, in sessions of approximately one hour several times a week.

Most of the studies carried out a training plan over several weeks, typically 12 weeks, in which they evaluated the physical and cognitive state of the elderly before and after the exercise and often applied analysis after each session to measure heart rate, blood pressure, and other basic parameters. Quality of life, depression, and various batteries were also administered to assess the physical and cognitive state of the participants. Some studies were not training trials with a training plan but observational studies, in which the physical activities were even more varied, including dance and walking at highly varied paces and frequencies.[6,8]

For cognitive exercises, activities such as drawing, handicrafts, writing, and video games were used as a strategy to develop concentration, memory, and executive functions.[10] In studies that evaluated the cognitive effects of physical exercise, cycling[13] and whole-body vibration exercise were used.[15] Some studies did not specify the exercises they used.

Effects of physical exercise on independence in the elderly

Physical exercise had the best results in the area of independence, as they showed significant improvement in the participants' abilities and skills. The most important studies regarding this conclusion are clinical trials with control group, which are the most reliable.

The observational, descriptive, and correlational studies analyzed in this search mostly found physical

improvements in the elderly. Improvements were usually noted in strength, gait, posture, flexibility, and speed. In these studies, physical exercise was considered to have effects on independence, autonomy, and functionality, as an elderly person who can move alone, grasp objects, change clothes, eat, and perform other basic functions has a good degree of independence. The studies that were most definitive in pointing out the relationship between physical exercise and increased functionality were those by Wadsworth et al.[15], and Belmonte et al.[3] and Tarducci et al.[6]

Effects of Cognitive Exercise on Independence in the Elderly

Cognitive exercises, the least found in the search, appear to have less original research. In general, doctors and professionals recognize the importance of cognitive stimulation in the elderly; therefore, there are programs, literature, and manuals of cognitive exercises for this population, both for elderly individuals with and without evident cognitive impairment [16]. However, scientific evidence specifically on cognitive exercises was not evident in the search conducted. It is possible that more evidence can be found with different search criteria.

In this review, it can be indicated that even with physical exercise, the elderly can obtain cognitive improvements, such as attention, visual scanning, processing speed[13], and confidence.[15] In all cases, the results varied greatly depending on the exercise applied, context, regularity, and measurement criteria used. For example, the study by Vieira et al.[10] using the Nintendo Wii as a cognitive development tool, did not show changes in the cognitive aspect but did show improvements in gait and posture. Therefore, further research should not be neglected to systematize the results, as they remain variable.

CONCLUSION

Physical and cognitive exercises have positive effects on functional independence in the elderly population. The possibilities for exercise are wide-ranging, but it is important that the activity is regular and consistent in the elderly to observe improvements and impact on the prevention of deterioration that affects quality of life, especially for those without disabling diseases or conditions. Undoubtedly, physical exercise is the activity with the most evidence in its favor, as it has been shown to have physical and cognitive effects on independence and functionality; therefore, it can be said that this should be encouraged in the routine of all older adults.

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ETHICAL COMPLICANCE

This review took into account ethical considerations that ensured respect for the copyright of the included articles. The selection of the reviewed articles was done according to predetermined criteria, so no primary data collection was performed nor were any human or animal subjects involved in this study.

DATA ACCESS STATEMENT

This literature review is based on the evaluation of 13 scientific articles selected from academic databases and relevant publications in the period 2013-2023. The articles used are available through their respective publishers and academic databases.

FINANCING

The author did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Victor Minango.
Data curation: Victor Minango.
Formal analysis: Victor Minango.
Research: Victor Minango.
Methodology: Victor Minango.
Project management: Victor Minango.
Resources: Victor Minango.

Software: Victor Minango.
Supervision: João de Araujo.
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Display: Victor Minango.
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Correcting errors and making contributions to the abstract: Marco Piedra.
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