



## Article

# Efficacy of the Use of Wii Games in the Physical and Functional Training of the Elderly: Protocol of a Systematic Review

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**Abstract:** Background: Scientific and technological development has constituted a reality in the lives of populations, making it unimaginable to live without specific incentives that development has allowed. That said, given the increase in the longevity of people, it will be helpful to implement these resources in promoting health and disease prevention in the elderly. The objective of this study is to identify, in the scientific evidence, the effects of Wii games on the physical training of the elderly. Methods: A systematic review will be carried out according to the methodology recommended by the Joanna Briggs Institute. Relevant databases will be used for the research, where the words will be used: rehabilitation, exercise, physical activity, rehabilitation exercise; movement; therapeutic exercise; engine activity; rehabilitation, geriatric, gerontologic care, and aged. Results: This systematic review will include experimental and quasi-experimental studies, including randomised studies with and without a control group, pre- and post-assessment. Conclusions: To promote the autonomy of the elderly and consequently healthy and prosperous ageing, it is crucial to implement all available measures and resources. For this purpose, exergames have been shown to be effective, and it is necessary to know which ones are suitable for the physical training of the elderly. This one protocol is registered with the Open Science Framework.



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**Keywords:** rehabilitation; exercise; physical activity; rehabilitation exercise; movement; therapeutic exercise; motor activity; rehabilitation; geriatric; gerontologic care; aged

## 1. Introduction

Exergames result from technological advances and offer users an interactive environment that combines the game with physical and cognitive exercise. They can be divided into three types: (1) living room exergames, which require the user to perform exercise routines, including dance, aerobics and yoga exercises; (2) cardio machine exergames, with specific training equipment, in some cases using virtual reality; (3) mobile exergames with accelerometers, body positioning systems that allow tracking of physical activity [1].

In health, exergames that combine digital games with physical exercise are increasingly used, considered an innovative alternative to traditional physical exercise programs [2,3]. Exergames are a recent alternative intervention used for physical rehabilitation, and their effectiveness in improving balance and muscle strength has already been widely studied [3].

Ageing usually results in a decreased ability to perform the exercise and a reduction in muscle strength, flexibility and bone mass [4]. These changes lead to poor locomotion, lack of balance and consequently, increased risk of falling [5].

The elderly are subject to processes arising from immobility when affected by debilitating chronic diseases, which make them a very fragile and vulnerable population group, which is why it is essential to implement interventions to reduce this fragility [6]. Implementing these activities has repercussions on the quality of life of the elderly [5], as well as economic gains in health care [6].

Several studies point out that exergames significantly impact the level of physical activity of the elderly in that when they use them, they experience an improvement in balance and cognitive function, in addition to the pleasure in using this tool, thus prolonging the experience of using the device—game and, consequently, the practice and satisfaction with physical activity exercise [7].

Concerning Nintendo Wii games, studies [6] recommend their use because it shows promise as an intervention that improves the physical function, cognition and psychosocial capacity of the elderly. Evidence supports that Wii exergames are easily accessible, affordable, safe and viable tools to encourage adults and the elderly to practice physical exercise, preventing sedentary behaviour [8,9]. With the use of a rehabilitation program with Wii games in the elderly, levels of frailty are reduced, as well as the risk of falling, by promoting static balance and increasing walking speed [5,10,11].

Considering the above, the present study aims to identify, in the scientific evidence, the effectiveness of Wii games in the physical training of the elderly, answering the following research questions:

- (a) How effective are Wii games in the physical activity of the elderly?
- (b) What are the games that promote the physical activity of the elderly?
- (c) What fitness domains are the Wii games effective in (e.g., muscle building, balance training, gait training, promoting body flexibility, body coordination, body agility, and physical resistance)?
- (d) What are the characteristics of the Wii games used in physical activity for the elderly (e.g., duration and frequency)?

## 2. Materials and Methods

### 2.1. Inclusion Criteria

#### Types of participants

This review will consider studies that include the elderly, that is, people aged 60 years or older.

#### Types of intervention(s)

This review will consider studies articles that will be included in which no context has been implemented using Wii games.

#### Type of comparator

This review will consider as a comparator the use of different Wii games for the physical training of the elderly, including the duration and frequency of their applicability and the comparison between Wii games and another type of intervention.

#### Type of outcomes

This review will consider studies that include the following outcomes assessed by valid and reliable instruments:

Effectiveness of Wii games in empowering the elderly, namely in the following areas: muscle strengthening, balance training, gait training, promoting body flexibility, promoting body coordination, promoting body agility, and promoting physical endurance.

#### Types of studies

This systematic review will consider experimental, quasi-experimental studies, including randomised studies with a control group and without a control group with pre- and post-assessment.

No time limit was considered. Articles written in English, Portuguese, Spanish and French will be considered for inclusion in this study.

## 2.2. Search Strategy

The search strategy aims to identify published studies. A three-stage search strategy will be used in this literature review. Initially, the search was limited to MEDLINE (via Pubmed), Cochrane Database, Prospero, DARE databases and JBI Evidence Synthesis, which ensured no recent similar research report on the topic under study. The words obtained by reading the title, abstract and indexed terms used to describe the articles were used to develop the current search strategy for the relevant databases. The words were adapted according to the specificity of each database included, this being the second phase of the review, as shown in Table 1. Two reviewers developed the search strategy, being later placed for consideration by peers by the third reviewer considering the Peer Review of Electronic Search Strategies (PRESS) checklist. The research strategy will include primary studies: experimental, quasi-experimental studies, including randomised studies with a control group and without a control group, with pre-and post-assessment, published in the following databases: Medical Literature Analysis and Retrieval System Online (MEDLINE<sup>®</sup>) via PubMed, and Cumulative Index to Nursing and Allied Health Literature (CINAHL<sup>®</sup>), SPORTDiscus with Full Text). Third, the bibliographic references of all included articles will be analysed to identify additional studies. This survey was carried out on 4 October 2022. After analysing the data, a new survey will be carried out to identify recent publications before the investigation's submission [12].

**Table 1.** Database search strategy and results.

Database: CINAHL Complete (via EBSCO)

Filters: English, Portuguese, Spanish, French, excluding MEDLINE

Results: 215

Search strategy (4 October 2022)

(MH Rehabilitation OR MH Exercise OR MH Physical Activity OR MH Rehabilitation Exercise OR MH Movement OR MH Therapeutic Exercise OR MH Motor Activity OR TI Train\* OR AB Train\* OR TI Rehabilitation OR AB Rehabilitation OR TI Exercis\* OR AB Exercis\* OR TI Intervent\* OR AB Intervent\* OR TI Balance\* OR AB Balance\* OR TI Strength OR AB Strength OR TI Cordina\* OR AB Cordina\* OR TI Motor control OR AB Motor control OR TI Postur\* OR AB Postur\* OR TI Power OR AB Power OR TI Physical\* OR AB Physical\* OR TI Activit\* OR AB Activit\*) AND (TI NINTENDO Wii Fit games OR AB NINTENDO Wii Fit games OR TI NINTENDO Wii video games OR AB NINTENDO Wii video games OR WII Fit games OR WII Fit games OR nintendo wii OR nintendo wii OR wii fit OR wii fit) AND (MH Aged OR MH Rehabilitation, Geriatric OR MH (Aged, 80 and Over) OR MH Gerontologic Care OR TI Aged OR AB Aged OR TI Geriatric OR AB Geriatric OR TI (Aged, 80 and Over) OR AB (Aged, 80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR TI OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly) 80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR TI OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly) 80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR TI OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR

**Table 1.** *Cont.*

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Database: Psychology and Behavioral Sciences Collection (via EBSCO)

Filters: English, Portuguese, Spanish, French

Results: 17

Search strategy (4 October 2022)

((SU Rehabilitation OR SU Exercise OR SU Physical Activity OR SU Exercise Therapy OR TI Train\* OR AB Train\* OR TI Rehabilitation OR AB Rehabilitation OR TI Exercis\* OR AB Exercis\* OR TI Intervent\* OR AB Intervent\* OR TI Balance\* OR AB Balance\* OR TI Strength OR AB Strength OR TI Cordina\* OR AB Cordina\* OR TI Motor control OR AB Motor control OR TI Postur\* OR AB Postur\* OR TI Power OR AB Power OR TI Physical\* OR AB Physical\* OR TI Activit \* OR AB Activit\*)) AND ((TI NINTENDO Wii Fit games OR AB NINTENDO Wii Fit games OR TI NINTENDO Wii video games OR AB NINTENDO Wii video games OR WII Fit games OR WII Fit games OR nintendo wii OR nintendo wii OR wii fit OR wii fit)) AND ((SU OLDER patients OR SU ELDER care OR SU AGING OR SU OLDER PEOPLE OR SU OLDER people physiology OR TI Aged OR AB Aged OR TI Geriatric OR AB Geriatric OR TI (Aged,80 and Over) OR AB (Aged, 80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR TI OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR TI OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR TI OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))

Database: SPORTDiscus with Full Text (via EBSCO)

Filters: English, Portuguese, Spanish, French

Results: 88

Search strategy (4 October 2022)

((SU Rehabilitation OR SU Exercise OR SU Physical Activity OR SU Rehabilitation Exercise OR SU Movement OR TI Train\* OR AB Train\* OR TI Rehabilitation OR AB Rehabilitation OR TI Exercis\* OR AB Exercis\* OR TI Intervent\* OR AB Intervent\* OR TI Balance\* OR AB Balance\* OR TI Strength OR AB Strength OR TI Cordina\* OR AB Cordina\* OR TI Motor control OR AB Motor control OR TI Postur\* OR AB Postur\* OR TI Power OR AB Power OR TI Physical\* OR AB Physical\* OR TI Activit\* OR AB Activit\*)) AND ((TI NINTENDO Wii Fit games OR AB NINTENDO Wii Fit games OR TI NINTENDO Wii video games OR AB NINTENDO Wii video games OR WII Fit games OR WII Fit games OR nintendo wii OR nintendo wii OR wii fit OR wii fit)) AND ((SU OLDER patients OR SU ELDER care OR SU AGING OR SU OLDER PEOPLE OR SU OLDER people physiology OR TI Aged OR AB Aged OR TI Geriatric OR AB Geriatric OR TI (Aged, 80 and Over) OR AB (Aged, 80 and Over) OR TI Gerontologic OR AB Gerontologic OR TI Gerontologic Care OR AB Gerontologic Care OR TI OLDER people OR AB OLDER people OR AB OLDER patients OR AB OLDER patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))

**Table 1.** *Cont.*

patients OR TI ELDER care OR AB ELDER care OR TI AGING OR AB AGING OR TI GERONTOLOGY OR AB GERONTOLOGY OR TI OLD age OR AB OLD age OR TI ACTIVE aging OR AB ACTIVE aging OR TI OLDER people physiology OR AB OLDER people physiology OR TI seniors OR AB seniors OR TI old people OR AB old people OR TI elderly OR AB elderly OR TI senior citizen OR AB senior citizen OR TI old person OR AB old person OR TI older adults OR AB older adults OR TI Frail Elderly OR AB Frail Elderly))

Database: SCOPUS

Filters: English, Portuguese, Spanish, French

Results: 431

Search strategy (4 October 2022)

((TITLE-ABS-KEY (Rehabilitation OR Exercise OR "Physical Activity" OR "Rehabilitation Exercise" OR "Therapeutic Exercise" OR "Motor Activity" OR Exercise OR Balance OR Strength OR Coordination OR "Motor control" OR Posture)) AND (TITLE -ABS-KEY ("NINTENDO Wii Fit games" OR "WII Fit games" OR "nintendo wii" OR "wii fit" OR NINTENDO)) AND TITLE-ABS-KEY ((Geriatric OR "Gerontologic Care" OR Gerontologic OR "OLDER" people" OR "OLDER patients" OR "ELDER care" OR AGING OR Gerontology OR ACTIVE aging OR IT seniors OR "old people" OR elderly OR "senior citizen" OR "old person" OR "older adults" OR "Frail Elderly"))

Database: MEDLINE (via PubMed)

Filters: English, Portuguese, Spanish, French

Results: 210

Search strategy ((October 04, 2022)

(((((NINTENDO Wii Fit games [Title/Abstract])) OR (NINTENDO Wii video games [Title/Abstract])) OR (NINTENDO Wii Fit games [Title/Abstract])) OR (nintendo wii [Title/Abstract])) OR (wii fit [Title/Abstract]) AND (medline [Filter])) AND (((((((((((((((Rehabilitation [MeSH Terms])) OR (Exercise [MeSH Terms])) OR (Rehabilitation exercise [MeSH Terms])) OR (exercise movement techniques [MeSH Terms])) OR (Movement [MeSH Terms])) OR (motor activity[MeSH Terms])) OR (Train\* [Title/Abstract])) OR (Rehabilitation[Title/Abstract])) OR (Exercis\* [Title/Abstract])) OR (Intervent\* [Title/Abstract])) OR (Balance\* [Title/Abstract])) OR (Strength [Title/Abstract])) OR (Coordina\* [Title/Abstract])) OR (Motor control [Title/Abstract])) OR (Postur\* [Title/Abstract])) OR (Power [Title/Abstract])) OR (Physical [Title/Abstract])) OR (Activit\* [Title/Abstract]) AND (medline [Filter])) AND (medline [Filter])) AND (((((((((((((((aged [MeSH Terms]) OR (geriatrics [MeSH Terms])) OR (Aged [ Title/Abstract])) OR (geriatric[Title/Abstract])) OR (aged, 80 [Title/Abstract] AND over[Title/Abstract])) OR (Gerontologic[Title/Abstract])) OR (Gerontologic Care [ Title/Abstract])) OR (OLDER people [Title/Abstract])) OR (OLDER patients [Title/Abstract])) OR (ELDER care [Title/Abstract])) OR (AGING [Title/Abstract])) OR (GERONTOLOGY [Title/Abstract])) OR (OLD age [Title/Abstract])) OR (ACTIVE aging [Title/Abstract])) OR (OLDER people physiology [Title/Abstract])) OR (seniors [Title/Abstract])) OR (old people [Title/Abstract])) OR (elderly [Title/Abstract])) OR (senior citizen [Title/Abstract])) OR (old person [Title/Abstract])) OR (older adults [Title/Abstract])) OR (Frail Elderly [Title/Abstract]) AND (medline [Filter] AND (medline [Filter]80 [Title/Abstract] AND over [Title/Abstract])) OR (Gerontologic [Title/Abstract])) OR (Gerontologic Care [Title/Abstract])) OR (OLDER people [Title/Abstract])) OR (OLDER patients [Title/Abstract])) OR (ELDER care [Title/Abstract])) OR (AGING [Title/Abstract])) OR (GERONTOLOGY [Title/Abstract])) OR (OLD age [Title/Abstract])) OR (ACTIVE aging [Title/Abstract])) OR (OLDER people physiology [Title/Abstract])) OR (seniors [Title/Abstract])) OR (old people [Title/Abstract])) OR (elderly [Title/Abstract])) OR (senior citizen [Title/Abstract])) OR (old person [Title/Abstract])) OR (older adults [Title/Abstract])) OR (Frail Elderly [Title/Abstract]) AND (medline [Filter] AND (medline [Filter]

The protocol of this systematic review follows the guidelines of the Joanna Briggs Institute (JBI) methodology [12]. For the final assessment, the items identified in the reports prepared for the guidance of systematic reviews and the extension of meta-analyses (PRISMA 2020) will be used [13]. This protocol was registered in the OSF (<https://osf.io/au758/> (accessed on 21 October 2022)).

### 2.3. Study Selection

The pilot test will be carried out by two independent reviewers (AL e MTM), initially by analysing the title/abstract and later the full text. For its realisation, 5% of the total research will be used to obtain at least a consensus of 75% agreement among the reviewers. In the second phase of the study, 2% of the full-text articles will be used to obtain the same level of understanding.

After reaching a consensus on the pilot test, all titles and abstracts will be read and selected by two independent reviewers (AL and MTM) for evaluation of inclusion and exclusion criteria. Relevant studies will be retrieved in full.

In this systematic review, the reasons for excluding full-text studies that do not meet the inclusion criteria will be reported. Any disagreement that arises between the two reviewers (AL and MTM) in any of the stages of the study selection process will be resolved through discussion using a third reviewer (CF).

The PRISMA flowchart will portray the article selection process [13].

#### 2.4. Assessment of Methodological Quality

The included articles will be critically evaluated by two reviewers (AL and MTM) regarding the level of evidence and its methodological quality, using the critical evaluation standardized by JBI for experimental and quasi-experimental studies [14]. To clarify any doubt related to the included studies, the authors will be contacted to request missing or additional data, when necessary. Once again, if there are differences between the reviewers, the third reviewer (CF) will be used. After critical review, studies will not be excluded based on their methodological quality, however, this review will be considered in the synthesis of evidence in narrative form. Thus, all studies, regardless of the results of their methodological quality, underwent data extraction and synthesis. In all these phases, once again, if there are differences between the reviewers, the third reviewer (CF) will be used.

#### 2.5. Data Extraction

Data will be extracted from the articles included in this systematic review using the standardised data extraction tool PRISMA 2020 Checklist [13], by the two reviewers (AL and MTM). The extracted data will consist of specific details about the interventions that consider the objective of the present study, as shown in Table 2. These details are study code, authors, year of publication, country of publication, objectives of the study, study population and sample size, type of study, instruments used, type of game, domain(s) covered by the intervention and characteristics (duration and periodicity of the same and existence or not of a control group).

**Table 2.** Data extraction form.

Systematic Review Details	
Systematic Review Title	Efficacy of using Wii games in the physical and functional training of the elderly: Protocol of a systematic review
Review Objective(s)	To identify in scientific evidence the effectiveness of Wii games in training the physical training of the elderly. How effective are Wii games in the physical training of the elderly?
Review Question(s)	What are the games that promote the physical training of the elderly? What domains of fitness are the Wii games effective in (e.g., muscle building, balance training, gait training, promoting body flexibility, body coordination, promoting body agility and Physical resistance)? What are the characteristics of the Wii games used in physical training for the elderly (e.g., duration and frequency)?
Inclusion/Exclusion Criteria	
Types of participants	This review will consider studies that include the elderly, that is, people aged 60 years or older.
Types of intervention(s)	This review will consider studies articles that will be included where they implement Wii games in context.
Type of comparator	This review will consider as a comparator the use of different Wii games for the physical training of the elderly, including the duration and frequency of their applicability and/or the comparison between Wii games and another type of intervention.
Types of outcomes	This review will consider studies that include the following outcomes assessed by valid and reliable instruments: - Effectiveness of Wii games in empowering the elderly; - Efficacy of Wii games in muscle strengthening, training balance, gait training, promoting body flexibility, promoting body coordination, promoting body agility, and promoting physical resistance.

**Table 2.** *Cont.*

Systematic Review Details	
Types of Evidence Sources	This systematic review will consider published studies: experimental, and quasi-experimental studies, including randomized studies with and without a control group, with pre- and post-assessment.
Evidence Source Details and Characteristics	No time limit was considered. Articles written in English, Portuguese, Spanish and French will be considered for inclusion in this study.
Author(s)	
Year of Publication	
Origin/Country of Origin (where the source was published or conducted)	
Aims/Purpose	
Population and Sample	
Kind of study	
Instruments	
size	
Game type	
Intervention	
control group	
Details/Results Extracted from the Source of Evidence (concerning the concept of the systematic review)	

### 2.6. Data Synthesis

Depending on the results of the different studies included, a purely descriptive analysis, a meta-analysis or an analysis with GRADE Evidence may be performed.

The JBI SUMARI system [15] will be used to perform the meta-analysis. For this analysis, random effects models are used only in moderate to high heterogeneity ( $I^2 > 50\%$ ) and in their absence, fixed effects models will be used. Effect sizes will be expressed as odds ratios (for dichotomous data) and weighted (or standardised) mean differences for continuous data. A funnel plot will be generated using JBI SUMARI to assess publication bias if ten or more studies are included in the meta-analysis.

If the outcomes are highly variable, analysis with GRADE evidence can be applied using the GRADEProfiler 3.6 Software (McMaster University, ON, Canada) [16]. Where statistical grouping is impossible, results will be presented in narrative form, including tables and figures, to aid data presentation where appropriate.

### 3. Discussion

This systematic review will gather the necessary results to identify Wii games' effectiveness in the physical training of the elderly. More specifically, the present study will allow us to understand which are the most effective Wii games in muscle strengthening, balance training, gait training, promoting body flexibility, promoting body coordination, promoting body agility and promoting physical resistance. In addition, it is also essential to know the duration and frequency with which these games should be used for the elderly to obtain these health gains.

The results of this systematic review will outline the type of games to be implemented in a randomised controlled study with the elderly. Implementing exergames, specifically Wii games, among the older population will allow health gains, namely in their physical health, which is why it is essential to identify these games in the literature for later implementation.

Will be included in this systematic review of articles published without a time limit on the subject under study, studies written in English, Portuguese, Spanish and French, which may constitute this last criterion, one of the limitations of this study.

### 4. Conclusions

It is expected that this systematic review will constitute yet another contribution to the implementation of physical activity programs aimed at the elderly and that they will present practical gains in their health, namely, material, contributing, this time, to active,

healthy and successful ageing using advanced technical and technological means, which go far beyond traditional programs. This type of means or resource introduces curiosity and motivation in those who practice it, which can significantly contribute to preventing a sedentary lifestyle in this population. This protocol intends to identify Wii games that can contribute to the physical training of the elderly and thus implement these games in the daily practice of care for this population, not only to recover but also to prevent losses from the ageing process.

**Author Contributions:** Conceptualization: A.L., M.T.M., M.S.F., V.P. and C.F. Validation A.L., M.T.M., M.S.F., V.P., D.T.M., M.d.P.N. and C.F. Writing—initial draft preparation: A.L., M.T.M., M.S.F., V.P., D.T.M., M.d.P.N. and C.F. Writing—review and editing A.L., M.T.M., M.S.F., V.P., D.T.M., M.d.P.N. and C.F. All authors have read and agreed to the published version of the manuscript.

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**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Not applicable.

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**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Tan, J.; Kumar, R.; Ralph, P. Blending immersive gameplay with intense exercise using asynchronous exergaming. In Proceedings of the 2016 IEEE/ACM 5th International Workshop on Games and Software Engineering (GAS), Austin, TX, USA, 16 May 2016; pp. 1–7. [\[CrossRef\]](#)
2. Fernandes, C.S.; Magalhães, B.; Lima, A.M.N.; Nóbrega, P.; Silva, M.; Santos, C.S.V. Impact of exergames on the mental health of older adults: A systematic review and GRADE evidence synthesis. *Games Health J.* **2022**, *11*, 355–368. [\[CrossRef\]](#) [\[PubMed\]](#)
3. Buyle, M.; Jung, Y.; Pavlou, M.; Gonzalez, S.C.; Bamio, D.-E. The role of motivation factors in exergame interventions for fall prevention in older adults: A systematic review and meta-analysis. *Front. Neurol.* **2022**, *13*, 903673. [\[CrossRef\]](#) [\[PubMed\]](#)
4. Tam, A.C.Y.; Chan, A.W.Y.; Cheung, D.S.K.; Ho, L.Y.W.; Tang, A.S.K.; Christensen, M.; Tse, M.M.Y.; Kwan, R.Y.C. The effects of interventions to enhance cognitive and physical functions in older people with cognitive frailty: A systematic review and meta-analysis. *Eur. Rev. Aging Phys. Act.* **2022**, *19*, 19. [\[CrossRef\]](#) [\[PubMed\]](#)
5. González-Bernal, J.; Jahouh, M.; González-Santos, J.; Mielgo-Ayuso, J.; Fernández-Lázaro, D.; Soto-Cámara, R. Influence of the use of Wii games on physical frailty components in institutionalized older adults. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2723. [\[CrossRef\]](#) [\[PubMed\]](#)
6. Apóstolo, J.; Cooke, R.; Bobrowicz-Campos, E.; Santana, S.; Marcucci, M.; Cano, A.; Vollenbroek-Hutten, M.; Germini, F.; D’Avanzo, B.; Gwyther, H.; et al. Effectiveness of interventions to prevent pre-frailty and frailty progression in older adults: A systematic review. *JBI Database Syst. Rev. Implement. Rep.* **2018**, *16*, 140–232. [\[CrossRef\]](#) [\[PubMed\]](#)
7. Ismail, N.A.; Hashim, H.A.; Yusof, H.A. Physical activity and exergames among older adults: A scoping review. *Games Health J.* **2022**, *11*, 1–17. [\[CrossRef\]](#) [\[PubMed\]](#)
8. Chao, Y.Y.; Scherer, Y.K.; Montgomery, C.A. Effects of using Nintendo Wii™ exergames in older adults: A review of the literature. *J. Aging Health* **2015**, *27*, 379–402. [\[CrossRef\]](#) [\[PubMed\]](#)
9. Silva, V.; Campos, C.; Sá, A.; Cavadas, M.; Pinto, J.; Simões, P.; Machado, S.; Murillo-Rodríguez, E.; Barbosa-Rocha, N. Wii-based exercise program to improve physical fitness, motor proficiency and functional mobility in adults with down syndrome. *J. Intellect. Disabil. Res.* **2017**, *61*, 755–765. [\[CrossRef\]](#) [\[PubMed\]](#)
10. Padala, K.P.; Padala, P.R.; Lensing, S.Y.; Dennis, R.A.; Bopp, M.M.; Roberson, P.K.; Sullivan, D.H. Home-based exercise program improves balance and fear of falling in community-dwelling older adults with mild Alzheimer’s disease: A pilot study. *J. Alzheimer’s Dis.* **2017**, *59*, 565–574. [\[CrossRef\]](#) [\[PubMed\]](#)
11. Padala, K.P.; Padala, P.R.; Lensing, S.Y.; Dennis, R.A.; Bopp, M.M.; Parkes, C.M.; Garrison, M.K.; Dubbert, P.M.; Roberson, P.K.; Sullivan, D.H. Efficacy of Wii-fit on static and dynamic balance in community dwelling older veterans: A randomized controlled pilot trial. *J. Aging Res.* **2017**, *2017*, 4653635. [\[CrossRef\]](#) [\[PubMed\]](#)
12. Aromataris, E.; Munn, Z. (Eds.) *JBI Manual for Evidence Synthesis*; JBI: Adelaide, SA, Australia, 2020.
13. Page, M.J.; McKenzie, J.E.; Bossuyt, P.M.; Boutron, I.; Hoffmann, T.C.; Mulrow, C.D.; Shamseer, L.; Tetzlaff, J.M.; Akl, E.A.; Brennan, S.E.; et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ* **2021**, *372*, n71. [\[CrossRef\]](#) [\[PubMed\]](#)
14. Tufanaru, C.; Munn, Z.; Aromataris, E.; Campbell, J.; Hopp, L. Chapter 3: Systematic reviews of effectiveness. In *JBI Manual for Evidence Synthesis*; Aromataris, E., Munn, Z., Eds.; JBI: Adelaide, SA, Australia, 2020.



15. Munn, Z.; Aromataris, E.; Tufanaru, C.; Stern, C.; Porritt, K.; Farrow, J.; Craig, L.; Matthew, S.; Sandeep, M.; Lucylynn, L.; et al. The development of software to support multiple systematic review types: The joanna briggs institute system for the unified management, assessment and review of information (JBI SUMARI). *Int. J. Evid. Based Healthc.* **2019**, *17*, 36–43. [[CrossRef](#)] [[PubMed](#)]
16. Guyatt, G.H.; Oxman, A.D.; Vist, G.E.; Kunz, R.; Falck-Ytter, Y.; Alonso-Coello, P.; Schünemann, H.J. GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* **2008**, *336*, 924–926. [[CrossRef](#)] [[PubMed](#)]

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