SYSTEMATIC REVIEW

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The Effects of Gamified Exercise on the Physical Health of Older Women: A Systematic Review

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Abstract

This systematic review aims to determine the effects of gamified exercise on the physical health of older women. A search of PubMed, Scopus, Web of Science, Cochrane, EBSCO, Google Scholar, and TR Dizin databases was conducted between July 1 and August 1 2025. Studies published in 2021 or later that investigated game-based interventions and employed randomised controlled or quasi-experimental designs were included. In line with the inclusion criteria, only studies involving women aged 65 years or older were reviewed, resulting in the inclusion of seven studies in the final analysis. Game-based exercises improved lower-extremity strength, balance, and postural control and reduced signs of fatigue and pre-frailty. Virtual-reality and Wii-based training demonstrated significant functional gains and were safe in older women. No additional benefit was found from transcranial stimulation. Overall, exercise games effectively improved physical and cognitive outcomes. Game-based activities are an effective and motivating approach to improving physical function in older women and may be considered a complementary intervention in geriatric rehabilitation.

Keywords: Older women, game-based exercise, physical function, geriatric rehabilitation

Introduction

The rapid increase in the elderly population worldwide is redefining the priorities of healthcare systems. Women, in particular, constitute a significant proportion of the elderly population due to their longer life expectancy and to biopsychosocial factors (1). Biopsychosocial factors include biological processes such as hormonal changes, loss of muscle and bone mass, and increased prevalence of chronic diseases; psychological factors such as depression, anxiety, loneliness, and loss of motivation; and societal factors such as changes in social roles, social isolation, caregiver burden, and economic dependency (2-4). The combination of these factors accelerates the loss of physical capacity and negatively impacts quality of life in older women (5). Therefore, it is important to develop low-cost, accessible, and comprehensive interventions that support the health of older women.

Game-based activities are increasingly used as innovative interventions to promote physical, cognitive, and psychosocial health among older adults. Physical games (e.g., boccia, movement games), cognitive games (e.g., Jenga, chess, Sudoku, puzzles), and digital games (e.g., exergaming, Wii, virtual reality (VR) games) can offer multiple benefits. The literature reports that game-based exercise improves balance, mobility, and physical performance in older people (6-8). However, existing studies tend to focus on the older population as a whole, and little data are available specifically on older women. However, women are a group at particular risk, as they are more likely to experience health problems, require more carers, and live alone in the postmenopausal period (9).

According to the existing literature, no previous systematic review has focused solely on the effects of gamified exercise interventions in older women, highlighting a critical gap in the current evidence base. This systematic review aims to develop

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evidence-based practice by demonstrating the effectiveness of game-based interventions for improving balance, mobility, and physical performance in older women.

Materials and Methods

Establishment of the Problem

The seven studies included in this systematic review were selected based on the following PICOS criteria: Population (P): women aged 60 years or older. Intervention (I): Game-based activities such as physical games (digital games, exergaming, Wii, VR-based games). Comparison (C): Individuals who received no intervention or participated in different activities (e.g., standard exercise, educational programmes, or passive activities). Outcomes (O): Physical function, mobility, balance, walking, and physical performance. Study design (S): Randomised controlled trials published in English and Turkish in 2021 and later.

Evidence Sources and Retrieval Strategies

For this systematic review, a literature search was conducted between July 1 and August 1, 2025. To retrieve international publications, the keywords "game and older women/game and elderly women", "Nintendo Wii", "Nintendo Switch", "video game," "exergame", "physical function", "mobility", "balance", "gait", "motor function", and "physical performance" were used. The databases searched included Web of Science, Scopus, PubMed, Cochrane, and EBSCO (Medline, CINAHL, PsycINFO). Additionally, Google Scholar and the TR Dizin database were searched to identify studies published in Türkiye.

Study Inclusion and Exclusion Criteria

The inclusion criteria for this systematic review were: participants were exclusively women aged 60 years or older; the intervention included game-based activities (digital games); the comparison group received no intervention or participated in another activity; at least one physical health indicator (such as mobility, balance, walking, muscle strength) was assessed as an outcome; the research design was randomised, controlled, or quasi-experimental; and the study was published in 2021 or later and in English or Turkish. The exclusion criteria were as follows: studies that consisted only of men or in which data on women were not reported separately; non-game-based interventions; qualitative studies; case reports; observational studies; reviews; conference abstracts; editorial articles; publications before 2021 or written in languages other than English and Turkish; and publications for which the full text could not be accessed.

Data Extraction

The researchers developed a standard data extraction tool for data collection, which was used in this study. This tool was designed to collect basic information about the studies. It includes the author(s)' name(s) and year of publication, the study location and duration, the research design, sample size, demographic characteristics of the groups, the type and method of the game-based intervention applied, and the main findings.

Results

A total of 3,952 data records were identified through database searches. Of these, 1,617 were duplicate records, 1,429 were categorised as unsuitable by automated tools, and 625 were excluded for other reasons. The remaining 281 records were screened on the basis of titles and abstracts, resulting in the exclusion of 225 records that did not meet the eligibility criteria. Fifty-six full-text articles were screened for eligibility; 49 were excluded (including descriptive studies, protocols, case reports, and qualitative studies). Ultimately, seven studies were included in this review (Figure 1).

Working Characteristics

Table 1 summarises the methodologies of the included studies. All studies were conducted among community-dwelling elderly women, and interventions were implemented in various clinical settings. Intervention durations ranged from 4 to 12 weeks, with sessions planned at a frequency of 2–3 times per week. The gamified exercise systems used included Nintendo Wii Fit Plus, Xbox Kinect, Beat Saber, Audioshield, immersive VR headsets, and applications combined with transcranial direct current stimulation (tDCS).

Control groups usually participated in conventional training programmes (proprioceptive exercises, home exercises, kinesiotherapy), whereas in some studies, only exergaming groups were included for comparison. Overall, studies have shown that exergaming applications can have positive effects on balance, postural control, physical function, and muscle strength in older women, but some studies have found that they are not superior to conventional exercises and instead show similar effects.

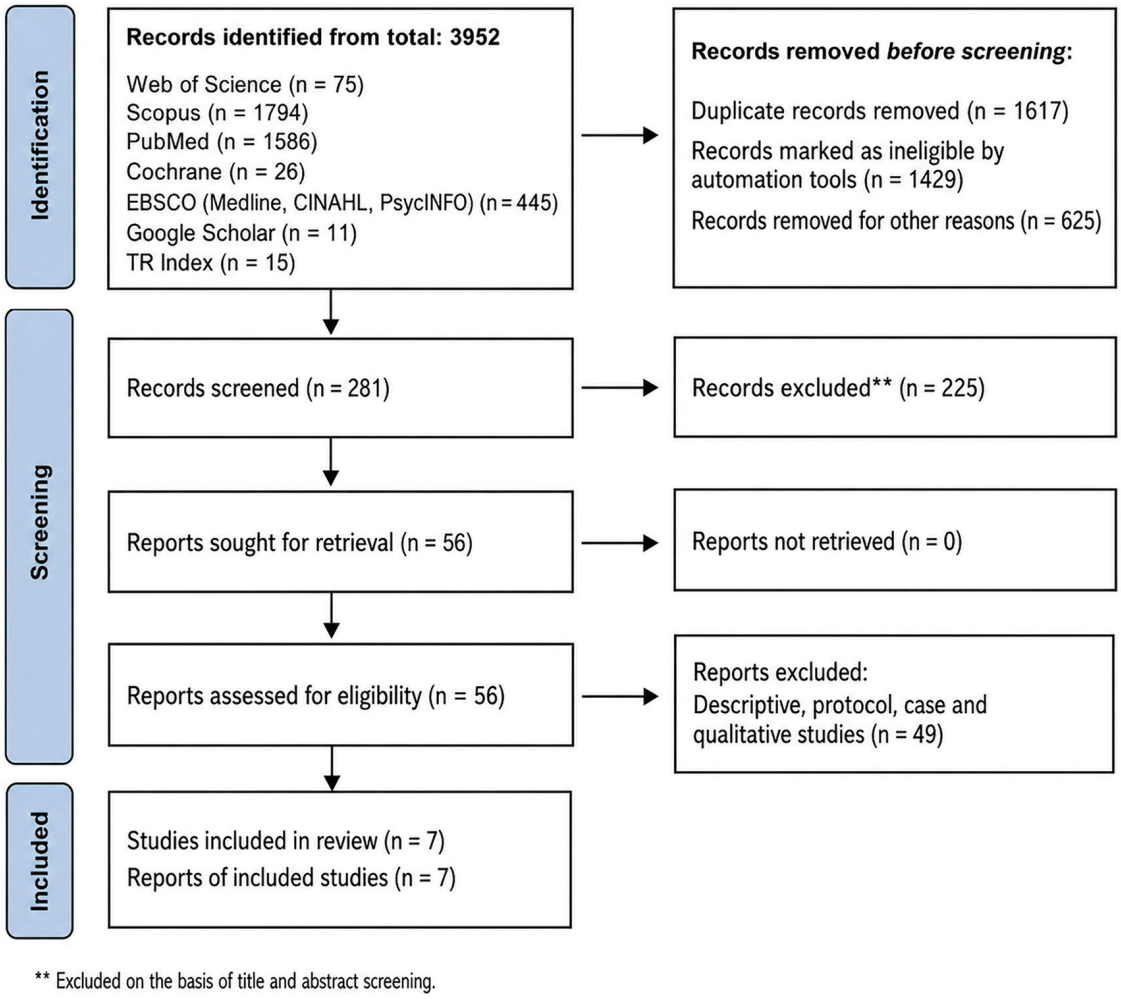

Figure 1. PRISMA flow diagram (10).

Table 1. Characteristics of the included studies.

Author (year) / country	Study year	Intervention characteristics	Sample size	Mean age	Measurement tool/ diagnostic test	Results / key findings
Filho et al. (11) (2022), Brazil	2017–2018	Exercise games (Nintendo Wii Fit Plus, resistance and balance exercises, twice a week, 12 weeks) + protein or isocaloric support	90 women	PTG: 71.2 years PSG: 73.1 years PTPSG: 71.7 years PTISG: 69.7 years CG: 70.4 years	Knee strength tests, five-time chair rise, timed up and go (TUG), gait speed, handgrip, ultrasound, fried frailty	Exercise games with protein supplementation increased lower extremity strength, reduced fatigue, and reversed pre-frailty status in some participants; improvements were significant within groups but not between groups.
Campo-Prieto et al. (12) (2022), Spain	2022	Immersive virtual reality exercise (10 weeks, three days a week, 6-minute sessions)	12 women	EG: 91.67 years CG: 90.83 years	Tinetti balance and walk test, TUG, usability scale	The virtual reality group significantly improved balance, gait, and total Tinetti scores. TUG scores were maintained. It was found to be safe and applicable in non-generative individuals.
Henrique et al. (13) (2023), Brazil	2023	Kinesiotherapy + exercise game vs. kinesiotherapy alone; 6 weeks, 2 days/week	22 women	EG: 64.3 years CG: 63.8 years	Brain-derived neurotrophic factor, interleukins, tumor necrosis factor, histone acetylation, Montreal cognitive assessment, cognitive tests	Improvements in cognitive performance, brain-derived neurotrophic factors, histone acetylation, and inflammation profiles were observed in both groups.

Table 1. Continued

Author (year) / country	Study year	Intervention characteristics	Sample size	Mean age	Measurement tool/ diagnostic test	Results / key findings
Mascarenhas et al. (14) (2023), Brazil	2023	Conventional proprioceptive exercise vs. Xbox Kinect exercise game vs. control; 8 weeks, 3 days/week	50 women	60–79 years (not mean)	Monofilament test	Both intervention groups increased plantar sensory sensitivity, with significant improvements compared to the control group. No difference was found between the groups.
Yilmaz and Kösehasanoğulları (15) (2024), Türkiye	2022	Wii Fit balance games vs. home exercise; 3 days/ week, 12 weeks	60 women	WEG: 67 years HEG: 68 years	TUG, Berg balance scale (BBS), falls efficacy scale (FES)	TUG, BBS, and FES improved in both groups. The Wii group showed greater improvement on the BBS. Exergaming was found to be superior to home exercise in women with osteoporosis.
Yalfani et al. (16) (2024), Iran	2021	Virtual reality-based exercises (bowling, boxing, tennis, skiing, Beat Saber, Audioshield, etc.; 3 days/week, 30 minutes, 8 weeks)	27 women	VRTG: 68.25 years CG: 67.08 years	Plantar pressure analysis, 30-second chair stand test, TUG	Virtual reality training reduced swaying in all directions and improved 30-second chair rise time, TUG performance, postural control, and overall physical function in older adults.
Corrêa et al. (17) (2024), Brazil	2023	Wii Fit balance games + transcranial direct current stimulation (anodal vs. sham) vs. game only; 4 weeks	57 women	AG: 70 SG: 69 CG: 69	Mini balance evaluation systems test	Mini balance assessment test scores improved in all groups; transcranial direct current stimulation provided no additional benefit, indicating that play training alone was effective.

PTG: Physical training using exergames, PSG: Protein supplementation, PTPSG: Physical training and protein supplementation, PTISG: Physical training and isoenergetic supplementation, EG: Experimental group, CG: Control group, TUG: Timed up and go, BBS: Berg balance scale, FES: Falls efficacy scale, WEG: Wii exercise group, HEG: Home exercise group, AG: Anodal group, SG: Sham group, VRTG: Virtual reality training group.

Discussion

Gamification is an approach designed to increase individuals' motivation and to create positive experiences by adapting mechanisms and elements from games to non-game domains (18,19). In recent years, the use of gamification-based methods in training programmes has increased and appears to enhance motivation (20). Gamified exercises, particularly in older adults, have been reported to increase adherence to exercise and to have potential positive effects on muscle strength, balance, walking speed, and functional capacity. A significant number of randomized controlled trials in our review suggest that exergames may be as effective as traditional exercise (13,14) and superior to home exercise or standard treatment approaches (15). A meta-analysis by Chen et al. (21) also reported that exergames may be comparable to traditional exercise in improving physical function, and a 2022 meta-analysis supports these findings (22). Current literature suggests that exergame interventions could be used as an alternative to traditional exercise and may, in some cases, even improve exercise adherence by enhancing motivation and participation. Factors such as low digital literacy in older individuals, difficulty accessing technology, and differences in motivation may limit the applicability and effectiveness of such interventions. However, inconsistent findings regarding their superiority over traditional exercise suggest that further high-quality randomized controlled trials are needed to clarify their effectiveness and to determine the conditions under which they may be more beneficial.

Our review also suggests that exergaming may have positive effects on lower-extremity muscle strength and functional capacity (11,15,16). Hernandez-Martinez et al. (23) reported that Wii Fit interventions improved lower-limb muscle strength by 34%, balance by 23.6%, and reduced fall risk by 35.1% in older adults over a six-week period, compared with those receiving conventional balance training. Additionally, a meta-analysis by Viana et al. (24) indicated that exergaming can enhance both upper- and lower-limb muscle strength in individuals with various health conditions, although this effect may be limited among middle-aged and older adults. These findings suggest that the effects of exercise games may vary depending on factors such as age, health status, duration of intervention, type of game used, and exercise intensity. Therefore, studies with larger samples, standardised protocols, and long-term follow-up may be needed to more comprehensively evaluate the effectiveness of exergame interventions.

Our study also demonstrates that exercise games can be safely implemented even among older adults. Campo-Prieto et al. (12) reported that VR exercises had beneficial effects on balance and gait in women aged over 90 years. Corrêa et al. (17) showed that Wii Fit balance games alone could improve balance without the need for additional methods such as tDCS. However, conflicting findings have also been reported in the literature. Montero-Alía et al. (25) noted that balance training using Nintendo Wii in individuals over 70 years of age did not have a significant effect on fall risk and balance. Lee et al. (26) reported that VR exercises only provided benefits for balance, but did not produce significant changes in walking, mobility, or fear of falling. These differences may stem from the lack of standardisation in intervention protocols, the variety of games and devices used, variation in application duration and intensity, and heterogeneity in participant characteristics. Additionally, factors such as low levels of digital literacy, limited access to technology, and differences in motivation among older adults may limit the effectiveness and feasibility of such interventions.

Study Limitations

This systematic review has several limitations. Most included studies do not report participants' cognitive status or comorbidities, which could influence outcomes. Additionally, the majority of the studies were designed as short-term interventions (4–12 weeks), making it difficult to draw conclusions about long-term effects. Furthermore, the heterogeneity of intervention types, implementation durations, and assessment scales is another important factor limiting the comparability and comprehensive evaluation of the results.

Conclusion

The reviewed study findings and existing literature suggest that exercise games have the potential to increase exercise participation and support motivation in older adults. The engaging, motivating, and accessible nature of technological applications may facilitate long-term adherence. In this context, exercise games can be considered an effective alternative, particularly for older adults who have difficulty adhering to exercise programs or who are unable to maintain traditional programs.

In summary, exergaming appears to be a safe and effective approach for enhancing balance, muscle strength, and functional performance in older women. These interventions may serve as complementary or alternative options to conventional exercise programs. Nevertheless, further evidence from randomized controlled trials with larger sample sizes, longer follow-up periods, and diverse populations is needed to confirm these results. Furthermore, the availability and sustainability of these interventions in various settings, such as home-based programs, nursing homes, or community centers, should be investigated to obtain more concrete data on their effectiveness in both clinical and real-world settings.

Footnotes

Authorship Contributions

Concept: A.K.S., Y.S.A., Design: A.K.S., Y.S.A., Data Collection or Processing: A.K.S., Y.S.,A., Analysis or Interpretation: A.K.S., Y.S.A., Literature Search: A.K.S., Y.S.A., Writing: A.K.S., Y.S.A.

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