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REHABILITATION NURSING INTERVENTIONS FOR PROMOTING BALANCE IN OLDER ADULTS: SCOPING REVIEW

INTERVENÇÕES DO ENFERMEIRO ESPECIALISTA EM ENFERMAGEM DE REABILITAÇÃO
PROMOTORAS DO EQUILÍBRIO NA PESSOA IDOSA: SCOPING REVIEW

INTERVENCIONES DE ENFERMERÍA DE REHABILITACIÓN PARA PROMOVER
EL EQUILIBRIO EN ADULTOS MAYORES: SCOPING REVIEW

Paula Rocha¹ ; Joana Gaspar² ; Carlos Albuquerque² ; Susana Batista² 

¹ Escola Superior de Saúde de Viseu do Instituto Politécnico de Viseu, Viseu, Portugal

² Escola Superior de Saúde de Viseu, Viseu, Portugal

Corresponding Author: Paula Rocha, paularocha@essv.ipv.pt

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RESUMO

Introdução: O envelhecimento populacional é um dos maiores desafios em saúde pública. O equilíbrio é determinante para a autonomia da pessoa idosa, estando associado à prevenção de quedas. O objetivo deste estudo foi mapear a evidência científica sobre as intervenções do Enfermeiro Especialista em Enfermagem de Reabilitação (EEER) promotoras do equilíbrio na pessoa idosa.

Metodologia: Foi realizada uma Scoping review com base nas orientações definidas pela Joanna Briggs Institute (JBI), orientada pela questão de investigação: “Quais as intervenções do enfermeiro de reabilitação promotoras do equilíbrio na pessoa idosa?”. A pesquisa foi efetuada nas bases de dados PubMed, CINAHL complete, MEDLINE complete, MedicLatina, Nursing & Allied Health Collection: Comprehensive e Cochrane Central Register of Controlled Trials. Foram considerados todos os artigos publicados em português, inglês, espanhol e francês, no período compreendido entre 2020 e 2025, que incluíram pessoas idosas (≥65 anos) residentes na comunidade.

Resultados: Foram incluídos 23 estudos, que evidenciaram quatro categorias de intervenção promotoras do equilíbrio na pessoa idosa: exercícios musculoesqueléticos, sensoriomotores, cognitivo-motores e multicomponente. Estas estratégias mostraram melhorias significativas no equilíbrio, marcha, proprioção e prevenção de quedas.

Conclusão: As intervenções do EEER promotoras do equilíbrio têm um impacto positivo na manutenção da funcionalidade e prevenção de quedas, na pessoa idosa. Programas multicomponente, que integrem treino muscular, sensorial e cognitivo, apresentam maior eficácia, na abordagem a esta problemática.

Palavras-chave: Idoso; Reabilitação; Equilíbrio; Enfermagem de reabilitação.

ABSTRACT

Introduction: Population aging is one of the greatest challenges in public health. Balance is crucial for the autonomy of older adults and is associated with fall prevention. The aim of this study was to map the scientific evidence on interventions by Rehabilitation Nursing specialists that promote balance in older adults.

Methodology: A scoping review was conducted based on the guidelines defined by the Joanna Briggs Institute (JBI), guided by the research question: “What are the interventions of rehabilitation nurses that promote balance in older adults?” The search was conducted in the PubMed, CINAHL complete, MEDLINE complete, MedicLatina, Nursing & Allied Health Collection: Comprehensive, and Cochrane Central Register of Controlled Trials databases. All articles published in Portuguese, English, Spanish, and French between 2020 and 2025 that included older adults (≥65 years) living in the community were considered.

Results: Twenty-three studies were included, which showed four categories of interventions that promote balance in older adults: musculoskeletal, sensorimotor, cognitive-motor, and multicomponent exercises. These strategies showed significant improvements in balance, gait, proprioception and fall prevention.

Conclusion: Rehabilitation nursing interventions that promote balance have a positive impact on maintaining functionality and preventing falls in older adults. Multicomponent programs that integrate muscle, sensory, and cognitive training are more effective in addressing this issue.

Keywords: Aged Adults; Rehabilitation; Postural Balance; Rehabilitation nursing.

RESUMEN

Introducción: El envejecimiento de la población es uno de los mayores retos en materia de salud pública. El equilibrio es fundamental para la autonomía de las personas mayores y está relacionado con la prevención de caídas. El objetivo de este estudio fue recopilar la evidencia científica sobre las intervenciones de los especialistas en enfermería de rehabilitación que promueven el equilibrio en las personas mayores.

Metodología: Se llevó a cabo una revisión exploratoria basada en las directrices definidas por el Instituto Joanna Briggs (JBI), guiada por la pregunta de investigación: «¿Cuáles son las intervenciones de las enfermeras de rehabilitación que promueven el equilibrio en los adultos mayores?». La búsqueda se realizó en las bases de datos PubMed, CINAHL complete, MEDLINE complete, MedicLatina, Nursing & Allied Health Collection: Comprehensive y Cochrane Central Register of Controlled Trials. Se consideraron todos los artículos publicados en portugués, inglés, español y francés entre 2020 y 2025 que incluían a adultos mayores (≥65 años) que vivían en la comunidad.

Resultados: Se incluyeron veintitrés estudios que mostraron cuatro categorías de intervenciones que promueven el equilibrio en los adultos mayores: ejercicios musculoesqueléticos, sensoriomotores, cognitivo-motores y multicomponentes. Estas estrategias mostraron mejoras significativas en el equilibrio, la marcha, la propiocepción y la prevención de caídas.

Conclusión: Las intervenciones de enfermería de rehabilitación que promueven el equilibrio tienen un impacto positivo en el mantenimiento de la funcionalidad y la prevención de caídas en los adultos mayores. Los programas multicomponentes que integran el entrenamiento muscular, sensorial y cognitivo son más eficaces para abordar esta cuestión.

Palabras clave: Adultos mayores; Rehabilitación; Equilibrio; Enfermería de rehabilitación.

INTRODUCTION

Population aging represents a growing challenge for health systems, being associated with a reduction in physical and cognitive abilities and an increased risk of disease and mortality. The World Health Organization (WHO) estimates that by 2030, 1 in 6 people in the world will be 60 or older ⁽¹⁾. In Portugal, demographic aging has intensified, with 192.4 elderly people for every 100 young residents in the country in 2024, meaning that there are almost twice as many elderly people as young people ⁽²⁾. This natural process involves physiological changes in the musculoskeletal, nervous, vestibular and visual systems, compromising motor coordination, gait and body balance, critical factors for the autonomy of the aged people ^(3,4).

It is known that loss of balance is associated with greater vulnerability to falls and limitations in Activities of Daily Living (ADL), directly impacting independence and quality of life ⁽⁵⁾. Exercises aimed at improving balance, including proprioceptive training and stimulation of sensory systems, have been shown to be effective in promoting postural stability, motor coordination and body awareness ^(6,7).

The Specialist Nurse in Rehabilitation Nursing (SNRN) plays a central role in the early identification of these changes and in the implementation of interventions aimed at promoting postural stability and functionality ⁽⁵⁾.

Considering the relevance of this topic, this review aimed to map the scientific evidence regarding SNRN interventions that promote balance in older adults.

METHODOLOGY

A scoping review was conducted between March and August 2025, based on the recommendations of the Joanna Briggs Institute (JBI). The study was registered in the Open Science Framework (OSF), with the DOI: <https://doi.org/10.17605/OSF.IO/TF45N>. This type of review was chosen because it is a methodological approach oriented towards identifying gaps in knowledge and for the preliminary mapping of existing scientific evidence on a given topic ⁽⁸⁾.

The PRISMA model - Preferred Reporting Items for Systematic Reviews and Meta-Analyses - was used to organize the information. The recommendations described in PRISMA-ScR (PRISMA Extension for Scoping Reviews) were also followed ⁽⁸⁾.

The research question was based on the acronym PCC (Population, Concept, and Context), as it allows the research to be directed towards obtaining scientific evidence in a clear and objective manner, and the inclusion and exclusion criteria were defined (Table 1).

Table 1 - Inclusion and exclusion criteria according to the PCC methodology

Inclusion criteria		Exclusion criteria
P	Elderly people (aged 65 or older);	Children and adults;
C	Interventions focused on promoting, maintaining, or restoring balance; Studies involving rehabilitation interventions that can be performed by rehabilitation nurses (even if also performed by other professionals).	Interventions unrelated to promoting balance; Interventions directed at people with specific pathologies; Rehabilitation interventions not performed by rehabilitation nurses; Articles not available in full text;
C	Community (home, community care units and home hospitalization).	Interventions developed in hospitals

Beyond the PCC criteria, criteria were defined regarding the types of studies and methodologies to be included or excluded. Randomized clinical trials, observational studies (cross-sectional or longitudinal), qualitative studies, and systematic reviews with or without meta-analysis were included. The inclusion of systematic reviews is justified by their ability to consolidate existing scientific evidence, allowing the identification of effective interventions

and knowledge gaps in the area of rehabilitation nursing for the promotion of balance. Case reports, expert opinions, study protocols, as well as studies without a clear methodological description or without access to the full text were therefore excluded. This methodological option ensures the inclusion of studies with relevant and diverse scientific evidence, suitable for mapping rehabilitation nursing interventions aimed at promoting balance in

the elderly population. Thus, the following research question was formulated: What are the SNRN interventions that promote balance in the elderly people?

The research was conducted in six databases (PubMed, CINAHL complete, MEDLINE complete, MedicLatina, Nursing & Allied Health Collection: Comprehensive, and Cochrane Central Register of Controlled Trials) using keywords such as “aged”,

“postural balance”, “rehabilitation nursing”, and “exercise therapy”, combined with the Boolean operators AND and OR, using the following search strategies (Table 2). All articles published in Portuguese, English, Spanish, and French between 2020 and 2025 were considered. This time frame was chosen to ensure the inclusion of the most recent available scientific evidence.

Table 2 - Research strategy

Research strategy	Database
((“aged”[MeSH Terms] OR “aged”[Title/Abstract] OR “elderly”[Title/Abstract] OR “elder”[Title/Abstract] OR “older”[Title/Abstract] OR “old people”[Title/Abstract] OR “senior”[Title/Abstract] OR “seniors”[Title/Abstract] OR “older people”[Title/Abstract] OR “geriatric”[Title/Abstract]) AND (“rehabilitation nursing”[MeSH Terms] OR “rehabilitation nursing”[Title/Abstract] OR “nursing rehabilitation”[Title/Abstract] OR “rehabilitation”[MeSH Terms] OR “rehabilitation”[Title/Abstract] OR “recovery of function”[MeSH Terms] OR “recovery of function”[Title/Abstract] OR “exercise therapy”[MeSH Terms] OR “exercise therapy”[Title/Abstract] OR “rehabilitation exercise”[Title/Abstract] OR “remedial exercise”[Title/Abstract] OR “therapy exercise”[Title/Abstract] OR “exercise movement techniques”[MeSH Terms] OR “exercise movement techniques”[Title/Abstract] OR “exercise movement therapies”[Title/Abstract] OR “exercise movements”[Title/Abstract] OR “exercise movements technique”[Title/Abstract] OR “exercise movement technics”[Title/Abstract] OR “physical therapy modalities”[MeSH Terms] OR “physical therapy modalities”[Title/Abstract] OR “physiotherapy”[Title/Abstract] OR “neurological physiotherapy”[Title/Abstract] OR “neuropsychophysiotherapy”[Title/Abstract] OR “physical therapy”[Title/Abstract] OR “physical therapy techniques”[Title/Abstract] OR “physical therapy technics”[Title/Abstract] OR “musculoskeletal manipulations”[MeSH Terms] OR “musculoskeletal manipulations”[Title/Abstract] OR “manipulation therapy”[Title/Abstract] OR “manipulations musculoskeletal”[Title/Abstract] OR “manipulative therapies”[Title/Abstract] OR “manipulative therapy”[Title/Abstract] OR “manual therapies”[Title/Abstract]) AND (“postural balance”[MeSH Terms] OR “postural balance”[Title/Abstract] OR “balance postural”[Title/Abstract] OR “balance posture”[Title/Abstract] OR “posture balance”[Title/Abstract] OR “musculoskeletal equilibrium”[Title/Abstract] OR “postural control”[Title/Abstract] OR “posture control”[Title/Abstract] OR “postural equilibrium”[Title/Abstract] OR “posture equilibrium”[Title/Abstract])) AND (2020/1/1:2025/12/31[pdat])	PubMed

Research strategy	Database
“aged” OR “elderly” OR “elder” OR “older” OR “old people” OR “senior” OR “seniors” OR “older people” OR “geriatric” AND “rehabilitation nursing” OR “nursing rehabilitation” OR “rehabilitation” OR “recovery of function” OR “exercise therapy” OR “rehabilitation exercise” OR “remedial exercise” OR “therapy exercise” OR “exercise movement techniques” OR “exercise movement therapies” OR “exercise movements” OR “exercise movements technique” OR “exercise movement technics” OR “physical therapy modalities” OR “physiotherapy” OR “neurological physiotherapy” OR “neurophysiotherapy” OR “physical therapy” OR “physical therapy techniques” OR “physical therapy technics” OR “musculoskeletal manipulations” OR “manipulation therapy” OR “manipulations musculoskeletal” OR “manipulative therapies” OR “manipulative therapy” OR “manual therapies” AND “postural balance” OR “balance postural” OR “balance posture” OR “posture balance” OR “musculoskeletal equilibrium” OR “postural control” OR “posture control” OR “postural equilibrium” OR “posture equilibrium”	CINAHL complete
	MEDLINE complete
	MedicLatina
	Nursing & Allied Health Collection: Comprehensive
	Cochrane Central Register of Controlled Trials

The identification of articles to be included in this scoping review went through a rigorous and systematic selection process, using Rayyan software. The titles and abstracts were reviewed independently and blindly by two independent reviewers to

assess the eligibility of the studies in relation to the defined inclusion criteria, with the result obtained by consensus, so it was not necessary to include a third reviewer for tie-breaking.

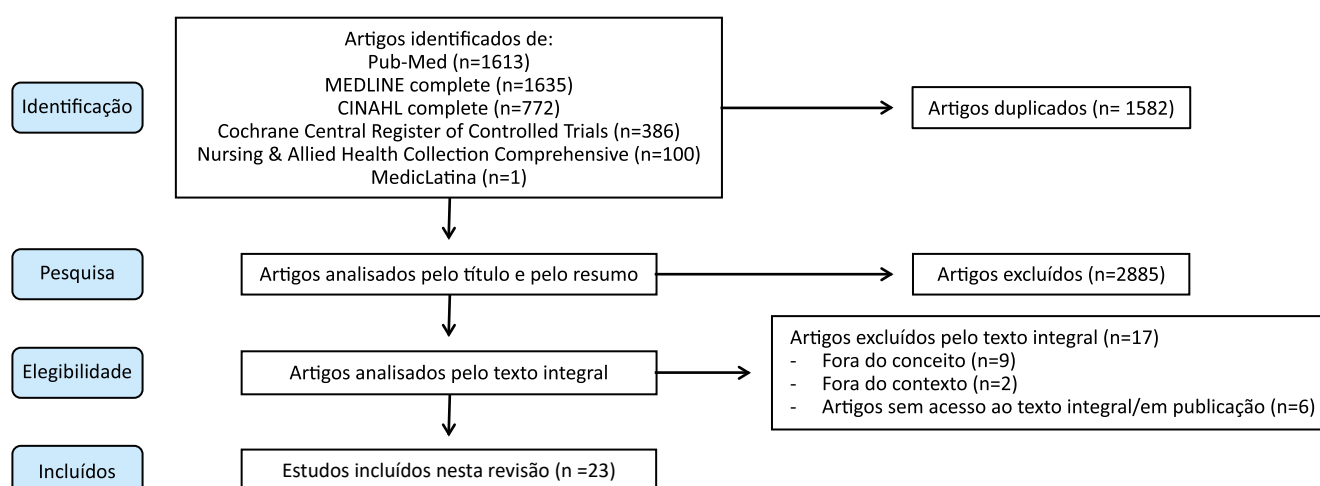
RESULTS

The scientific research carried out in the different databases allowed us to identify 4,507 articles, of which 1582 were eliminated because they were duplicates. After screening by the inclusion criteria, 2,885 articles were excluded, leaving 40 for full analysis, of which 17 were discarded. The selected articles ⁽²³⁾

were analyzed in detail in order to determine their relevance to this review.

The entire aforementioned process of selecting relevant articles to answer the formulated research question is explained in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA®) (figure 1).

Figure 1 - PRISMA® flowchart (adapted) of the study selection process



The articles included in this scoping review were published between 2020 and 2025. The highest concentration of publications was observed in 2024, with ten studies ^(9,10,11,12,13,14,15,16,17,18,19), followed by 2020 and 2021, with four articles each ^(19,20,21,22,23,24,25,26,27). One article was included from 2022 ⁽²⁸⁾, two articles from 2023 ^(29, 30), and finally, one article already published in 2025 ⁽³¹⁾.

Regarding geographical distribution, studies

from the Asian continent stand out with particular relevance. Studies developed in Europe and some from South America were also identified. This geographical dispersion reflects the scientific community's interest in addressing this topic.

Regarding the typology of the studies, randomized clinical trials prevailed ^(10,15,16,17,19,20,21,24,26,27,28,30), with different formats. Seven systematic reviews with or without meta-analysis were also identified

^(9,11,12,13,14,18,25,29,31). It is worth noting the presence of two observational studies, one cross-sectional ⁽²³⁾ and the other prospective longitudinal ⁽²¹⁾, which complement the methodological diversity of the sample.

For an adequate organization of the data extracted from the 23 articles included in the review, an instrument was developed, based on the Joanna Briggs Institute Manual ⁽⁸⁾, with the most relevant information to answer the initial question (table 3).

Table 3 - Summary of the articles included in the study

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Salse-Batán et al., 2025) ⁽³¹⁾ Spain	Effects of stretching exercise on walking performance and balance in older adults: A systematic review and meta-analysis	To analyze the effects of stretching exercises as a strategy to improve gait and balance in older adults.	Systematic review with meta-analysis of 29 randomized clinical trials (n not reported).	Muscle stretching exercises promoted improvements in gait and balance. The improvement in balance results from the increased range of motion resulting from the stretching of muscle fibers, improving the function of the trunk muscles.	Stretching can be an effective and safe strategy to improve balance and mobility in older adults.
(Mello et al., 2024) ⁽⁹⁾ Brazil	Updates in inspiratory muscle training for older adults: A systematic review	To evaluate the effects of inspiratory muscle training in older adults.	Systematic review of 13 studies (including healthy elderly individuals) with a control group, including randomized and non-randomized clinical trials (n not reported).	Training the inspiratory muscles improved dynamic and static balance, cardiac performance, endothelial function, and brain function.	Training inspiratory muscles, in addition to improving ventilation, has a positive impact on cardiovascular function and postural balance in older adults.

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Mohammadian et al., 2024) ⁽¹⁰⁾ Iran/ Chile	Effects of shuttle balance exercises on gait speed, postural control, and quality of life in older males: A randomized controlled trial	To analyze the effects of balance exercises on a shuttle platform (multidirectional movements on an unstable platform) on gait, postural control, and quality of life in elderly men.	Randomized clinical trial with an experimental group (with balance training on an unstable platform) and a control group (n not reported).	Significant improvements in postural control were observed in the intervention group. Improvements in gait speed were also noted.	Balance training exercises on a shuttle platform (on an unstable surface with multidirectional movements) have proven effective in promoting balance and functional mobility in older adults.
(Wang et al., 2024) ⁽¹¹⁾ China	Effect of multicomponent exercise intervention in community dwelling frail elderly: A systematic review and meta-analysis	To evaluate the effects of multicomponent exercise (strength, balance, endurance, and flexibility) on the functionality of older adults in a community setting.	Systematic review with meta-analysis of 19 randomized clinical trials (n=1221).	The combined strength and balance training exercises improved body balance and increased muscle strength. On the other hand, no effects were observed on gait speed.	Applying exercises with multiple components (balance and strength training) simultaneously has proven effective in improving body balance and functional capacity in older adults.

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Liang et al., 2024) ⁽¹²⁾ China	The effect of adding real-time postural <i>feedback</i> in balance and mobility training in older adults: A systematic review and meta-analysis	To evaluate the impact of real-time postural feedback on balance and mobility training.	Systematic review with meta-analysis (8 studies, n=203).	Interventions that incorporated real-time feedback (visual or vibratory) showed statistically significant improvements in dynamic balance and functional mobility. Providing vibrotactile feedback helps develop proprioceptive mechanisms and adjust the body's center of pressure. Similarly, providing visual feedback through a mirror showed improvements in dynamic balance by enhancing awareness of body position in space.	By providing real-time feedback during balance or mobility training, we see immediate improvements in the balance of older adults.
(Dawson et al., 2024) ⁽¹³⁾ United Kingdom / Australia	Effective fall prevention exercise in residential aged care: an intervention component analysis from an updated systematic review	Identifying effective components in exercises to prevent falls in homes.	Systematic review with component analysis of 17 randomized clinical trials (n not reported).	The review shows that the most effective exercises include balance and strength training, which should be personalized for each individual and supervised by professionals.	Well-structured interventions based on strength and balance training, adapted to the needs of each individual, are more effective in improving the functional capacity of the elderly and therefore more effective in preventing falls.
(Mollà-Casanova et al., 2024) ⁽¹⁴⁾ Spain	Effects of mirror neuron activation therapies on functionality in older adults: Systematic review and meta-analysis	To evaluate the effects of mirror neuron activation therapies on functionality and balance.	Systematic review with meta-analysis of 13 randomized clinical trials (n not reported).	Mirror neuron activation therapies (mirror therapy, action observation, and motor imagery) produced statistically significant improvements in functional mobility, body balance, and gait speed.	Activating the neuronal system through therapies involving mirror neurons improves body balance and gait, allowing for improved functionality in the elderly.

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Niyazi et al., 2024) ⁽¹⁸⁾ Iran	The effect of functional exercise program on physical functioning in older adults aged 60 years or more: A systematic review and meta-analysis of randomized controlled trials	To evaluate the effects of functional exercise programs on the physical capacity of older adults (over 60 years old).	Systematic review with meta-analysis of 16 randomized clinical trials (n not reported).	Functional exercise programs (motor activities that simulate the performance of ADLs) show significant improvements in balance and gait (speed and cadence).	Functional exercise significantly improves functionality and independence in older adults by improving balance and gait.
(Zhang et al., 2024) ⁽¹⁵⁾ China	Effects of aerobic and combined aerobic-resistance exercise on motor function in sedentary older adults with mild cognitive impairment: A randomized controlled trial	To evaluate the effects of aerobic exercise (using a cycle ergometer) and combined exercise (aerobic and strength training with resistance exercises) on the motor function of sedentary older adults.	Randomized clinical trial with three groups: control, aerobic, and combined (n not reported).	Both exercise groups showed significant improvements in lower limb strength and static (single-leg stance with eyes closed) and dynamic balance. The combined group demonstrated additional improvements in dual-task gait speed.	Aerobic and combined exercise programs are beneficial for increasing lower limb muscle strength and therefore improving static and dynamic balance in sedentary elderly individuals. Combined exercise was effective in improving gait speed.
(Lee et al., 2023) ⁽²⁹⁾ South Korea	The effect of a gait and balance training program on an unstable mudflats surface in older adults: A randomized controlled pilot study	To evaluate the effect of gait and balance training on an unstable surface (muddy area) in elderly individuals.	Randomized, controlled, pilot clinical trial with blinded assessors (n not reported).	After applying balance and strength training exercises on an unstable surface (mud), significant improvements were observed in the experimental group, in the muscular strength of the lower limbs (particularly ankles and knees) and in static balance (single-leg stance with eyes open).	Balance and strength training on unstable surfaces significantly improved lower limb strength and balance in the short term in older adults.

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Hernández-Guillén et al., 2022) ⁽²⁸⁾ Spain	Talus mobilization-based manual therapy is effective for restoring range of motion and enhancing balance in older adults with limited ankle mobility: A randomized controlled trial	To analyze the relationship between talus mobilization and ankle mobility and balance in older adults.	Randomized clinical trial (n not reported).	Anteroposterior mobilization of the talus allows for a significant increase in range of motion (especially in dorsiflexion), which translates into improved static and dynamic balance.	Talus mobilization is effective in restoring range of motion in the ankle joint, improving dorsiflexion and consequently balance.
(Golubić et al., 2021) ⁽²³⁾ Slovenia	Association between trunk muscle strength and static balance in older women	To analyze the association between trunk muscle strength and static balance ability in elderly women.	Cross-sectional, correlational observational study (n=94, ≥65 years old).	The strength of the trunk extensor muscles correlated significantly with static balance (less postural displacement) in both single-task and dual-task conditions. No significant correlations were observed for the flexor and lateral muscles.	The strength of the trunk extensor muscles is associated with static balance ability in older women. This suggests that trunk strengthening programs may be useful in preventing falls.
(Oh & Choi, 2021) ⁽²⁴⁾ South Korea	Effects of Motor Imagery Training on Balance and Gait in Older Adults: A Randomized Controlled Pilot Study	To evaluate the effects of motor imagery training on balance and gait in elderly individuals.	Pilot randomized clinical trial, with random allocation of elderly individuals into three groups: experimental group with motor imagery training, group with task-oriented physical training, and a third group without intervention (n not reported).	Both intervention groups (with motor imagery and task-oriented physical training) significantly improved static balance and gait parameters compared to the control group. The group with motor imagery showed superior improvements in dynamic balance. When combined, they produce a superior positive effect.	Training with motor imagery, when combined with functional training, produced significant improvements in static and dynamic balance and gait ability, with more pronounced effects than training solely guided by tasks.

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Keating et al., 2021) ⁽²⁵⁾ Spain	Influence of Resistance Training on Gait & Balance Parameters in Older Adults: A Systematic Review	To analyze the impact of resistance training on gait and balance parameters.	Systematic review of 12 randomized clinical trials (n not reported).	Studies have indicated that resistance training (resistance exercises) has a positive impact on both gait and balance in older adults. Resistance training at the ankle joint level improved postural stability, thus improving static and dynamic balance.	Resistance training is effective in promoting mobility in older adults, as it improves walking ability and balance.
(Shahrbanian et al., 2021) ⁽²⁶⁾ Iran	The comparison of the effects of physical activity and <i>neurofeedback</i> training on postural stability and risk of fall in elderly women: A single-blind randomized controlled trial	To compare the effects of physical activity versus neurofeedback training on postural balance and fall risk in elderly women.	Randomized single-blind clinical trial (n=45, ≥65 years old), divided into three groups (control, physical activity, and neurofeedback) over 12 weeks.	Neurofeedback therapy has proven more effective in improving postural control and reducing the risk of falls than physical activity.	Both neurofeedback training and physical activity can improve postural control and reduce the risk of falls in older women. However, neurofeedback has proven superior to traditional physical activity.
(Stroppa-Marques et al., 2020) ⁽¹⁹⁾ Brazil	Plantar Myofascial Mobilization: Plantar Area, Functional Mobility, and Balance in Elderly Women: A Randomized Clinical Trial	To evaluate the effects of plantar myofascial mobilization on the plantar surface, functional mobility, and balance in elderly women.	Randomized, single-blind clinical trial (n=42, mean age 69 years old). Participants were divided into three groups: intervention group (vigorous plantar myofascial mobilization), placebo group (mild mobilization), and control group.	Vigorous myofascial mobilization promoted positive effects on foot morphology, increasing the plantar contact area and reorganizing the body's center of mass. It also allowed for the stimulation of plantar proprioceptive sensory components, with significant improvements in body balance.	Vigorous plantar myofascial mobilization improves balance and functional mobility in elderly women, as it increases plantar support and stimulates sensory and proprioceptive components of the foot.

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Espejo-Antúnez et al., 2020) ⁽²⁰⁾ Spain	The Effect of Proprioceptive Exercises on Balance and Physical Function in Institutionalized Older Adults: A Randomized Controlled Trial	To evaluate the effects of a proprioceptive exercise program on static/dynamic balance, functional mobility, endurance, and fall risk in institutionalized elderly individuals.	Randomized, single-blind clinical trial (n=42, ≥65 years old). Participants were randomly assigned to two groups: experimental group (proprioceptive exercises) and control group (usual activities).	The experimental group showed statistically significant improvements in total scores on balance and gait assessment tests compared to the control group. The effects were relevant, demonstrating that proprioceptive exercises are effective in improving balance and functionality.	Proprioceptive exercises are an effective and safe intervention to improve balance, mobility, and overall physical function in institutionalized older adults.
(Aartolahti et al., 2020) ⁽²¹⁾ Finland	Long-term strength and balance training in prevention of decline in muscle strength and mobility in older adults	To evaluate the effects of a supervised strength and balance training program (over a prolonged period) on muscle strength and physical functionality of older adults in a community setting.	Prospective longitudinal study (n=182, ≥75 years old). Weekly strength and balance training was conducted.	There was an improvement in knee extension strength, balance, and gait speed in female participants, and both sexes improved performance in the sit-to-stand test.	Strength and balance training, when combined, even on a weekly basis, can prevent the decline of muscle strength and mobility in older adults in the community, especially women. The beneficial effects tend to persist for some time after the intervention ends.
(Firoz et al., 2024) ⁽¹⁶⁾ India	Comparison of Effects of Balance Training Exercise and Gaze Stability Exercises on Balance and Postural Control in Elderly With Fall Risk: A Randomized Controlled Trial	To compare the effects of balance training versus gaze stability exercises in older adults at risk of falls.	Randomized clinical trial (n=44). Participants were divided into 3 groups (balance training, gaze stability training, and control).	The balance training group showed significant improvements compared to the gaze stability training group, which only showed improvement in one item. There were improvements in proprioception and reaction time, especially in the balance training group. The control group did not show significant changes.	Balance training exercises have proven more effective in improving postural control and balance in older adults at risk of falls, compared to gaze stability exercises. Similarly, they improved proprioception and self-confidence in gait (fall prevention).

(Authors, Year) Country	Title	Aims	Type of study / Methods	Results	Conclusions
(Shameer et al., 2023) ⁽³⁰⁾ India	Effects of Visual Feedback on Balance and Risk of Fall among Geriatric Population	To evaluate the effects of visual feedback (mirror) on balance and fall risk in older adults.	Randomized clinical trial (n=30). Divided into experimental group (visual feedback) and control group.	The group that received visual feedback demonstrated significant improvements in body balance and a reduced risk of falls when compared to the control group.	Visual feedback has proven to be an effective and accessible tool for improving balance and reducing the risk of falls in older adults.
(Sunethra et al., 2024) ⁽¹⁷⁾ India	Effectiveness of Multidirectional Stepping Training on Balance among Geriatric Population	To evaluate the effectiveness of multidirectional step training in improving balance in older adults.	Randomized clinical trial (n=82, ≥65 years old). Participants were randomly divided into two groups: an experimental group and a control group.	The experimental group, which performed multidirectional stepping training, showed statistically significant improvements in balance compared to the control group. An overall improvement was observed in body balance and motor response capacity in induced balance instability situations.	Multidirectional step training is an effective, simple, and low-cost strategy to improve body balance and reduce the risk of falls in older adults, thus improving their quality of life.
(Patel et al., 2020) ⁽²²⁾ India	Effectiveness of Combined Balance and Step Training versus Task-Oriented Exercises with Sensory Input on Balance in Older Adults: A Comparative Study	To compare the effects of combined balance and step training with task-oriented exercises with sensory stimulation on the balance of older adults.	Comparative study (n=40, ≥65 years old), divided into two groups: balance and stepping (multidirectional) training vs. task-oriented training with sensory stimulation (unstable surfaces).	Both groups showed significant improvements in balance scores, but the group with combined training (balance + multidirectional steps) showed more pronounced gains, especially in tasks requiring quick and multidirectional responses.	Although both types of training are effective in improving balance, combined balance and multidirectional step training is more effective than task-oriented exercises with sensory stimulation. Both should be combined for more positive effects.
(Chandran & Damodar, 2021) ⁽²⁷⁾ India	Comparison of Single Task and Dual Task Balance Training on the Quality of Life of Elderly with Balance Impairment	To compare the effects of single-task and dual-task balance training on the quality of life of elderly people with imbalance.	Comparative experimental study with parallel groups (n=34). Divided into two groups: single-task training vs. dual-task training.	The dual-task training group achieved more significant improvements in dimensions related to autonomy, mobility, and social participation. Introducing cognitive challenges during balance training stimulates functional adaptation.	Dual-task training is more effective than traditional (single-task) training in improving the overall quality of life and functionality of older adults.

The systematic reviews included in this review demonstrated that targeted exercise programs consistently improve balance, functional mobility, and, in some cases, gait speed in older adults ^(9,10,11,13,25,36). Exercises encompassing various strategies were identified, such as inspiratory muscle training, mirror neuron activation therapies, and the use of real-time feedback ^(9,12,14,16,23,30,38). When these interventions are associated with complementary strategies, they tend to enhance functional capacity, according to the conclusions of the reviews ^(11,13,21,41).

Regarding clinical trials, it was found that the experimental groups obtained significant improvements in balance and gait compared to the control groups ^(10,15,17,22,25,28,29). Strategies such as training on unstable surfaces, dual-task training, and joint mobilizations were applied ^(10,27,28,29,33,36,40). Exercise plans that combined strength and balance training proved to be more effective than those that used only one of these modalities. Strategies such as neurofeedback proved to be interesting alternatives in balance training; however, evidence on this topic is still limited ^(9,15,23,26,34,35,39).

In methodological terms, most intervention plans had short durations and small sample sizes, which limits the generalization of the results and reinforces the need for more robust and standardized studies.

From the analysis of the studies selected for this review and subsequent systematization of the data, four categories of SNRN interventions promoting balance in older adults in a community setting emerged: musculoskeletal exercises, sensorimotor exercises, cognitive-motor exercises, and multicomponent exercises.

DISCUSSION

The 23 studies included in this scoping review show diversity in research designs and assessment instruments, but converge in highlighting the relevance of intervention in promoting and maintaining balance in older adults. Balance, defined as the body's ability to maintain a stable posture, is an essential pillar for the safe execution of daily activities. In older adults, this ability tends to decrease progressively, leading to consequences such as an increased risk of falls and loss of functional capacity, compromising quality of life. Thus, early intervention to preserve and enhance balance becomes fundamental to avoid complications and promote well-being ⁽⁶⁾.

MUSCULOSKELETAL EXERCISES

Muscle group stretching exercises promote improvements in range of motion (resulting from the stretching of muscle fibers) and, therefore, improvements in balance ⁽³¹⁾. When combined with balance training, the effects are enhanced, resulting

in gains superior to isolated training, showing that this strategy enhances the effects of balance training in older adults. Similarly, the need to include stretching exercises in training plans is highlighted, as they increase flexibility, muscle strength, and gait speed in older adults ⁽³²⁾. Joint mobilization interventions, especially at the ankle level ^(28,33), increase range of motion (especially in dorsiflexion) and improve dynamic balance. This is justified by the improvement of the foot's support base and correction of its position, contributing globally to improved posture.

Similarly, localized muscle resistance exercises (especially at the tibiotalar joint level) have a direct impact on balance and gait performance in older adults when performed systematically and progressively. Active-resistance exercises significantly improve dynamic balance, so systematic and progressive training of localized muscle resistance enhances muscle strength and balance improvement ^(25,35).

Ventilation training increases the strength of trunk muscles, essential for maintaining posture, while aerobic and combined exercise programs (aerobic and active resistance exercises) are beneficial for increasing lower limb muscle strength. Therefore, they have demonstrated a positive impact on overall muscle strength and consequently on functional balance, showing that specific training of these muscles is fundamental for maintaining postural stability ^(9,15,23,34).

SENSORIMOTOR EXERCISES

Training on unstable surfaces, combined with strategies such as oscillating platforms and closed-eye exercises, promotes rapid and functional motor adaptations. This technique prepares older adults to respond to unforeseen situations and reduces the risk of falls, in addition to promoting significant improvements in strength, flexibility, and gait speed. Consequently, the importance of simulating, in a supervised context, demands similar to those experienced in the daily lives of older adults is reinforced, enhancing postural and functional adaptation ^(10,29,36). The inclusion of complex and multidirectional movement patterns boosts the activation of neuromuscular compensation mechanisms, promoting significant gains in body balance and gait speed ^(17,22).

In turn, real-time sensory feedback (visual or vibratory) through the inclusion of visual stimuli (visual scanning) and vibro-tactile stimuli assists in postural correction and motor relearning. A structured program that includes this type of exercise enables significant improvement in body balance and gait speed ^(12,16,30). Similarly, peripheral sensory and proprioceptive stimulation techniques (through plantar mobilization or proprioceptive exercises) improve postural control and gait. This effect results from the activation of mechanoreceptors present in the plantar region

and the tibiotalar joint, which are responsible for the neuronal input necessary for proprioception. Thus, the inclusion of techniques such as Proprioceptive Neuromuscular Facilitation reinforces postural control, increases joint mobility, and promotes functionality in older adults ^(19,20,37).

COGNITIVE-MOTOR EXERCISES

Exercises that promote the activation of the mirror neuron system, such as mirror therapy, action observation, and motor imagery, show superior improvements in balance and gait, especially when compared to purely motor training. This is justified by cortical activation that reinforces motor circuits without the need for physical load. The effectiveness of cortical activation in balance training reinforces the need for the integration of exercises with cognitive stimuli (especially in situations of instability) in rehabilitation programs ^(14, 23, 38).

In turn, neurofeedback training proves effective in postural control, functioning as an alternative or complement to conventional exercises, constituting a differentiated option for individuals with mobility limitations or lower tolerance to physical exercise. However, its application requires a multidisciplinary intervention ^(26, 39).

Similarly, dual-task exercises (motor and cognitive) provide more significant gains in balance and mobility than purely motor training, favoring postural readaptation and functional performance. Therefore, the value of this approach in promoting autonomy in the elderly population is reinforced. The inclusion of these exercises in the training plan is particularly relevant, considering that the elderly rarely perform tasks in isolation in their routine. Thus, training that simulates these complex demands becomes more effective and transferable to real functionality ^(27,40).

MULTICOMPONENT EXERCISES

Multicomponent exercise plans, when adapted to the clinical condition of the elderly, promote significant improvements in balance and mobility. These multicomponent interventions stand out for their comprehensive approach, combining various types of physical training (strength, balance, gait, endurance, and flexibility) and cognitive training, aiming to simultaneously improve multiple aspects of functionality. Similarly, they improve the balance and cognitive performance of this population, being recommended for the prevention of disability in elderly people living in the community. In addition, the interventions contribute to reducing functional decline, promoting quality of life and independence in the elderly people ^(11,13,21,41).

Functional exercises that simulate the performance of ADLs consolidate motor patterns relevant to the daily life of the elderly person and promote

their independence. This type of training is based on patterns of daily movements and requires the cooperation of different physical abilities, such as muscle strength and balance. By simulating the execution of activities of daily living, a significant contribution is being made to independence in performing these ADLs and improving quality of life ^(18, 42). The results to date suggest that training programs that simultaneously combine musculoskeletal exercises with sensory exercises and cognitive stimulation are fundamental to improving balance and functionality in the elderly population. This approach could make an important contribution to promoting autonomy and improving the quality of life of older adults, and its inclusion should be considered in the intervention of the Elderly Person's Health Education Program for this population.

STUDY LIMITATIONS

Some limitations relate to the scarcity of studies conducted on the subject, particularly when directed at the elderly population. Methodologically, most intervention plans were short-term and had small sample sizes, which limits the generalizability of the results. Another limitation concerns the influence of participants' comorbidities. Future research should evaluate the effectiveness of the strategies individually and involve larger samples with rigorous methodologies that allow direct comparisons between approaches.

CONCLUSION

This scoping review allowed us to map the scientific evidence on SNRN interventions that promote balance in older adults, identifying intervention domains categorized as: musculoskeletal, sensorimotor, cognitive-motor, and multicomponent exercises.

The results show that balance is influenced by multiple factors, with the most effective intervention being one that combines muscle, sensory, and cognitive training. Multicomponent programs, by integrating several of these aspects, represent the most comprehensive approach to improving functionality and preventing functional decline.

The evidence reinforces the importance of implementing structured interventions adapted to the needs of older adults, which, in addition to enhancing gains in balance, are essential for optimizing functionality and preventing the loss of autonomy associated with aging.

This study offers a relevant scientific basis that could make a valuable contribution to nursing practice. By highlighting intervention domains adapted to the specific needs of older adults, it provides a solid foundation for the development of strategies that promote improved balance and prevent complications associated with its loss. Thus, it also represents an important resource for guiding

clinical practice and strengthening informed decision-making by rehabilitation professionals, contributing to the quality of care provided and therefore to the quality of life of the elderly population.

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