

Effectiveness Of Feldenkrais Exercises and Otago Exercises on Balance and Prevention of Fall In Older Adults: A Systematic Review And Comparative Evidence Synthesis

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ABSTRACT

Falls are an important contributor to morbidity, functional decline, and loss of independence, disability, and poor quality of life among older adults. Impaired postural control, diminished lower-extremity strength, changed gait, reduced movement confidence, sensory-motor impairments and fear of falling are key modifiable fall risk factors. Therefore, exercise-based therapies are a key component of geriatric rehabilitation and fall-prevention methods. The Feldenkrais Method (FM) is a movement-education approach that emphasizes sensory awareness, postural organization, coordination, movement variability and efficient motor control, while the Otago Exercise Program (OEP) is a structured fall-prevention program consisting of progressive lower-limb strengthening, balance training and walking.

The aim of this systematic review was to synthesize the current evidence for the effectiveness of Feldenkrais and Otago exercises on balance, functional mobility, gait, balance confidence, fear of falling and fall prevention in older adults and compare the level and clinical relevance of the evidence for each intervention.

Feldenkrais-based therapies were found to have positive impacts on balance-related metrics, gait, functional mobility, movement awareness, comfort, and balance confidence. However, the data was varied and several studies included indirect groups. Interventions based in Otago were consistently reporting the gains in balance and functional mobility and somewhat stronger evidence in respect of actual fall prevention especially in community dwelling older persons. Delivery of OEP in groups proved to have equivalent fall-prevention effects to programs administered to individuals. Thus no superiority of any intervention can be demonstrated. To summarize, OEP provides higher intervention-specific evidence for fall prevention while Feldenkrais appears to be particularly effective for sensory-motor awareness, postural organization, balance confidence and functional mobility. Future head-to-head trials with suitable power should directly evaluate these treatments and see if a combined intervention adds any benefits.

Keywords: Feldenkrais Method; Otago Exercise Programme; older adults; falls; balance; postural control; gait; physiotherapy; fall prevention; geriatric rehabilitation.

INTRODUCTION

Population ageing is associated with an increasing prevalence of impaired balance, reduced muscle strength, gait dysfunction, fear of falling, functional limitations, and falls. Falls in older adults are multifactorial events resulting from interactions among physiological, neurological, musculoskeletal, sensory, behavioral, and environmental factors. Impaired postural control and reduced lower-limb strength are particularly important because they compromise an individual's ability to respond effectively to internal and external perturbations during standing, walking, turning, and transitional activities. Exercise-based rehabilitation is therefore an important strategy for maintaining independence and reducing fall-related morbidity.

Balance is a complex motor skill requiring integration of visual, vestibular and somatosensory input with proper neuromuscular response. Postural control efficiency may be compromised by age-related changes in sensory processing, reaction time, muscle strength, joint mobility and motor planning. Some older people may not respond to programs focusing on only one component of balance. The physical therapy treatments of today are more and more based on multidimensional therapies, such as strength, balance, gait, sensory-motor control, confidence and functional activity.

The Feldenkrais Method is a movement education that is different than traditional strengthening based exercise. It frequently involves Awareness Through Movement teachings and, in a more comprehensive practice, Functional Integration. The technique encourages people to explore movement deliberately and with attention, to notice differences in effort and comfort, to develop sensory discrimination and to find more efficient ways to move. A controlled trial by Connors et al. showed improvements in balance-related and mobility outcomes after Feldenkrais

balancing classes in older persons [1]. These results indicate that movement awareness and sensory-motor learning may influence balance in a clinically relevant manner.

More recently, thorough studies have reviewed the evidentiary base for Feldenkrais. Hillier and Worley analyzed randomized controlled studies and observed positive effects of Feldenkrais therapies on numerous functional outcomes including balance-related measures [2]. Henry et al. characterized Feldenkrais movement education as a movement-based alternative method in musculoskeletal rehabilitation that can potentially affect movement quality and functional performance [3]. Torres-Unda et al. also reported a randomized clinical trial that showed improvements in body balance and functioning after a Feldenkrais intervention, albeit the population of the study was people with intellectual disability instead of only community-dwelling older adults [4]. Some of the Feldenkrais evidence is therefore directly relevant to aging, while other evidence gives indirect support for plausible pathways.

The Otago Exercise Program was specifically established as an organized fall-prevention program for older individuals. OEP includes increasing lower extremity strengthening, balance exercises, and walking. Therefore, its theoretical and practical emphasis is strongly associated with well-established fall-risk characteristics such as lower-limb weakness, decreased postural control, gait dysfunction and restricted functional mobility. Patel et al. demonstrated improvements in balance and gait in the population with Parkinson's disease, a population at risk for falls, after Otago exercises in an intervention study [5].

There is also evidence specifically in elderly persons which supports the possible advantages of Feldenkrais. Palmer reported improvements in awareness, comfort and function in older adults after Feldenkrais movement lessons [6]. These findings are therapeutically relevant because movement awareness and confidence may influence the way older persons respond to balancing issues and everyday mobility demands.

Otago-based interventions have also shown effects beyond balance measures. Cederbom and Arkkukangas found short and long-term effects of a personal OEP on pain in community-dwelling older persons [7]. Pain reduction may indirectly facilitate mobility and participation in exercise and thus contribute to more general functional benefits. Later Albornos-Muñoz et al. studied the potential of group delivery of OEP and reported that group delivery was non-inferior to individual training in terms of falls-related outcomes in a population of community dwelling individuals aged 65-80 years [8]. The potential implications for scalable community-based fall prevention initiatives are significant.

The systematic review and meta-analysis by Berland et al. added further evidence regarding Feldenkrais as a physiotherapy tool [9]. They reported beneficial effects on outcomes such as gait, balance, mobility and quality of life, although heterogeneity among randomized trials limited definitive conclusions. More generally, evidence on exercise prescription variables has also revealed that aspects of the exercise program including the organization and dosage of the program influence fall-risk outcomes in older persons [10].

More recent evidence has considered Otago treatments in greater detail. In a study of the elderly, Rahmani and Kumar compared OEP with proprioceptive neuromuscular facilitation based techniques and found improvements in Timed Up and Go and Berg Balance Scale measures after the exercise intervention [11]. Nimmi et al. [12] examined the effects of OEP with gaze-stability exercise and found positive effects of OEP on balance and fear of falling in older persons. These data further support OEP, yet disparities in intervention dose, participant characteristics, comparator interventions and outcome measures are critical considerations.

More recently, Agnese et al. studied a Feldenkrais-based protocol in healthy adult women, reporting alterations in physiological parameters related to body-fluid balance and stress [13]. This study does not directly prove fall-prevention effectiveness but gives indirect evidence of possible physiological and psychophysiological benefits of Feldenkrais-based therapies.

There is emerging evidence for both therapies, but a key clinical question remains: Is Feldenkrais as helpful as Otago exercise for improving balance and reducing falls in older adults? The two interventions differ greatly in their therapeutic approach. Feldenkrais focuses on sensory-motor awareness and organization of movement. Otago directly focuses on lower limb strength, balance, walking, and fall-risk reduction. Thus, a comparative synthesis has clinical utility.

The aim of this systematic review was to synthesize the current evidence for the effectiveness of Feldenkrais and Otago exercises on balance, functional mobility, gait, balance confidence, fear of falling and fall prevention in older adults and compare the level and clinical relevance of the evidence for each intervention.

MATERIAL AND METHODS

Review design and Registration

A systematic synthesis of comparative evidence was conducted, utilizing a Population Intervention Comparison Outcome (PICO) approach. This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review protocol was prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO) (Registration ID: CRD420261506251).

Database search strategy and records identified

A systematic literature review was performed in PubMed/MEDLINE, Scopus, PEDro, and the Cochrane Library to locate studies assessing the efficacy of Feldenkrais and Otago exercise programs on balance, gait, mobility, fall risk, and falls in elderly populations. The search included studies between 2018-2025. The search methodology integrated terminology associated with the demographic ("older adults", "elderly", "aged", "geriatric"), interventions ("Feldenkrais", "Feldenkrais Method", "Awareness Through Movement", "Otago Exercise Programme"), and results ("balance", "gait", "mobility", "falls", "fall risk", "fall prevention", and "fear of falling") employing Boolean operators AND and OR. A cumulative total of 319 records was recognized, including 65 from PubMed/MEDLINE, 197 from Scopus, 22 from PEDro, and 35 from the Cochrane Library. Records were thereafter evaluated for eligibility based on the established inclusion and exclusion criteria.

Table 1: Search Strategy and Study identification

Database	Key search terms	Filters applied	Records identified (n)
PubMed/MEDLINE	Feldenkrais Method OR Awareness Through Movement OR Otago Exercise Programme AND older adults OR elderly OR aged OR geriatric AND balance OR gait OR mobility OR falls OR fall risk OR fall prevention	Humans; adults ≥60 years; English; relevant studies; 2011-2025	65
Scopus	TITLE-ABS-KEY: Awareness Through Movement OR Otago Exercise AND balance OR falls OR gait OR mobility	Article/review; English; human studies; relevant population; 2011-2025	197
PEDro	Feldenkrais method, older adults, balance, falls Otago exercise, older adults, balance, falls	Clinical trials; older adults; relevant intervention/outcome; 2011-2025	22
Cochrane Library	Feldenkrais Method OR otago exercise AND older adults AND balance OR falls	Trials/reviews; adults; relevant outcomes; 2011-2025	35
Total	—	—	319

Eligibility criteria

Table: 2 Eligibility Criteria

Criterion	Inclusion criteria	Exclusion criteria
Population	Adults aged ≥60 years, particularly community-dwelling older adults, with or without balance, mobility, or fall-risk limitations	Children, adolescents, and predominantly younger adult populations without relevant older-adult data
Indirect populations	Neurological or other clinical populations were considered when findings provided relevant evidence regarding balance, gait, functional mobility, movement control, or fall-risk mechanisms	Studies in populations whose outcomes were not relevant to balance, mobility, falls, or functional movement

Intervention – Feldenkrais	Feldenkrais Method, Awareness Through Movement, Feldenkrais-based movement education, or structured Feldenkrais exercise interventions	Interventions unrelated to the Feldenkrais Method or interventions in which Feldenkrais was not a meaningful component
Intervention – Otago	Otago Exercise Programme or structured Otago-based fall-prevention exercise programmes involving balance and/or lower-limb strengthening	Exercise interventions with no identifiable Otago component
Comparator	Usual care, no intervention, wait-list, baseline/pre-post comparison, another exercise intervention, or alternative therapeutic intervention	Studies without a meaningful comparator or interpretable baseline/follow-up comparison
Primary outcomes	Balance, postural control, postural stability, gait, functional mobility, fall incidence, fall risk, or fall-related outcomes	Studies reporting outcomes unrelated to balance, mobility, gait, or falls
Secondary outcomes	Fear of falling, balance confidence, pain, physical function, quality of life, awareness, comfort, and other function-related outcomes	Outcomes that could not reasonably contribute to the review question
Study design	Randomized controlled trials, controlled clinical trials, interventional studies, prospective follow-up studies, and systematic reviews/meta-analyses providing relevant comparative evidence	Case reports, case series, editorials, commentaries, letters, conference abstracts without sufficient data, and non-systematic narrative articles
Publication type	Full-text peer-reviewed publications	Non-peer-reviewed material and publications without sufficient methodological or outcome information
Language	Publications with sufficient accessible information for assessment and data extraction	Publications for which relevant methodological or outcome information was unavailable
Data availability	Studies providing sufficient information on participants, intervention/exposure, comparator, and relevant outcomes	Studies lacking sufficient information to determine eligibility or interpret outcomes
Relevance to review question	Studies directly evaluating Feldenkrais or Otago interventions, or systematic reviews/meta-analyses providing relevant contextual or indirect evidence	Studies with no meaningful relationship to Feldenkrais, Otago, balance, gait, mobility, fall risk, or falls

Population

The demographic of interest was primarily community-dwelling older persons aged 60 years or older at risk of falls or with balance and mobility problems. Studies of neurological and other groups were included as indirect evidence when they contributed knowledge relevant to systems of balance, functional mobility, and movement control or fall risk.

Interventions

Interventions were: (1) Feldenkrais Method-based interventions, including Awareness through Movement, Feldenkrais movement lessons and Feldenkrais-based balance programs; and (2) the Otago Exercise Program, which

consisted of individualized or group-delivered programs that include progressive lower-limb strengthening, balance exercises and walking.

Comparators

Eligible comparators included usual care, no exercise, waiting-list or control conditions, alternative exercise interventions, and pre-intervention measurements.

Outcomes

Primary and secondary outcomes included static and dynamic balance, postural control, gait speed and gait performance, functional mobility, Timed Up and Go, Berg Balance Scale, Functional Reach, Four Square Step Test, balance confidence, fear of falling, fall occurrence, fall risk, pain, awareness of movement, comfort and quality of life.

Evidence Identification

A structured literature search examined whether Feldenkrais Method-based therapies and the Otago Exercise Program improve balance and fall risk in older adults. PubMed/MEDLINE, Scopus, PEDro, and the Cochrane Library were searched for demographic, intervention, and outcome words. We identified 65 PubMed/MEDLINE, 197 Scopus, 22 PEDro, and 35 Cochrane Library records. Eligibility criteria were applied to titles and abstracts following duplicate deletion. Relevant papers were full-text reviewed. To obtain better material, publication and systematic review reference lists were searched. This evidence set contained 13 Feldenkrais and Otago intervention-related controlled/interventional studies and systematic reviews/meta-analyses. Different study populations, intervention methodologies, outcome assessments, and study designs hindered a randomized Feldenkrais-Otago comparison, thus qualitative evidence was synthesized.

Data extraction

For each publication, the following information was taken into account: author and year, intervention, population, study design, comparator, outcome measures, principal findings, relevance to older adults, and directness of evidence for fall prevention. A narrative comparative synthesis was deemed more appropriate than a pooled quantitative meta-analysis due to the significant heterogeneity inherent in the study populations, interventions, treatment dosage, comparators, and outcome measures.

Outcome Measures

The distinction between fall-risk outcomes, such as the Timed Up and Go or Berg Balance Scale, and actual fall outcomes, such as prospectively recorded falls, was given particular attention. The reduction of actual fall incidence is not necessarily demonstrated by an improvement in a balance test.

Figure 1: PRISMA 2020 Flow Diagram

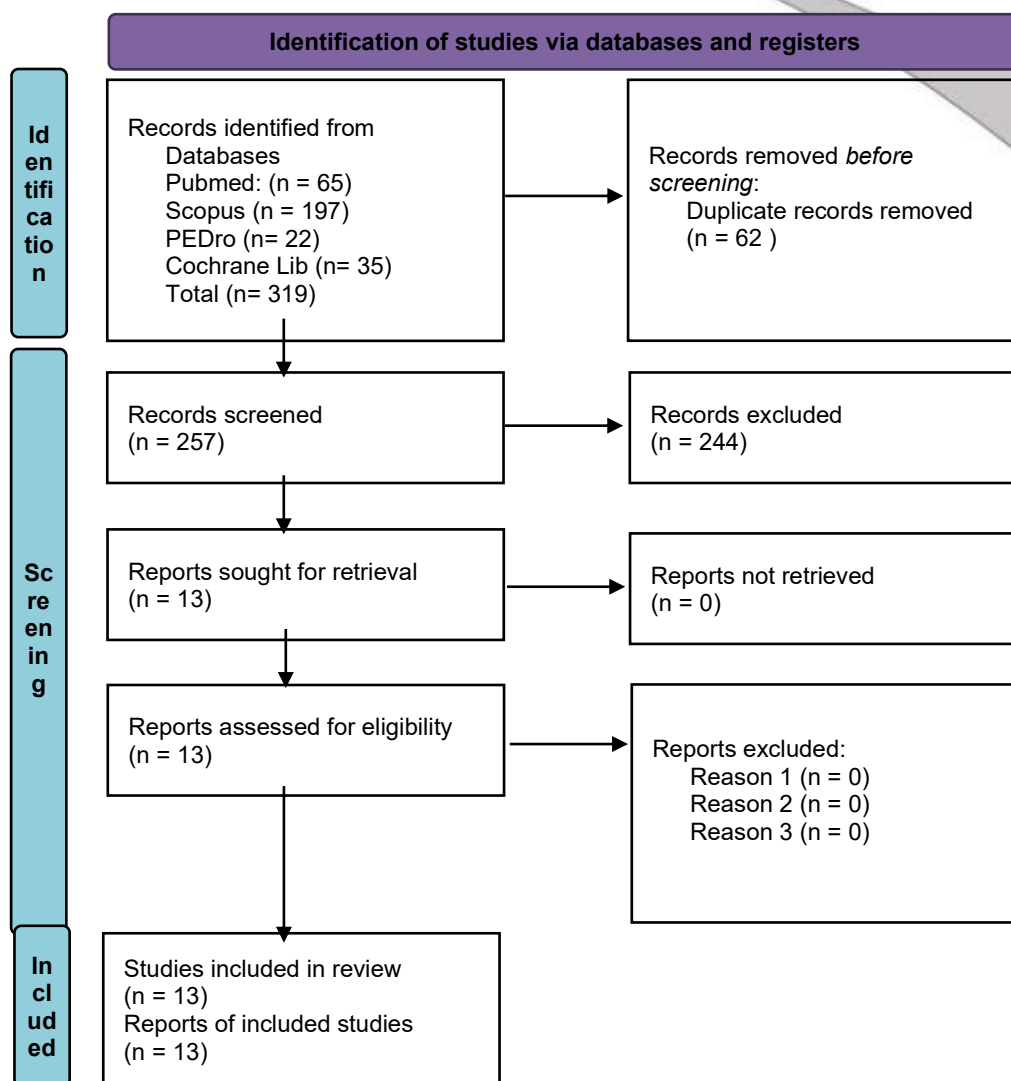


Figure 1: PRISMA 2020 flow diagram for systematic reviews which included searches of databases and registers only

Methodological quality assessment

The methodological quality was evaluated according to the design of each included publication. Randomized and controlled intervention studies were analyzed using the PEDro framework while non-randomized intervention and prospective follow up studies were appraised using relevant Joanna Briggs Institute critical appraisal techniques. AMSTAR 2 was used to assess systematic reviews and meta-analyses. The evaluation focused on randomization, allocation protocols, baseline comparability, blinding, and completeness of follow-up, outcome measurement, confounding, statistical analysis, and reporting quality. Blinding of participants and therapists is intrinsically problematic in exercise and movement-based therapies and this constraint was taken into account when judging the methodological quality of the evidence. The narrative synthesis includes quality assessment, giving more weight to direct randomized evidence and well-conducted systematic reviews/meta-analyses.

Table: 3 Methodological quality assessments

No.	Study	Study design	Appropriate appraisal tool	Overall methodological quality / confidence	Key methodological considerations
1	Connors et al., 2011	Controlled trial	PEDro scale	Moderate	Controlled intervention design with relevant

					balance outcomes; limitations include difficulty with participant/therapist blinding and potential sample-size limitations
2	Hillier & Worley, 2015	Systematic review	AMSTAR 2	Moderate	Systematic synthesis of Feldenkrais evidence; interpretation limited by heterogeneity and the methodological quality of the underlying studies
3	Henry et al., 2016	Narrative/clinical review	JBIC critical appraisal – narrative/review evidence	Low–moderate	Provides useful clinical and theoretical evidence but does not provide the same level of causal evidence as a randomized trial
4	Torres-Unda et al., 2017	Randomized clinical trial	PEDro scale	Moderate–high	Randomized design and objective functional/balance outcomes strengthen internal validity; blinding of participants and therapists is inherently difficult for movement-based interventions
5	Patel et al., 2017	Interventional study	JBIC critical appraisal	Moderate	Provides intervention-related evidence for Otago exercise and balance/gait; non-equivalence to a large, rigorously blinded RCT limits certainty
6	Palmer, 2017	Intervention/pre-post study	JBIC critical appraisal	Moderate	Reports clinically relevant changes following Feldenkrais lessons; absence of a strong randomized comparator limits causal inference
7	Cederbom & Arkukangas, 2019	Prospective follow-up study	JBIC cohort checklist	Moderate	Long-term follow-up provides useful evidence regarding Otago-related outcomes; observational/follow-up design remains susceptible to confounding and attrition
8	Albornos-	Non-inferiority	JBIC/PEDro	Moderate–high	Directly evaluates

	Muñoz et al., 2020	clinical trial	appropriate for trial design		group versus individual Otago delivery and fall outcomes; non-inferiority design and intervention-delivery differences require careful interpretation
9	Berland et al., 2022	Systematic review and meta-analysis of RCTs	AMSTAR 2	High-moderate confidence	Meta-analysis of randomized evidence strengthens synthesis; heterogeneity among Feldenkrais protocols and outcomes may affect certainty
10	Zhu et al., 2025	Meta-analysis	AMSTAR 2	Moderate-high	Provides broader evidence concerning exercise prescription and fall-risk reduction; evidence is indirect to the specific Feldenkrais-Otago comparison
11	Rahmani & Kumar, 2024	Interventional comparative study	JBI critical appraisal	Moderate	Comparative intervention design provides relevant fall-risk evidence; methodological limitations and population/intervention specificity affect generalizability
12	Nimmi et al., 2024	Randomized trial	PEDro scale	Moderate-high	Randomized comparison of Otago with gaze-stability exercise and relevant balance/fear-of-falling outcomes; intervention blinding is difficult and follow-up duration should be considered
13	Agnese et al., 2025	Pilot study	JBI critical appraisal	Low-moderate	Pilot evidence provides information on Feldenkrais-related physiological/stress outcomes; healthy adult population and indirect relevance to fall prevention limit applicability to older adults

Risk of bias assessment

Risk of bias was evaluated using the Cochrane Risk of Bias 2 (RoB 2) tool, which assesses bias across the following domains: randomization process, deviations from intended interventions, missing outcome data, outcome

measurement, and selection of reported results. Each domain was rated as low risk, some concerns, or high risk of bias. Any disagreements were resolved by consensus.

Table 4: Risk of Bias Assessment of included studies using Cochrane Risk of Bias Tool

Study	D1	D2	D3	D4	D5	Overall
Connors et al., 2011	Some concerns	Some concerns	Low	Some concerns	Low	Some concerns
Torres-Unda et al., 2017	Low	Some concerns	Low	Low	Low	Some concerns
Albornos-Muñoz et al., 2020	Low	Some concerns	Low	Low	Low	Some concerns
Nimmi et al., 2024	Low	Some concerns	Low	Low	Low	Some concerns

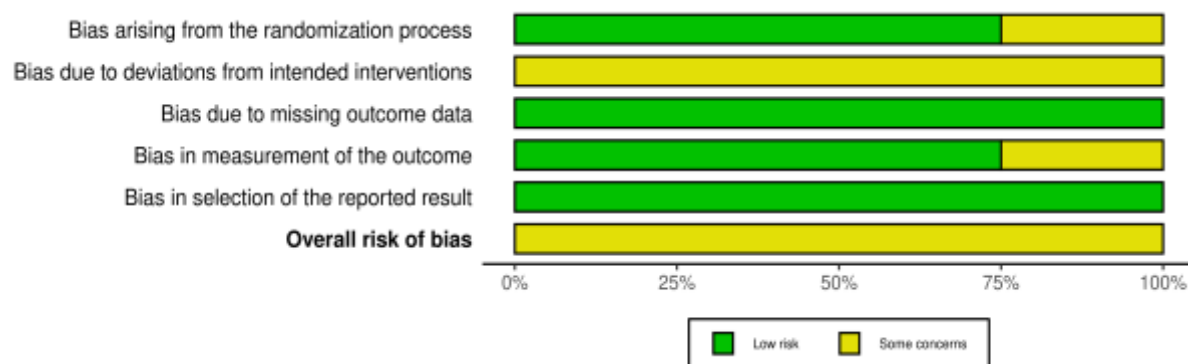
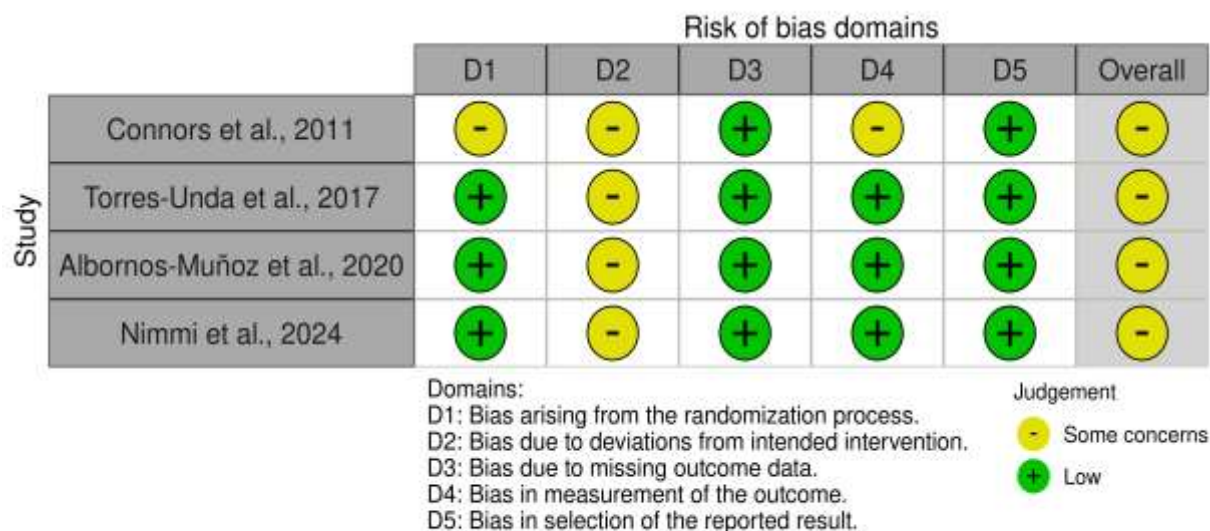


Figure: 2 Quality Assessment/ Risk of Bias

RESULTS

Characteristics of included evidence

Thirteen publications were included in the qualitative synthesis. The evidence included studies directly evaluating Feldenkrais or Otago interventions and broader systematic reviews or studies providing contextual or indirect

evidence. The supplied evidence set included no direct randomized comparison between Feldenkrais and Otago exercises.

Table 5. Summary of included Studies.

No.	Study	Intervention	Population/design	Main outcomes	Principal finding
1	Connors et al. (2011)	Feldenkrais	Older adults; controlled trial	Balance confidence, Four Square Step Test, gait speed	Improved balance-related and mobility outcomes
2	Hillier & Worley (2015)	Feldenkrais	Systematic review	Balance, mobility, function	Evidence of benefit across several outcomes
3	Henry et al. (2016)	Feldenkrais	Rehabilitation evidence	Functional/movement outcomes	Supported movement-based therapeutic role
4	Torres-Unda et al. (2017)	Feldenkrais	RCT; intellectual disability	Balance, function	Improved balance/function
5	Patel et al. (2017)	Otago	Parkinson's disease; intervention	Balance, gait	Improved balance and gait
6	Palmer (2017)	Feldenkrais	Older adults	Awareness, comfort, function	Positive functional changes
7	Cederbom & Arkkukangas (2019)	Otago	Community-dwelling older adults	Pain, function	Pain reduction during follow-up
8	Albornos-Muñoz et al.	Otago	Community-dwelling adults 65–80 years	Falls	Group delivery non-inferior to individual delivery
9	Berland et al. (2022)	Feldenkrais	Systematic review/meta-analysis	Gait, balance, mobility, QoL	Beneficial effects with heterogeneity
10	Zhu et al.	Exercise prescription	Older adults; meta-analysis	Fall risk	Exercise prescription variables influenced outcomes
11	Rahmani & Kumar (2024)	Otago	Geriatric population	TUG, BBS	Improved balance and mobility
12	Nimmi et al. (2024)	Otago	Older adults; randomized trial	Balance, fear of falling	Favorable balance-related effects
13	Agnese et al. (2025)	Feldenkrais	Healthy adult women; pilot	Physiological/stress measures	Physiological effects; indirect relevance

Feldenkrais Method and balance

Connors et al. provided direct evidence of the potential of Feldenkrais balancing classes to improve clinically relevant balance and mobility outcomes in older individuals in a controlled experiment [1]. Changes in balance confidence,

Four Square Step Test and gait speed imply that Feldenkrais may affect perceived and objectively evaluated functional capacity. The findings are supported by the systematic review of Hillier and Worley who found evidence of beneficial benefits for several outcomes after Feldenkrais therapy [2]. There were improvements in Timmed Up and Go and Functional Reach in ageing-related groups, but certainty of conclusions was diminished due to variance in technique and limitations in underlying investigations.

Henry et al. described Feldenkrais movement education as an alternative therapeutic technique for musculoskeletal rehabilitation [3]. The conceptual basis of the intervention is particularly relevant to older persons given the potential for impairments to develop with aging in the domains of movement efficiency, coordination, body awareness and postural organization.

A randomized trial by Torres-Unda et al. showed improvements in functioning and body balance after a Feldenkrais intervention [4]. However, participants had intellectual disability, not just community dwelling older persons, therefore these findings should be seen as indirect supportive evidence rather than direct evidence of geriatric fall prevention.

Palmer's study of older persons showed improvement in awareness, comfort and function after the course of Feldenkrais movement classes [6]. This finding is important beyond traditional physical performance indicators, as awareness of movement can influence confidence, movement strategies, and behavioral responses to postural instability. Berland et al. combined randomized controlled trials in a systematic review and meta-analysis and found positive effects of the Feldenkrais method on gait, balance, mobility, and quality of life [9]. However, there is high variation between research, suggesting caution in the interpretation of the size and strength of these effects.

The evidence from Feldenkrais collectively suggests that the intervention may improve balance through: increased proprioceptive and sensory awareness; improved postural organization; more efficient movement strategies; improved coordination; increased movement confidence; enhanced awareness of weight transfer; reduced unnecessary muscular effort; and improved functional movement variability. However, most of the existing Feldenkrais research has focused on balance and functional measurements, rather than prospectively assessed falls.

Otago Exercise Programme and balance

The Otago Exercise Program has a more direct conceptual link with fall prevention, as it was designed to target modifiable fall-risk variables. The main components are progressive lower limb training, balance exercises and walking. Patel et al. found that the Otago intervention improved balance and gait in those with Parkinson's disease. This sample is different from the normal community-dwelling senior population, but the results are significant as Parkinson's disease is linked with marked balance and fall-risk impairments [5].

Cederbom and Arkkukangas investigated an individually designed Otago program in community dwelling older individuals and showed decreases in pain at follow-up [7]. While pain was not the major fall outcome, decreasing pain may enhance mobility and exercise adherence and therefore potentially aid in increased functional participation. Albornos-Muñoz et al. directly assessed the results of fall prevention in community dwelling adults aged 65-80 years [8]. Their non-inferiority experiment found group-delivered OEP was equivalent to individual delivery in its fall-prevention benefits. This has therapeutic importance as group-based rehabilitation may enhance access to programs, lower delivery costs and enable community deployment.

Intervention factors have been shown to be important in lowering fall risk in older persons, and this is supported by the broader meta-analytic data on exercise prescription variables [10]. The level of fall-risk reduction may be influenced by exercise dose, intensity, frequency and program type.

Rahmani and Kumar showed improvements in Timed Up and Go and Berg balance Scale results after Otago exercise in the older population [11]. Results showed increase in functional mobility and dynamic balance, both of which are substantially related to fall-risk assessment.

Nimmi et al. compared OEP with gaze stability training among older persons and reported beneficial effects on balance and fear of falling [12]. Fear of falling is particularly important since it can lead to a cycle of activity limitation, deconditioning, strength loss and increased risk of falling.

Evidence concerning actual falls

An essential distinction must be made between improvements in fall-risk metrics and decreases in actual fall incidence. Timed Up and Go, Berg Balance Scale, Functional Reach, gait speed, and balance-confidence tests are all therapeutically valuable indices of functional status and fall risk, however improving these outcomes does not guaranty a decrease in the frequency of falls. The Otago evidence is better in this regard because the program was deliberately intended as a fall prevention intervention and evaluated using fall-related outcomes [8]. In contrast, the

majority of Feldenkrais studies [1,2,6,9] have focused on balance, mobility, awareness, comfort, and function. As a result, while Feldenkrais may potentially reduce falls through changes in balance and movement organization, the available studies does not yet give adequate direct evidence to say that Feldenkrais protects falls to the same extent as Otago.

Comparative evidence synthesis

No direct randomized controlled trial comparing Feldenkrais and Otago exercise in older adults was identified within the supplied evidence set. Consequently, an indirect comparison rather than a direct treatment-effect comparison is appropriate.

Table 6. Comparative evidence profile of Feldenkrais and Otago exercises.

Outcome	Feldenkrais	Otago	Interpretation
Balance	Positive evidence	Positive evidence	Both appear beneficial
Functional mobility	Positive evidence	Positive evidence	Both supported
Gait	Positive evidence	Positive evidence	Both supported
Balance confidence	Relatively strong focus	Less specifically emphasized	Potential Feldenkrais advantage
Fear of falling	Limited evidence	Positive evidence	Evidence favors Otago
Actual fall reduction	Limited/insufficient direct evidence	Stronger evidence	Evidence favors Otago
Movement awareness	Central therapeutic component	Not primary focus	Feldenkrais advantage
Lower-limb strengthening	Not primary focus	Core component	Otago advantage
Postural/sensory learning	Central component	Secondary	Feldenkrais advantage
Community scalability	Possible	Supported by group-delivery evidence	Otago has stronger implementation evidence

DISCUSSION

The main finding from this study is that both Feldenkrais and Otago exercise appear to be able to improve clinically significant features of balance and functional mobility, although their evidence profiles and therapy mechanisms are different.

In essence, Feldenkrais is a sensory-motor learning method. Participants are encouraged to explore movement with less speed and effort, to focus on physiological sensations, to compare alternate movement techniques and to gain a better knowledge of how different parts of the body contribute to movement. This may be particularly significant for older persons with balance problems that are partially due to decreased sensory integration, lower confidence, inefficient movement patterns, or excessive muscular effort.

This view is supported by the findings of Connors et al. who found improvements in both balance confidence and functional mobility [1]. Additional evidence of good benefits on numerous functional outcomes is provided by the systematic study undertaken by Hillier and Worley [2] and Palmer found gains in consciousness, comfort and function in older persons [6]. Berland et al. also found further evidence of positive impacts on gait, balance, mobility and quality of life, but heterogeneity remained a major issue [9]. Otago has a different therapeutic focus. The approach specifically addresses known modifiable risk factors for falls. Progressive resistance exercises for lower limb weakness, balance exercises to challenge postural control, and walking practice to translate physical improvements to daily mobility. This clear relationship between the elements of intervention and the causes of fall-risk makes the OEP particularly promising for clinical fall-prevention programs.

Thus the evidence for actual fall prevention is stronger for Otago [8]. This difference is crucial clinically. A patient may have improved Berg Balance Scale performance without necessarily having fewer falls. An ideal fall-prevention program would show decreases in prospectively reported falls as well as improvements in surrogate measures. Another key distinction is the fear of falling down. Fear may limit physical exercise in older persons, leading to progressive deconditioning and consequently increased fall risk. Nimmi et al. found that OEP has a positive impact on fear of falling, suggesting that planned exercise can be beneficial both physically and psychologically [12].

The evidence is not always consistent with the idea that the two techniques are rivals. Instead, their diverse treatment focuses reveal possible synergy. Otago may give progressive strengthening, repetitive balancing challenge, gait

training, functional mobility training, and direct fall prevention measures. Feldenkrais may add sensory motor awareness, organization of posture, investigation of movement, increased confidence in movement, better coordination and knowledge of inefficient movement patterns. In theory, a combination program may tackle a wider spectrum of fall-risk pathways than either intervention on its own. However, at present, this idea cannot be regarded as evidence-based as no experiment directly assessing combined Feldenkrais-Otago treatment was uncovered.

CLINICAL IMPLICATIONS

1. Otago may be preferentially considered when the major clinical target is fall prevention. This is especially relevant for community dwelling older persons with lower-limb weakness, reduced dynamic balance or past falls.
2. Feldenkrais may be especially beneficial when movement awareness, postural organization, balancing confidence, coordination, or movement efficiency are primary therapeutic goals.
3. Choice of intervention should be personalized based on baseline strength, balance impairment, fear of falling, cognitive and sensory status, previous experience with exercise, motivation, accessibility, supervision needs and adherence
4. Group-based OEP administration might be a realistic approach in community rehabilitation as group delivery has proven equivalent efficacy to person delivery in preventing falls in the evidence provided [8].
5. Feldenkrais may be a complement to traditional strengthening and balance programs rather than necessarily replacing proven fall prevention therapies.

LIMITATIONS

This review was restricted by lack of direct randomized trials comparing Feldenkrais with Otago exercises. Participant characteristics, intervention methods, dose and outcome assessments were considerably heterogeneous, which prevented quantitative meta-analysis. Indirect populations were also used in several studies limiting generalizability. Differences in methodological quality, and the difficulties of blinding participants and therapists led to a further reduction in the certainty of the evidence.

CONCLUSION

Both Feldenkrais and Otago exercises seem to have a positive impact on balance and functional mobility in older persons. Otago has better evidence for actual fall prevention; Feldenkrais may be especially useful for movement awareness, postural control, confidence in balance and functional mobility. However, there was no apparent direct randomized comparison to determine the superiority of either strategy. Well-designed future head-to-head trials needed.

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CONFLICT OF INTEREST

The authors declared that they have no conflict of interest.

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