

FEAR OF FALLING AS A BARRIER TO PHYSICAL ACTIVITY IN LATER LIFE: CONTRIBUTIONS OF MULTICOMPONENT TRAINING TO FUNCTIONAL CONFIDENCE IN OLDER ADULTS

O MEDO DE CAIR COMO BARREIRA À ATIVIDADE FÍSICA NA VELHICE:
CONTRIBUIÇÕES DO TREINAMENTO MULTICOMPONENTE PARA A CONFIANÇA
FUNCIONAL DE PESSOAS IDOSAS

EL MIEDO A CAER COMO BARRERA PARA LA ACTIVIDAD FÍSICA EN LA VEJEZ:
CONTRIBUCIONES DEL ENTRENAMIENTO MULTICOMPONENTE A LA
CONFIANZA FUNCIONAL DE LAS PERSONAS MAYORES

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ABSTRACT: Fear of falling may restrict mobility, social participation, and physical activity among older adults even in the absence of a previous fall, becoming an important component of the cycle of inactivity, functional decline, and increased perceived vulnerability. This study aimed to synthesize scientific evidence on the contributions of multicomponent training to reducing fear of falling and strengthening functional confidence, mobility, and participation in physical activity among community-dwelling older adults. An exploratory and descriptive integrative review was conducted using a narrative and descriptive synthesis of data, guided by the PICO framework and by transparency elements from PRISMA 2020. Studies published from January 2016 to September 2026 were considered when they combined at least two exercise components and measured fear of falling or functional confidence using identifiable instruments. The evidence analyzed indicates that programs combining balance, strength, mobility, aerobic capacity, and functional tasks tend to produce consistent physical performance gains, while psychological effects vary according to dose, supervision, delivery mode, and baseline risk profile. Functional confidence should therefore be treated as an outcome in its own right rather than as an automatic consequence of motor improvement.

Keywords: aging. fear of falling. functional confidence. multicomponent training. physical activity.

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RESUMO: O medo de cair pode limitar a mobilidade, a participação social e a prática de atividade física de pessoas idosas mesmo na ausência de queda prévia, constituindo um componente relevante do ciclo de inatividade, perda funcional e maior percepção de vulnerabilidade. Este estudo teve como objetivo sintetizar as evidências científicas sobre as contribuições do treinamento multicomponente para a redução do medo de cair e para o fortalecimento da confiança funcional, da mobilidade e da participação em atividades físicas entre pessoas idosas residentes na comunidade. Realizou-se revisão integrativa, de caráter exploratório e descritivo, com síntese narrativa e descritiva dos dados, orientada pela estratégia PICO e por elementos de transparência do PRISMA 2020. Foram considerados estudos publicados entre janeiro de 2016 e setembro de 2026 que combinaram pelo menos dois componentes do exercício e mensuraram medo de cair ou confiança funcional por instrumentos identificáveis. O conjunto analisado mostrou que programas que articulam equilíbrio, força, mobilidade, capacidade aeróbica e tarefas funcionais tendem a produzir ganhos consistentes no desempenho físico, enquanto os efeitos psicológicos variam conforme dose, supervisão, modalidade de entrega e perfil inicial de risco. Conclui-se que a confiança funcional deve ser tratada como desfecho próprio, e não como consequência automática da melhora motora.

Palavras-chave: atividade física. confiança funcional. envelhecimento. medo de cair. treinamento multicomponente.

RESUMEN: El miedo a caer puede limitar la movilidad, la participación social y la práctica de actividad física de las personas mayores, incluso en ausencia de caídas previas, y constituye un componente relevante del ciclo de inactividad, pérdida funcional y mayor percepción de vulnerabilidad. Este estudio tuvo como objetivo sintetizar las evidencias científicas sobre las contribuciones del entrenamiento multicomponente a la reducción del miedo a caer y al fortalecimiento de la confianza funcional, la movilidad y la participación en actividades físicas entre personas mayores que viven en la comunidad. Se realizó una revisión integrativa, de carácter exploratorio y descriptivo, con una síntesis narrativa y descriptiva de los datos, orientada por la estrategia PICO y por elementos de transparencia de PRISMA 2020. Se consideraron estudios publicados entre enero de 2016 y septiembre de 2026 que combinaron al menos dos componentes del ejercicio y evaluaron el miedo a caer o la confianza funcional mediante instrumentos identificables. El conjunto de estudios analizados mostró que los programas que integran equilibrio, fuerza, movilidad, capacidad aeróbica y tareas funcionales tienden a producir mejoras consistentes en el rendimiento físico, mientras que los efectos psicológicos varían según la dosis, la supervisión, la modalidad de implementación y el perfil inicial de riesgo. Se concluye que la confianza funcional debe considerarse un resultado específico y no una consecuencia automática de la mejora motora.

Palabras clave: actividad física. confianza funcional. envejecimiento. miedo a caer. entrenamiento multicomponente.

INTRODUCTION

Population aging makes it necessary to understand not only the occurrence of falls but also the factors that precede restrictions in mobility and participation in everyday activities. Among these factors, fear of falling is particularly relevant because it influences how older adults assess their functional abilities and decide whether to walk, leave their homes, perform daily tasks, or engage in physical activities. Xiong et al. (2024), in a systematic review and meta-analysis involving 153 studies and 200,033 participants, estimated a global prevalence of 49.6%, with higher rates in developing countries and clinical populations, indicating that this phenomenon is widespread and is not restricted to individuals with a previous history of falls.

Concerns about falling may lead to voluntary activity restriction even among individuals who have never experienced a fall. Reduced mobility and exposure to motor tasks decrease physical activity levels, contribute to physical deconditioning, muscle weakness, and impaired balance, and may consequently increase functional vulnerability. Souza et al. (2022) identified a consistent association between fear of falling and frailty among community-dwelling older adults, while Nicklen et al. (2025) reinforced the relationship between frailty, concerns about falling, and activity restriction. In this context, fear of falling, concerns about falling, self-efficacy, and balance confidence must be distinguished, as they represent related but non-equivalent constructs assessed using instruments designed for different purposes, such as the Falls Efficacy Scale–International (FES-I) and the Activities-specific Balance Confidence Scale (ABC) (Feng et al., 2022).

Physical activity is one of the main strategies for preserving functional capacity and preventing falls. However, exercise prescription for older adults experiencing postural insecurity requires greater specificity than the general recommendation to increase physical activity levels. The World Health Organization (2022) emphasizes the importance of activities combining different physical capacities, particularly strength and balance, while Montero-Odasso et al. (2022) recommend progressive, individualized programs aligned with the demands of daily living. From this perspective, multicomponent training integrates two or more elements, such as strength, balance, mobility, aerobic capacity, flexibility, gait, and functional tasks, seeking to address the multifactorial nature of autonomy in old age.

The central issue, however, is not merely to determine whether training improves strength, balance, or mobility, but whether these adaptations are accompanied by greater confidence in performing activities. Favorable motor outcomes may coexist with a persistent perception of vulnerability, particularly when fear is associated with previous experiences, unsafe environments, or prolonged activity restriction. Kumar et al. (2016) identified a small to moderate effect of exercise on fear of falling, with uncertainty regarding its maintenance over longer follow-up periods, while Kruisbrink et al. (2022) demonstrated that effects vary according to the components employed. Accordingly, physical performance and functional confidence should be examined as related but not automatically equivalent dimensions.

In light of this problem, the review was guided by the following research question: To what extent do multicomponent training programs contribute to reducing fear of falling and improving functional confidence, mobility, and participation in physical activities among community-dwelling older adults? The general objective was to synthesize scientific evidence regarding these contributions. Specifically, the study sought to characterize fear of falling as a factor restricting physical activity and everyday participation, identify the most frequent components of training programs, and examine their effects on fear of falling, functional confidence, balance, mobility, and adherence.

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The relevance of this study to Physical Education lies in integrating outcomes that are frequently assessed separately: on the one hand, strength, gait, balance, and functional performance; on the other, the perception of safety that influences the decision to remain physically active. This integration makes it possible to discuss exercise prescription not only in terms of training load and progression but also in relation to safe exposure to tasks, mastery experiences, and the transfer of improvements to everyday life. Within this scope, the review examines whether multicomponent training simultaneously supports physical capacity and functional confidence, identifying the most consistent findings and the main gaps in the available evidence.

METHODOLOGY

An exploratory and descriptive literature-based study was conducted, structured as an integrative literature review and developed through a narrative and descriptive

synthesis of the data, without classifying the investigation as employing a "qualitative approach." This methodological choice made it possible to bring together studies with different designs, assessment instruments, and intervention protocols while preserving the possibility of structured comparisons between intervention characteristics and their outcomes. From a methodological perspective, Whittemore and Knafl (2005) describe the integrative review as a strategy capable of combining diverse forms of evidence through systematic stages of problem identification, literature searching, evaluation, data extraction, and synthesis, provided that the procedures are described with sufficient transparency to ensure traceability.

The review question was structured according to the PICO framework. The population consisted of community-dwelling adults aged 60 years or older; the intervention comprised multicomponent training programs incorporating at least two elements among strength, balance, aerobic capacity, flexibility, and mobility; the comparison, when available, included usual care, no intervention, or other exercise modalities; and the primary outcomes were fear of falling, concerns about falling, fall-related self-efficacy, or functional confidence, accompanied by measures of balance, mobility, physical performance, participation, and adherence. This framework maintained consistency with the research question and prevented the review from expanding to exclusively institutional programs or interventions without identifiable measures of psychological outcomes related to falls.

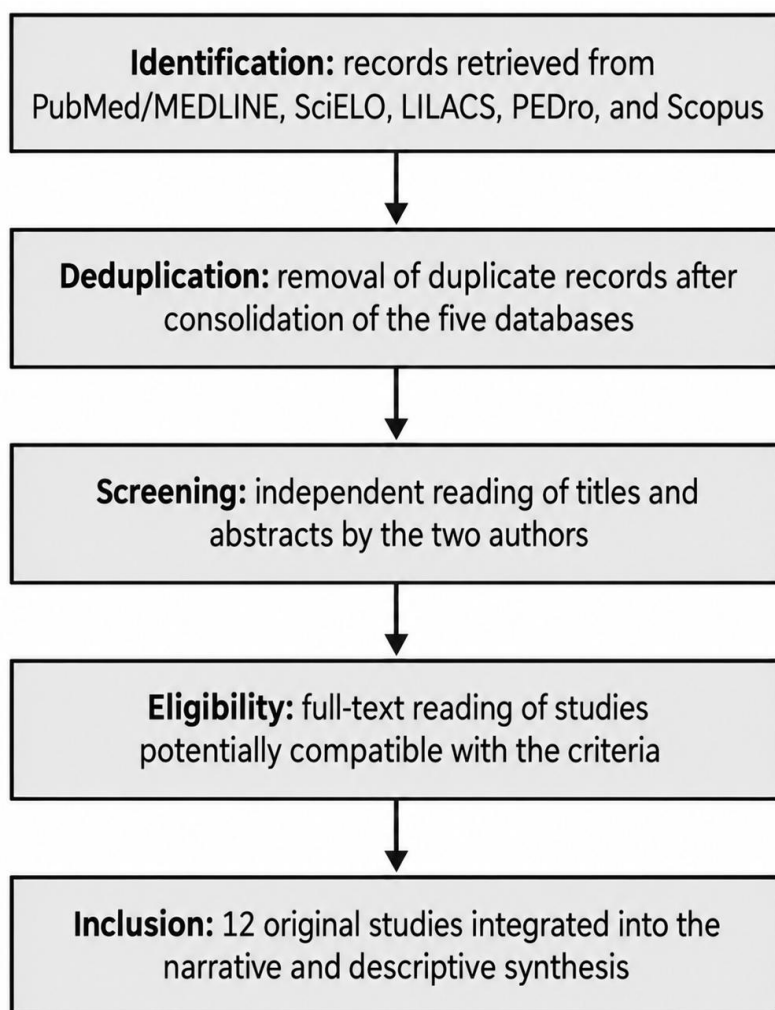
The literature searches were designed to cover PubMed/MEDLINE, SciELO, the Latin American and Caribbean Health Sciences Literature database (LILACS), the Physiotherapy Evidence Database (PEDro), and Scopus, encompassing publications from January 2016 to September 2026 in Portuguese, English, and Spanish. Controlled descriptors and free-text terms equivalent to "idoso," "older adults," "aged," "fear of falling," "falls efficacy," "balance confidence," "multicomponent exercise," "multicomponent training," "physical exercise," "postural balance," and "mobility" were combined using the Boolean operators AND and OR, adapted to the search syntax of each database. The temporal scope was established to concentrate the synthesis on contemporary evidence, including both face-to-face interventions and digital delivery modalities that expanded during the period.

Original full-text studies were included when they involved community-dwelling participants aged 60 years or older, interventions comprising at least two exercise components, and assessments of fear of falling or functional confidence using explicitly identifiable instruments. Duplicate records, study protocols, editorials, abstracts without available full texts, reviews, exclusively hospital-based or institutional studies, interventions without exercise components comparable to the established criteria, and investigations in which the effects of multicomponent training could not be examined separately were excluded. Systematic reviews and guidelines were used exclusively to support the theoretical background and discussion and were not included among the original studies synthesized in the results table.

Study selection was organized into two stages: screening of titles and abstracts, followed by full-text assessment of potentially eligible studies. As the undergraduate thesis is being prepared by two authors, the screening of titles, abstracts, and full texts was planned to be conducted independently by both authors; any uncertainties or disagreements should be resolved through consensus and, when necessary, referred to the academic supervisor. The same principle was applied to data extraction, using a matrix containing authorship, year of publication, country, study design, sample characteristics, program components, duration, frequency, delivery modality, assessment instruments, and main findings, thereby reducing the risk of unilateral decisions during the review process.

To present the identification, screening, eligibility, and inclusion processes, a PRISMA-style flowchart was adopted, recording the number of articles retrieved from each database, duplicates removed, records excluded after title and abstract screening, full-text articles assessed, and studies included in the synthesis. Regarding scientific transparency, Page et al. (2021) emphasize that PRISMA 2020 facilitates documentation of the study selection process and reduces ambiguities concerning how the final set of studies was obtained. In this version of the article, the final analytical corpus consists of twelve original studies that met the established content and outcome criteria; the identification and deduplication counts must be verified directly against the export files from the five databases before final submission, avoiding the inclusion of untraceable numerical data.

Figure 1. Methodological flowchart of the study selection process, following the PRISMA 2020 framework.



Source: Prepared by the authors (2026).

Given the heterogeneity of study designs, assessment instruments, intervention intensity, duration, and comparators, no original meta-analysis was performed. The findings were subjected to narrative and descriptive synthesis, organized into four thematic domains: effects on fear of falling and functional confidence; balance, mobility, and physical performance; participation and adherence; and program characteristics associated with more consistent responses. Interpretation prioritized the direction of effects, consistency between subjective and objective measures, the presence or absence of between-group comparisons, and limitations reported by the included studies. As this was a review of published studies, involving neither direct contact with participants nor the use of identifiable personal data, no primary human participant data were collected.

The flowchart serves to make the review's decision-making sequence explicit; however, its validity depends on reproducing the initial record counts from the database search histories and export files rather than reconstructing them from memory. This methodological precaution is particularly necessary when the same reference appears simultaneously in MEDLINE, Scopus, and PEDro, as counting records without deduplication may artificially inflate the number of records identified. The final set of twelve studies was used for the synthesis presented below, while reviews and guidelines remained sources of interpretive support.

Results And Discussion

Characteristics of the Included Studies

The twelve original studies included in this review demonstrate considerable diversity in countries, delivery modalities, intervention duration, and assessment instruments, supporting the appropriateness of narrative synthesis rather than an independent statistical pooling of results. Sample sizes ranged from pilot studies involving approximately thirty to forty participants to pragmatic trials with more than six hundred individuals, while intervention protocols varied between six and sixteen weeks, with subsequent follow-up assessments in some cases. Relevant differences were also observed in the comparison conditions: some studies used usual care or no intervention, whereas others compared two active exercise modalities, a circumstance that tends to reduce between-group differences even when both groups improve relative to baseline.

Heterogeneity was also evident in the technologies employed. The studies included supervised face-to-face programs, home-based exercises taught during workshops, telepresence interventions with real-time feedback, instructional videos, electronic games, activity trackers, and mobile applications. This diversity is relevant because delivery modalities influence access barriers, frequency of contact, and opportunities for technical correction, potentially affecting both adherence and perceived safety. From an applied perspective, Hong et al. (2018), Kim et al. (2025), and Huertas-Hoyas et al. (2025) demonstrate that digital resources can support interventions involving older adults but do not eliminate the need for individualization, supervision, and usability assessment.

Regarding outcome measures, the Falls Efficacy Scale–International (FES-I), Short FES-I, Modified Falls Efficacy Scale, Activities-specific Balance Confidence Scale (ABC), Iconographical Falls Efficacy Scale (Icon-FES), and study-specific questionnaires were used in different combinations. This variation in measurement instruments indicates that "reduction in fear of falling" does not represent precisely the same phenomenon across all studies. Some instruments assess concerns about falling, others measure confidence, while others employ broader indicators of fear. Consistent with this measurement issue, Feng et al. (2022) reported that trials investigating exercise and fear of falling inconsistently describe exercise intensity parameters and training principles, limiting the identification of a universally superior exercise dose.

Table 1. Characteristics and main findings of the included studies.

Study	Country/design/sample	Intervention	Main outcome measures	Summary of findings
Hafström et al. (2016)	Sweden; randomized crossover trial; n = 40	6 weeks; self-administered multimodal program targeting balance and sensorimotor control.	Berg Balance Scale, TUG, functional gait speeds, and balance confidence.	Improved balance, mobility, and confidence, indicating concurrent physical and perceptual benefits.
Kwok; Pua (2016)	Singapore; randomized trial; n = 80	12 weeks; WiiActive versus gym-based exercise, 1 session/week.	MFES, knee strength, TUG, gait, and 6-minute walk test.	No between-group difference in MFES at week 13; WiiActive showed an advantage in MFES at week 24.
Hong et al. (2018)	South Korea; randomized trial; 34 recruited, 23 completed	12 weeks; telepresence-based elastic resistance and balance training, 3 sessions/week.	Korean FES, Fear of Falling Questionnaire, Berg Balance Scale, and chair stand test.	Significant improvements in fear of falling, balance, and lower-limb function.
Nor et al. (2021)	Malaysia; pre-post intervention study; n = 40	3 months; group-based strength, balance, aerobic, and flexibility training.	TUG, ABC, handgrip strength, and chair rise test.	Significant improvements in mobility, balance confidence, and muscular function.
Bates et al. (2022)	Australia; pragmatic randomized trial; n = 617	Home-based balance and lower-limb strengthening program taught in workshops.	Falls, fear of falling, strength, balance, physical activity, and quality of life.	No significant reduction in falls; improvements in fear of falling at 3, 6, and 12 months.
Kulkarni; Nagarkar (2023)	India; randomized intervention study; n = 95	16 weeks; video-based stretching, strength, balance, and dual-task training.	Fall incidence, activities of daily living (ADL), and fear of falling.	45% reduction in fall incidence and improved ADL; no difference in fear of falling at 12 months.
Chan et al. (2024)	Hong Kong; randomized pilot study; n = 42	8 weeks; Ring Fit exergaming with balance and strengthening exercises, 2 sessions/week.	Mini-BESTest, TUG, Icon-FES, strength, and executive function.	Feasible and safe program; improved anticipatory balance, without a robust demonstrated effect on fear of falling.
Arkkukangas et al. (2024)	Sweden; randomized trial; n = 101	8 weeks; strength, balance, and fall-technique training delivered by trained peers.	FES-I, fear-of-falling questionnaire, physical activity, and fall techniques.	Reduced fear of falling in the exercise group, with improvements in activity and fall techniques.
Kim; Park; Noh (2025)	South Korea; randomized trial; n = 30	12 weeks; activity tracker plus home-based multicomponent exercise versus activity tracker alone.	ABC, FES-I, SPPB, TUG, and 2-minute step test.	Both groups improved in FES-I and TUG; the exercise group showed within-group physical gains, without between-group superiority.

Study	Country/design/sample	Intervention	Main outcome measures	Summary of findings
Courtay-Breuil et al. (2025)	France; prospective study; n = 105	10 weeks; supervised group intervention, 2 sessions/week.	FES-I, gait parameters, SPPB, TUG, and gait quality.	Improved fear of falling, gait, and function; greater reductions in fear among participants with baseline fear.
Müller et al. (2025)	Germany; FEARFALL randomized trial; n = 160	16 weeks; multimodal program versus low-intensity sham control.	FES-I, avoidance, perceived control, and stress markers.	Improvements in concerns about falling and perceived control in both groups; no intervention-specific effect across all markers.
Huertas-Hoyas et al. (2025)	Spain; multicenter quasi-experimental study; n = 127	8 weeks; app-based home exercise versus face-to-face sessions.	Short FES-I, adherence, and satisfaction.	Reduced fear of falling in both formats; statistically significant improvement in the face-to-face group and a clinically meaningful reduction in the app group.

Source: Prepared by the authors (2026).

Note: ABC = Activities-specific Balance Confidence Scale; ADL = activities of daily living; FES-I = Falls Efficacy Scale–International; Icon-FES = Iconographical Falls Efficacy Scale; MFES = Modified Falls Efficacy Scale; Mini-BESTest = Mini-Balance Evaluation Systems Test; SPPB = Short Physical Performance Battery; TUG = Timed Up and Go.

Table 1 shows that physical outcomes exhibit greater consistency, whereas psychological outcomes are more variable. This asymmetry does not necessarily indicate a limitation of multicomponent training; rather, it suggests that confidence emerges from the interaction among functional capacity, previous experiences, risk appraisal, and context. Trials in which the comparator group also performed active exercises tend to show smaller between-group differences, as observed by Kwok and Pua (2016) and Kim et al. (2025), whereas studies using usual care or no intervention frequently show clearer contrasts. In addition, small studies may detect within-group changes while lacking sufficient statistical power to demonstrate superiority between conditions.

Effects on Fear of Falling and Functional Confidence

The synthesis of the studies suggests that multicomponent training can reduce fear of falling or increase functional confidence, although its effects are not uniform. In some interventions, psychological improvement accompanies changes in balance and mobility; in others, perceptual outcomes remain unchanged despite objective benefits. Considering the pooled evidence, Kumar et al. (2016) identified a small to moderate effect of exercise on fear of falling immediately after the intervention, while Feng et al. (2022), including 75 trials, also estimated a small to moderate overall effect and highlighted shortcomings in reporting exercise intensity and progression principles. These findings support an expectation of benefit but do not justify concluding that every program or training dose will produce a similar response.

In studies that directly measured confidence, the effects are particularly informative. From a functional perspective, Hafström et al. (2016) observed a significant increase in confidence scale scores after six weeks of multimodal exercise, alongside improved balance and mobility performance. Similarly, Nor et al. (2021) identified a significant increase in ABC scores after three months, accompanied by improvements in TUG performance, grip strength, and lower-limb function. Taken together, these findings suggest that repeated experiences of successful task performance may recalibrate perceptions of ability, particularly when programs include progressive tasks and supervision.

The findings from digital programs reveal a more complex pattern. In a telepresence intervention, Hong et al. (2018) reported reduced fear of falling and improvements in physical measures among older women at high risk, suggesting that

synchronous interaction and feedback can preserve important elements of supervision. In contrast, Kim et al. (2025) observed decreased FES-I scores in both groups, including the group that used only an activity tracker, without significant differences between conditions. An appropriate interpretation is that self-monitoring may change behavior and perception, effectively making the comparator active; therefore, the absence of superiority in the multicomponent group does not mean an absence of clinical improvement.

The BEST at Home trial provides an example of divergence between fall occurrence and fear. In this pragmatic trial, Bates et al. (2022) found no significant difference in fall rates over twelve months but observed a reduction in fear of falling at three, six, and twelve months in the intervention group. This finding demonstrates that a psychological outcome may improve even when fall incidence remains unchanged and reinforces the need to avoid relying on a single indicator when assessing program success. Confidence may improve through a stronger sense of control, mastery of exercises, and perceived competence, without necessarily reducing a multifactorial event such as a fall.

The opposite pattern is also reported in the literature. Kulkarni and Nagarkar (2023) reported significant reductions in fall incidence and difficulties in activities of daily living following a video-based intervention, but no significant difference in fear of falling at the twelve-month follow-up. This result may reflect the persistence of beliefs about vulnerability, the extended interval between intervention and assessment, or insufficient emphasis on mastery experiences specifically related to fear. The finding supports the hypothesis that reducing objective risk and changing subjective appraisal are connected yet distinct processes.

In the FallFitness study, the inclusion of falling techniques added an element rarely found in traditional programs. Regarding coping with falls, Arkkukangas et al. (2024) observed a significant reduction in fear in the exercise group, alongside improved learning of backward and sideways falling techniques and increased physical activity. Learning how to respond to the feared event may reduce perceived loss of control, acting as a bridge between motor competence and subjective safety. Nevertheless, the intervention was brief and group-based, so social interaction, peer support, and motivation may also have contributed to the outcomes.

More recent studies reinforce the need to consider baseline fear levels. In a stratified analysis, Courtay-Breuil et al. (2025) found that a ten-week intervention improved gait parameters, functional outcomes, and fear, with the perceptual reduction

being more pronounced among participants who initially reported fear of falling. This pattern is plausible because individuals without substantial concern have less room for score reductions, a floor effect that can obscure intervention effects when the sample is analyzed as a whole. In practice, the result suggests that initial screening may help target confidence-building strategies toward participants who actually experience this problem.

Conversely, the FEARFALL study shows that even an intervention specifically designed to address concerns about falls can yield favorable responses in the control group. In this experimental setting, Müller et al. (2025) observed decreased concern and increased perceived control over time in both conditions, whereas only some physiological markers changed. A control condition involving light activities and regular contact may produce effects through attention, expectations, social interaction, and continued movement. This finding highlights the importance of the comparator when interpreting outcomes and discourages conclusions based solely on pre- and post-intervention changes without an adequate comparison.

Taken together, these findings support an interim conclusion: multicomponent programs have genuine potential to reduce fear of falling and increase confidence, particularly when they include progression, balance, strength, functional tasks, and follow-up, but psychological effects are neither automatic nor universal. Functional confidence must be measured explicitly and, when substantial insecurity is present, programs should incorporate functional goals, performance feedback, graded exposure to avoided tasks, and realistic discussions of risk. Improved motor test scores are relevant, but they do not replace assessment of everyday decisions to resume walking, leave home, and participate in activities.

Balance, Mobility, and Physical Performance

Effects on physical performance were more consistent than those on fear of falling, particularly for measures of balance and mobility. This regularity is expected because strength, balance, and gait can be trained directly and respond to progressive stimuli over relatively short periods. Within this body of evidence, Nor et al. (2021) observed a 12.89% improvement in TUG performance and increased balance confidence after three months, while Hong et al. (2018) reported improvements in the chair stand test and Berg Balance Scale after twelve weeks of supervised remote exercise. The convergence between face-to-face and digital studies suggests that the structure of the exercise stimulus may be more

decisive than the physical setting in which it is delivered, provided that dosage and guidance are appropriate.

Improvements in mobility also emerge from interventions involving more playful technologies. In this category, Chan et al. (2024) identified significant progress in the anticipatory domain of the Mini-BESTest after an exergame program combining balance and strengthening activities, demonstrating that commercial platforms can be adapted to functional objectives. However, the study assessed feasibility and experienced participant attrition, so its results do not justify treating exergames as generally equivalent to supervised programs. Its principal contribution is to demonstrate a potential option for improving engagement and task diversity, particularly when combined with careful exercise selection.

The findings reported by Kim et al. (2025) add another dimension: the group using an activity tracker combined with multicomponent exercise improved on the SPPB, TUG, and two-minute step test, whereas the tracker-only group showed significant improvement only on the TUG, although no between-group differences emerged for the primary outcomes. When conditions are compared, the within-group pattern suggests a broader range of physical adaptations when monitoring is combined with structured exercise, but the small sample size prevents definitive conclusions regarding superiority. In professional practice, technology appears more useful as a tool for exercise prescription and feedback than as a replacement for training principles.

The study by Courtay-Breuil et al. (2025) broadens the analysis by demonstrating changes in spatial gait parameters and perceived locomotor quality after multicomponent intervention. Gait is not a single variable: step length, variability, contact angles, and turning strategies respond differently and may be especially relevant among individuals experiencing fear. From a biomechanical perspective, the authors identified functional improvements across the entire cohort and specific changes among participants with fear, although correlations between reductions in fear and changes in gait were limited. These weak correlations reinforce the view that perceptual and motor dimensions, although related, do not necessarily evolve in parallel.

In pragmatic trials, functional effects also depend on adherence and the quality of exercise performed outside supervised settings. BEST at Home was designed to teach balance and strength exercises through workshops, enabling subsequent practice at home. Regarding implementation, Bates et al. (2022) observed reduced fear and an initial

improvement in gait speed, but no significant reduction in fall rates. This combination indicates that scalable interventions may yield benefits in intermediate outcomes even when their effect on falls is small or absent, particularly among relatively high-functioning populations.

The findings further suggest that physical performance should not be interpreted solely in terms of statistical significance. Small changes may be functionally meaningful when they allow an individual to perform a previously avoided task, whereas statistically significant differences in larger samples may sometimes be modest in magnitude. Interpretation should consider baseline values, the risk of ceiling effects, and relevance to everyday goals. Methodologically, Arkkukangas et al. (2024) discussed ceiling effects of the SPPB among relatively active participants, noting that instruments designed to assess frailty tend to lose sensitivity when applied to individuals with high functional capacity.

This observation has implications for assessment in Physical Education: combining objective and self-reported measures reduces the risk of one-dimensional conclusions. The TUG, SPPB, Berg Balance Scale, and sit-to-stand tests reveal the capacity to perform standardized tasks; the FES-I and ABC indicate how individuals perceive their safety; and physical activity measures and participation reports show whether that capacity is actually being used in everyday life. Ideally, a successful program should bring these three dimensions closer together, producing better performance, greater confidence, and the maintenance or expansion of activity without exposing participants to unnecessary risks.

Table 2. Synthesis of effects by outcome domain.

Outcome domain	Pattern observed in the synthesis	Illustrative studies	Interpretation
Fear/concern	Tendency toward reduction, with variable responses that are not always superior to an active comparator.	Hafström et al. (2016); Bates et al. (2022); Arkkukangas et al. (2024); Courtay-Breuil et al. (2025).	Benefit is more likely when baseline fear, progression, and mastery experiences are present.
Balance confidence	Frequent improvements when the ABC or equivalent scales are used.	Hafström et al. (2016); Nor et al. (2021); Kim et al. (2025).	Confidence must be measured directly because it cannot be inferred from motor tests alone.
Balance and mobility	More consistent results, especially on the TUG, Berg, SPPB, and gait parameters.	Hong et al. (2018); Nor et al. (2021); Chan et al. (2024); Courtay-Breuil et al. (2025).	Directly trained capacities tend to respond more rapidly than beliefs and behaviors.
Falls	Inconsistent effects across studies, depending on follow-up, exposure, and baseline risk.	Bates et al. (2022); Kulkarni and Nagarkar (2023).	Falls are multifactorial events and should not be the only criterion used to assess program effectiveness.

Participation/activity	Some studies show increased activity or maintenance of high activity levels.	Arkkukangas et al. (2024); Kim et al. (2025).	This is a strategic outcome because it shows whether gains translate.
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Source: Prepared by the authors (2026).

Table 2 reinforces that the most consistent conclusion of the review is not a homogeneous effect across all outcomes, but rather the presence of a pattern: physical measures tend to respond more consistently, whereas fear, confidence, and fall occurrence depend more strongly on context, assessment instruments, and comparators. This interpretation avoids treating multicomponent training as a universal solution while recognizing its usefulness as a strategy capable of addressing several determinants of autonomy when appropriately prescribed.

Participation, Adherence, and Delivery Modalities

Participation in physical activities is a particularly important outcome because the ultimate purpose of improving confidence is not merely to obtain lower scores on assessment scales, but to expand the ability to move around and engage in meaningful activities. Fear of falling may promote sedentary behavior, which in turn reduces the stimuli required to maintain functional capacity. Within this cycle, Ramsey et al. (2022) synthesized associations between higher objectively measured physical activity and lower fear of falling, although the relationship with falls was inconsistent. This evidence indicates that remaining active is an important component of a protective cycle, provided that activity is safe and appropriate to functional capacity.

Adherence depends on logistical and perceptual factors. Distance, transportation, climate, schedules, costs, and concerns about exercising without supervision can all reduce continued program participation. The telepresence approach examined by Hong et al. (2018) addressed some of these barriers by providing real-time remote supervision, while the app-based program studied by Huertas-Hoyas et al. (2025) sought to individualize home exercises and monitor their execution. These models are particularly relevant to individuals with mobility limitations, but their adoption requires consideration of device access, connectivity, and technological familiarity.

The GAITCARE findings show that both remote and face-to-face modalities can reduce fear, even though statistical significance was reached in the face-to-face group. In comparing delivery formats, Huertas-Hoyas et al. (2025) observed a clinically relevant

reduction of approximately 20% in the app-based group, despite a lower baseline score and the absence of equivalent statistical significance. This finding suggests that technology assessment should not be limited to p-values: accessibility, adherence, satisfaction, and the ability to reach individuals who would not attend an in-person service are also dimensions of effectiveness under real-world conditions.

Peer-led delivery offers another strategy for expanding access. In community settings, Arkkukangas et al. (2024) reported average attendance equivalent to seven of eight sessions and no exercise-related adverse events, indicating that previously trained older adults can contribute to the delivery of low-cost programs. This model, however, does not eliminate the need for clear protocols, appropriate training, referral criteria, and professional support, particularly when participants have frailty, multiple health conditions, or a high risk of falling.

Adherence is also related to the experience of competence. Exercises that are too easy may fail to produce adaptation or a sense of progress, while excessively difficult exercises may reinforce insecurity and withdrawal. Prescription should establish a level of challenge at which participants can recognize effort and improvement without experiencing frequent failure. Regarding exercise principles, Feng et al. (2022) noted that progression and intensity are incompletely reported in many trials, representing an important limitation for replication. In practice, documenting load, level of support, task complexity, and progression criteria is as important as recording weekly frequency.

Delivery modality also influences the nature of feedback. Face-to-face supervision enables immediate correction and spontaneous adaptation but may increase access barriers; video-based interventions are more scalable but offer less personalization; telepresence preserves synchronous feedback but depends on connectivity; and applications and activity trackers can provide continuous monitoring, although they require user-friendly design. For planning purposes, the available evidence is insufficient to establish one universally superior delivery modality. The most defensible criterion is to select a format capable of maintaining safety, adequate exercise dosage, progression, and adherence within the participant's particular context.

For Physical Education, this finding shifts the question from “Which technology should be used?” to “Which follow-up structure ensures safe and progressive exercise performance?” Digital tools may extend continuity between sessions, record activity, and provide reminders, but they do not replace initial assessment, individualization, and the

recognition of warning signs. Effective multicomponent programs appear to combine relevant motor content, sufficient follow-up, and understandable goals, regardless of whether they take place in community centers, at home, or in hybrid settings.

Implications for Exercise Prescription and Limitations of the Evidence

The synthesis supports practical implications without converting heterogeneous findings into a rigid protocol. Fear of falling should be screened at baseline and reassessed throughout the program using an instrument compatible with the construct being investigated. Individuals with pronounced fear but preserved physical capacity may require graded exposure and mastery experiences, whereas objective strength and balance limitations require functional progression and safety conditions before more complex tasks are introduced.

Progression should occur across multiple dimensions, combining increased load with reduced external support, changes in the base of support, variations in direction and speed, obstacles, and cognitive tasks. From a functional perspective, Montero-Odasso et al. (2022) advocate individualized exercises that reproduce the demands of daily life and maintain sufficient challenge to promote adaptation. Systematic documentation of progression makes it possible to relate prescription decisions to functional responses.

The relationship between safety and autonomy requires careful adjustment of external assistance. Maintaining unnecessary assistance may reinforce dependence, while withdrawing support too early increases risk and may consolidate insecurity. Professionals should progressively reduce assistance, enabling experiences of control during tasks such as single-leg stance, lateral movements, negotiating obstacles, and changing direction, in which perceived instability may exceed objective limitations.

It is also necessary to incorporate meaningful tasks, such as getting up from the floor, carrying objects, walking at different speeds, turning, climbing steps, and performing dual tasks. The transfer of gains to confidence is more plausible when participants recognize competence in the actual activities they aim to perform. In this respect, Arkkukangas et al. (2024) observed the acquisition of falling techniques, while Courtay-Breuil et al. (2025) showed that gait changes do not necessarily parallel changes in fear.

Participation outside training sessions should be monitored, because improvements on tests do not guarantee a return to everyday activities. Diaries, pedometers, activity

trackers, and structured questions about mobility may help verify whether gains are transferred into daily life. Regarding monitoring, Kim et al. (2025) observed that activity tracker monitoring influenced measures such as the FES-I and TUG, indicating that feedback on activity may form part of the behavioral dimension of the intervention.

Limitations of the evidence include small samples, diverse assessment instruments, poorly comparable protocols, exercise intensity that is not always reported, and short follow-up periods. Studies also involved participants with different functional profiles, which limits generalizability. In the available synthesis, Kruisbrink et al. (2022) demonstrated moderate effects of multicomponent interventions and varying contributions of their components, without supporting any single combination as ideal.

Adherence is also reported inconsistently. Session attendance does not necessarily indicate the quality of performance, the exercise load completed at home, or the reasons for absence, and digital access logs do not guarantee adequate exercise intensity. Future research should report dose, progression, supervision, adverse events, and implementation fidelity, making it possible to understand not only whether a program had an effect, but under which conditions.

The review reinforces that fear of falling should be treated as a distinct clinical and functional outcome. Programs may improve physical capacity without changing fear, or increase confidence without producing the same effect on falls, and these responses are not equivalent. Integrated assessment prevents oversimplified interpretations and guides interventions toward safe autonomy by linking performance, perceived ability, and everyday participation.

Table 3. Applied synthesis for the prescription and monitoring of multicomponent training.

Prescription stage	Recommended approach	Monitoring indicators	Risk to avoid
Initial assessment	Combine fall history, a fear/confidence scale, and functional tests.	FES-I/ABC; TUG/SPPB; strength; use of walking aids; avoided activities.	Assuming that high levels of fear always indicate severe physical incapacity.
Component selection	Include at least two components, prioritizing strength, balance, and functional tasks according to individual needs.	Ability to perform exercises, fatigue, pain, stability, and personal goals.	Designing a varied exercise circuit unrelated to deficits or meaningful tasks.
Progression	Gradually increase load, postural complexity, speed, or dual-task demands.	Technical quality, support requirements, perceived safety, and exertion.	Progressing solely by increasing load or withdrawing support prematurely.
Functional transfer	Include tasks resembling activities that the participant wishes to resume.	Reported participation, mobility in daily life, and confidence in real situations.	Assuming that improved test performance automatically translates into increased participation.

Follow-up	Reassess performance and fear at defined intervals and document adherence.	Score changes, attendance, adverse events, and activity outside training sessions.	Assessing only at baseline and completion without adjusting the program throughout.
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Source: Prepared by the authors (2026).

Table 3 organizes practical implications without seeking to replace individualized clinical judgment. Its value lies in translating the pattern observed across the studies: more coherent interventions link assessment, component selection, progression, transfer to tasks, and follow-up. Functional confidence should be reassessed alongside physical tests because divergent changes across these domains provide useful information for adjusting exercise prescriptions and, when necessary, referring participants for interdisciplinary assessment.

Final Considerations

The review addressed the research question by indicating that multicomponent training programs may reduce fear of falling and increase functional confidence among community-dwelling older adults, although the consistency of these effects varies according to the intervention, participants' baseline characteristics, and the instruments employed. Outcomes were more consistent for balance, mobility, and physical performance, whereas fear and confidence showed greater heterogeneity, making it inappropriate to equate motor improvement with perceptual change.

The general objective of synthesizing scientific evidence was fulfilled through the comparison of twelve original studies involving different combinations of strength, balance, mobility, aerobic capacity, flexibility, functional tasks, and technological resources. The specific objectives made it possible to characterize fear of falling as a barrier to activity and participation, identify the central role of strength and balance in training programs, and demonstrate that effects on functional confidence are frequently favorable, although not uniform.

The findings indicate that the quality of exercise prescription depends on coherence among assessment, task selection, progression, and functional goals, rather than merely the number of components involved. Insufficient stimuli may limit adaptation, while excessively challenging tasks may reinforce insecurity and withdrawal. Prescription should therefore balance challenge and safety, creating graded mastery experiences capable of linking physical gains with the resumption of daily activities.

Delivery modalities proved flexible: face-to-face, home-based, and technology-mediated interventions all produced useful outcomes, without any one format demonstrating superiority under all conditions. Digital resources may broaden access and monitoring, while in-person supervision facilitates immediate correction and adaptation. Decisions should consider fall risk, technological ability, feedback requirements, the home environment, and the practical likelihood of adherence.

Heterogeneity among the studies prevents identification of a single optimal exercise dose or generalization that every multicomponent program will reduce fear of falling. Differences in scales, comparators, samples, and descriptions of intensity limit comparability. Future studies should report dose, progression, implementation fidelity, adverse events, and participation outside supervised sessions more precisely, while including longer follow-up periods and subgroups with different levels of fear and frailty.

Multicomponent training therefore represents a relevant strategy for autonomy in later life when functional confidence is treated as an outcome in its own right, alongside strength, balance, and mobility. Its professional contribution extends beyond increasing physical capacity to creating conditions in which that capacity can be perceived and transferred to everyday movement, activities, and social relationships. Fall prevention should preserve movement and participation, preventing safety from being achieved through restrictions on everyday life.

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