Journal for Quality in Public Health ISSN: 2614-4913 (Print), 2614-921(Online)
Vol. 9, No. 2, Nov 2025, pp: 104-112
DOI : https://doi.org/10.30994/jqph.v9i2.613

Effectiveness of Community-Based Exercise Interventions for Fall Prevention among Older Adults: A Systematic Review

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Received : May 8th 2026

Accepted : May 20th 2026

Published : May 31st 2026

ABSTRACT

Falls among older adults remain a major public health problem associated with increased morbidity, disability, reduced quality of life, and healthcare burden. Community-based exercise interventions have been widely implemented as preventive strategies to reduce fall risk among community-dwelling older adults. This systematic review aimed to analyze the effectiveness of community-based exercise interventions in preventing falls among older adults. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Literature searches were conducted in PubMed, Scopus, ScienceDirect, ProQuest, and CINAHL databases for articles published between 2019 and 2024. Inclusion criteria included primary studies with randomized controlled trial or quasi-experimental designs involving community-dwelling older adults receiving exercise-based interventions. Six eligible studies were included and analyzed using narrative synthesis. The interventions consisted of Lifestyle-integrated Functional Exercise (LiFE), Tai Chi-based exercise, multicomponent exercise, balance training, and combined education with home safety interventions. The findings demonstrated that community-based exercise interventions effectively reduced fall risk, improved balance, mobility, physical activity, and decreased fear of falling among older adults. Multifactorial interventions combining exercise, education, and environmental modification showed more optimal outcomes than single interventions. Community-based exercise programs can therefore be considered effective promotive and preventive strategies for fall prevention and healthy aging among older adults.

Keywords: *Community-Based Exercise, Fall Prevention, Older Adults, Physical Activity, Systematic Review.*

INTRODUCTION

The increasing elderly population is a global phenomenon that has resulted in an increase in various geriatric health problems, one of which is falls. Falls in the elderly are a serious public health problem because they are associated with increased morbidity, mortality, disability, reduced quality of life, and the economic burden on health care services. According to the World Health Organization, falls are the leading cause of fatal and nonfatal injuries in older adults worldwide. Furthermore, the Centers for Disease Control and Prevention reports that more than one in four older adults falls each

year, and repeated falls increase the risk of serious injury and hospitalization (Centers for Disease Control and Prevention, 2024).

In Indonesia, falls among older adults also represent an important public health issue. The increasing elderly population in Indonesia contributes to a higher risk of fall-related injuries, disability, hospitalization, and decreased quality of life among older adults. According to national health reports, falls are among the common causes of injury and functional decline in the elderly population. Therefore, effective and accessible community-based fall prevention programs are increasingly needed within Indonesian community and primary healthcare settings.The risk of falls increases with age, particularly in older adults with balance disorders, decreased muscle strength, limited mobility, frailty, visual impairment, and chronic diseases. The impact of falls is not only physical injuries such as fractures and head trauma, but also a fear of falling, which leads to decreased physical activity, social isolation, and dependence in daily activities (Montero-Odasso et al., 2022).

Fall prevention in older adults is a critical priority in community health and geriatric nursing services. Several studies have shown that exercise-based interventions are the most effective strategy for reducing the risk of falls in community-dwelling older adults. Physical exercise is known to improve muscle strength, balance, flexibility, coordination, and mobility in older adults, thereby significantly reducing the risk of falls. Recent recommendations from the US Preventive Services Task Force indicate that exercise interventions provide moderate to significant benefits in reducing falls and fall-related injuries in high-risk older adults (Guirguis-Blake et al., 2024).

Community-based exercise interventions are increasingly gaining popularity because they are considered more accessible, cost-effective, and able to increase participation and adherence in older adults with exercise programs. Programs such as Tai Chi, balance training, multicomponent exercise, the Otago Exercise Program, and Lifestyle-Integrated Functional Exercise (LiFE) have been widely implemented in community settings and have shown positive results in fall prevention. In addition to reducing falls, community-based programs can also improve quality of life, physical activity, balance, and confidence in carrying out daily activities in older adults (Sherrington et al., 2020).

A community-based approach is also relevant to the concept of healthy aging because it involves active community participation, social support, and multidisciplinary collaboration in maintaining the health of older adults. Community interventions enable older adults to receive regular exercise in a supportive and safe environment, thereby increasing the sustainability of fall prevention programs. Several recent studies have shown that community exercise programs combining education, balance training, home safety assessment, and strengthening exercises provide more optimal results than single interventions (Liu et al., 2022).

Although numerous studies have been conducted on community-based exercise interventions, the results still show variation in the type of exercise, duration of intervention, frequency of exercise, and outcomes used to measure the effectiveness of fall prevention. Previous systematic reviews have demonstrated that exercise-based interventions are effective in reducing fall risk among older adults. However, many earlier reviews included older primary studies with considerable heterogeneity in intervention models, settings, and outcome measurements. In addition, several previous reviews primarily focused on general exercise interventions without specifically emphasizing recent community-based approaches that integrate physical exercise, education, and environmental modification. Recent studies published between 2019 and 2024 provide updated evidence regarding more accessible, sustainable, and multifactorial community-based exercise interventions, such as Lifestyle-integrated Functional Exercise (LiFE), Tai Chi-based exercise, and combined home safety interventions. Therefore, this systematic review specifically focuses on recent primary studies to provide updated evidence and new insights into the effectiveness of community-based exercise interventions for fall prevention among community-dwelling older adults.

Therefore, this systematic review was conducted to analyze and synthesize scientific evidence regarding the effectiveness of community-based exercise interventions in preventing falls in older adults.

METHODS

This study used a systematic review design to analyze the effectiveness of community-based exercise interventions in preventing falls among older adults. The review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency, methodological rigor, and quality of reporting. A systematic literature search was conducted using five international electronic databases, namely PubMed, Scopus, ScienceDirect, ProQuest, and CINAHL. The literature search process was performed from January to March 2026. This review specifically focused on recent primary studies published between 2019 and 2024 to provide updated evidence regarding current community-based exercise interventions for fall prevention among community-dwelling older adults. The decision to include studies published within this timeframe was intended to capture recent developments in multifactorial and community-integrated exercise interventions that may not have been adequately represented in earlier systematic reviews. Previous systematic reviews have generally included older studies with considerable heterogeneity in intervention types, exercise models, and outcome measurements. In addition, several earlier reviews mainly focused on general exercise interventions without specifically emphasizing recent community-based and multifactorial approaches integrating physical exercise, education, and environmental modification. Therefore, this review aimed to synthesize recent evidence and provide updated insights into sustainable and accessible community-based exercise interventions for fall prevention among older adults.

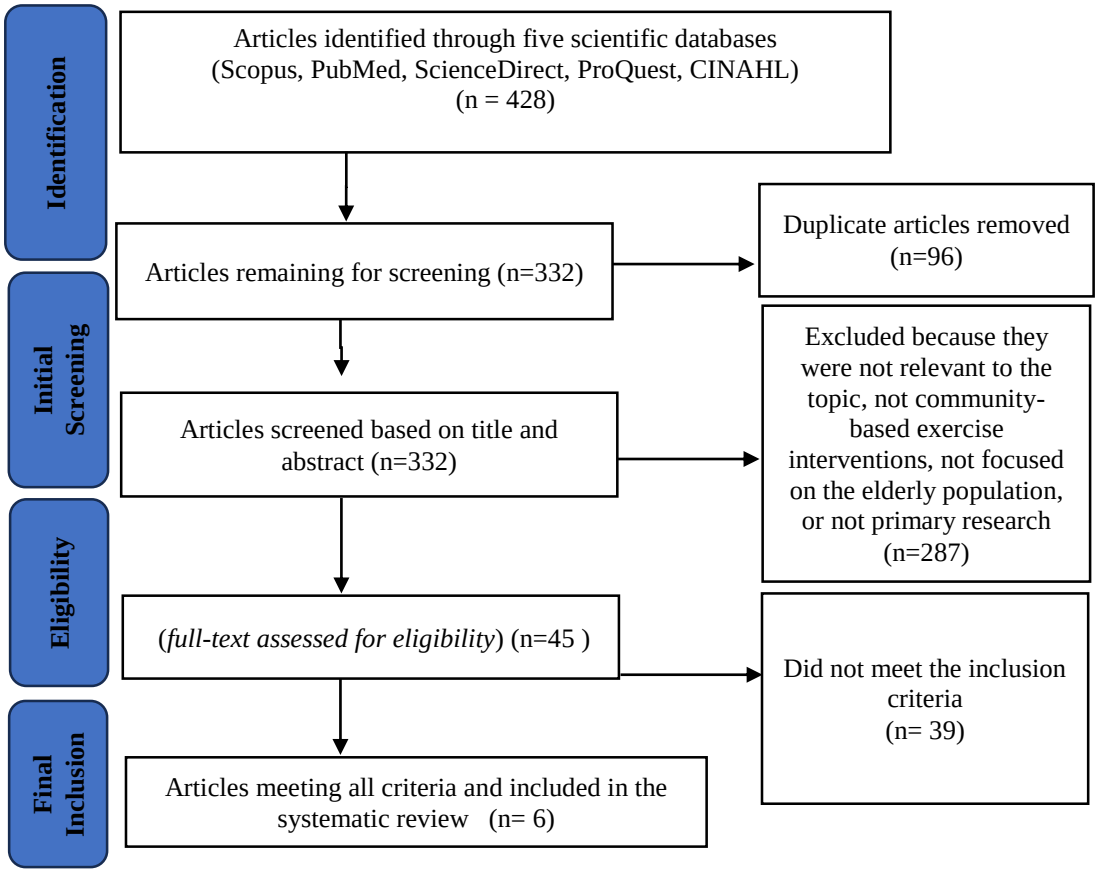
The search strategy used combinations of Medical Subject Headings (MeSH) terms and keywords with Boolean operators "AND" and "OR". The keywords included "older adults", "elderly", "community-based exercise", "physical activity", "balance training", "Tai Chi", "fall prevention", "fall risk", "randomized controlled trial", and "quasi-experimental". The search strategy was adapted according to the characteristics of each database. Study selection was conducted using the PICOS framework: Population: community-dwelling older adults aged ≥60 years; Intervention: community-based exercise interventions such as Tai Chi, Lifestyle-integrated Functional Exercise (LiFE), balance exercise, multicomponent exercise, and home-based exercise; Comparison: usual care or no intervention; Outcomes: fall incidence, fall risk, balance, mobility, fear of falling, and physical activity; Study Design: randomized controlled trials (RCTs) and quasi-experimental studies.

The inclusion criteria were: (1) primary research articles; (2) studies involving community-dwelling older adults; (3) interventions focusing on community-based exercise programs for fall prevention; (4) articles published in English between 2019 and 2024; and (5) full-text availability. Exclusion criteria included review articles, meta-analyses, conference abstracts, editorials, study protocols, and studies not specifically related to community-based exercise interventions for fall prevention. The article selection process followed the PRISMA 2020 flow diagram. Duplicate articles were removed before screening titles and abstracts. Full-text articles were then assessed for eligibility according to the inclusion and exclusion criteria. Two independent reviewers conducted the screening and eligibility assessment process to minimize selection bias. Disagreements between reviewers were resolved through discussion. Data extraction was performed systematically using a standardized extraction form including author names, publication year, study design, sample size, intervention characteristics, duration of intervention, outcomes measured, main findings, follow-up period, and methodological quality assessment. Data were analyzed using narrative synthesis by comparing intervention characteristics, exercise duration, exercise frequency, and outcomes related to fall prevention among older adults. The synthesis was conducted to identify the most effective forms of community-based exercise interventions for reducing fall risk and improving physical function in community-dwelling older adults.

RESULTS

A literature search was conducted through the PubMed, Scopus, ScienceDirect, ProQuest, and CINAHL databases using a predetermined search strategy. After identifying articles, eliminating duplications, screening titles and abstracts, and reviewing full-text articles based on inclusion and exclusion criteria, six articles were identified as eligible for analysis in this systematic review.

Figure 1. PRISMA Diagram of the Article Selection Process



The study characteristics showed that four articles used a randomized controlled trial (RCT) design and two articles used a quasi-experimental design. All studies were conducted on community-dwelling older adults with a sample size of more than 120 to 300 respondents. The duration of the interventions varied from 12 weeks to 12 months. The interventions used included Lifestyle-integrated Functional Exercise (LiFE), Tai Chi-based exercise, multicomponent exercise, health education, balance training, and home safety intervention. The primary outcomes measured included fall rate, fall incidence, fall risk, fear of falling, balance, and physical activity. Research by Clemson et al. (2019) showed that the Lifestyle-integrated Functional Exercise (LiFE) program was effective in reducing the incidence of falls in the elderly and improving their ability to perform daily activities. This program integrates balance and muscle strengthening exercises into the elderly's daily routine, making it easier to implement sustainably. The results showed a significant reduction in fall rates after 12 months of intervention. Similar findings were reported by Gawler et al. (2021), who evaluated the adaptation of the LiFE program for community-dwelling older adults. The study showed that an activity-based exercise intervention significantly reduced the risk of falls compared to a control group. Furthermore, adherence to the exercise program was relatively good because the intervention was integrated into daily activities. Liu et al.'s (2022) study used a multifactorial approach, combining health education, physical exercise, and home safety assessments. The results showed that the multifactorial intervention effectively reduced the risk of falls in older adults after a six-month follow-up. This program not only improved balance and physical mobility but also increased awareness of environmental risk factors that can contribute to falls.

In a quasi-experimental study, Sousa et al. (2023) reported that community-based education and exercise improved balance and reduced fear of falling in the elderly. The intervention was conducted in a group setting within the community, providing positive social support for the elderly's participation in

the exercise program. The results showed a significant improvement in balance ability after six months of intervention. Research by Park et al. (2022) demonstrated that community-based Tai Chi exercise effectively improved balance and reduced fear of falling in the elderly. Regular Tai Chi exercise for 12 weeks helped improve postural control, body coordination, and movement stability, thereby reducing the risk of falls. Furthermore, the elderly also showed increased confidence in performing daily activities after participating in the exercise program. Meanwhile, Arkkukangas et al. (2024) found that the FallFitness multicomponent exercise program effectively increased physical activity and supported fall prevention in community-dwelling elderly. The exercise program, which combined muscle strengthening, balance training, and functional training, showed a positive impact on the elderly's mobility abilities after six months of intervention.

Table 1. Study Characteristics

Author (Year)	Design	Setting	Sample	Intervention	Duration	Outcome
Clemson et al., (2019)	Randomized Controlled Trial (RCT)	Community-dwelling older adults	>300 elderly	Lifestyle-integrated Functional Exercise (LiFE)	12 months	Fall rate, daily activities
Gawler et al., (2021)	RCT	Community	>300 elderly	LiFE program adaptation	12 months	Fall incidence, risk of falling
Liu et al., (2022)	RCT	Community	>300 elderly	Health education + physical exercise + home safety assessment	6 months	Fall risk, balance, mobility
Sousa et al., (2023)	Quasi-experimental	Community	>150 elderly	Community-based education and training	6 months	Balance, fear of falling
Park et al., (2022)	Quasi-experimental	Community centers	>120 elderly	Tai Chi-based community exercise	12 weeks	Fear of falling, balance
Arkkukangas et al., (2024)	RCT	Community-dwelling older adults	>200 elderly	FallFitness multicomponent exercise program	6 months	Physical activity, fall prevention

Based on the quality appraisal results, most randomized controlled trials had a low risk of bias based on the Risk of Bias version 2 (RoB 2) assessment. Meanwhile, quasi-experimental studies showed moderate methodological quality based on the Joanna Briggs Institute (JBI) Critical Appraisal Checklist. Overall, the analyzed articles had good methodological quality and were therefore suitable for use in this systematic review synthesis.

Table 2. Study Quality Appraisal

Author	Appraisal Instrument	Assessment Results	Risk of Bias
Clemson et al. (2019)	RoB 2	All domains showed good methodological quality	Low risk of bias
Gawler et al. (2021)	RoB 2	Most domains showed good methodological quality	Low risk of bias

Author	Appraisal Instrument	Assessment Results	Risk of Bias
Liu et al. (2022)	RoB 2	Some limitations in follow-up and allocation concealment	Some concerns
Sousa et al. (2023)	JBI Critical Appraisal	Adequate methodological quality	Moderate quality
Park et al. (2022)	JBI Critical Appraisal	Several methodological limitations identified	Moderate quality
Arkkukangas et al. (2024)	RoB 2	All domains showed good methodological quality	Low risk of bias

The overall synthesis of results indicates that community-based exercise interventions are effective in reducing the risk of falls in older adults. Regular, structured exercise programs can improve balance, physical activity, mobility, and quality of life in older adults. Multifactorial interventions combining physical exercise, health education, and environmental modifications have been shown to be more effective than single interventions in preventing falls in older adults living in the community.

Table 3. Main Research Results

Writer	Intervention	Key Results	Conclusion
Clemson et al., (2019)	LiFE program	Significant reduction in the number of falls and increase in daily activities	LiFE is effective in preventing falls in the elderly
Gawler et al., (2021)	LiFE adaptation program	The risk of falls decreased significantly after the intervention.	Daily activity-based programs improve fall prevention
Liu et al., (2022)	Education + training + home safety	Reduced fall risk and increased mobility	Multifactorial interventions are more effective than single interventions
Sousa et al., (2023)	Community education and training	Improved balance and decreased fear of falling	Community programs increase the self-confidence of the elderly
Park et al., (2022)	Tai Chi-based exercise	Balance improves and fear of falling decreases	Tai Chi effectively improves postural control in the elderly
Arkkukangas et al., (2024)	FallFitness multicomponent exercise	Physical activity increases and the risk of falls decreases	Multicomponent exercise supports fall prevention in the elderly

DISCUSSION

The findings of this systematic review demonstrate that community-based exercise interventions are effective in reducing fall risk among community-dwelling older adults. Across the studies analyzed, exercise-based interventions consistently improved balance, mobility, physical activity, and reduced fear of falling. These findings strengthen the growing evidence that structured exercise programs are among the most effective non-pharmacological strategies for fall prevention in older adults. The results of this review are consistent with previous systematic reviews reporting that exercise interventions significantly reduce fall incidence and improve physical functioning among older adults. Sherrington et al. (2020) previously demonstrated that exercise programs emphasizing balance and functional training are highly effective in preventing falls among community-dwelling older adults. Similarly, Montero-Odasso et al. (2022) emphasized that exercise interventions are essential components of global

fall prevention strategies for healthy aging. The current review supports these findings while specifically highlighting the effectiveness of recent community-based and multifactorial interventions published between 2019 and 2024.

One of the important findings in this review is the effectiveness of the Lifestyle-integrated Functional Exercise (LiFE) program. Studies by Clemson et al. (2019) and Gawler et al. (2021) consistently showed that LiFE interventions significantly reduced fall incidence and improved the ability of older adults to perform daily activities independently. Unlike conventional exercise programs, the LiFE approach integrates balance and strength exercises into routine daily activities, making the intervention more practical, sustainable, and easier to implement in community settings. This integration into everyday activities may contribute to better adherence among older adults compared with traditional scheduled exercise programs. The findings related to LiFE interventions are also supported by earlier evidence indicating that interventions embedded within daily routines are associated with higher long-term participation and sustainability. Older adults often experience barriers to attending structured exercise sessions due to transportation limitations, low motivation, or physical fatigue. Therefore, interventions such as LiFE may provide more feasible and accessible alternatives for long-term fall prevention in community settings. Tai Chi-based exercise interventions also demonstrated positive outcomes in improving balance and reducing fear of falling among older adults. The findings of Park et al. (2022) are consistent with previous studies showing that Tai Chi improves postural control, body coordination, flexibility, and movement stability. Tai Chi emphasizes slow and controlled body movements that enhance neuromuscular coordination and body awareness, which are important factors in preventing falls among older adults.

Previous studies have also shown that Tai Chi contributes not only to physical improvements but also to psychological well-being. Fear of falling is a common problem among older adults and often leads to decreased physical activity, social isolation, and reduced quality of life. The current review found that Tai Chi-based exercise significantly reduced fear of falling, supporting previous evidence that regular physical activity improves self-confidence and independence among older adults. Another important finding of this review is the effectiveness of multifactorial interventions combining exercise, health education, and home safety assessments. Liu et al. (2022) demonstrated that multifactorial interventions produced more optimal outcomes compared with single exercise interventions. These findings are consistent with previous literature suggesting that fall risk among older adults is multidimensional and influenced by both intrinsic and extrinsic factors.

Intrinsic risk factors include muscle weakness, impaired balance, reduced mobility, chronic diseases, visual impairment, and frailty, whereas extrinsic factors include unsafe environmental conditions such as poor lighting, slippery floors, and inadequate home safety modifications. Therefore, multifactorial interventions are considered more comprehensive because they simultaneously address physical, behavioral, and environmental factors contributing to falls. Compared with earlier systematic reviews, the present review specifically focuses on recent primary studies published between 2019 and 2024. This approach provides updated evidence regarding recent developments in community-based exercise interventions, including integrated and multifactorial strategies that were less emphasized in older reviews. Recent interventions increasingly combine exercise with education, behavioral modification, and environmental assessment, reflecting a more holistic approach to fall prevention among older adults. Another important aspect identified in this review is the advantage of community-based interventions compared with facility-based programs. Community-based exercise programs are generally more accessible, cost-effective, and socially supportive for older adults. Exercise conducted within community environments may improve participation and adherence because older adults feel more comfortable exercising in familiar and socially interactive settings. Social support from peer groups and community health workers may also contribute positively to motivation and sustainability of physical activity programs.

The duration and consistency of interventions also appear to influence program effectiveness. Studies with intervention periods ranging from six months to one year demonstrated more consistent improvements in balance, mobility, and fall reduction compared with shorter interventions. This finding suggests that fall prevention programs should be implemented continuously to maintain physical functioning and mobility among older adults. Despite the positive findings, this systematic review has

several limitations. First, there was considerable heterogeneity among studies regarding intervention types, duration, frequency, and outcome measurements. Second, the number of eligible studies included in this review was relatively limited. Third, two included studies used quasi-experimental designs with moderate methodological quality, which may affect the strength of evidence. Furthermore, this review only included articles published in English, which may have introduced language bias.

Nevertheless, the findings of this review have important implications for community health services and geriatric nursing practice. Community-based exercise interventions can be integrated into primary healthcare and community nursing programs to support healthy aging and fall prevention among older adults. Community nurses play a crucial role in identifying fall risk, providing health education, facilitating exercise programs, and promoting adherence to long-term physical activity interventions. Overall, this systematic review provides updated evidence supporting the effectiveness of community-based exercise interventions in preventing falls among older adults. The review also highlights the importance of multifactorial and sustainable community-integrated approaches in improving balance, mobility, physical activity, and quality of life among community-dwelling older adults.

CONCLUSION

This systematic review suggests that community-based exercise interventions may be effective in reducing fall risk among community-dwelling older adults. Various interventions, including Lifestyle-Integrated Functional Exercise (LiFE), Tai Chi-based exercise, multicomponent exercise, and combined education with home safety interventions, were associated with improvements in balance, mobility, physical activity, and reductions in fear of falling among older adults. The findings also suggest that multifactorial interventions combining physical exercise, health education, and environmental modification may provide more comprehensive benefits compared with single interventions because they address multiple fall risk factors simultaneously. Furthermore, community-based exercise programs may offer practical advantages by improving accessibility, participation, and adherence among older adults.

However, the findings should be interpreted cautiously due to the limited number of included studies, variations in intervention characteristics, and the use of narrative synthesis. Further large-scale randomized controlled trials and systematic reviews with meta-analysis are needed to strengthen the evidence regarding the effectiveness of community-based exercise interventions for fall prevention among older adults.

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