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Fear of Falling Among Community-Dwelling Older Adults: A Scoping Review to Identify Effective Evidence-Based Interventions

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Abstract

Fear of falling presents a significant problem for many older adults by reducing physical function and increasing the risk of future falls. Several different types of interventions have improved fear of falling and a summary of efficacious interventions will help clinicians recommend treatment options. Using the Arksey and O'Malley Framework for scoping reviews, the purpose of this review was to identify efficacious interventions for treating fear of falling among community-dwelling older adults in order to provide a list of potential treatment options for care providers. A total of 45 publications were identified for inclusion in this review.

Keywords

fear of falling; falls; scoping review; older adults

Introduction

Fear of falling, defined as a “persistent feeling related to the risk of falling during one or more activities of daily living”,¹ is a significant problem among older adults. The prevalence of fear of falling is between 20–39% among community-dwelling older adults.^{2–5} Although approximately one half of individuals who fall develop a fear of falling,⁶ research suggests that fear of falling is also present in people who have not fallen and is an independent risk factor for disability.⁷ Fear of falling has been associated with reductions in physical and social activity as well as reduced quality of life.⁶ Additionally, high levels of fear of falling have been shown to increase an individual's risk of future falls, although low levels of fear of falling have been shown to have a protective effect against falls, regardless of the presence of balance impairments.⁸ Given the prevalence of fear of falling among community-dwelling older adults and significant impact that fear of falling can have on physical function and risk

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of future falls it is important for healthcare providers to assess fear of falling and consider implementing strategies to reduce fear of falling as part of a comprehensive care plan.

In the past two decades, a significant number of studies have examined the effectiveness of interventions to improve fear of falling. In 2007, Zijlstra and colleagues⁹ published a systematic review of interventions to reduce fear of falling in which 19 articles were eligible for inclusion. Of the effective trials included in that review, fall-related multifactorial programs were most common, followed by tai chi and exercise interventions. Since 2007, numerous studies have examined the effectiveness of fear of falling interventions and an overview of the interventions is needed to provide clinicians with options for addressing fear of falling with their patients.

Purpose

Therefore, given the significant impact that fear of falling can have on mobility, independence, and quality of life and the lack of guidelines for management of fear of falling among older adults, we sought to conduct a scoping review to answer the following question: “What interventions investigated with randomized controlled trials improve fear of falling among community-dwelling older adults?” Following the principles of the Arksey and O’Malley Framework for scoping reviews,¹⁰ we summarize the existing evidence related to interventions for the management of fear of falling and provide recommendations for interventions clinicians could consider for their patients who experience fear of falling.

Method

Eligibility and Search Strategy

A librarian with systematic review expertise helped the investigators create a search strategy to find eligible articles. Four databases, Ovid MEDLINE, CINAHL, EMBASE, and PsychINFO were searched on May 3, 2017 using a complex combination of search terms (i.e., fear*, concern*, worry*, afraid, fall, balance confidence*). The search was limited to articles published in English between 2007 and the search date, as a rigorous systematic review on fear of falling interventions for community dwelling older adults was published that year.⁹ To be included in the review publications had to focus on community-dwelling adults age 65 years and older, be a randomized controlled trial with a sample size of at least 60 participants, investigate an intervention lasting 6 weeks or longer, and include fear of falling as either a primary or secondary outcome. As the focus of this review is to provide evidence-based recommendations for the management of fear of falling among independently living older adults in the community, studies meeting any of the following criteria were excluded from this review: nursing home or assisted living population, mean age less than 65 years, disease specific population (e.g., Parkinson’s disease, multiple sclerosis, acute stroke, osteoporosis) and focus on rehabilitation following acute health events (e.g., stroke, paraplegia).

Abstract and Full Text Screening

All three investigators screened abstracts and full text documents for eligibility. Only one investigator reviewed each citation. When questions about eligibility arose, all three

investigators reviewed the full text document and came to a consensus about eligibility. Excel spreadsheets were used to track decisions made during abstract and full text screening and the results were summarized in a flow diagram as recommended by PRISMA guidelines.¹¹

Data Collection from Eligible Articles

All three investigators collected data from the eligible articles, but data from each publication was only abstracted by one investigator. Data was abstracted into a standardized Excel spreadsheet that elicited information on sample size and characteristics; the intervention components, setting, interventionist, and duration; follow-up period; and fear of falling measures and outcomes. It was noted whether or not the study found a statistically significant improvement in fear of falling.

Data Synthesis

As the heterogeneity between publications precluded meta-analysis and the review was designed to be scoping in nature, the tables of abstracted data were used to conduct a qualitative synthesis of findings.¹² Articles were described by population, intervention type, length of follow-up period, outcomes measured, and overall findings.

Quality Assessment

The Cochrane Collaboration's tool for assessing risk of bias was used to appraise the quality of eligible publications.¹³ Using this assessment tool, the reviewer rated the risk of bias in six domains (sequence generation, allocation concealment, blinding of participants, personnel, and outcome assessors, incomplete outcome data, selective outcome reporting, and other) as low, unclear, or high. Each publication was assessed by one investigator, when questions arose, all three investigators reviewed the full text document and came to a consensus on its status.

Results

The database searches identified 1,295 citations. The reviewers screened 1,093 non-duplicative abstracts and 90 full text documents for eligibility. Figure 1 presents the number of documents identified at each stage of screening and reasons for ineligibility.

Forty-five publications, representing 44 unique studies, were identified for inclusion in the review.¹⁴⁻⁵⁸ Two manuscripts reported data from the same study, though reporting data from differing follow-up times.^{23,24} The publications included in this review summarize a variety of interventions that were designed specifically to reduce fear of falling, or report the results of studies that have included fear of falling as a secondary outcome of interest (see Table 1). Fear of falling was the primary target of the chosen intervention for nine of the studies,¹⁴⁻²² all of which were effective at reducing fear of falling. Twenty-three studies were designed to primarily target fall prevention,²³⁻⁴⁵ ten of these interventions were effective in reducing fear of falling.²³⁻³² Fear of falling was the secondary outcome for 13 studies,⁴⁶⁻⁵⁸ seven of which demonstrated efficacy.⁴⁶⁻⁵²

Overall, 26 of the forty-five articles included in this review (58%) reported the results of effective fear of falling interventions.^{14–32,46–52} Of these studies, a total of 8314 older adults were enrolled with sample sizes ranging from 60 to 1256.^{23,24,28} Intervention periods of the effective studies ranged from 6 weeks to 2 years, with follow-up periods over six weeks to two years.^{22,46} Fear of Falling was measured most frequently (n=16) using the Falls Efficacy Scale or a modified FES. Other fear of falling measures utilized included the Geriatric Fear of Falling Measure,¹⁴ Activities-specific Balance Scale,^{18,21} and Survey of Activities and Fear of Falling in the Elderly (SAFFE).²⁸ A number of studies utilized the approach of asking one to two questions to evaluate fear of falling, with yes no response⁵⁰ or with options designed to evaluate level of fear of falling.^{9,18,19,25,29,46}

Efficacious Interventions

Interventions were considered effective if they reported a statistically significant fear of falling outcome improvement at any point during their follow-up period; results did not have to be sustained to be considered efficacious. The efficacious studies included interventions that were single and multi-component.

Single-component studies most often tested a form of exercise, compared exercise modalities, or exercise delivery mechanisms. The types of exercise that proved effective in reducing fear of falling were those aimed at improving strength, balance, agility, and flexibility, either specifically or in combination. Studies that used specific types of exercise included tai chi,^{14,26} walking,^{21,50} and water-based training.⁴⁷ Non-exercise single component interventions included guided relaxation,²² a virtual reality trainer,²⁸ and cognitive behavior therapy.¹⁷ Training delivery methods that were effective included Wii,¹⁵ in-home training,^{21,31} and group training.⁴⁸

An intervention was considered multi-component when two or more differing methods of intervention were applied within one treatment arm. Defined this way, eleven studies utilized a multi-component intervention.^{14,16,19,20,27,29,30,46,50–52} Cognitive behavioral therapy was one of the most common components included in multi-component interventions; five studies evaluating multi-component interventions included CBT.^{14,16,19,20,27} CBT was coupled with tai chi,¹⁴ or included activity training as a component in their CBT protocol.^{16,19,20,27} Other than CBT, effective multi-component interventions included fall prevention education,^{29,30} vitamin D supplementation,⁴⁶ whole-body vibration therapy,⁵¹ and motor training.⁵²

Quality Assessment

Each efficacious (Table 3) and non-efficacious study (Table 4) was appraised for risk of bias.¹³ As expected for the type of interventions reported here, few studies reported participant blinding.^{22,42,43,52} Likewise, none of the interventionists were blinded, though many of the researchers took steps to keep the outcome assessors blinded (n=25). Attrition rates among the studies ranged from 0.03–0.49.

Discussion

Numerous studies have examined interventions to reduce fear of falling in the past 10 years. The interventions found to be effective in this review are similar to those summarized by Zijlstra and colleagues.⁹ This scoping review also extends the results of the systematic review conducted by Zijlstra and colleagues⁹ by including 44 additional studies examining fear of falling interventions. In both reviews, the effective interventions typically were multi-component programs that included exercise (primarily balance and strength training or tai chi) and cognitive behavioral therapy.

Characteristics that were common among effective interventions included ongoing support such as weekly sessions, extended treatment periods and booster sessions.^{16,19,20} Studies showing statistically significant improvement also included those based on previously established effective fear of falling interventions such as A Matter of Balance^{17,19} or protocols based on prior work.^{14,16,24} In contrast, fear of falling was not the primary aim of any of the non-effective interventions. In addition, non-effective studies included unsupervised interventions and interventions that did not include ongoing supportive contact.^{34,54} Non-effective treatments also included one-time assessments without resources for participants to carry out the recommended improvements,³⁴ though a similar study where resources were provided was also ineffective.⁵³ However, 84% of the non-effective studies had intervention dosing and follow-up durations similar to the effective interventions.

There were some conflicting findings. For example, tai chi was included as the exercise coupled with CBT in an intervention that demonstrated improvement in fear of falling, but did not result in improvement in fear of falling when used independently in three trials.^{36,44,56} This was also true of the varying types of single-component exercise training interventions. Among the effective interventions, eight of the included studies^{15,18,23–26,28,32} demonstrated improvement in fear of falling, when using exercise to improve functionality, while nine trials that also utilized exercise were non-effective.^{33,35–39,44,55,56}

Implications for Clinical Practice

Although the importance of fear of falling intervention is clearly established in our review, this review did not reveal clear recommendations regarding clinical intervention and screening. However, the high prevalence and impact of fear of falling on function indicate a need to proactively identify patients experiencing fear of falling and to provide an intervention plan and resources. We recommend clinicians begin by identify patients for whom intervention is most effective and are most at risk for fear of falling. Fear of falling could be assessed using a validated tool, such as the FES, SAFFE, etc. as well using a single item similar to those used by many of the articles included in this review. Finally, the clinician should assess the patient's interest in participating in fear of falling interventions. Interventions have been trialed in home and community group settings, with varying degrees of success in terms of fear of falling and intervention adherence.⁵⁹ Similarly, no form of exercise has shown better efficacy than any other, although many studies have included strength and balance training in some format.^{14,17,60,61} Evidence does suggest that combining psychotherapy and exercise is most effective,^{9,14,59} and we recommend patients receive the referrals and resources necessary to initiate both simultaneously.

It is important to note that the majority of the included studies examined an intervention (often multi-component) when compared to usual care. Given the lack of head-to-head comparisons of different types of interventions or intervention components, there is no clear consensus as to which type of intervention is best. Rather, the most appropriate evidence-based recommendation given the current state of the literature is to determine which intervention is the best fit for a patient and his or her circumstances. Engaging in an intervention (such as multi-component programs, exercise, CBT) has consistently been shown to be superior to standard care and thus some type of action is recommended. Further research should examine the effectiveness of different types of interventions in comparison to one another, as well as examine the intervention components that are most efficacious, to provide clinicians with guidance as to which interventions should be preferentially selected.

Limitations and Strengths

There are several limitations to the present review. Most studies available have targeted falls and examined fear of falling among older adults as a secondary outcome. Additionally, most of these studies have been done with individuals who have experienced a previous fall, thus little is known about the effects of these programs in the prevention of fear of falling with or without a history of falls. Future research is needed to examine the efficacy of such programs in individuals who have not fallen, as fear of falling is present in older adults who have not fallen and is an independent risk factor for disability.⁷ Additionally, there are little data available reporting long-term outcomes of interventions to reduce fear of falling (longest duration study was 2 years⁴⁶), so we are unable to comment on the potential long-term effects of the proposed interventions. Similarly, there have not been any studies that have conducted direct comparisons of different modes of exercise training (e.g., aerobic, resistance, balance), and so we are unable to make specific recommendations on the type of exercise. Future studies should consider the implications of reducing fear of falling on long-term outcomes such as disability and quality of life and evaluate the comparative effectiveness of different types of exercise programs.

Despite these limitations, there are a number of key strengths to the present scoping review. This scoping review includes a wide variety of interventions that provide the clinician with the opportunity to tailor the intervention to a specific individual. For example, a patient with significant fear of falling and visual impairment due to cataracts may experience reduced fear of falling following surgical cataract repair, but may benefit from both CBT and environmental hazard modification. Alternatively, an older adult with fear of falling without visual impairment would not benefit from this strategy. Thus, this review provides a menu of evidence-based strategies that may be helpful for and appealing to specific patients.

Conclusion

In this scoping review, we summarized efficacious evidence-based interventions that care providers should consider for patients with fear of falling. Fear of falling can have a substantial impact on physical function of older adults and increase their risk of future falls. Thus, it is important for healthcare providers to assess fear of falling and consider implementing strategies to reduce fear of falling as part of a comprehensive care plan.

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Abbreviations

ABC	Abilities-Specific Balance Confidence Scale
FES	Falls Efficacy Scale
FES-I	Falls Efficacy Scale – International
FOF	Fear of Falling
GARS	Groningen Activity Restriction Scale
RCT	randomized controlled trial
SAFFE	Survey of Activities and Fear of Falling in the Elderly
VAS	Visual Analogue Scale

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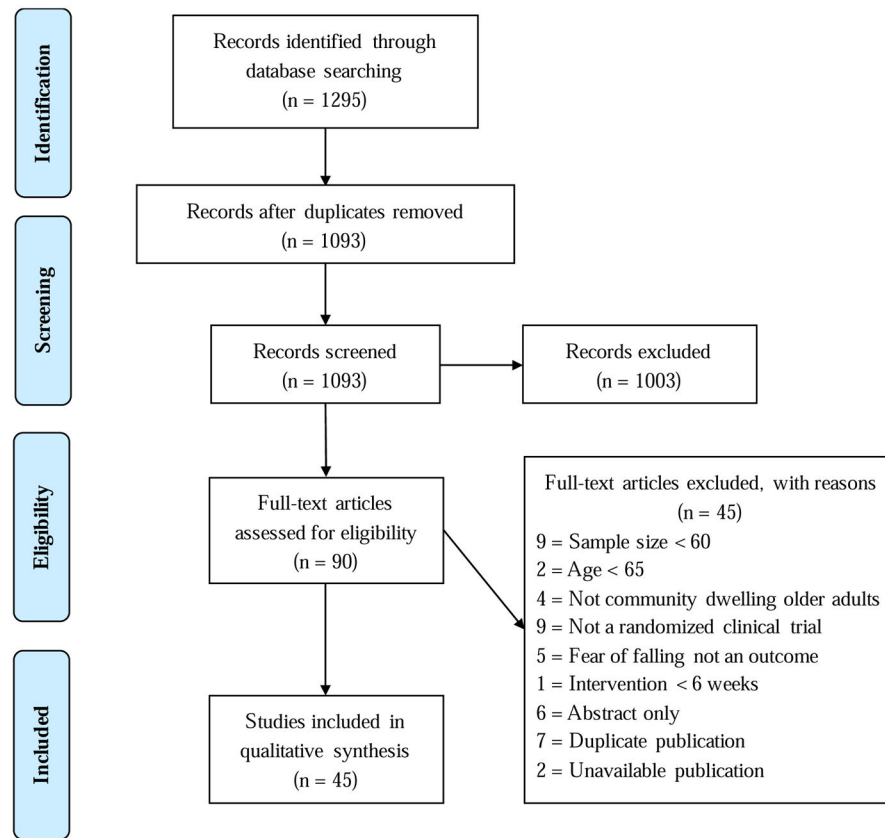


Figure 1. Flow of records during literature search and document reviewing process.

Table 1

Number of Eligible Articles (N = 45, 44 unique studies) by Intervention Target & Efficaciousness

Intervention Target	Number of Articles	Citations
Fear of falling was primary target		
All studies were efficacious	9	14–22
Fall prevention was primary target		
Efficacious studies	10	23–32
Non-efficacious studies	13	33–45
Fear of falling was secondary outcome of non-fall prevention trial		
Efficacious	7	46–52
Non-efficacious	6	53–58

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Table 2

Characteristics of Efficacious Studies

Author, Year	Primary Target	Design/Intervention	Duration	Follow-up period	N	Sample Description	FOF Measure(s)
Huang, 2011 ¹⁴	FOF	3 arms: CBT; CBT + tai chi; control	2 months	5 months	186	60+ yrs, community dwelling	Geriatric Fear of Falling Measure FES
Kwok, 2016 ¹⁵	FOF	2 arms: Wii exercise; gym exercise	3 months	6 months, 12 months	80	community dwelling 60+ yrs; not routine exercisers	Modified FES
Zijlstra, 2009 ¹⁶	FOF	2 arms: multi- component with CBT; control	2 months + 1 session at 6 months	12 months	540	70+ yrs, community dwelling with FOF or activity avoidance	Single item: Are you concerned about falling? (1–5) Single item: Do you avoid certain activities due to concerns about falling? (1–5) Frenchay Activities Index
Dorresteyn, 2016 ¹⁷	FOF	2 arms: home- based CBT program; usual care	5 months	5 months, 12 months	389	70+ yrs, fair or poor perceived health, concern about falling and activity avoidance	FES-I FES-IAB (activity avoidance) GARS
Oh, 2012 ¹⁸	FOF	2 arms: education + exercise; education only	3 months	3 months	65	65+ yrs, community dwelling, fallen in previous year	Single item: How afraid are you of falling down? (0–4) ABC Scale – Korean version
van Haastregt, 2013 ¹⁹	FOF	2 arms: multi- component (CBT, environmental modification, exercise); control	14 months	2 months, 8 months, 14 months	540	70+ yrs, report some fear of falling and activity avoidance	Single item: Are you afraid of falling? (0–4) Single item: Do you avoid certain activities due to fear of falling? (0–4)
Parry, 2016 ²⁰	FOF	2 arms: STRIDE – CBT-based intervention; control	2 months	12 months	415	60+ yrs, community dwelling, express fear of falling	FES-I Single item: Fear of falling (0– 10)
Cyarto, 2008 ²¹	FOF	3 arms: home- based resistance and balance training; group- based resistance and balance training; group based walking training	5 months	5 months	9 clusters, 167 participants	65–96 yrs, independently living retirement village residents	ABC Scale
Kim, 2012 ²²	FOF	2 arms: guided relaxation with imagery; guided relaxation	6 weeks	6 weeks	91	60+ yrs, report a fear of falling	7-item FES-I
Iliife, 2014 ²³ and Iliife, 2015 ²⁴	Falls	3 arms: group- based exercise (FAME); home based exercise (Otago); usual care	6 months	18 months	1256	65+ yrs, able to take part in exercise class	Confidence in Balance scale FES-I

Author, Year	Primary Target	Design/Intervention	Duration	Follow-up period	N	Sample Description	FOF Measure(s)
Lin, 2007 ²⁵	Falls	3 arms: education, home safety and modification; exercise training	4 months	8 months	150	65+ yrs, recent fall	VAS (0–10)
Hwang, 2016 ²⁶	Falls	2 arms: tai chi; lower extremity training	6 months	6 months, 18 months	456	60+ yrs, had a fall-related emergency department visit at least 6 months ago, ambulate independently	FES-I
Barban, 2017 ²⁷	Falls	4 arms: motor training only (stretching, balance, gait); motor + cognitive exercises delivered via 1-walker; cognitive training only; control	3 months	6 months	496	65+ yrs, at risk of falling	FES-I
Duque, 2013 ²⁸	Falls	2 arms: balance training; usual care	6 weeks	6 weeks, 9 months	60	65+ yrs, at least 1 fall in the previous 6 months, poor balance (posturography)	SAFFE
Jeon, 2014 ²⁹	Falls	2 arms: multi- component (strength, balance, education); control	3 months	3 months	70	65+ yrs, female, residing in rural area, at least 3 falls in previous year	Single item: Do you fear falling? (0–3) FES
Siegnist, 2016 ³⁰	Falls	2 arms: muscle strengthening and balance training; usual care	4 months	12 months	378	older adults, independently living, at high risk for falling	FES-I
Gallo, 2016 ³¹	Falls	2 arms: individualized home-based exercise program; usual care	6 months	6 months	69	65+ yrs, living independently, at risk of falling	ABC Scale
Boongird, 2017 ³²	Falls	2 arms: home- based exercise program (modified Otago); control	12 months	6 months	439	older adults, balance impairment unrelated to neurological condition	FES – Thai version
Patil, 2016 ⁴⁶	Other	4 arms: vitamin D + exercise; vitamin D only; placebo + exercise; placebo only	24 months	24 months	409	home-dwelling women with fall in previous year	FES-I VAS (0–100)
Oh, 2015 ⁴⁷	Other	2 arms: water- based exercise; land based exercise	10 weeks	10 weeks	80	65+ yrs, more than 1 fall in previous 3 months, not regular exercisers	Modified FES
Sheffield, 2013 ⁴⁸	Other	2 arms: individualized assessment with adaptive equipment and home modifications; control	3 months	3 months	90	65+ yrs, currently receiving some sort of agency service (significant impairments in ADLs)	FES-I
Freiberger, 2013 ⁴⁹	Other	2 arms: complex exercise (balance, gait, muscle strength, body awareness, motor coordination, self- efficacy); usual care	4 months	4 months	33 clusters, 378 participants	65+ yrs, one or more fall in past 12 months or fear of falling or physical fall risk	FES-I – German version
Yamada, 2012 ⁵⁰	Other	2 arms: pedometer based walking; control	6 months	6 months	87	older adults, community dwelling, sedentary	Single item: Are you afraid of falling? (yes/no)

Author, Year	Primary Target	Design/Intervention	Duration	Follow-up period	N	Sample Description	FOF Measure(s)
Pollock, 2012 ⁵¹	Other	2 arms: whole body vibration; exercise	2 months	6 months	77	frail older fallers	FES-I
Schoene, 2015 ⁵²	Other	2 arms: interactive videogame for cognitive-motor step training; control	3 months	4 months	90	70+ yrs, independent living	Icon-FES

Abbreviations: ABC = Activity-specific Balance Confidence; FES = Falls Efficacy Scale; FOF = Fear of Falling; GARS = Groningen Activity Restriction Scale; SAFPE = Survey of Activities and Fear of Falling in the Elderly; VAS = Visual Analogue Scale;

Table 3

Quality Appraisal of Efficacious Studies

Author, year	Intervention Target	Sequence Generation	Allocation Concealment	Blinding of Participants	Blinding of Interventionists	Blinding of outcome assessors	Incomplete outcome data	Selective outcome reporting	Other source of bias	Attrition Rate
Huang, 2011 ¹⁴	FOF	+	+	-	?	+	+	-	-	0.05
Kwok, 2016 ¹⁵	FOF	+	?	-	-	?	-	-	-	0.2
Zijlstra, 2009 ¹⁶	FOF	+	-	-	-	+	-	-	-	0.25
Dorresteijn, 2016 ¹⁷	FOF	+	+	-	-	+	?	+	+	0.2
Oh, 2012 ¹⁸	FOF	+	?	-	-	?	+	+	+	0.15
van Haastregt, 2013 ¹⁹	FOF	+	+	-	-	-	+	+	+	0.25
Parry, 2016 ²⁰	FOF	+	+	-	-	-	+	-	+	0.25
Cyarto, 2008 ²¹	FOF	+	+	-	-	+	+	+	+	0.11
Kim, 2012 ²²	FOF	+	+	+	-	-	?	+	+	0.16
Iliffe, 2014 ²³	Falls	+	+	-	-	-	+	+	+	0.34
Iliffe, 2015 ²⁴	Falls	?	-	-	-	-	-	-	-	0.44
Lin, 2007 ²⁵	Falls	+	-	-	-	+	-	-	-	0.17
Hwang, 2016 ²⁶	Falls	+	+	-	-	+	+	+	+	0.27
Barban, 2017 ²⁷	Falls	+	-	-	?	+	+	+	+	0.03
Duque, 2013 ²⁸	Falls	?	?	-	-	?	+	+	+	0.07
Jeon, 2014 ²⁹	Falls	+	?	-	-	?	+	+	+	0.11
Stegrist, 2016 ³⁰	Falls	+	+	-	-	?	-	-	-	0.21
Gallo, 2016 ³¹	Falls	?	+	?	-	-	-	-	-	0.49
Boongird, 2017 ³²	Falls	+	+	-	-	+	+	+	+	0.02
Patil, 2015 ⁴⁶	Other	-	-	-	-	?	-	-	-	0.1
Oh, 2015 ⁴⁷	Other	+	+	-	-	-	?	+	+	0.16
Sheffield, 2013 ⁴⁸	Other	?	?	-	-	-	-	+	+	0.33
Freiberger, 2013 ⁴⁹	Other	+	-	-	-	-	+	+	+	0.14
Yamada, 2012 ⁵⁰	Other	+	+	-	-	+	+	+	-	0.08
Pollock, 2012 ⁵¹	Other	+	+	-	-	+	+	+	+	0.27

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Author, year	Intervention Target	Sequence Generation	Allocation Concealment	Blinding of Participants	Blinding of Interventionists	Blinding of outcome assessors	Incomplete outcome data	Selective outcome reporting	Other source of bias	Attrition Rate
Schoene, 2015 ⁵²	Other	+	+	+	-	+	+	+	+	0.1

Note: (-) indicates "high risk of bias", (+) indicates "low risk of bias", and (?) indicates "unclear risk of bias".

Table 4

Quality Appraisal of Non-Efficacious Studies

Record Number	Intervention Target	Sequence Generation	Allocation Concealment	Blinding of Participants	Blinding of Interventionists	Blinding of Outcome Assessors	Incomplete Outcome Data	Selective Outcome Reporting	Other Source of Bias	Attrition Rate
Frieberger, 2012 ³³	Falls	+	+	-	-	?	-	-	-	0.26
Pighills, 2011 ³⁴	Falls	-	-	-	-	+	-	-	-	0.24
Karinkanta, 2012 ³⁵	Falls	+	-	-	?	?	-	-	+	0.2
Zhao, 2016 ³⁶	Falls	+	-	-	-	?	-	-	-	0.08
El-Khoury, 2015 ³⁷	Falls	+	+	-	-	+	+	+	+	0.19
Gawler, 2016 ³⁸	Falls	+	+	-	?	?	-	+	+	0.52
Cockayne, 2017 ³⁹	Falls	+	+	?	-	-	+	+	+	0.12
Vind, 2010 ⁴⁰	Falls	+	?	-	-	+	+	+	+	0.07
Markle-Reid, 2010 ⁴¹	Falls	+	+	-	-	+	+	+	+	0.16
Corrie, 2015 ⁴²	Falls	+	?	+	-	+	+	+	+	0.1
Gschwind, 2015 ⁴³	Falls	+	+	+	-	+	-	+	+	0.18
Logghe, 2009 ⁴⁴	Falls	+	+	-	-	+	+	+	+	0.07
Talley, 2014 ⁴⁵	Falls	+	+	-	-	+	+	+	+	0.07
Gitlin, 2008 ⁵³	Other	?	-	-	-	+	+	-	-	0.11
Scheffer, 2012 ⁵⁴	Other	-	-	-	-	-	-	-	-	0.33
Beyer, 2007 ⁵⁵	Other	+	?	-	-	-	?	+	+	0.22
Wu, 2010 ⁵⁶	Other	+	?	-	-	?	?	+	+	0.2
Metzelthin, 2013 ⁵⁷	Other	+	-	-	-	+	+	+	+	0.22
Kim, 2011 ⁵⁸	Other	+	?	?	?	?	-	+	-	0.03

Notes: (-) indicates "high risk of bias", (+) indicates "low risk of bias", and (?) indicates "unclear risk of bias".