

Cochrane Corner



What are the effects of exercise interventions for preventing falls in older people living in the community? - A Cochrane Review summary with commentary

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The aim of this commentary is to discuss from a rehabilitation perspective the published Cochrane Review "Exercise for preventing falls in older people living in the community"¹ by Sherrington et al.². This review was produced with the support of the Cochrane Bone, Joint and Muscle Trauma Group. This Cochrane Corner is produced in agreement with the *Journal of Musculoskeletal and Neuronal Interactions* by Cochrane Rehabilitation.

Background

Falls are one of the most important health problems for older people living in the community, with significant consequences including reduced life expectancy. The total cost of fall-related injuries accounts for substantial economic resources of medical care, leading health systems to develop better policies for the prevention of falls^{2,3}. A growing body of evidence has shown that exercise can be effective in reducing the risk of falling and the fear of falling through the improvement of strength and balance⁴⁻⁶. Other different types of interventions, including

multifactorial interventions (home safety, educational counselling, correction of vitamin D deficiency), and physical activity programmes have also been demonstrated to be effective in the prevention of falls among older persons living in the community^{7,8}. However, there is a distinction between physical activity, defined as any bodily movement that results in increased energy expenditure and can be achieved by a variety of leisure-time, work or transportation-related activities, and exercise, referred to physical activities that are planned, structured, repetitive, and intended to improve or maintain fitness, function, and health⁹. A recent Cochrane Review searched for evidence of the effectiveness of exercise interventions in the prevention of falls in community dwelling elderly¹.

Exercise for preventing falls in older people living in the community

(Sherrington C, Fairhall NJ, Wallbank GK, Tiedemann A, Michaleff ZA, Howard K, Clemson L, Hopewell S, Lamb SE. 2019)

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The views expressed in the summary with commentary are those of the Cochrane Corner author and do not represent the Cochrane Library or Wiley.



What is the aim of this Cochrane review?

The aim of this Cochrane Review was to evaluate benefits and harms of exercise interventions for preventing falls in older people living in the community.

What was studied in the Cochrane review?

The population studied in the Cochrane Review was older people (an inclusion criterion of 60 years of age or over was specified) living in the community or in residences that did not provide residential health-related care or rehabilitative services. People with specific clinical conditions that increase the risk of falls, such as neurological diseases (e.g. stroke), hip fracture, and severe visual impairment were excluded by the review.

The studied interventions included a wide range of exercise programmes, categorized according to an established taxonomy of fall prevention interventions¹⁰: gait, balance, and functional training; strength/resistance exercise; flexibility programmes; three-dimensional exercise (e.g. Tai Chi, Qigong, dance); general physical activity; endurance exercise; and other kinds of exercises. These exercise programmes were compared primarily with either 'usual care', defined as no change in usual activities, or a 'control intervention', defined as an intervention that is not thought to reduce falls, such as general health education, social visits, gentle exercise, or 'sham' exercise, not expected to impact on falls. The review also undertook secondary comparisons of different exercise programmes; these are not covered in this summary.

The primary outcome of this review was the rate of falls (number of falls per person-year). The secondary outcomes of this review were: the risk of falling (number of people experiencing one or more falls), the presence of fall-related fractures, the need for medical attention or hospital admission due to falls, health-related quality of life (HRQoL), and adverse effects. In addition, data on mortality and the possible socio-economic impact were studied.

Search methodology and up-to-dateness of the Cochrane review?

The review authors searched for studies that had been published up to 2 May 2018.

What are the main results of the Cochrane review?

The review included 108 randomized controlled trials (RCTs), involving 23,407 participants with a mean age of 76 years, mostly (77%) women. Eighty-one of these trials involving 19,684 participants compared exercise (all types) with control intervention (defined as the one not thought to reduce falls).

The review shows:

When all types of exercise interventions are compared to the control group:

- A reduction in the rate of falls by 23% (59 trials with 12,981 participants) (high-certainty evidence).
- A reduction in the number of individuals sustaining one or more falls by 15% (63 trials with 13,518 participants) (high-certainty evidence).
- A possible reduction in the number of individuals sustaining one or more falls-related fractures (10 trials, 4,047 participants) (low-certainty evidence).
- A possible reduction in the number of individuals who fell once or more which required medical attention (5 studies with 1,019 participants) (low-certainty evidence).
- Uncertainty whether exercise is effective in reducing the number of individuals who fell once or more which required hospital admission (2 trials with 1,705 participants) (very low-certainty evidence).
- A possible effect of exercise making little important difference to HRQoL (15 trials with 3,172 participants) (low-certainty evidence).
- The evidence for adverse events associated with exercise was very limited. Where reported, they were usually non-serious adverse events of a musculoskeletal nature.

Preplanned subgroup analyses showed no evidence of a difference with regard to effect on both falls outcomes according to the selection of participants at increased risk of falling or not in trials. However, subgroup analysis showed that different forms of exercise had different impacts on falls. The review reported the results for the different types of exercise programmes versus control for a reduced set of outcomes. There were no trials comparing flexibility or endurance exercise versus control.

Balance and functional exercises:

- A reduction by 24% in the rate of falls (39 trials with 7,920 participants) (high-certainty evidence) and by 13% in the number of elderly who sustained falls once or more (37 trials with 8,288 participants) (high-certainty evidence).
- A possible reduction by 56% in the number of elderly who sustained one or more falls-related fractures (7 trials with 2,139 participants) (low-certainty evidence).
- Mostly nonserious and musculoskeletal adverse events; some other adverse events including shortness of breath, palpitations (in 4 and 1 participants, respectively) and a pelvic stress fracture in a single study (15 trials with 4,167 participants) (very low-certainty evidence).

Multiple exercise categories (gait, balance, and functional training plus resistance training):

- A probable reduction by 34% in the rate of falls (11 trials with 1,374 participants) (moderate-certainty evidence) and by 22% in the number of those sustaining one or more falls (17 trials with 1,623 participants) (moderate-certainty evidence).
- A possible reduction in the number of individuals with one or more falls-related fractures by 15% (3 trials with 1,810 participants) (low-certainty evidence).
- Mostly nonserious and musculoskeletal adverse events; some others including exacerbations of osteoarthritic

symptoms (1 trial) and one surgery for inguinal hernia as reported in 10 trials with 1,177 participants out of 21 trials (very low-certainty evidence).

Resistance exercises:

- Uncertainty whether resistance training is effective in reducing rate of falls (5 trials with 327 participants), number of elderly falling once or more (2 trials with 163 participants) and the number of one or more falls-related fractures (1 trial with 73 participants) (very low-certainty evidence).
- Musculoskeletal adverse events (10 in the intervention and 1 in the control group) from data derived from 1 trial (64 participants) (very low-certainty evidence).

Tai Chi:

- A probable reduction by 19% in the rate of falls (7 trials with 2,655 participants) (low-certainty evidence).
- A reduction by 20% in the number of elderly who fell once or more (8 trials with 2,677 participants) (high-certainty evidence).
- Reporting of adverse events in 2 trials (474 participants) out of 10, indicating no occurrence (very low-certainty evidence).

Dance:

- Uncertainty whether dance is effective in reducing the number of falls or the number of older persons who fell once or more from data reported by only 1 trial with 522 individuals studied (very low-certainty evidence).
- Non-occurrence of adverse events was reported in the intervention group.

General physical activity (walking):

- Uncertainty whether general physical activity is effective in reducing the number of falls, number of elderly falling (2 trials with 441 participants) and the number of individuals with one or more falls-related fractures (1 trial with 97 participants) (very low-certainty evidence).
- Adverse events outcome were not reported in these studies.

How did the authors conclude?

The authors concluded that structured exercise programmes are effective in reducing the rate of falls and the risk of falling, while their role is less certain for non-falls outcomes. Effective training is composed of balance and functional exercises, especially in reducing the rate of falls and the risk of falling. Also, more structured programmes, including resistance exercises with balance and functional training, and Tai Chi may reduce falls in the elderly living in the community.

These programmes lasted 12 weeks or over, even if it is common to have planned training lasting one year or more. Training is effective regardless of whether exercise is delivered individually or in groups, by health professionals or trained non-health professionals, to younger or older populations (based on a 75-year age threshold) or for people selected on the risk of falls. People may achieve longer-term benefits due to the modification of people habits.

The effects of other types of exercise such as resistance training (alone), dance or walking have less clear effects, while flexibility or endurance training were not evaluated versus control groups. Adverse events related to exercise may occur but they are predominantly minor (musculoskeletal, mostly).

What are the implications of the Cochrane evidence for practice in rehabilitation?

Falling is a potentially catastrophic and life-threatening event for both older persons with specific clinical conditions and for those living in the community. Consequently, the prevention of falls is crucial. Despite the continuous efforts in research, fall prevention programmes are frequently not applied, even if some efficacious fall prevention strategies are available. Not all older people engage in daily physical activity; perhaps because of an unwillingness to partake in regular exercise or perhaps because of a lack of organized structures that would encourage their participation.

This Cochrane Review¹ provides evidence of the effectiveness of exercise interventions on the reducing the risk of falls and falling. The high-certainty evidence on the effectiveness of exercise of all types on fall rate reduction by almost one-fourth, when compared with control interventions, which are not perceived to reduce falls, implies that it is very unlikely that further research will change the evidence¹¹. This improves the possibility to structure adequate health policies of exercise interventions for the fall rate reduction. Improvements in fall prevention can be achieved from initiatives of the general public institutions and physicians' interventions, modifying unhealthy behaviour (obesity, sedentary) and the clinical risk factors. The use of co-interventions could improve the efficacy of this physical activity⁸. As well, a possible step forward could consist of multifactorial risk assessments and individualized care plans, targeting the strategy on the people in order to maximize the adherence. However, more research is needed to elucidate if fall reduction leads to less fall-related fractures. While there is evidence on this important outcome, it is low quality/certainty evidence indicating that further research is likely to change the evidence¹¹. Applying recommendations for fall prevention and implementing specific exercise interventions are important challenges that health systems are called to face in order to guarantee healthy ageing to the elderly.

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References

1. Sherrington C, Fairhall NJ, Wallbank GK, et al. Exercise for preventing falls in older people living in the community. *Cochrane Database Syst Rev* 2019;1:CD012424.

2. WHO. WHO global report on falls prevention in older age. 1st ed. Geneva, Switzerland: World Health Organization; 2008.
3. Pahor M. Falls in Older Adults: Prevention, Mortality, and Costs. *JAMA* 2019;321(21):2080-1.
4. Liu CJ, Latham N. Progressive resistance strength training for improving physical function in older adults. *Cochrane Database Syst Rev* 2009;3:CDOO2759.
5. Howe TE, Rochester L, Neil F, Skelton DA, Ballinger C. Exercise for improving balance in older people. *Cochrane Database Syst Rev* 2011;11:CDOO4963.
6. Kendrick D, Kumar A, Carpenter H, Zijlstra GA, Skelton DA, Cook JR, et al. Exercise for reducing fear of falling in older people living in the community. *Cochrane Database Syst Rev* 2014;11:CDOO9848.
7. Guirguis-Blake JM, Michael YL, Perdue LA, Coppola EL, Beil TL. Interventions to prevent falls in older adults: updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA* 2018;319(16):1705-6.
8. Hopewell S, Adedire O, Copsey BJ, et al. Multifactorial and multiple component interventions for preventing falls in older people living in the community. *Cochrane Database Syst Rev* 2018;7:CDO12221.
9. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep* 1985;100(2):126-31.
10. Lamb SE, Becker C, Gillespie LD, et al.; Taxonomy Investigators. Reporting of complex interventions in clinical trials: development of a taxonomy to classify and describe fall-prevention interventions. *Trials* 2011;12:125.
11. Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, Schünemann HJ; GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336(7650):924-6.