Do exercise interventions designed to prevent falls affect participation in life roles? A systematic review and meta-analysis

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CRD summary
The review found that interventions that included exercise may improve participation in life roles among older people. These conclusions appear to reflect the evidence presented but (as the authors' acknowledged) require cautious interpretation due to heterogeneity between the studies, a small overall effect size and the absence of a gold standard for evaluating participation outcomes.

Authors' objectives
To determine whether exercise interventions targeting falls improve participation in life roles among older people.

Searching
The searches used in two Cochrane reviews of interventions for falls were updated from their most recent search date to May 2010. Databases searched were MEDLINE, AMED, EMBASE, PsycINFO, CINAHL and Cochrane Central Register of Controlled Trials (CENTRAL). Search terms were as documented in the original Cochrane reviews. Reference lists of relevant articles were checked. The search was limited to published articles. There was no restriction by language.

Study selection
Randomised controlled trials (RCTs) and quasi-RCTs of exercise interventions for older people that reported falls (number of falls or fallers, fall rate), measured participation and were conducted in a home, aged care facility or hospital setting were eligible for inclusion in the review. Participants were required to be aged over 60 years or be clearly described as elderly or senior; otherwise it was required that the mean age of the study population minus one standard deviation (SD) exceeded 60 years. The study intervention could comprise exercise alone or as part of a multi-faceted intervention. Controls could include placebo, alternative therapy or usual care. Studies were required to report participation at baseline and follow-up and to use self- or interview-administered generic instruments, designed for adults, that measured the International Classification of Functioning, Disability and Health (ICF) concept of participation using published methods (detailed in the review). Studies that referred participants to an exercise programme outside the study were excluded.

The mean age of participants in the included studies ranged from 75 to 85 years. Studies were set in the community or in aged care facilities and in several studies participants were recently discharged from hospital. More than half of the studies had fall history or risk factors for falls as an inclusion criterion. Interventions varied (such as endurance, strength, gait, balance and functional exercise, Tai Chi and/or physiotherapy) and were delivered in supervised groups, individually in classes or at home. Most studies delivered exercise as a single intervention; some included other interventions (such as goal-setting, cognitive behavioural therapy and home safety assessment). Intervention duration ranged from 1.5 to 12 months and frequency ranged from daily to three or more times over three months. Controls received alternative therapy, usual care or placebo. Participation was measured at 1.5 to 14 months after randomisation using one or more of nine different instruments.

One reviewer initially screened titles and abstracts retrieved by the search. Two reviewers performed the final selection of studies, with differences settled by discussion.

Assessment of study quality
Study quality was evaluated using the Cochrane Risk of Bias tool to assess sequence generation, allocation concealment, blinding of outcome assessment and selective reporting bias.

It appeared that two or more reviewers assessed study quality and resolved disagreements by discussion.

Data extraction
Standardised mean differences (SMDs, Hedges' g) between the groups in final or change scores and accompanying standard deviations were extracted or calculated for each study using the first post-intervention measure of participation as the final score. Where necessary the correlation between pre- and post-intervention scores was imputed. Methods were detailed in the review. Where multiple measures of participation were used, those that incorporated self-perception were prioritised over those that assessed frequency of nominated activities. Where two groups in the same study received similar interventions they were combined as a single intervention group. Where unavailable, means and standard deviations were estimated. Unadjusted values were used if available.

Data were extracted by one reviewer and checked by a second. Disagreements were resolved by consensus.

**Methods of synthesis**
Studies were combined using a random-effects model to calculate pooled SMDs and 95% confidence intervals (CIs). Heterogeneity was assessed with $I^2$ and Q statistics. Egger's test and a funnel plot were used to assess publication bias. Prespecified meta-regression was used to assess the effect of intervention type (single or multi-faceted). The authors planned to use meta-regression to explore any substantial statistical heterogeneity. Sensitivity analyses were conducted to examine the effect of alternative methods of imputing data.

**Results of the review**
Fifteen randomised and quasi-randomised controlled trials were included (3,616 participants, range 53 to 682). Risk of bias was low for 11 studies for sequence generation and for eight studies for allocation concealment. All studies used self-report measures and were deemed at high risk of bias for blinding of outcome assessment. Four were at low risk of bias related to selective outcome reporting.

Pooling of the 15 studies indicated a small but statistically significant benefit from the intervention (SMD 0.16, 95% CI 0.04 to 0.27; $I^2=54\%$). There was no conclusive evidence of publication bias. Meta regression showed no significant difference in effect between single and multi-faceted exercise interventions.

**Authors’ conclusions**
Interventions that include exercise may improve participation in life roles among older people.

**CRD commentary**
The objectives and inclusion criteria of the review were clear. Relevant sources were searched for studies without language restrictions. The restriction to published studies meant that there was some risk of publication bias but formal testing showed no conclusive evidence of this. Steps were taken to minimise risks of reviewer bias and error by having more than one reviewer assess study quality and extract data. Preliminary stages of study selection were undertaken by a single reviewer. Study validity was assessed using an appropriate tool. Studies varied widely for type and intensity of exercise intervention and the outcome measures used. No details were reported about control interventions. The statistical methods used to combine the studies and assess for heterogeneity appeared appropriate.

The authors’ conclusions appear to reflect the evidence presented but (as they acknowledged) their findings require cautious interpretation due to heterogeneity between the studies, the small overall effect size and the absence of a gold standard for evaluating participation outcomes.

**Implications of the review for practice and research**
**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that future studies should measure the consequence of falls prevention interventions at societal level, consider the effect of different types of intervention on participation outcomes and aim to determine the optimal intervention to increase participation. They suggested that a core set of ICF categories should be developed to standardise reporting of functional outcomes for older people at risk of falling.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.