Meta-analysis of the effects of exercise interventions on functional status in older adults

Gu MO, Conn VS

CRD summary
The authors concluded that exercise interventions significantly improved functional status and physical performance in older adults; however, this effect may not be sufficient to improve activities of daily living. Given the potential for publication bias, unclear quality of the included studies and uncertainty regarding the analysis, the authors’ conclusions should be treated with caution.

Authors’ objectives
To assess the impact of exercise interventions on functional status, physical performance and activities of daily living in older adults.

Searching
MEDLINE and CINAHL were searched for articles published in English between 1990 and 2006. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) that compared the impact of exercise interventions with that of no intervention or attentional controls on functional status in adults aged 65 years or more were eligible for inclusion. Interventions had to be directly supervised by research staff. Studies of multiple interventions were not eligible for inclusion. Studies of interventions aimed at participants with specific diseases were excluded. Studies had to be randomised at the individual level and have at least 10 participants per treatment group. Cluster-randomised studies were not eligible for inclusion.

Included RCTs assessed strength or resistance exercise, aerobic exercise, balance, flexibility or functional exercise interventions. Interventions lasted from 15 to 90 minutes and had a frequency of one to seven days per week. Most studies were carried out in community settings. Attendance rates ranged from 62% to 99%. Mean age of participants was 65 to 88 years. Median percentage of females was 79. Healthy and inactive and frail and functionally limited participants were included. Most participants lived at home. Outcomes included measures of activities of daily living and instrumental activities of daily living: standardised measures of functional performance and physical performance outcomes (chair rise, walk speed, walk endurance, balance and co-ordination).

The authors did not state how studies were selected for the review.

Assessment of study quality
The authors did not state that they assessed study validity.

Data extraction
The post-intervention difference between intervention and control groups was extracted and used to calculate standardised mean differences (d) with 95% confidence intervals (CI). Effect size was adjusted for small sample bias and weighted by the inverse of its sampling variance. Measures selected for analysis were those with greatest reliability and validity or those used most frequently across studies. Data were extracted using a predetermined coding frame.

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
Pooled effect sizes (ES) with 95% CI were calculated using random-effects and fixed-effect models. Studies with effect sizes that produced large residuals or where omission of effect sizes substantially improved homogeneity were excluded from the meta-analysis. Heterogeneity was assessed using the Q statistic.

Results of the review
Nineteen RCTs were included for review (n=2,201, range 21 to 486).

Exercise interventions had a modest significant impact on functional status (ES 0.37 95% CI 0.22 to 0.52; 10 studies) compared to controls. Exercise interventions had a moderate significant impact on chair rise (ES 0.30 95% CI 0.04 to 0.57; five studies), walk speed (ES 0.26, 95% CI 0.11 to 0.41; 11 studies), walk endurance (ES 0.25 95% CI 0.02 to 0.48; 10 studies) and balance (ES 0.27, 95% CI: 0.11 to 0.42; eight studies) compared to controls. Exercise interventions did not significantly improve activities of daily living. All reported effect sizes were calculated using a random-effects model after outliers were removed. There was no evidence of statistical heterogeneity.

**Authors' conclusions**
Exercise interventions significantly improved functional status and physical performance in older adults. The effect may not be sufficient to improve activities of daily living.

**CRD commentary**
The review addressed a clear question with well defined inclusion criteria. Only two databases were searched; therefore, relevant data may have been missed. The search was restricted to published articles in English, which introduced the possibility of publication and language biases. It was unclear whether appropriate steps were taken in the review process to minimise the risk of reviewer error and bias. It appeared that no validity assessment was carried out; therefore, it was not possible to assess reliability of the included studies. Statistical heterogeneity was assessed and ruled out. However, the authors reported that they excluded study outliers; the potential effects of this were unclear. Given clinical heterogeneity between studies, it was unclear whether the most suitable methods for pooling studies were used. Given the potential for publication bias, error and bias in the review process, the unclear quality of included studies and uncertainty regarding the analysis, the authors’ conclusions should be treated with caution.

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

**Research:** Further studies were needed to investigate the impact of exercise on activities of daily living and identify moderating variables associates with functional status outcomes.

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