Effect of exercise on depression severity in older people: systematic review and meta-analysis of randomised controlled trials
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CRD summary
The authors concluded that in older people with depression, structured exercise with mixed elements of endurance and strength training tailored to individual ability reduced depression severity after three to 12 months of follow-up. A comprehensive search and good review methodology suggest that the authors’ conclusions are reliable, but longer term effects are uncertain.

Authors' objectives
To estimate the effect of exercise on depression severity among older people with clinically significant symptoms of depression. A secondary objective was to assess whether any treatment effect varied according to depression criteria.

Searching
Nineteen general medical and more subject relevant databases (including MEDLINE, PsycINFO and DARE) were searched from inception to January 2011. Search terms were indicated and a full example search strategy was provided online. Reference lists of relevant articles were scanned for further studies.

Study selection
Studies were eligible for inclusion if they were randomised controlled trials of exercise interventions for depression among older people (mean age 60 years or older). Pre-existing depression had to be evaluated using a clinically valid method of assessment. Any exercise intervention in comparison to any control intervention was considered. Depression had to be reported as an outcome at follow-up periods of three months or more.

Included trials were conducted in the UK, USA, Australia, New Zealand, China and Hong Kong. The mean age of participants ranged from 65 years to 88 years. The proportion of women ranged from 50 to 89%. Depression was determined by clinician diagnosis, symptom checklist, or a three-question depression screen for use in primary care. Permission of use of antidepressant medication at baseline varied between trials. Most exercise interventions included both strength and endurance training; a small number included elements of Tai Chi and Qi Gong. The interventions generally involved exercising three to five times per week for 30 to 45 minutes, over 10 weeks to six months. Exercise was performed either at the participants’ home (including care homes) or at a community-based facility. In most trials, exercise was supervised. About half the interventions were individual interventions; the other half were group interventions. About half of the trials had an active comparison group (including usual care, education/advice) and the rest had an inactive comparison group (including waiting list, non intervention, attention).

Two authors independently screened the studies. Any disagreements were resolved by discussion.

Assessment of study quality
Two authors independently assessed trial quality using the Cochrane risk of bias tool (adequacy of sequence generation, allocation concealment, blinding of outcome assessors, completeness of follow-up and analysis by intention-to-treat). Risk of bias in each trial was defined as low, medium or high (criteria defined).

Data extraction
Trial results at each follow-up were recorded as means and standard deviation. Data were extracted by one author and checked by another.

Methods of synthesis
For the pooled analysis, differences in depression severity were expressed as standardised mean differences (SMD) using Hedges’ adjusted g. Meta-analysis was carried out using a random-effects model. Heterogeneity was assessed using $I^2$. Small study bias was assessed by visual inspection of a funnel plot.
A subgroup analysis was carried out according to patient eligibility criteria (patients satisfying diagnostic criteria for depression versus patients achieving a threshold on a depression symptom checklist). Sensitivity analyses involved excluding trials with moderate or high risk of bias, with non-active or no intervention control groups, and trials with no post-intervention follow-up.

Results of the review
Nine randomised controlled trials were included (667 participants, range of sample size 14 to 193).

Risk of bias according to the criteria was low in three trials, moderate in four trials, and high in two. Overall, 60% of the risk of bias criteria were adequately fulfilled. Common shortcomings included not analysing data according to the intention-to-treat principle, not blinding outcome assessment, and incomplete follow-up of participants. Half the trials assessed adherence; 57% to 75% of participants satisfied the respective adherence criteria.

Four of nine trials achieved significant improvement in depression severity compared with control. Two of these were Chinese trials with a high risk of bias including Tai Chi and Qi Gong and these reported substantially greater effect sizes than the other trials, causing significant heterogeneity. When excluding these two trials from the analysis, there was still a small significant effect of mixed exercise on depression severity (SMD -0.34, 95% CI -0.52 to -0.17; seven trials; no heterogeneity). There was no indication of small study bias.

Results were similar for trials requiring a depression diagnosis for eligibility and for trials using a symptom checklist threshold. The effect remained significant when only considering studies with a low risk of trial (three trials), trials using an active intervention control (four trials), and in trials with extended follow-up (four trials).

Authors’ conclusions
In older people with clinically meaningful symptoms of depression, structured exercise with mixed elements of endurance and strength training tailored to individual ability reduced depression severity. The evidence for Tai Chi and Qi Gong was insufficient.

CRD commentary
The review question and inclusion criteria were clear. A comprehensive search of a large number of relevant databases was undertaken. No searching restrictions were mentioned. Care was taken to minimise error and bias in study selection, quality assessment and data extraction.

Details on each trial and quality assessment were presented. Three quarters of the trials were of moderate or high quality. Suitable subgroup and sensitivity analyses were carried out; these confirmed the results obtained in the main analysis. Similarly, suitable methods were used to assess heterogeneity. However, none of the trials had a follow-up period of more than a year, which made longer term effects uncertain.

Given the good review methodology and the decent quality of a large proportion of the included trials, the authors’ conclusions appear reliable.

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

Research: The authors stated that a pragmatic randomised controlled trial was needed with sufficient power to detect the equivalent of an SMD of 0.3. Randomisation should be stratified and data assessed by depression severity, receipt of antidepressant medication, and level of regular exercise. Interventions should include and assess strategies based on behaviour change techniques to maximise uptake of and adherence to exercise.

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