Effect of therapeutic exercise on gait speed in community-dwelling elderly people: a meta-analysis
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CRD summary
This review concluded that therapeutic exercise can improve gait speed in community-dwelling elderly people, with the type, intensity and dosage of the exercise intervention being important contributory factors. Overall, given the relatively small effect sizes and limitations in the review methods and analyses, the findings may not be reliable.

Authors' objectives
To examine the effect of type, intensity and dose of therapeutic exercise on changing gait speed in community-dwelling older adults.

Searching
MEDLINE, ProQuest, CINAHL, the Cochrane Library, the Science Citation Index and Dissertation Abstracts were searched from 1995 to 2003; the search terms were reported. Only articles published in the English language were eligible for inclusion.

Study selection
The authors did not state which types of study design were eligible for inclusion in the review.

Specific interventions included in the review
Eligible studies had to assess a clearly defined form of therapeutic exercise such as resistance, aerobic, endurance or balanced training. The included studies assessed various interventions such as different types of training (balance, gait, strength, aerobic, flexibility, relaxation) and t’ai chi. The majority of the interventions consisted of three or more sessions, lasted for 8 to 12 weeks, and were carried out in a facility-based setting.

Participants included in the review
Only studies of ambulatory adults aged 60 years or older, living within community dwellings or living independently in retirement communities, who were free from specific impairments limiting their ability to walk, were eligible for inclusion. Individuals could be ambulatory with or without an assistive device. Studies in which the participants were selected on the basis of medical condition (e.g. stroke, Parkinson's disease, osteoarthritis, fractures and peripheral vascular disease) were excluded from the review. The ages of the included participants ranged from 60 to 89 years, 11 studies only included men, and only 2 studies reported that the participants used assistive devices.

Outcomes assessed in the review
Studies reporting a specific measure of gait speed, or sufficient data to calculate gait speed in metres per second, were eligible for inclusion. Both habitual and fast gait speeds were included in the review.

How were decisions on the relevance of primary studies made?
Two independent reviewers assessed the relevance of the studies.

Assessment of study quality
The authors did not state that they assessed validity. The studies were graded on the basis of study design, using the levels of evidence developed by Sackett et al.
Data extraction
Two independent reviewers extracted data from the primary studies according to criteria developed by content experts. Any disagreements were discussed until a resolution was reached. In addition, a third reviewer independently extracted a random sample of five articles; agreement between the three reviewers was 100% for this random sample. Attempts were made to contact authors for missing data.

For each study, effect sizes for habitual and fast gait speeds were either extracted where available or calculated where there were sufficient data. Gait speeds were converted to metres per second. Where the type of gait speed was not specified, the gait speed values were compared with age-referenced values to verify speed assignment. The studies were coded according to the direction of the effect and the characteristics of the exercise intervention; further details were provided.

Methods of synthesis
How were the studies combined?
The studies were combined in a random-effects meta-analysis to give a pooled effect size with 95% confidence interval (CIs). Studies with missing data were given lower weighting in the meta-analysis. Funnel plots and fail-safe numbers (calculated using the file drawer method) were used to assess the risk of publication bias.

How were differences between studies investigated?
The studies were grouped according to outcome (habitual and fast gait speed) and weighted in the meta-analysis according to study quality using published levels of evidence. Subgroup analyses were carried out according to the characteristics of the exercise intervention (i.e. combination training, strength training, high/moderate/low intensity exercise, and high/low dosage exercise). A stem-and-leaf display was used to visually assess homogeneity. Statistical heterogeneity was assessed using the chi-squared test. Some differences were also evident from the review text and data tables.

Results of the review
Thirty-three studies (n=1,614) were assessed in the review: 19 controlled studies, 8 quasi-controlled studies and 6 uncontrolled studies.

Habitual gait speed (24 studies).

There was no evidence of statistical heterogeneity (p=0.42). Strength training (8 studies; combined effect size 0.145, 95% CI: 0.028, 0.258, p=0.17) and combination training (aerobic exercise plus other exercise) (16 studies; combined effect size 0.176, 95% CI: 0.116, 0.235, p=0.002) were found to have significant positive effects on habitual gait speed. High-intensity exercise (10 studies; combined effect size 0.184, 95% CI: 0.082, 0.285, p=0.001) and high-dosage exercise (14 studies; combined effect size 0.190, 95% CI: 0.112, 0.266, p=0.001) were also found to have significant positive effects on habitual gait speed. No significant effects were observed for moderate- and low-intensity exercise and low-dosage exercise.

Fast gait speed (18 studies).

No exercise intervention was found to affect fast gait speed.

Publication bias.

Overall, publication bias was reported as unlikely, but the fail-safe number suggested that publication bias may be an issue for the analysis of the effect of exercise mode.

Authors’ conclusions
The evidence showed a weak correlation between therapeutic exercise and gait speed, suggesting that therapeutic exercise could improve gait speed in community-dwelling elderly people. The type, intensity and dosage of the exercise intervention appear to be important contributing factors.
CRD commentary
This review answered a clear review question using a wide variety of study designs. The authors searched published literature, but only those studies published in English were eligible for inclusion, suggesting that language and publication bias may influence the findings. The authors attempted to assess publication bias but the small numbers of studies included in some analyses may limit the reliability of these assessments. The main review methods seem reliable and processes were double-checked to reduce the risk of bias and error. However, the authors did not appear to have assessed the validity of the studies, though they had grouped studies according to their basic design. The studies also varied considerably in terms of their intervention characteristics, populations and outcome definitions, but the effects of several of these factors were investigated in subgroup analyses. Overall, given the relatively small effect sizes and the limitations in the review methods and analyses, the findings may not be reliable.

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

Research: The authors stated that future prospective studies should investigate whether a relationship exists between fast gait speed and the intensity and duration of exercise interventions. Studies should also focus on other intervention characteristics and their effect on gait speed.

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