Effectiveness of physical training on motor performance and fall prevention in cognitively impaired older persons: a systematic review

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CRD summary
The authors concluded that there is currently a lack of strong evidence to support any intervention and acknowledged several limitations in this synthesis of diverse, poor-quality studies. These conclusions reflect the evidence presented and are likely to be reliable.

Authors’ objectives
To evaluate the effectiveness of physical training in cognitively impaired older persons.

Searching
MEDLINE (1966 to 2004), CINAHL (1982 to 2004), GeroLit (1979 to 2004) and the Cochrane CENTRAL Register were searched for relevant studies; the search terms were reported. The reference lists of trials, reviews and related articles were screened and authors were contacted for additional studies. No language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies of physical training to improve motor performance or prevent falls were eligible for inclusion. Amongst a diverse range of physical training interventions (including those contained within multifactorial packages), most of the included studies reported walking exercises and gait training as part of the programme. Different methods of training for muscle strength, balance, flexibility and functional skill were also reported. The interventions were not tailored to the level of cognitive impairment. The duration and frequency of training ranged from 30 to 150 minutes; 2 to 7 days per week, over a period of 2 to 30 weeks.

Participants included in the review
Studies of older persons with cognitive impairment in home-dwelling or institutional care settings were eligible for inclusion. The included studies contained persons with different levels of cognitive impairment, although a large proportion had moderate to severe impairment (as assessed by the Mini-Mental State Examination). The participants were predominantly located in nursing homes or other long-term care facilities.

Outcomes assessed in the review
Studies measuring physical function or the prevention of falls were eligible for inclusion. Gait speed was the most frequently measured outcome. The other outcomes measured were muscle strength, flexibility, motor or functional performance, physical activity levels, or falls or fall-related outcomes. The reliability and validity of the outcome measures were largely unreported.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
An established Cochrane checklist was modified to allow the assessment of concealment of treatment, intention-to-treat analysis, blinding of the assessors, baseline comparisons, standardisation of usual care, definition of inclusion and exclusion criteria, description of the training programme, and outcome measure definition. A rating of 2 was given for all standards attained, a rating of 1 if partly attained, and 0 if not defined or not mentioned. The maximum possible quality score was 16 points. Two reviewers independently assessed study quality. Any disagreements were resolved by consensus, or by reference to a third reviewer.
Data extraction
Two reviewers independently extracted the data. Any disagreements were resolved by consensus, or by reference to a third reviewer.

Methods of synthesis
How were the studies combined?
Due to the heterogeneity of the included studies, the results were combined in a narrative.

How were differences between studies investigated?
Differences between the studies were presented in the tables and text.

Results of the review
Eleven RCTs (n=918) were included in the review. The sample sizes ranged from 12 to 308 participants.

Out of a maximum score of 16, the mean quality score was 6.1 (range: 1 to 11); only 4 studies attained a score of 8. Drop-out rates (reported in 10 studies) ranged from 0 to 42%. No statistical data were reported and there was wide variation in all aspects of the included studies.

Gait variables.
Due to the multifactorial nature of the 2 studies (n=461) with the highest quality scores, the independent effectiveness of physical training on motor function was unclear. One of these studies (n=153) suggested a significant reduction in activity restriction. Improved gait quality was reported in 2 studies (n=320) and increased total walking time in another study (n=25). There were reported benefits in strength and flexibility in 4 studies (n=123). A significant improvement in mobility was suggested in one study of physiotherapy (n=24) and in functional level in another study (n=72).

Falls prevention.
Only one study (when adjusted for study compliance) suggested a significant reduction in falls as a result of a multifactorial intervention (n=308).

Authors' conclusions
There is a lack of strong evidence to support the effectiveness of physical training in people with cognitive impairment.

CRD commentary
The review question was clear and the inclusion criteria were sufficiently detailed for the participants, interventions, outcomes and study design. The search strategy seemed appropriate for the topic area and was unrestricted by language. However, it is not clear whether unpublished material was sought and this means that publication bias might have been introduced. Appropriate validity assessment criteria were applied to the included studies and the results were used in the discussion of the review findings. The potential for error and bias was addressed in most parts of the review process, with the exception of study selection for which the procedure was not reported. The method of data synthesis was appropriate given the wide variation in the included studies, but the lack of statistical detail precluded verification of tentative claims to intervention effectiveness. The authors acknowledged the potential limitations of synthesising diverse, poor-quality studies in this review. Their conclusions reflect the evidence presented and are likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that different approaches to training methods, settings and assessments may be needed according to the level of cognitive impairment.

Research: The authors stated that further studies are required with adequate sample size and comparisons of similar levels of cognitive impairment, higher specificity in terms of intervention type and cognitive status, and more reliable and valid outcome measures.
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