Cognitive interventions in healthy older adults and people with mild cognitive impairment: a systematic review

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CRD summary
The authors concluded there was evidence that cognitive training could be effective in improving various aspects of objective cognitive functioning, memory performance, executive functioning, processing speed, attention, fluid intelligence and subjective cognitive performance. These conclusions reflect the evidence presented but the variability and the small number of studies reporting outcomes means the reliability of the conclusions is uncertain.

Authors' objectives
To evaluate the effectiveness of cognitive interventions in healthy older adults and people with mild cognitive impairment.

Searching
PubMed and PsycINFO were searched for articles published in English between August 2007 and February 2012. The search terms were reported. Reference lists of selected articles were also examined.

Study selection
Randomised controlled trials (RCTs) and clinical studies of cognitive interventions were eligible for inclusion. Participants were healthy older adults or people with mild cognitive impairment.

For the RCTs, interventions varied and were delivered either by group, individually or mixed methods. Interventions were aimed at improving memory or cognitive function. Some studies used an active control condition, while other used waiting list or no training as a control. Interventions varied in duration but most were short-term. The mean age of participants ranged from 54 to 80 years old. Most studies included a healthy population of “older” adults; the remaining studies included adults with mild cognitive impairments. Both subjective and objective outcomes were reported. Details of the non-randomised controlled trials were not reported.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
Methodological quality of the included studies was assessed using Consolidated Standards of Reporting Trials (CONSORT) statement. Items included methods of trials and randomisation (maximum score 37 points). Quality was indicated by the percentage of items of the CONSORT statement reported.

Two reviewers independently assessed quality; disagreements were resolved through consensus.

Data extraction
Two reviewers independently extracted data; disagreements were resolved through consensus.

Methods of synthesis
Data were combined in a narrative synthesis with studies grouped by design. A linear regression analysis was conducted to investigate if the effectiveness of an intervention could be predicted by the total hours of the intervention.

Results of the review
Thirty-five studies were included (27 RCTs and eight non-randomised trials). There were 2,930 participants in the RCTs; sample sizes ranged from 22 to 487 participants. The percentage of CONSORT items reported by individual studies ranged from 16% to 73% (mean 44%) for RCTs. Details of the non-randomised trials were not reported.

RCTs (27 trials): Significant improvements were reported for intervention groups of healthy older adults compared to control groups for objective memory performance (17 of 21 RCTs); executive functioning (eight studies), fluid
intelligence (three RCTs), processing speed (two RCTs), general cognitive functioning (one RCT), subjective cognitive performance (five RCTs) and attentional tasks (two RCTs). There were no significant differences in daily function (one RCT) or activities of daily living (one RCT).

Significant improvements were also reported for intervention groups with participants with mild cognitive impairment for objective memory performance (four of six RCTs), executive functioning (one of two RCTs) subjective general cognitive performance (one of three RCTs). No significant differences between groups were reported for measures of daily functioning (one RCT) or subjective cognitive performance (three RCTs).

The results of eight non-randomised trials were also reported. The linear regression analysis found no significant effects between total hours of an intervention and effectiveness of an intervention.

**Authors’ conclusions**
The results show evidence that cognitive training could be effective in improving various aspects of objective cognitive functioning, memory performance, executive functioning, processing speed, attention, fluid intelligence and subjective cognitive performance in healthy older adults and adults with mild cognitive impairment.

**CRD commentary**
The review question was clear and inclusion criteria were defined. Some relevant sources were searched, but restriction to studies published in English meant that some data may have been missed. Study quality was assessed and the results reported in full, but study quality varied considerably. Appropriate efforts to reduce reviewer error and bias (two reviewers conducting the review process) appear to have been used for the assessment of study quality and data extraction, but it was unclear if these methods were used for study selection.

A narrative synthesis was appropriate given the variation between studies in interventions and outcome measures, but the lack of quantitative data made it difficult to confirm the results and their significance. Most outcomes were reported by only a few studies. Study details and quality of the non-randomised controlled trials were not reported.

The authors’ conclusions reflect the evidence presented but the variability of the studies and the small number of studies reporting outcomes means the reliability of the conclusions is uncertain.

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

**Research:** The authors stated that further research was needed to assess whether the effects of cognitive interventions generalize to improvement in everyday life activities. Further research should include a core set of outcome measures to compare the effectiveness of different cognitive intervention programmes; include both objective and subjective outcome measures for specific cognitive domains and ecological valid measures to show improvements in daily cognitive functioning. Methodologically rigorous studies addressing the quality control items contained in the CONSORT criteria are needed, particularly relating to the description of trial design and randomisation, and follow-up assessments.

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