A review of cognitive training in schizophrenia
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CRD summary
This review assessed the effectiveness of cognitive training (CT) interventions for people with schizophrenia. The authors concluded that there was evidence that CT can yield some positive effects in terms of cognitive performance, psychiatric symptoms and everyday functioning. The authors’ conclusions appear justified, although it is difficult to assess their reliability given the limitations in the review methods and reporting.

Authors’ objectives
To assess the effectiveness of cognitive training (CT) interventions that aim to improve neuropsychological functioning in people with schizophrenia.

Searching
MEDLINE and PsycINFO were searched from inception to 2001 for peer-reviewed reports in the English language. The authors also checked the reference lists of identified articles for additional relevant studies.

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 CT, cognitive rehabilitation and cognitive remediation were eligible for the review. Studies of psychosocial skills training were excluded from the review. The majority of the included studies used a type of task practice as the CT intervention; some used paper-and-pencil and other types of task drills (categorised as automated task practice), some used task practice with strategy coaching (categorised as strategy-oriented task practice) and some used computer-assisted techniques. The CT sessions lasted between 20 and 60 minutes and the number of sessions ranged from 1 to 36. Control groups received no treatment, treatment as usual, attention placebo, training placebo, occupational therapy or other therapeutic interventions.

Participants included in the review
Studies of patients with schizophrenia were eligible for inclusion. The mean age of the participants was 38 years, the mean level of formal education was 11.9 years, and 71% were male.

Outcomes assessed in the review
Studies that assessed outcomes that could reflect generalisation of CT were eligible for inclusion. Studies that relied on the cognitive tests used in training, such as the Wisconsin Card Sorting Test, were excluded from the review. Although the outcomes assessed in the included studies varied, most used cognitive tests as outcome measures; some also reported symptom measures or measures of social or community functioning. The longest duration of follow-up was 4 weeks.

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
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data
Where sufficient data were available, the authors calculated effect sizes (Cohen's d) for each outcome measure as long as no statistically significant differences between the experimental and control groups were found for the pre-test measures.

**Methods of synthesis**

How were the studies combined?
The authors calculated weighted mean effect sizes (Cohen's d) by pooling studies within each category of intervention type.

How were differences between studies investigated?
Heterogeneity was not formally assessed. However, the studies were grouped according to the type of intervention: automated task practice, strategy-oriented task practice, computer-assisted automated task practice and computer-assisted strategy-oriented task practice. The authors discussed differences between the studies.

**Results of the review**

Seventeen RCTs with a total of 695 participants were included in the review.

Fourteen of the 17 included studies reported statistically significant positive results with CT, compared with the control group, for at least one outcome measure. The remaining 3 studies reported no significant differences between groups.

The weighted mean effect size across studies was 0.32 for improvements in neuropsychological performance, 0.26 for reductions in symptom severity, and 0.51 for improvement in everyday functioning; these represented small-to-medium effects.

Automated task practice.

Two of the 3 studies assessing this type of technique reported positive findings, whilst one study of occupational therapy reported negative results. The weighted mean effect size was 0.42.

Strategy-oriented task practice.

All 4 studies assessing this type of technique reported positive findings in at least one outcome. The weighted mean effect size was 0.23.

Computer-assisted automated task practice.

Six of the 8 studies assessing this type of technique reported positive findings and two reported negative findings. The weighted mean effect size was 0.49.

Computer-assisted strategy-oriented task practice.

One study assessed this type of technique. The results were positive for problem-solving, but there was no difference between groups for memory training. The mean effect size relating to memory training was -0.38.

Environmental intervention.

One study assessed an environmental intervention using cognitive adaptation training and found positive results for a number of outcomes. The mean effect size was 1.22.

**Authors' conclusions**
The authors concluded that there are effective elements of computer-assisted CT, automated and strategy-oriented
practice CT and environmental adaptation CT. There was no compelling evidence that cognitive impairments can be eliminated by any available treatment. The authors stated that there was evidence that CT can yield some positive effects in terms of cognitive performance, psychiatric symptoms and everyday functioning, but it is not known whether these effects are sustainable. They also stated that environmental adaptation CT warrants further research.

CRD commentary
The review question was clear in terms of the study design, participants, interventions and outcomes. The authors searched two relevant databases; however, studies were restricted to peer-reviewed reports in English, thereby increasing the potential for language and publication bias. The authors did not report the processes used to select the studies or extract the data, therefore the potential for error or reviewer bias could not be assessed. The included studies did not appear to have been systematically assessed for validity, although the authors discussed some methodological limitations, e.g. small sample sizes and insufficient description of the interventions.

Pooled effect sizes were calculated although statistical heterogeneity was not assessed. Effect sizes from each study were reported but not the actual between-group differences, thus the reliability of the results could not be assessed. Some studies considered more methodologically sound were selected for a more detailed review, although the authors did not justify their reasons for selection. The authors’ conclusions are based on both the literature review and the further review of the more rigorous studies. From the evidence presented, their conclusion that different types of CT have effective components appears justified, but there were limitations in the review methods and reporting.

Implications of the review for practice and research
Practice: The authors stated that clinicians may consider using task practice approaches and environmental adaptations in appropriate settings, while awaiting more definitive research.

Research: The authors stated that further research in this area is required, particularly in relation to environmental interventions, length of treatment and cost-effectiveness. They stated that future studies should be more theoretically grounded and measure real-world changes in functioning, have adequate sample sizes, and use a more representative sample of patients with schizophrenia.

Bibliographic details

PubMedID
14552510

Original Paper URL
http://schizophreniabulletin.oxfordjournals.org/cgi/reprint/29/2/359

Indexing Status
Subject indexing assigned by NLM

MeSH
Activities of Daily Living; Cognition Disorders /etiology; Cognitive Therapy; Humans; Prognosis; Randomized Controlled Trials as Topic; Schizophrenia /rehabilitation /therapy; Treatment Outcome

AccessionNumber
12003006671

Date bibliographic record published
31/05/2007
Date abstract record published
31/05/2007

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.