Effective weight loss for overweight children: a meta-analysis of intervention studies

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CRD summary
The review concluded that there are effective methods for weight loss in overweight or obese children, but not enough data to support one intervention over others. The authors’ conclusions appear to reflect the evidence, but the reliability of them is unclear given the inadequate reporting of the review methods and validity assessment.

Authors' objectives
To evaluate the effectiveness of weight-loss interventions for overweight or obese children.

Searching
MEDLINE, CINAHL, PsycINFO, HealthSTAR, ERIC, ProQuest Nursing Journals, a social sciences database, Sociological Abstracts, Health Source: Nursing/Academic Edition and Dissertation Abstracts were searched for studies published between 1980 and 2002; the search terms were reported. In addition, manual searches were conducted at health science libraries and retrieval using the ancestry method was performed.

Study selection
Study designs of evaluations included in the review
Controlled studies with at least seven participants in each group were eligible. Retrospective studies were excluded.

Specific interventions included in the review
Studies reporting any activity, instruction, training or programme implemented for the purpose of assisting overweight children to lose weight were eligible for inclusion. The included studies used a variety of approaches which consisted of varying intensities of cognitive-behavioural treatment, exercise programmes and dietary interventions; the majority of interventions combined these components. The interventions were delivered in groups or in individual sessions, some aimed at children alone and others at children and their parents. The duration of the interventions, where reported, ranged from 1 day (for a control intervention) to 15 weeks.

Participants included in the review
Studies of children aged 6 to 16 years with a mean age not older than 12 years were eligible. Children with chronic illness were excluded. The included studies were in school children aged 6 to 16 years with a mean age of 10.77 years. All children in the treatment groups were obese, but the definition and severity varied in the included studies: for example, one included children with a body weight 140 to 195% above the ideal, one included children with weight above the 95th percentile of weight in their age group, and some were only described as overweight.

Outcomes assessed in the review
Studies had to report means and standard deviations of weight loss for the intervention and control groups.

How were decisions on the relevance of primary studies made?
Two reviewers independently screened the papers; any disagreements were resolved by discussion.

Assessment of study quality
Studies were assessed regarding first author expertise, funding, sampling, sample size, measures, biophysical outcomes, self-report outcome instruments, observation outcomes, design, data collection, data analysis and 'group'. Based on these criteria, a quality score ranging from 0 to 40 was assigned. The authors did not state how the validity assessment was performed.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. For each study, the mean weight loss was reported for each treatment group and the effect size (Cohen's) was presented for each active intervention.

Methods of synthesis
How were the studies combined?
The average Cohen's $d$ across all interventions and 95% confidence interval (CI) was reported, but methods used to calculate this were not explicitly reported.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the $Q$ statistic. The fail-safe $N$ was calculated to identify how many studies reporting no significant difference would be needed so that the demonstrated effect is no longer significant. The correlation between the effect size and programme duration was reported, and the influence of the amount of structure of the intervention was discussed.

Results of the review
Seven studies ($n=694$) were included in the review. These studies evaluated 14 different interventions.

The quality scores of the included studies ranged from 15 to 28 out of a possible 40.

Four of the 7 included studies showed a statistically significant weight loss effect size; these interventions evaluated protein sparing diet, exercise programme, training on cognitive and behavioural weight-loss strategies, diet and exercise lifestyle programmes, motivation presented in different conditions (group therapy, individual therapy, summer camp, advice in single session), and a programme that included a peer-counselling strategy. The 7 studies showed an average effect size of 0.95 (95% CI: 0.79, 1.11) for the 14 reported interventions. Significant heterogeneity was found; the fail-safe $N$ was 13. The mean weight loss ranged from 1.44 kg (for gradual procedural treatment) to 14.67 kg (for camp intervention) in the treatment studies; the control groups reported weight gains ranging from 0.2 to 2.6 kg.

The correlation between length of programme and effect size was 0.19, with longer intervention periods showing greater effect sizes. Structured interventions showed greater effect sizes than unstructured interventions.

Authors' conclusions
There are effective methods for weight loss in children, but there was not enough data to support one intervention as being more effective than any other.

CRD commentary
The review stated a clear question and inclusion criteria. Several sources were searched but it was not clear whether any attempts were made to minimise language bias. Study validity was assessed using an aggregated quality scoring system, although details of the individual components were lacking. Details of the study designs were also lacking and this means it was not possible to adequately assess the strength of the evidence presented. The reviewers took measures to reduce errors and bias when selecting the studies but the methods used for other stages of the review were not described. The methods used to combine effect sizes were not reported, so it is not possible to assess the appropriateness of the methods used. The authors' conclusions appear to reflect the evidence presented, but incomplete reporting of review methods and inadequate reporting of the validity assessment means that the reliability of the conclusions is unclear.

Implications of the review for practice and research
Practice: The authors stated that adequate resources for overweight/obesity prevention, intervention, and maintenance programmes must be considered if the overall health of children is to be improved.
Research: The authors stated that more research is needed to identify the most effective methods for treating overweight or obese children. In addition, the effect of length and intensity of the interventions should be investigated and it would be beneficial to use similar outcome measures across studies.

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