An integrative review of interventions for adolescent weight loss

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CRD summary
This review assessed the effectiveness of interventions to reduce weight or body mass index in overweight adolescents. The authors concluded that the evidence base suffered from a number of methodological limitations and no single intervention was consistently associated with weight loss. Despite limitations to this review, the authors' cautious conclusions appear reasonable.

Authors' objectives
To assess the effectiveness of interventions to reduce weight or body mass index (BMI) in overweight adolescents.

Searching
CINAHL (1982 to 2003) and MEDLINE (1966 to October 2003) were searched using the reported search terms. Reference lists were checked for additional studies. Only English language studies published in nursing, psychology, nutrition, medicine and exercise physiology journals (1980 to 2003) were included in the review.

Study selection
Study designs of evaluations included in the review
Comparative studies were eligible for inclusion in the review. The study designs reported in the review were randomised controlled trials (RCTs), cluster RCTs, quasi-RCTs and pre-test post-test studies. The size of the studies ranged from 20 to 82 participants.

Specific interventions included in the review
Studies that compared at least two study groups, at least one of which had received a weight loss intervention, were eligible for inclusion. The interventions reported in the review included exercise programmes, dietary reductions, medication (i.e. metformin and sibutramine), monetary incentives, telephone- and mail-based interventions, and interventions with and without parental participation. The control interventions, where these existed, included placebo, standard care (e.g. basic dietary and exercise advice with behavioural therapy), or no intervention groups. The majority of the studies used group interventions for behavioural change and were between 12 and 20 weeks in duration.

Participants included in the review
Studies that included overweight adolescents aged between 11 and 19 years were eligible for inclusion. In studies reporting the information, 68% of the participants were female and 32% were male. The participants included: 44% white/Caucasian; 38% African American/black; 0.5% Asian American; 2.5% Latino/Hispanic; and 15% other ethnic groups. One included study recruited overweight adolescents with insulin-dependent diabetes (IDDM). The participants were recruited from a range of sources such as schools, health professionals, media advertising, community meetings and a hired recruiter.

Outcomes assessed in the review
It was evident from the review that eligible studies had to report a measure of weight change or change in BMI. Other reported outcomes included: percentage body fat, cardiovascular fitness, total cholesterol, blood-pressure, high-density lipoprotein levels, low-density lipoprotein levels, triglyceride levels, and total body and visceral adiposity. The authors also reported levels of attrition and attendance.

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

Database of Abstracts of Reviews of Effects (DARE)
Quality was assessed using a modified instrument (Beck 1995) and the studies awarded a score of between 0 and 30. The following criteria were assessed: first author's publication experience, funding, sampling, measurement, design and statistical reporting. The authors did not state how many reviewers performed the validity assessment.

Data extraction
The reviewers extracted and classified the study data using a codebook. Inter-rater reliability was tested between three reviewers for a small sample of the studies (7 out of 17) and was found to be at least 90%. The authors did not state how many reviewers performed the data extraction for the remaining studies. The data appeared to have been reported as in the original study reports.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative.

How were differences between studies investigated?
The studies were grouped according to intervention type. Some differences between the studies were evident from the text of the review and the tables.

Results of the review
Seventeen studies (n=811) were included in the review. The design of the individual studies was not reported clearly.

The quality scores ranged from 14 to 26 (mean 18.4, standard deviation 3.12). The attrition rates (13 studies) ranged from 10 to 45% (mean 23.23, standard deviation 11.6).

Parental participation (5 studies).
Two studies, including one of African American females, found no significant differences in weight loss between interventions delivered to adolescents with and without their parents. One study found a significant difference in the percentage of overweight adolescents in favour of separate interventions for adolescents and parents (1 year follow-up 20.5%), compared with a joint intervention (1 year follow-up 5.5%). Another study found that after 15 months, relative weight loss was significantly improved in a SHAPEDOWN intervention group involving parental participation, compared with a no intervention control group. Another study that assessed the SHAPEDOWN intervention, but only included individuals with IDDM, found no statistically significant difference in weight loss between those receiving the intervention and those receiving standard care for IDDM.

Exercise interventions (5 studies).
One study reported increased cardiovascular fitness and visceral adiposity for a lifestyle education and physical training programme conducted after school in comparison with lifestyle education alone. However, increasing the intensity of the exercise did not result in any benefit in terms of the percentage body fat. Similarly, another study failed to find any significant differences in BMI between exercise programmes of differing intensities. Two school-based studies both reported significant benefits of exercise interventions compared with no intervention control groups: one in terms of body weight and the other in terms of the percentage of overweight individuals. One study reported no significant differences in weight loss or percentage body fat for those receiving an exercise, diet and lifestyle programme, compared with those receiving the diet and lifestyle programme alone or those receiving no intervention.

Dietary interventions (2 studies).
One study reported no significant difference in weight loss between groups receiving behavioural change education with and without dietary restrictions. Another study reported that individuals following a low carbohydrate diet as opposed to a low fat diet achieved significantly greater weight loss after 12 weeks.

Monetary rewards (2 studies).
One study found that greater weight loss was achieved with more frequent monetary incentives. However, another study by the same authors reported that similar levels of weight loss were achieved when monetary incentives were removed.

Telephone and mail-based interventions (1 study).

No significant differences in BMI were reported between adolescents receiving a telephone- or mail-based intervention, compared with those receiving the same intervention but clinic based.

Medication (2 studies).

One study reported that adolescents taking metformin had a significantly reduced BMI (1.3% reduction) compared with those receiving placebo (2.3% increase). In another study, adolescents receiving sibutramine combined with a behavioural, diet and exercise regimen achieved a 4.5% greater reduction in BMI than adolescents just receiving the behavioural, diet and exercise regimen and placebo.

Attenders versus non-attenders (1 study).

One behavioural intervention study found that increased attendance was not associated with significant changes in weight loss.

**Authors’ conclusions**
The evidence base for weight loss interventions in adolescents was found to suffer from a number of methodological limitations. No single intervention was found to be consistently associated with weight loss.

**CRD commentary**
This review was based on a clear research question. However, only two electronic databases were searched, in addition to reference lists, and only studies published in English were included in the review; relevant studies may therefore have been missed and there may be a risk of publication and language bias. It was also unclear whether appropriate steps were taken to reduce bias and error when selecting the studies and assessing their quality. Some of the quality criteria also appeared not to be strictly related to the internal validity of the studies (e.g. publication record of the first author), and it was unclear from the details presented how much weight was given to such criteria in the overall quality score. Despite the poor reporting of some review methods, the data extraction appeared to have been conducted in triplicate for at least a small proportion of the studies, thereby reducing the risk of error and bias.

Given the heterogeneity between the studies, the authors’ decision to combine the studies in a narrative seemed reasonable. However, some additional detail in the data extraction tables would have been beneficial, at least in terms of the types of study design used. In addition, some studies listed in the tables were not mentioned in the text. Despite the limitations in the methodology of the studies and differences between them, the authors' cautious conclusions appear reasonable.

**Implications of the review for practice and research**
Practice: The authors stated that interventions must promote a health-centred approach rather than a weight-centred approach and take into account the risk of harm associated with weight management interventions. It is also important that school-based interventions are based on a conceptual framework.

Research: The authors stated that when planning and evaluating further research, studies should consider changing the definitions of 'family' to incorporate grandparents, single parents and other individuals providing daily care to adolescents. Future interventions should be theoretically based, be replicated across populations, and include strategies to reduce attrition. Interventions should be adequately described and use consistent outcomes and statistical measures. The influence of ethnicity and gender should also be considered. The authors also suggested that computerised interventions may be of interest for further study.
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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.