Effectiveness of interventions to promote physical activity in children and adolescents: systematic review of controlled trials
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CRD summary
The authors concluded that multi-component interventions improve physical activity levels in adolescents, but the effects of interventions in children are unclear. The authors acknowledged various limitations with the studies and their conclusions are likely to be reliable.

Authors' objectives
To evaluate the effectiveness of interventions promoting physical activity in children and adolescents.

Searching
PubMed, PsycLIT, Scopus, MEDLINE (via Ovid), SPORTDiscus and EMBASE were searched from inception to December 2006. Manual searches of references of included studies and review articles were also undertaken. Key search areas were reported and a full list of search terms are available online. Only published trials were included.

Study selection
Study designs of evaluations included in the review
No criteria were specified for the study design.

Specific interventions included in the review
Studies comparing interventions that incorporated a physical activity promotion component with a non-physical activity control were eligible for inclusion. Studies were excluded if they involved structured obesity prevention exercise programmes, or interventions to reduce sedentary behaviour. The included studies identified educational, environmental and multi-component physical activity promoting interventions, with or without family or community involvement. Treatment duration ranged from 1 month to 6 years for children and from 30 minutes to 4 years for adolescents.

Participants included in the review
Studies of children and adolescents aged 18 years or younger, of any health status, were eligible for inclusion. The included studies involved participants from ethnic minority groups, low socioeconomic status, groups with a specific body mass index and low activity groups. Where reported, the mean age of the participants ranged from 4.2 to 17 years, and 13 studies were restricted to girls and one to boys.

Outcomes assessed in the review
Studies reporting a physical activity-related outcome, measured quantitatively with subjective or objective methods, were eligible for inclusion. The primary outcome was improved physical activity behaviours, which were variably defined and measured. Various methods to measure physical activity were used, including self-report and parent-reported questionnaires, diaries or recall.

How were decisions on the relevance of primary studies made?
Two reviewers independently screened studies for relevance and any disagreements were resolved through discussion.

Assessment of study quality
Two reviewers independently assessed the included studies for methodological quality, using a published 10-item tool, and assigned an overall score to each study. Studies were also scored on the sample size (positive if over 250 patients) and the use of a power calculation. Any disagreements were resolved through discussion.

Data extraction
Two reviewers extracted the data separately for children and for adolescents; any disagreements were resolved through discussion. Effects were classified as positive, negative, inconclusive or no difference.
Methods of synthesis
How were the studies combined?
The studies were described in a narrative, weighted by methodological quality and sample size, and grouped by age (children less than 12 years, and adolescents 12 years or older).

How were differences between studies investigated?
Levels of agreement between reviewers for the validity assessment were analysed using Cohen’s chi-squared test. Due to methodological heterogeneity, stratified analysis was used to assess studies by setting, target population and type of intervention. Summary study characteristics were tabulated.

Results of the review
Thirty-six RCTs and 21 controlled studies (19,174 children, 16,411 adolescents, plus 24 schools with a mean 1,109 adolescents per school) were included. Thirty-six educational interventions, 5 environmental interventions and 16 multi-component interventions were evaluated.

Study quality was deemed high in 24 studies (42%), of which 15 had more than 250 patients. Only 18% of the studies reported follow-up durations of 6 months or more.

Overall effect.
A significant improvement in physical activity behaviours was reported by 47% of studies, with a 13% increase in levels of moderate to vigorous physical activity.

Children.
Significant benefits were reported in 4 studies (19 in total) evaluating education alone interventions, 2 low-quality RCTs (4 in total) evaluating changes in the school environment, and one of the 3 high-quality RCTs (10 studies in total) evaluating multi-component interventions. The benefit of school- and family-based interventions was varied and therefore inconclusive. No evidence of an effect was found for interventions in children targeting females only or ethnic minorities. Significant improvements in the numbers of minutes of moderate and vigorous physical activity were reported by 3 studies in children from low socioeconomic groups; adjusted difference 0.8 (95% confidence interval, CI: 0.1, 1.6, p=0.03); standardised beta 0.11, p<0.05 for minutes of moderate physical activity, and odds ratio 1.6 (95% CI: 1.0, 2.6); and p<0.05 at 32 months for vigorous physical activity.

Adolescents.
No significant benefits were observed across 17 studies evaluating education alone interventions, or the one trial assessing environmental intervention. The 6 studies evaluating multi-component interventions reported a significant benefit. The benefit of school-, family- and community-based interventions alone was inconclusive. Positive effects were observed when school-based interventions were combined with family or community involvement. Findings were inconclusive for interventions in adolescents targeting one gender or low socioeconomic groups.

Authors' conclusions
Multi-component interventions combining school with family or community involvement appear to be effective in adolescents. Conclusions regarding the efficacy of interventions in children were limited by study quality.

CRD commentary
The review question was clear and the inclusion criteria referred to participants, interventions and outcomes. The literature search was undertaken using electronic databases and other relevant sources, and appropriate measures were taken to avoid language and selection bias. However, there was no apparent search for unpublished material, which means that potentially relevant papers might have been missed. An adequate validity assessment was undertaken, although less than half of the studies were considered to be of a high quality. Methodological quality and reporting, including short follow-up periods, randomisation methods and definitions of physical activity outcome measures, were often lacking or inadequate. However, the authors considered the quality of the included studies in relation to the
strength of the evidence for each outcome. A large number of the studies had small sample sizes. The synthesis of the outcomes was limited by the varied definitions and outcome measures used, thus the decision to combine the studies in a narrative seems appropriate. Such limitations affect the reliability of the included studies but, as the authors appear to have taken these limitations into consideration, their conclusions are likely to be reliable.

Implications of the review for practice and research

Practice: The authors stated that multilevel approaches to promoting physical activity, which combine school-based interventions with family or community involvement, should be promoted in adolescents. No implications for practice were specified for children.

Research: The authors stated that future studies should explore the limitations of interventions reporting no effect or inconclusive findings, and assess the effectiveness of interventions in the home and target younger children and adolescents from ethnic minorities. Studies should also provide more robust and accurate methodological and outcome reporting to increase power and reliability, and undertake a cost-effectiveness analysis.

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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.