Physical activity as a predictor of adolescent body fatness: a systematic review

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CRD summary
The authors concluded that most studies showed a protective effect of physical activity on adiposity, but that literature was sparse and studies had methodological limitations. There were limitations in reporting of review methods and study quality, but overall the authors’ cautious conclusions appeared to reflect the limited data.

Authors' objectives
To investigate the effect of physical activity on levels of adiposity in adolescents.

Searching
Published trials were identified through a search of MEDLINE, SPORTDiscus, SCIELO, BioMed Central and PsycINFO from inception to July 2007. Reference lists of identified articles were searched and authors of included trials were contacted for any other published or unpublished data. Search terms were reported.

Study selection
Longitudinal studies that examined effects of physical activity on subsequent levels of adiposity in adolescents measured at 10 to 19 years of age were eligible. Cross-sectional studies and studies with less than 50 participants were excluded.

Experimental (including quasi-experimental) and observational studies were included. Most studies were undertaken in high-income countries. Interventions were school-based, family-based or individual-based. Age of participants ranged from five to 19 years. All but two of the experimental studies were in obese or overweight participants at baseline. All experimental studies included other intervention components as well as physical activity: components included dietary, behavioural and lifestyle education. Most observational studies measured physical activity using self report. Follow-up ranged from eight weeks to nine years.

The authors stated neither how the studies were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
Methodological quality was assessed by two independent reviewers using the Downs and Black checklist (a comprehensive 27-item list) for experimental study designs. A modified version of the checklist was used to assess observational studies. Maximum possible score was 28 for experimental studies and 24 for observational studies. Studies were considered adequate or inadequate for individual check-list items; however, there was no indication of what constituted an adequate study. Disagreements were resolved by consensus.

Data extraction
The authors stated neither how data were extracted nor how many reviewers performed data extraction.

Methods of synthesis
The studies were grouped by study design (experimental and observational) and combined using a narrative synthesis supported by tables.

Results of the review
This review included 24 studies (n=39,512): five experimental studies; six quasi-experimental (no control group); and 13 observational studies. Sample size ranged from 55 to 11,887 people. Five studies exclusively included adolescents (10 to 19 years).

Study quality: Average quality scores were 17.2 (range 14 to 21) out of 28 for experimental studies and 16.4 (range 12 to 19) out of 24 for observational studies. Common methodological flaws included lack of clear description of
confounders, lack of blinding and lack of use of valid and reliable outcome measures.

**Experimental and quasi-experimental studies:** All studies showed favourable effects of physical intervention on adiposity level. One study showed decreased obesity among girls only; all other experimental studies showed comparable results between boys and girls.

**Observational studies:** All except two studies showed significant inverse associations of physical activity with body composition or body mass index. Some studies reported that these outcomes depended on sex, ethnicity and baseline body mass index. Observational studies demonstrated that physical activity may play a role in the prevention of fat accumulation in normal-weight participants, although most studies estimated physical activity from questionnaires where there were several differences between units of measurement, cut-off points and type of physical activity.

**Authors' conclusions**
Although most studies showed a protective effect of physical activity on adiposity, particularly in obese individuals, current literature was sparse and studies had methodological limitations.

**CRD commentary**
This review addressed a clear question in terms of participants and outcomes. It did not clearly address interventions or comparisons, which may have led to subjective decisions regarding inclusion. Relevant databases were searched. Language restrictions were unclear. Attempts were made to obtain unpublished data, but not to locate unpublished studies and so publication bias could not be excluded. Suitable methods to minimise risk of reviewer error and bias were reported for validity assessment; it was unclear whether steps to reduce reviewer bias and error were undertaken for study selection and data extraction.

Study quality was assessed using the Downs and Black checklist. However, the article reported the number of adequate studies per checklist item, rather than overall quality of individual studies. This made it difficult for the reader to judge the quality of individual studies and hence assess the reliability of the evidence. The decision to present included studies narratively and not to pool studies in a meta-analysis was appropriate given the heterogeneity between studies.

The authors correctly acknowledged that use of multicomponent interventions made it virtually impossible to draw conclusions about the effect of physical activity alone on adolescent adiposity. There were limitations in reporting of review methods and study quality, but overall the authors' cautious conclusions appeared to reflect the limited data.

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

**Research:** The authors stated that further studies were needed to generate evidence-based recommendations for quality and quantity of adolescent physical activity needed to prevent and treat adolescent obesity.

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