Direct and indirect influence of physical education-based interventions on physical activity: a review
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CRD summary
The authors concluded that the evidence for an effect of physical education on out-of-class and long-term physical activity remained inconclusive. Studies generally showed modest effects in boys, but not in girls. The review was open to bias, the quality of included studies was unclear, and data synthesis was limited. As such, any conclusions should be interpreted with caution.

Authors' objectives
To investigate the direct and indirect effects of physical education-based interventions on physical activity in primary and secondary school-aged children.

Searching
MEDLINE, Academic Search Premier, and SPORTDiscus were searched from 1989 to 2009 for English language publications. Search terms were reported. Reference lists of retrieved articles were manually searched.

Study selection
School-based studies that assessed the effects of interventions with a physical education component on physical activity were eligible for inclusion.

Included studies were at primary and secondary schools in children aged eight to 16 years. Physical education interventions were aimed at increasing energy expenditure and promoting enjoyment and participation in moderate to vigorous physical activity in-class (direct effect) and/or outside the classroom (indirect effect). Interventions included aerobic activities, gymnastic sessions, promotional materials, nutrition education, out-of-school promotional activities and parental involvement. Physical activity assessment was measured using the System for Observing Fitness Instruction Time (SOFIT), physical activity checklists, questionnaires, surveys, recall, or use of pedometers/accelerometers. Study duration ranged from six weeks to three years.

The authors did not state how many reviewers screened studies for inclusion.

Assessment of study quality
The authors did not state that they assessed study quality.

Data extraction
The authors did not state how data were extracted or how many reviewers performed the data extraction. It appeared that the percentage increase or decrease in physical activity for intervention and control groups was extracted, along with significance (p) values.

Methods of synthesis
Data were presented as a narrative synthesis and in tables.

Results of the review
Fourteen studies (including at least 18,467 children) were included in the review.

In-class physical activity in primary and secondary schools (nine studies): The authors reported that one study showed no statistically significant differences between intervention and controls in physical activity. However, the table suggested two studies showed no significant differences. Therefore most studies showed significant improvements in in-class physical activity.

Out-of-class physical activity in primary schools (six studies): One study showed statistically significant increases in
physical activity in boys and girls, while one study only showed improvements in boys. Two studies showed decreased physical activity over time. Two studies showed no significant effects.

**Out-of-class physical activity in secondary schools** (seven studies): The findings were mixed in this groups of studies, with some showing significant improvements in physical activity in boys, but none showing improvements in girls.

There was insufficient evidence to infer the impact of physical education interventions on physical activities in adulthood.

**Authors' conclusions**
The available evidence for an effect of physical education per se on out-of-class physical activity and long-term physical activity remained inconclusive. Although studies in which physical education was part of a multi-component intervention generally showed modest effects in boys, the effects in girls were less convincing. Further research was required.

**CRD commentary**
The study aim and inclusion criteria were very broadly defined. A basic literature search was undertaken, but there was potential for both language and publication bias. Review processes were not reported to have been undertaken in duplicate, which meant that reviewer error and bias could not be ruled out.

Quality assessment was not performed, so the quality of the included studies was unclear. Given the considerable clinical and methodological variance among studies, a narrative synthesis seemed appropriate. However, this was somewhat limited and the findings were inconsistent.

In general, this review appeared to be open to several forms of bias, and the between study variance made it difficult to synthesise the evidence. As such, any conclusions should be interpreted with caution, although the authors’ suggestion for further high quality research seems appropriate.

**Implications of the review for practice and research**
**Practice:** The authors stated that interventions should focus on the direct effects of physical education. To maximise increased daily moderate to vigorous physical activity through physical education, they proposed that scheduled physical education time was increased and that lesson strategies that maximise student activity were implemented.

**Research:** The authors stated that high quality research was needed in primary school children, and that further studies were warranted to more accurately determine the impact of increased physical education levels on physical activity in-class and out-of-class.

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