Physical activity interventions in the school setting: a systematic review
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CRD summary
The authors concluded that school-based physical activity interventions showed positive effects on psychological determinants, activity behaviour and health and fitness outcomes. The absence of a reliable synthesis along with shortcomings in the review methodology mean these conclusions cannot be considered reliable.

Authors' objectives
To evaluate the effect of school-based activity programmes on psychological determinants, activity behaviour and health and fitness outcomes.

Searching
Seven databases (including MEDLINE and PsycINFO) were searched between July 2008 and December 2010. Search terms were reported. Reference lists of review articles found in the search were checked for further studies.

Study selection
Eligible studies had to investigate a physical activity intervention based in a school setting and delivered during school hours. Controlled studies were eligible. Studies had to include students between the ages of six and 19 years. Studies had to report outcome variables from at least one of the three investigated domains of psychological determinants, activity behaviour and health and fitness. Only studies published as journal articles were considered for inclusion. Studies of after school activity programmes and studies investigated specific populations were excluded.

Most of the included studies investigated samples of children (six to 12 years). Some studies contained adolescents aged 13 to 19 years. Three studies included children and adolescents. The vast majority of studies examined both boys and girls. More than half of the studies investigated interventions that combined physical activity and cognitive components. The other studies assessed physical activity interventions only. A wide range of physical activity approaches were included and were described by the authors. Most studies were conducted in North America and Europe.

Three reviewers selected studies. Any disagreements were resolved through discussion.

Assessment of study quality
Study quality was assessed based on the items: pre-test analysis, randomisation, drop-out rate, timing of measurements, blinding of outcome assessment, follow-up and systematic drop-out. One point was awarded to a study when a criterion was met, zero points were given for unmet or criteria that were not described clearly. Authors interpreted overall scores of zero to 1 to indicate low quality, 2 to 4 to be medium quality and 5 or more to represent high-quality studies.

The authors did not report how many reviewers performed the quality assessment.

Data extraction
Study and participant characteristics, information on intervention and control programmes, outcomes and the underlying theoretical background were extracted from each study.

Data extraction was performed by one reviewer; it was unclear whether extracted data were checked.

Methods of synthesis
The authors presented results from the included studies in tables and text rather than using a meta-analysis. Studies were grouped into categories to investigate possible moderator effects: age, methodological quality, type of intervention, duration of intervention and frequency of intervention. Psychological determinants were investigated as possible moderators.

Results of the review
The review included 129 studies. The overall number of participants was not reported but most studies included 250
children or more. Follow-up ranged from less than three months (30 studies) to more than 13 months (34 studies). Most studies (65) were of between four and 12 months duration. Frequency of intervention delivery varied from daily to once a week. Health and fitness outcomes were measured in various ways that included body mass index (BMI), motor performance and skin fold thickness. Psychological determinants assessed included attitudes, self-concept, knowledge, motivation and others that included social support.

Twenty-eight studies were judged to be of low methodological quality, 91 were of moderate quality and 10 were considered to be of high methodological quality. Less than half of the studies fulfilled criteria on randomisation, drop-out, blinding of outcome assessment, follow-up and systematic drop-out. Pre-test analysis and timing of measurements were the only domains for which most studies met the criteria. Details of the quality assessment were provided in supplementary material.

Health and fitness outcomes: Seventy-five studies investigated BMI as a health and fitness outcome and 28% found a positive effect of the intervention, 2.7% found a negative effect and 69.3% found no effect. Seventy-four studies investigated physical activity and 56.8% found a positive effect, 6.8% found a negative effect and 36.4% found no effect. Sixty-six studies investigated motor performance and 69.7% reported a positive effect and 30.03% reported no effect. Also investigated were self-concept (20 studies; 30% positive and 70% no effect), knowledge (16 studies; 87.5% positive and 12.5% no effect) and attitudes (16 studies; 43.8% positive, 12.5% negative and 43.7% no effect).

Physical activity behaviour: Seventy-four studies examined physical activity behaviour and 56.8% (42 studies) reported a positive effect of the intervention and five studies (6.8%) reported a negative effect. A positive intervention effect was found in 87.5% of 16 studies investigated knowledge as a psychological determinant. Seven of 16 studies that investigated attitudes reported positive treatment effect and two reported a negative effect. Fourteen studies investigated motivation or enjoyment and four of these found a positive effect of the intervention.

Investigation of sub-categories of studies revealed that studies of adolescents more frequently reported significant differences in BMI between intervention and control group than did studies of children. Studies that combined a physical activity programme with a cognitive approach were more likely to report reduced BMI than studies that investigated an activity intervention only. Low quality studies reported significant results more frequently than studies of moderate or high methodological quality. Long-term studies and studies in which the intervention was delivered more than three times a week reported negative effects on BMI. Further results were reported. Three studies investigated possible psychological moderators. No definitive findings were reported.

Authors' conclusions
School-based physical activity interventions showed positive effects on psychological variables, activity behaviour and health and fitness outcomes.

CRD commentary
The review question and inclusion criteria were clear. Relevant databases were searched. Only published studies were eligible for inclusion so relevant unpublished studies may have been missed. The risk of publication bias was not assessed. It was unclear where any language restrictions were applied to the search so language bias may have been introduced. Limited study details were reported so it was not possible to evaluate how well the included studies matched the inclusion criteria and how representative they were. Appropriate independent and duplicate processes were used during study selection; it was unclear whether the same processes were used during data extraction and quality assessment so reviewer error and bias could not be ruled out. A detailed quality assessment that largely included relevant domains was reported but the use of a scoring system with cut-off scores made it difficult to assess potential for bias in the primary studies.

The choice not to conduct a quantitative meta-analysis seemed appropriate given the variability between studies acknowledged by the authors. However, merely presenting numbers and/or percentages of studies with or without significant findings without an indication of effect sizes or confidence intervals limited the usefulness of the results. Basic study details (such as sample size) were not reported and quality assessment scores were not considered in the reporting of the results so the findings were difficult to interpret.

The authors did not sufficiently synthesise studies or report effect sizes or confidence intervals in their results for the conclusions of this review to be considered to be reliable. Reliability was further weakened by a limited search, unclear
review processes and missing study details.

**Implications of the review for practice and research**

**Practice**: The authors did not state implications for practice.

**Research**: The authors recommended that future research should analyse the impact of particular participant variables such as gender or fitness on activity interventions.

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