



Review

Physically active lessons as physical activity and educational interventions: A systematic review of methods and results



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ABSTRACT

Objective. Physically active lessons aim to increase children's physical activity whilst maintaining academic time. This systematic review aimed to investigate the methods used in such interventions and their effects on physical activity and educational outcomes.

Methods. In March 2014; PubMed, Web of Science, PsycINFO and ERIC electronic databases were searched. Inclusion criteria were: 1. Classroom lessons containing both PA and educational elements; 2. intervention studies featuring a control group or within-subjects baseline measurement period; 3. any age-group; and 4. English language. Studies assessing physically active lessons within complex interventions were excluded. Data were extracted onto a standardised form. Risk of bias was assessed using the Effective Public Health Practice Project (EPHPP) tool.

Results. Eleven studies were identified: five examined physical activity outcomes only, three examined educational outcomes only and three examined both physical activity and educational outcomes. All studies found improved physical activity following physically active lessons: either in the whole intervention group or in specific demographics. Educational outcomes either significantly improved or were no different compared to inactive teaching. Studies ranged from low to high risk of bias.

Conclusions. Encouraging evidence of improved physical activity and educational outcomes following physically active lessons is provided. However, too few studies exist to draw firm conclusions. Future high-quality studies with longer intervention periods are warranted.

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Introduction

Physical activity is associated with improved cardiovascular risk factors (Andersen et al., 2011; Cesa et al., 2014) and mental health in children (Biddle and Asare, 2011). However, the typical classroom is currently inherently sedentary, with obligatory seated lessons contributing greatly to the 7–8 h a day spent sedentary in children (Esliger and Hall, 2009; Mantjes et al., 2012). Despite ever-increasing demands on teaching time and school space, no such rigid demands have been made for improved child physical activity (PA) levels (Weiler et al., 2013). National frameworks to secure time for physical education are currently absent in both the UK (Weiler et al., 2013) and USA (Slater et al., 2012).

There is evident efficacy for school-based physical activity interventions (Dobbins et al., 2013). School environments provide a unique opportunity to ensure physical activity in a maximum number of children over lengthy periods of time (Donnelly and Lambourne, 2011; Rasberry et al., 2011). A recent Cochrane review analysis found school-based interventions to significantly increase pupils' VO₂ max and their moderate and vigorous physical activity (MVPA) during school hours (Dobbins et al., 2013). However, authors noted that studies typically found small effects and featured moderate or high risk of bias: proposing a need for further research into school-based PA interventions (Dobbins et al., 2013). Although teachers may support physical activity interventions, insufficient time is often available to implement them with preference given to academic tasks (Erwin et al., 2012; Ward et al., 2006).

Physically active lessons are a novel teaching technique that introduces PA into the school learning environment (Centers for Disease Control and Prevention, 2010; Kibbe et al., 2011). These teacher-led sessions aim to incorporate physical activity into the teaching of academic content (Bartholomew and Jowers, 2011). Physically active lessons are hence distinct from 'activity-' or 'brain breaks' which facilitate bouts of classroom-based PA without educational features (Bartholomew and Jowers, 2011). The accumulation of short PA intervals during physically active lessons may be more feasible in helping reach recommended guidelines compared to extending recess or physical education (Barr-Anderson et al., 2011).

The combination of movement and learning via physically active lessons follows well-supported associations between physical activity and learning outcomes (Tomprowski et al., 2011). A significant positive relationship between physical activity and cognition in children has been identified in meta-analytic study, with significant effect sizes of 0.32 (Sibley and Etnier, 2003). Such findings align with the Executive Function Hypothesis: finding executive function tasks of goal-directed planning to be improved with physical activity (Best, 2010; Diamond and Lee, 2011; Tomprowski et al., 2011). Physically active lessons also follow the principals of Experiential Learning theory: learning through action and experience as opposed to via rote (Kolb, 1984; Kolb et al., 2001).

Intervention studies have implemented physically active lessons into various school environments. However, a review of the effects of these programmes on physical activity and educational outcomes accompanied by detailed quality assessment is yet to be performed. It is important to assess the range of strategies used and results found in this relatively novel area. This systematic review aimed to: 1) assess

the current methods used to measure i) physical activity and ii) educational outcomes in physically active lesson interventions, 2) assess observed effects of physically active lessons on i) physical activity and ii) educational outcomes and 3) evaluate the risk of bias in these identified interventions.

Methods

Search strategy & information sources

In March to April 2014, a systematic search for original research articles was conducted using ERIC, PubMed, PsycINFO and Web of Science electronic databases. Abstracts and titles were searched with three separate strings representing: 1) physical activity, 2) class or lesson and 3) children. Fig. 1 provides a full search strategy for PubMed which was revised according to the requirements of each database. Researchers' own work and reference lists of included papers were searched. Grey literature was also searched from the websites of two UK and two US organisations involved in child physical activity research:

Play England: <http://www.playengland.org.uk/>
 Active Living Research (US): <http://activelivingresearch.org/>
 Institute of Education, University of London: <http://www.ioe.ac.uk/index.html>
 Active Academics (US): <http://www.activeacademics.org/?pid=20&homepage>.

The PRISMA guidelines for systematic review reporting were followed (Moher et al., 2009).

Inclusion/exclusion criteria

Randomised and non-randomised intervention studies were sought that evaluated the effects of implemented physically active lessons on physical activity and/or educational outcomes.

- 1) Physically active lessons: Classroom-based sessions containing both physical activity and educational elements were included. Physical education, physical activity breaks without educational content, after-school and recess interventions were excluded.
- 2) Complex interventions: Physically active lessons as part of complex interventions were excluded to isolate the effects of these lessons alone.
- 3) Study design: Intervention studies that either featured a control group or a baseline comparison phase were included. Studies also featured baseline and post-intervention pupil outcome measurement. Reviews and protocol studies providing no intervention results were excluded.
- 4) Sample: Child and adolescent samples were included regardless of age. Studies solely investigating special populations (such as disabled or obese children) were excluded as such conditions may have impacted physical

Search strategy used in PubMed.

1. physical activity or activit* or exercise (title and abstract)
2. class* or lesson* or learning* (title and abstract)
3. child* or young* (title and abstract)
4. 1 and 2 and 3

Fig. 1. Search strategy used in PubMed.

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