School-based Physical Activity Programmes

A review for TOP Foundation

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Introduction

Physical activity in youth

Physical activity during childhood and adolescence is important for health. Studies have shown that children and adolescents who participate in more physical activity are at a reduced risk of developing cardiovascular disease risk factors, obesity and the metabolic syndrome.[1-3] There is also some indication that regular physical activity in childhood and adolescence is associated with improved mental health and cognitive performance (leading to better academic achievement).[4 5] Furthermore, there is some evidence that physical activity tracks moderately from youth into adulthood, suggesting that children and adolescents who are active are more likely to be active adults.[6] Further evidence is needed to confirm this but this potentially links physical activity in youth with the health benefits associated with physical activity in adulthood (including a reduced risk of cardiovascular disease, type 2 diabetes, osteoporosis and some forms of cancer[7]). Promoting physical activity in childhood and adolescence is therefore a vital step to improving health and wellbeing during youth and potentially beyond.

Recommendations for physical activity state that children and adolescents should participate in 60 minutes of physical activity per day that is of a moderate to vigorous intensity.[8] Moderate to vigorous intensity activities raise your heart rate and make you breathe harder, though for moderate activities you should still be able to carry on a conversation.[8] The Health Survey for England 2008 reported that only 32% of boys and 24% of girls aged 2-15 years were meeting this guideline, when based on self- or parent-reported data.[9] In a sub sample of 4-15 year-olds who wore a physical activity monitor to measure their physical activity (a more accurate measure of activity), these proportions were 33% for boys and 21% for girls.[9] As well as girls being less active than boys, adolescents were shown to be less active than children (particularly among girls). There has also been evidence from UK studies that South Asian children are less active than other ethnic groups.[10 11] These findings emphasise the need for efforts to promote physical activity in children and adolescents in the UK, with particular attention being given to adolescent girls and South Asian children.

Promoting physical activity in the school setting

There are a wide range of influences on youth physical activity, existing across school, home and community settings. However, the key advantage of focusing efforts to promote physical activity on school-based programmes is the significant amount of time that all children in the UK up to the age of 16 must spend in school. This ensures regular access to all children across the population.

School-based physical activity programmes can be solely school-based or school-based but with additional components targeted at families or communities. Additionally, there are several different types of school-based physical activity programmes depending on the approaches taken. Educational programmes focus on providing education to children about physical activity during school-based lessons or workshops. These might cover the health benefits of physical activity, ways that children might try to introduce more physical activity into their lives, and children setting themselves goals regarding physical activity. Educational programmes may also provide education to children's parents through the provision of leaflets or newsletters or possibly providing workshops for parents as well as the children. Curricular programmes focus on making changes to the school curriculum, such as introducing more physical education (PE) sessions or building physical activity into standard academic lessons. Environmental programmes involve changing an aspect of the school environment, such as providing more play equipment during school break times. These changes might also tie in with changes to school policies regarding physical activity. Lastly, multi-component programmes include a combination of educational, curricular or environmental approaches. Further specific examples are given in the sections below.

Aims of review

The aims of this review are to:

- Give an overview of which types of school-based programmes are the most effective at promoting physical activity in children and adolescents based on the available evidence.
- Discuss whether there is evidence that particular programmes work better for particular groups of children (specifically discussing gender, ethnicity, socio-economic status and weight status).

School-based physical activity programmes in children (5-12 years)

A large number of studies have been published which evaluate school-based physical activity programmes targeted at children aged up to 12 years but these vary considerably on the content of the programme and the quality of the evaluation.[12 13] Based on the best quality evidence available, multi-component physical activity programmes seem to be the best approach for increasing physical activity levels in children.[12] Due to the variation in the physical activity programmes that have been evaluated, it is difficult to say exactly what works best but the common link seems to be including more than one approach. Physical activity programmes that are purely educational, for example, do not appear to be effective at increasing physical activity in children.[13] It is not clear from current evidence whether including a family or community component significantly adds to the effectiveness of a physical activity programme; there have been effective programmes both with and without parental or family involvement. The example boxes on the next two pages highlight the components of three physical activity programmes (one conducted in the UK) that were shown to be effective at increasing physical activity levels in children in good quality evaluations.

Physical activity programmes that focus on increasing activity during school PE classes or at break times can be effective at increasing activity during the school day but this does not necessarily mean that children will also become more active outside of school.[14] In fact, a possible side effect of increasing children's physical activity levels during the school day is that they might then compensate for this by being less active outside of school, resulting in no overall change to children's total daily physical activity. It is therefore important that evaluations of school-based physical activity programmes look at the effect on total daily physical activity. Some evaluations in the UK of painting colourful markings in school playgrounds have shown an increase in children's physical activity during school break times but it is unknown whether this translates to an increase in total physical activity.[15-17] A substantial rise in children's physical activity during the school day, however, may be enough to raise their total daily physical activity as demonstrated in the example of an intensive Swiss physical activity programme given on page 5.

After-school physical activity programmes have also shown some promise for increasing children's physical activity, however, weaknesses in the quality of studies evaluating these programmes mean that we can only draw preliminary conclusions.[18 19] The programmes that have been successful tend to have at least two sessions a week but further evidence is required to confirm whether these programmes increase total physical activity or just physical activity during attendance at the club.[19]

Examples of successful physical activity programmes in children[20 21]

Gorely et al, 2009 & 2011 – The GreatFun2Run programme[20 21]

- Target age: 7-11 year olds
- Location: North East of England, UK
- Programme components (delivered over 10 months):
  - A CD-rom for teachers including PE lesson plans and homework exercises plus suggestions for including health activity related issues across the curriculum. CD-rom themed around space travel and contained 8 planets (units of work) that teachers could visit and work through.
  - Two highlight events to give children a goal for increasing their physical activity. These included participation in a 1 mile school run/walk or in the local Great North Junior Run (1 mile). These events were mass participation events and focused on participation not competition.
  - An interactive website for pupils, teachers and parents to raise awareness of the need for physical activity and health eating.
  - A local media campaign employing regional radio and print media to maintain interest and create excitement.
  - A summer activity wall planner and record.
- Effect on physical activity (measured using physical activity monitors)
  - Children who participated in the programme increased the time spent in moderate to vigorous physical activity by almost one minute a day for every month of the programme while children who did not get the programme decreased their physical activity. This meant that children who participated in the programme were doing about 20 minutes more of moderate to vigorous physical activity than children who did not do the programme by the end of the programme period.
  - When the children were followed up 18-20 months after the end of the programme, there were no longer any differences between children who had participated and those who hadn't. However, interviews with teachers at the school suggested that due to time pressures, competing resources, curriculum demands and staff changes, the majority of teachers had not continued to use the resources. This highlights the need for ongoing support for long-term implementation of a programme.

Examples (continued)

Salmon et al, 2008 – The Switch-Play programme[22]

- Target age: 10 years old
- Location: Australia
- Programme components (three programmes were evaluated):
  - P1: 19 lessons (40-50 minutes each) delivered over the course of one school year in addition to regular PE classes focusing on Behavioural Modification (BM). These focused on: raising awareness of the time children spent doing physical activity, the health benefits of physical activity, and things in the children's home and community environments that might influences their activity; decision-making and identifying alternatives to screen-based behaviours (TV watching and using computers); and designing physical activity games. Parents were sent newsletters and encouraged to support children with their goals.
  - P2: 19 lessons as above but the focus of the sessions was on fundamental movement skills (FMS), using games and activities to help children gain mastery of a range of skills.
  - P3: P1 and P2 combined (19 lessons on BM plus 19 lessons on FMS). Parents did not receive anything for this programme.
- Effect on physical activity (measured using physical activity monitors)
  - The strongest effect was seen for P2. Children in this group spent 8 minutes more per day in vigorous physical activity and 10 minutes more per day in moderate physical activity than the control group (who did not receive any physical activity programme). Children in P1 also spent 3 minutes more per day in vigorous physical activity compared to the control group but no significant difference was found for minutes of moderate activity. These findings remained when the children were followed up one year later.
  - Although there was a general increase in physical activity observed for children in P3, the effect was not significantly different from the control group. This suggests that delivering both programmes at the same time did not bring about any further benefits and was perhaps too intensive.

Kriemler et al, 2010 – The KISS programme[23]

- Target age: Grade 1 (6 years old) and Grade 5 (11 years old)
- Location: Switzerland
- Programme components (delivered over one school year):
  - 5 x 45 minutes PE sessions per week. All sessions were designed by PE specialists; three were delivered by the usual class teacher (as standard) and the two additional sessions were delivered by PE specialists.
  - 3-5 physical activity breaks per day were introduced to academic lessons.
  - Physical activity homework – children were given activity tasks to do at home such as standing on one leg while cleaning their teeth and hopping up and down the stairs.
- Effect on physical activity (measured using physical activity monitors):
  - Children who received the programme increased their physical activity more than children who didn't with a difference of about 11 minutes of moderate to vigorous physical activity per day between the two groups.
  - When these results were further explored, the difference in total daily physical activity was found to be due to an increase in physical activity during the school day whereas no difference was found in physical activity outside of school.
  - No long term results for this study have been published so it is unclear whether these effects remained.

School-based physical activity programmes in adolescents (12-18 years)

Fewer studies evaluating physical activity programmes targeted at adolescents have been conducted than in children and more of these have been evaluated using self-report measures of physical activity. These are known to have less accuracy than physical activity monitors. However, there are some good quality evaluations of adolescent physical activity programmes and, as with children, the strongest evidence appears to be for multi-component programmes.[12 13] Again, physical activity programmes that focus on educational approaches only do not appear to be effective at promoting physical activity.[13] Including family involvement, however, seems to be an important component of effective physical activity programmes in this age group.[13] Examples of effective physical activity programmes in adolescents that have been well evaluated are given on the next page. A key point to emphasise when discussing physical activity programmes in adolescents is that, given the decline in physical activity that occurs during adolescence, a successful programme might simply reduce the decline in physical activity that would otherwise occur rather than necessarily increase physical activity levels. This is different to activity programmes in children which generally seek to bring about an increase in physical activity levels to be effective.

Several adolescent physical activity programmes that have been evaluated have included a component focused on PE lessons at school, within the context of a broader programme.[14] However, those that have targeted both adolescent boys and girls appear to only be effective at promoting physical activity in boys.[14] Where girls have been targeted alone, physical activity programmes with a PE component have been shown to be effective at promoting physical activity.[14 24] These findings suggest that adolescent physical activity programmes that include a focus on school PE should be conducted separately for boys and girls. However, this might be specific to programmes that include a PE component. The ICAP programme[25] (described on the next page), for example, did not find any differential effect for boys and girls.

Example successful physical activity programmes in adolescents (12-18 years)

Simon et al, 2008 – The ICAPS programme[25]

- Target age: 11-12 years at start of programme, 15-16 years by the end of the programme
- Location: France
- Programme components (delivered over 4 years):
  - Changing knowledge, attitudes and motivation towards physical activity through information and debates.
  - Encouraging social support from parents, peers, teachers and physical activity instructors.
  - Providing environmental conditions that enable physical activity – specifically providing new opportunities for physical activity during school hours (lunchtime and breaks) and after-school hours, and asking local policy makers to provide a supportive environment that promotes enjoyable physical activity (such as providing low-cost or free physical activity facilities).
  - Parents and teachers invited to regular meetings to encourage them to support adolescents to adopt a physically active lifestyle.
- Effect on physical activity (measured using questionnaires)
  - Adolescents who received the programme reported doing more hours of supervised leisure time physical activity per week at the end of the programme (3.45 hours per week) than those who did not receive it (2.55 hours per week).
  - No difference was observed between those who attended the programme and those who didn't for reported active commuting (minutes per day walking or cycling to school).

Haerens et al, 2007[26]

- Target age: 11-15 year-olds (average age: 13 years)
- Location: Belgium
- Programme components (implemented over two school years):
  - A workgroup was created in each school. This workgroup received background information and guidelines on how to address the programme topics from the research staff who set up the programme. They were also given a programme manual and other educational materials. The workgroup met with the researchers at the start of each school year then every three months during the year.
  - Schools were asked to create more opportunities for students to be physically active during breaks, at noon, or after school hours by organising extra physical activities. These physical activities were varied and included non-competitive activities.
  - Every school received a box with sports materials such as ropes, frisbees, balls and beach ball sets which was made available to students.
  - Over the 2-year period, a total of 4 hours of class time was spent on the promotion of physical activity. At the start of the programme, students had to complete a fitness test and were then given feedback on their fitness level and possible ways to improve it. Students were then given access to a computer-based programme which asked them questions about their physical activity levels and their beliefs and attitudes to physical activity. They then received tailored feedback, depending on how they had answered the questions.
  - A component on food was also included which aimed to increase fruit consumption and decrease soft drink consumption and fat intake.
  - In half of the schools, a parent component was also included. Parents were invited to a meeting at the school about physical activity and diet and also given a free CD with the computer programme that the students were completing at school for them to complete themselves at home.
- Effect on physical activity (measured using questionnaires)
  - Students who participated in the physical activity programme (and received the parent component) did, on average, 4 minutes of physical activity (of at least a moderate intensity) per day more by the end of the programme while students who did not participate in the programme were doing 7 minutes of physical activity (of at least moderate intensity) per day less by the end of the programme period. There was little change in the group who participated in the physical activity programme without the additional parent component.
  - These findings suggest that including a parent component was important for the success of this physical activity programme.

Do different approaches work for different children and adolescents?

As mentioned above, it appears that, where school PE is a component of physical activity programmes, separate programmes for adolescent boys and girls might be necessary to effectively promote physical activity in both genders.[14] However, there does not seem to be any evidence to suggest that physical activity programmes in children (aged <12 years) have different effects on boys and girls.[27] Furthermore, there is no consistent evidence to suggest that children and adolescents of different ethnicity, socio-economic status, or initial weight status respond differently to physical activity programmes.[27] It should be noted, however, that most of the research on this has been conducted outside of the UK and may not necessarily be applicable to the UK setting. Further UK-based research is therefore needed to establish the situation here. What has sometimes been linked to the effectiveness of physical activity programmes, is the physical activity level of participants at the start of the programme: those with lower activity levels often respond better to the programme.[27] This is perhaps unsurprising given that children and adolescents with the lowest physical activity levels have the most potential to change.

Practical advice for smooth running

Implementing school-based physical activity programmes can be challenging and this is clearly important to the success of the programme. Key elements to success seem to be developing and maintaining good relationships with teachers and, if possible, incorporating the physical activity programme into the school curriculum as this gives the highest participation rates.[12 28] Involving parents in school-based physical activity programmes can also be difficult but may be important for the success of the programme, particularly in adolescents. The biggest barrier to parental participation in programmes seems to be time constraints.[29] Parents have reported that activities that are fun, interactive, and involve both them and their children are most likely to motivate them to attend. Additionally, parents appreciate receiving information about physical activity opportunities in the local area and financial support to attend these or the organisation of affordable physical activity opportunities.[29]

Summary

Based on the evidence to date, multi-component school-based physical activity programmes (that is those that include more a combination of educational, curriculum or environmental components), are the most effective at promoting physical activity in children and adolescents. It is not clear from the evidence to date whether family involvement is necessary for success in physical activity programmes targeted at children while it appears to be a key component of successful physical activity programmes targeted at adolescents.

There is some evidence to suggest that physical activity programmes targeted at adolescents that include a focus on school PE are better to be targeted at boys and girls separately while there does not appear to be any need to deliver physical activity programmes in children separately to boys and girls. Based on the evidence available, it does not seem that children of different ethnicity, socio-economic status or weight status respond differently to physical activity programmes, suggesting that programmes do not need to be tailored for these population groups.

One limitation of the research to date in both children and adolescents is that many studies do not assess the long term effects of a physical activity programme.[12 13] This means that a programme might initially raise physical activity levels but whether this effect remains after the programme has come to an end is unclear. However, it is likely that repeated efforts throughout childhood and adolescence, rather than a one-off physical activity programme, are needed to bring about long lasting impacts on physical activity behaviour. Therefore a physical activity programme that at least brings about a short-term impact on physical activity behaviour may still be a worthwhile venture.

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