Evidence Briefing

Physical Activity for Children and Young People

BHF National Centre
physical activity+health

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Contents

The purpose of this evidence briefing is to provide an overview of the evidence relating to children and young people (aged 5-18 years) and physical activity to help commissioners, policy makers and practitioners influence work in the field. It summarises the benefits of physical activity, current physical activity levels, the factors affecting participation and the evidence for the effectiveness of interventions to increase physical activity.

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Summary

The evidence reviewed in this document indicates:

- Physical activity can improve the physiological and psychological health of children and young people.
- Using self-report measures, most children in England and many children in Scotland, Wales and Northern Ireland do not achieve recommended physical activity levels.
- Participation in physical activity decreases in adolescence, but levels remain higher in boys than girls.
- A complex range of individual, family, social and environmental factors influence participation in physical activity by children and young people.
- Public health guidelines recommend children and young people should undertake a minimum of 60 minutes, and up to several hours, of moderate to vigorous activity every day.
- Vigorous activities including those that promote strengthening of muscle and bone should be included three times per week.
- The most successful interventions with children and young people aged 5-18 years have been multi-component approaches. These approaches are largely school-based so that they can reach all young people. They include modifications to the school culture and environment and also include family and community involvement.
- Evidence-based action is required at school, community and family levels to increase physical activity and to reduce prolonged periods of sedentary behaviour among children and young people.

Introduction

According to the World Health Organization physical inactivity is one of the leading causes of major chronic diseases, yet even in those nations where physical activity is highest, only 43% of 11 year old boys and 31% of 11 year old girls (Ireland) and 33% of 15 year old boys and 17% of 15 year old girls (USA) take part in 60 minutes of moderate physical activity per day [1]. As the evidence grows that physical activity and fitness track into adulthood, it is important to ensure that as many children and young people as possible meet the present guidelines [2, 3]. In addition, physical activities such as active play, individual and team sports, dance and creative pursuits are important for young people as they provide the opportunity for enjoyment, social interactions and community engagement [4].

This evidence briefing summarises the benefits of taking part in physical activity, the current guidelines and levels of physical activity for children and young people in the UK and highlights what can be done to enhance participation levels.

Key term – Children and young people

In this document, the term *children and young people* is used to describe those aged 5-18 years. The term *children* is used when specifically referring to those aged 5-11 years and the term *young people* when referring to those aged 12-18 years.

Key term – Physical activity

Physical activity is described as “any body movement produced by skeletal muscles that results in a substantial increase over the resting energy expenditure” [5].

Physiological and psychological outcomes of physical activity

There is an increasing body of evidence that demonstrates that children and young people can gain important physiological and psychological benefits if they undertake at least 60 minutes of physical activity every day [6-8].

Physiological outcomes

Regular participation in physical activity is associated with the following physiological outcomes in children and young people [6-10]:

- improved cardiovascular fitness
- improved cardiovascular and metabolic health such as a 20-35% lower risk of cardiovascular disease including coronary heart disease, stroke and improved cholesterol profiles
- decreased risk of type 2 diabetes
- improved bone health
- reduced body fat and maintaining a healthy weight
- stronger muscles.

There is a growing body of evidence that there is a 'dose-response' relationship, in terms of physiological outcomes, that means the more physical activity done the better physiological outcomes are seen [6].

There is also some evidence to support a positive association between physical activity and academic performance in 5-18 year olds, but further research is needed on this topic [8].

Psychological outcomes

Regular participation in physical activity is associated with the following psychological benefits in children and young people [4, 6-8, 11, 12]:

- improved self-confidence in young people aged 10-16 years undertaking a 'high-level' of activity

- improved social skills, integration into peer groups and extending social networks for young people
- improved self-esteem in young people with a greater effect for children with perceptual, emotional and learning disabilities
- reduced anxiety and the potential for reduced depression, although the evidence for this is limited.

Key term – Sedentary behaviour

Prolonged periods of sedentary behaviour (behaviours that occur while sitting or lying down that require very low energy expenditure) may increase the risk of ill health even among those who are active at the recommended levels. For more information about sedentary behaviour and children and young people please download the BHFNC evidence briefing on sedentary behaviour at www.bhfactive.org.uk

Current levels of physical activity

UK

Self-reported levels of physical activity in children and young people vary across the England, Northern Ireland, Scotland and Wales. This may be largely due to the different questions asked in each country's individual health survey, and partly due to different methods of data collection. It is, however, possible that real differences exists between the countries.

The weight of available evidence would suggest that significant numbers of children and young people across the UK, including three-quarters of the girls in England and over half the girls in Wales, do not achieve the recommended levels of physical activity. Across all countries, boys are more active than girls and physical activity declines with age.

The Health Behaviours in School-aged Children Survey (HBSC) 2009/2010 [1] provides comparative data on physical activity levels in children in England, Scotland and Wales. Data was collected using a self-report survey which asks young people to report the number of days over the past week that they were physically active at a moderate to vigorous level for at least 60 minutes. Data from this survey reveals that:

- the proportion of children undertaking at least 60 minutes of moderate to vigorous physical activity (MVPA) on a daily basis decreased with age in both boys and girls in all three countries
- children in Scotland (both boys and girls) are generally less active than their counter parts in England and Wales (Figure 1).

England

Total physical activity

The data in this section are taken from the Heath Survey for England 2012, which provides self-report data for young people aged 5-15 years [13]. (Please note there is no data included in this survey for 16-18 year olds.) The survey examined if young people achieved at least 60 minutes of MVPA on seven days a week.

The Health Survey for England 2012 data reveal that:

- 21% of boys and 16% of girls aged 5-15 years met the recommendation
- the proportion of girls meeting the recommendation was 23% in those aged 5-7 years and 8% in those aged 13-15 years
- the proportion of boys meeting the recommendation was 24% in those aged 5-7 years and 14% in those aged 13-15 years

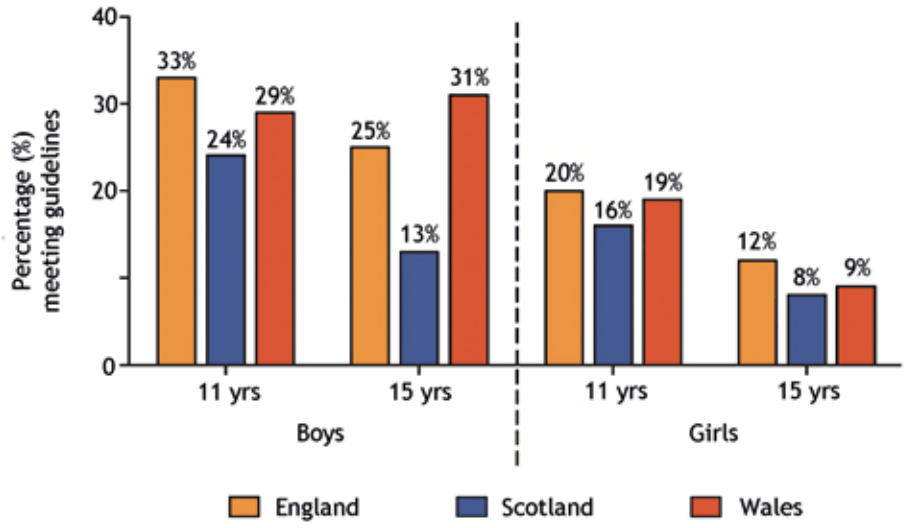

Figure 1. Percentage of 11 and 15 year olds in England, Scotland and Wales meeting the recommendation of at least 60 minutes of MVPA per day, seven days per week (measured by self-report) [1].

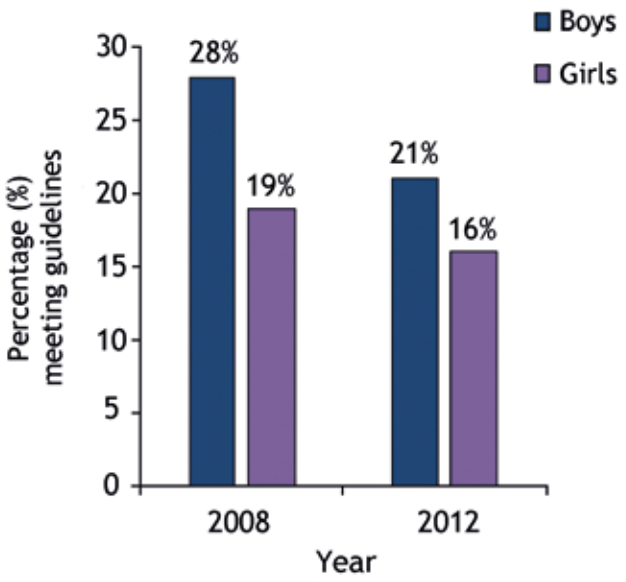

Figure 2. The proportion of 5-15 year old children in England meeting the recommendation of at least 60 minutes of MVPA per day, seven days per week (measured by self-report) [13].

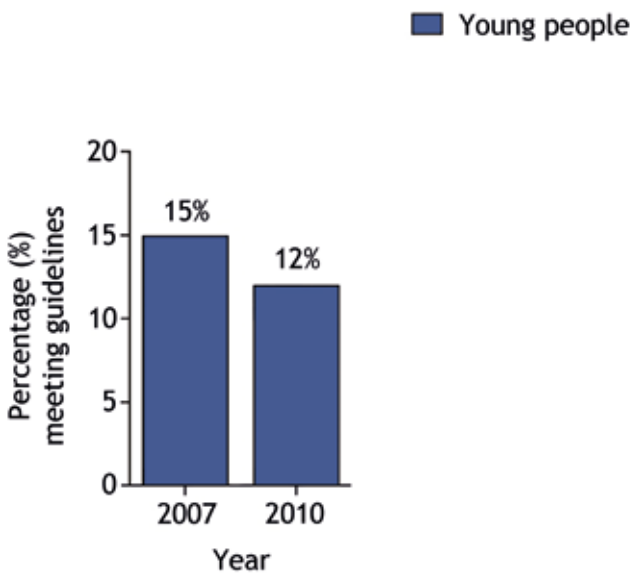

Figure 3. The proportion of 11-16 year olds in Northern Ireland meeting the recommendation of at least 60 minutes of MVPA per day, seven days per week (measured by self-report) [14, 15].

- in the week prior to the survey more girls than boys had walked to or from school on at least one occasion (67% and 64% respectively)
- in the week prior to the survey, more boys than girls cycled to or from school on at least one occasion (6% and 1% respectively)
- more boys than girls participated in formal sport (48% and 38% respectively)
- levels of informal activity were similar in both sexes (85% among both sexes).

Unfortunately there was no accelerometry (objective) data collected for children in the 2012 Health Survey for England.

Some children and young people also have extremely low levels of physical activity. The Health Survey for England defines low levels of activity as either obtaining fewer than 30 minutes of MVPA on each day or undertaking 60 minutes or more of MVPA on fewer than seven days in the last week. Overall, 39% of boys and 45% of girls aged 5-15 years were classified as having low levels of activity.

Trends

Questions on physical activity have been asked in the Health Survey for England since 1997, but the questions were revised and amended in 2002 and 2008. Therefore, comparison of long-term physical activity trends among boys and girls is problematic. The most recent data, however demonstrates that between 2008 and 2012 physical activity levels have slightly decreased in both boys and girls (Figure 2).

Northern Ireland

Data for this section has been taken from the Young Persons' Behaviour and Attitudes Survey (YPBAS), a school-based survey conducted among 11-16 year-olds in Northern Ireland [14].

Total physical activity

Data suggested that among 11-16 year olds only 12% had exercised so that they "got out of breath or hot and sweaty for at least 60 minutes" in the previous seven days (the data were not sub-divided by sex). In this survey it was reported that:

- 89% of pupils said they enjoyed doing sport or physical activity

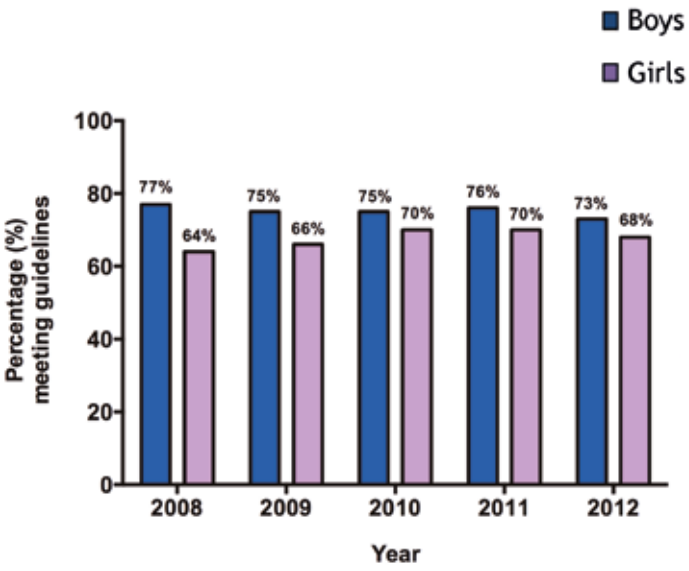

Figure 4. Percentage of 2-15 year olds in Scotland achieving the least 60 minutes of MVPA per day, seven days per week (measured by self-report including school-based activities) [16].

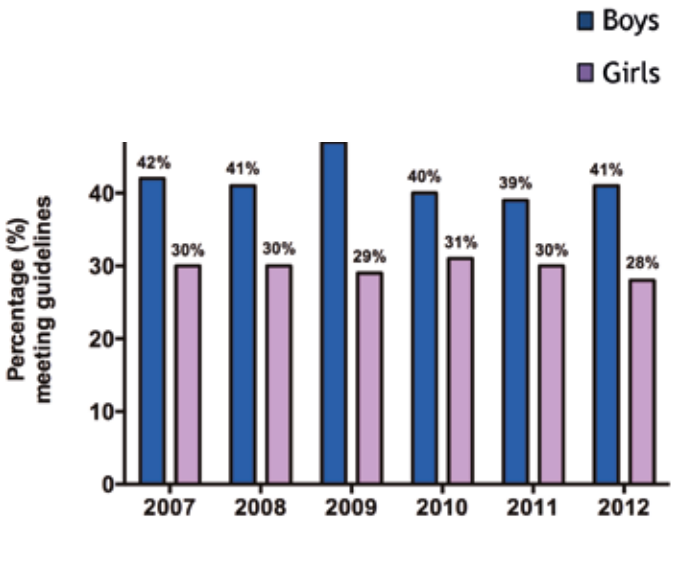

Figure 5. Percentage of 4-15 year olds in Wales meeting the at least 60 minutes of MVPA seven days per week (measured by self-report) [17-22].

- football (48%) and active games (eg, chase and skipping) (42%) were the most popular sports/ physical activities that pupils participated in
- 90% of pupils played sport, exercised or played actively
- 32% of pupils who played sport, exercised or played actively did so for at least 60 minutes on five or more days per week.

Trends

Based on The Young Persons' Behaviour and Attitudes Survey 2007-2010 [14, 15] the proportion of 11-16 year olds in Northern Ireland participating in at least 60 minutes of MVPA, seven days per week, appears to be decreasing (2007: 15%; 2010: 12%; the data were not sub-divided by sex, Figure 3).

Scotland

Total physical activity

The 2012 Scottish Health Survey [16], a self-report survey on the number of people in Scotland meeting the 2011 UK physical activity guidelines, found that:

- when including school-based activity 70% of children and young people aged 2-15 participated in 60 minutes of physical activity seven days a week
- 73% of boys met the guidelines
- 68% of girls met the guidelines
- 80% of 5-7 year olds met UK physical activity guidelines, but only 55% of 13-15 year olds did so
- the largest drop in physical activity participation was between ages 11-12 and ages 13-15 - 66% of girls aged 11-12 years met guidelines but only 45% of girls aged 13-15 years did so.

It is not known why these self-report measures for Scotland are so much higher than for the other countries. It could be due simply to differences in the surveys used.

Trends

In Scotland, between 2008 and 2012, the proportion of boys meeting the physical activity recommendations seemed relatively stable, varying from 75-77%. However, there was a drop to 73% in 2012. Over the same period, the proportion of girls meeting the physical activity recommendations fluctuated between 64% and 70% (Figure 4) [16].

Wales

Total physical activity

The 2012 Welsh Heath Survey, a self-report survey, reported on the number of active days children reported each week. An active day is defined as doing at least 60 minutes of MVPA that day. The survey reported that:

- 59% of boys and 42% of girls reported doing five or more active days per week
- 11% of boys and 15% of girls aged 4-15 years reported doing no active days in a week.

Trends

Data from the Welsh Health Survey between 2007 and 2012 suggests that the number of Welsh children and young people engaging in at least 60 minutes of MVPA seven days per week varied from 39-47% in boys and 28-31% in girls (Figure 5).

Factors affecting participation in physical activity

Physical activity is a complex, multi-dimensional behaviour influenced by a wide range of factors (often referred to as correlates) operating at individual, social, family and environmental levels. A summary of the various factors affecting participation in physical activity in children and young people is included below.

Biological factors

Age: Children are more active than young people [23, 24]. The decline in activity appears most markedly in late childhood (around ten years of age) and early adolescence, particularly for girls [25].

Gender: In almost all countries for which records exist, boys are more active than girls [1, 23, 26, 27]. For example according to the HBSC 2009/2010 study at age 11, 43% of boys and 31% of girls in Ireland and 30% of boys and 24% of girls in the USA achieve 60 minutes of MVPA [1].

Demographic factors

Socio-economic status: Adolescents from higher socio-economic groups tend to be more physically active than those from lower socio-economic groups, with around a 10% difference between low and high affluence households [1, 28]. In children, this relationship is even less clear, possibly because physical activity in this age group is frequently informal in nature [29, 30].

Ethnicity: White adolescents are more likely to be active than those from other ethnic groups [23, 24]. In children, again the relationship between these factors is not so clear [29, 30].

Education: Lower levels of educational attainment are associated with lower levels of physical activity participation in school-aged children and a greater decline in participation through adolescence [31].

Psychological factors

The psychological factors that positively affect participation in physical activity include:

- being involved in the selection and planning of physical activity [32]
- an interest and belief in the values of physical activity [33]
- feelings of competence, success and achievement for adolescents [24]
- a positive attitude towards physical activity and enjoyment of physical activity, particularly for girls [23, 24]
- belief in one's ability to be physically active (self-efficacy) [24, 34]
- activities that are enjoyable, developmentally appropriate and are consistent with personal goals and lifestyle [35]
- opportunities to challenge oneself, set goals and to improve [27, 36].

The psychological barriers to taking part in physical activity include [23-25, 37]:

- perceived lack of time
- lack of interest
- the effort required
- other activities
- issues of body image and appearance in adolescent girls.

Social factors

Physical activity participation is affected (positively and negatively) by the social support and role models provided by significant others. For children and adolescents these significant others include:

- family and care givers
- peers
- friends
- teachers
- health professionals
- exercise professionals including coaches and physical activity instructors.

These individuals can provide encouragement, positive feedback, on-going support to help with set-backs and provide access to physical activity in free time, such as driving their children to sporting events and enrolling them at sports clubs [38]. There is an association between parental support and physical activity for both children and adolescents, in that the greater the parental support given the higher the physical activity level of the child or adolescent [27].

Teachers, parents/carer and friends/peers can act as positive role models when encouraging children and young people to be active. Friends' physical activity levels have been found to have a significant influence on a young person's own physical activity levels [39]. Furthermore, young people's physical activity is positively associated with that of their fathers [29], with parental activity being more important during childhood than adolescence [27, 40].

Environmental factors

The environmental factors that can positively affect participation in physical activity include [24, 40-42]:

- access to programmes and facilities such as playgrounds, parks and green areas
- the provision of safe walking/cycling routes to school
- adolescents' perceptions of neighbourhood safety, which has been positively associated with physical activity in some studies [40] but not others [42]
- the time spent outdoors.

Key term – Environmental factors

Any aspect of the physical (natural) environment or the urban or constructed (built) environment that subconsciously or consciously relates to an individual and their physical activity behaviour.

School and other factors

In adolescence, there is a positive association between physical education/school sports and physical activity [27]. Well developed and implemented school programmes promote physical activity in young people [43]; and physical activity related policies in schools (eg, time spent outdoors at school, access to equipment) are associated with greater activity.

Other important factors that impact participation in physical activity in this age group include that activities are:

- delivered at an appropriate cost, style, timing and location
- age and developmentally appropriate
- focusing on participation, enjoyment and personal development
- available in formal and informal contexts such as youth clubs and Brownies
- opportunities for social interactions and friendships
- working towards a goal
- on the door-step
- available to do with the family, after school or at weekends [37].

UK public health guidelines on physical activity for children and young people

The latest physical activity guidelines for children and young people were published in 2011 with the endorsement of the Chief Medical Officers from England, Northern Ireland, Scotland and Wales [6]. The guidelines are based on evidence from research and provide information on how much physical activity is required to achieve health and other benefits.

The key difference between the 2011 UK physical activity guidelines and the previous guidelines for this age group are:

- inclusion of vigorous physical activity in recognition of the additional benefits that this can provide
- emphasis that 60 minutes a day is a minimum with the addition of 'and up to several hours each day'
- frequency of activities to strengthen muscle and bone has increased from two days to at least three days per week
- there is no guideline relating to flexibility
- the addition of a new guideline relating to reducing sedentary behaviour.

These guidelines are written for professionals who work with children and young people. The guidelines should be adapted to each young person's needs and abilities.

It is important to remember that the 60 minutes of physical activity can be accumulated across the day, often in short 10 minutes bouts. Furthermore inactive children and young people may benefit from even 30 minutes of activity, which may serve as a 'stepping stone' to higher levels of activity.

For more information to help you use the 2011 physical activity guidelines for this age group download *Interpreting the UK physical activity guidelines for children and young people* by visiting www.bhfactive.org.uk

2011 UK physical activity guidelines for children and young people

Guideline 1: All children and young people should engage in moderate to vigorous intensity physical activity for at least 60 minutes and up to several hours every day.

Guideline 2: Vigorous intensity activities, including those that strengthen muscle and bone, should be incorporated on at least three days a week.

Guideline 3: All children and young people should minimise the amount of time spent being sedentary (sitting) for extended periods.

A full copy of the Chief Medical Officers' report *Start Active, Stay Active* (2011) is available to download at www.bhfactive.org.uk/guidelines

Interventions to increase physical activity

School-based interventions

School-based interventions are considered to be the 'most universally applicable and effective way to counteract low physical activity and fitness' in children and young people aged 5-18 years [44]. Schools are often thought of as an ideal environment because of their great influence in the first two decades of life and because schools can provide benefits to all at risk groups. Therefore 100% of students can be exposed to the intervention strategy, which typically includes some combination of school curricula, printed educational materials, educational sessions, and physical activity specific sessions [9].

The possible disadvantages of school-based interventions are that some overweight or unfit students may be identified and stigmatised by peers, particularly when 'forced' to engage in rigorous physical activity that they do not wish to undertake [9].

Despite these possible limitations, between half to two-thirds of school-based interventions have been shown to be effective and have increased the duration of physical activity by 5 to 45 minutes per day, reduced the time spent watching television by 5 to 60 minutes per day and increased aerobic fitness. Children and young people exposed to school-based interventions were also approximately three times more likely to engage in moderate to vigorous activity during the school day [44].

To achieve these outcomes a minimum combination of printed educational materials and changes to the school curriculum that promote physical activity during school hours is required [9].

Key term – Aerobic fitness:
Aerobic exercise increases the breathing rate. Aerobic fitness improves as the heart and lungs become more efficient.

Recommendations for multi-component school-based interventions with a community, family and active travel component

The most successful school-based interventions have been multi-component in nature using, for example, a curriculum approach with modifications to the school culture and environment with family and community involvement. There is some debate regarding the effectiveness of family involvement, focusing on increased risk populations and what the optimum intensity and duration of interventions is [44]. The main characteristics of successful multi-component interventions are summarised below.

- Foster a positive attitude to physical activity. This is best achieved through a focus on fun and enjoyment, which may increase physical activity and at the same time enhance fitness. A focus on activities such as intense running may have a negative impact on the attitude to physical activity in some young people particularly those that are overweight or unfit [45].
- Keep the main focus on physical activity. It is important to ensure that there is sufficient exposure to the physical activity element of the intervention to facilitate behaviour change. Young people may be overwhelmed with information if attempts are made to simultaneously change other health behaviours such as smoking [9].
- Use a whole-school approach. It is important to ensure that there is school leadership and management structure support and that all class teachers and lunchtime supervisors are engaged. This whole-school approach includes training for all staff and additional physical activity in several curriculum areas (eg, in biology or maths) [46].
- Provide an activity friendly environment. Successful physical activity interventions aim to create safe opportunities for active play or travel [47]. Children are more likely to be active if they have good access to facilities in their neighbourhood, eg, playgrounds, parks [42].
- Include a family or home-based element. Intervention programmes appear most successful when they promote physical activities that can be done within or starting from the family home [48]. Involvement of families has also been demonstrated to be an integral part of any school-based programme promoting physical activity [43].
- Implement the intervention for at least three months to one year and ensure that sustainability is planned into the programme. Evidence suggests that longer physical activity initiatives, such as those that run for a whole school year, tend to have a stronger effect on total physical activity levels than those of a shorter duration [9, 44].
- Ensure that the voice of children, young people, parents and carers is heard. Involvement in planning is likely to enhance participation in programmes [32].
- Create inclusive programmes. The most successful interventions maximise the potential for involvement of all children and young people by ensuring activities are differentiated and that they cater for a range of abilities [44].
- Change screen time habits. Interventions that have decreased screen time (ie, TV and computer use) have not necessarily increased physical activity. However, they offer children the opportunity to increase physical activity as that time is no longer being used for sedentary screen time [9].
- Provide safe walking routes. The most successful interventions have included safe walking or cycling routes to school with an identified leader for the active travel component of the initiative who might be a volunteer or paid professional [42].

Implications for practice

The evidence summarised in this document has important implications for commissioners, policy makers and practitioners. Potential action areas for each of these groups are outlined below [48].

Actions for commissioners

- Build robust monitoring and evaluation into programmes for children and young people to ensure the effectiveness of any interventions that are undertaken.
- Ensure data is collected to allow cost effectiveness analysis, and where practical to establish if any cost savings have resulted from implementation of the intervention.
- Identify, understand and if possible remove social barriers such as poverty, unemployment, lack of education and local environment that will influence intervention effectiveness.
- Work in partnership with individuals, communities and organisations to plan initiatives and elicit behaviour change.
- Ensure interventions or programmes include elements such as:
  - a needs assessment of the target audience and information on the cultural and socio-economic context of their lives
  - the behaviours that will be targeted
  - what process and outcome measures will be used to evaluate effectiveness
  - a clear description of what will happen, how, when, for how long and any other mechanism(s) of delivery
  - A clear explanation of how the target audience will contribute to the development, evaluation and implementation of the intervention.

Actions for policy makers

- Take action to promote physical activity to all children and young people through inclusive policy measures.
- Assess in advance the intended and unintended impact policy proposals are likely to have on children and young people's physical activity participation.
- Ensure that appropriate process and outcome measures are used to evaluate the effectiveness, acceptability, feasibility, equity and safety of any policy or programme interventions.
- Training and support should be made available to practitioners to enable successful delivery of policy or programmes.
- Provide activity friendly environments in local communities for children, young people and families to access.

Actions for practitioners

- Ensure programmes are underpinned by the 2011 CMO physical activity guidelines for children and young people.
- Involve the children and young people you are targeting to help determine appropriate provision and activities.
- Ensure physical activity programmes and opportunities maximise the potential for involvement for all children and young people by ensuring that activities are differentiated and cater for a range of abilities.
- Ensure physical activity programmes use a multi-component approach, such as changing the school environment, implementing changes to the curriculum and incorporating a family-based element.
- Implement robust monitoring and evaluation of local programmes.
- Ensure those providing opportunities for children and young people are appropriately educated and trained in how to liaise with children and young people and to understand the ways in which behaviour change can be initiated and maintained.

For more information regarding practical strategies for promoting physical activity in young people, look for the two BHFNC practice briefings that focus on children and adolescents available from www.bhfactive.org.uk

References

1. Currie C, Zanotti C, Morgan A, Currie D, de Looze M, Roberts C, Samdal O, Smith ORF, Barnekow V. Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: International report from the 2009/2010 survey. Health Policy for Children and Adolescents; No. 6. Copenhagen: WHO Regional Office for Europe; 2012.
2. Twisk JW, Kemper HC, van Mechelen W. Tracking of physical activity and fitness and the relationship with cardiovascular disease risk factors. Med Sci Sports Exerc. 2000;32:1455-61.
3. Telama R. Tracking of physical activity from childhood to adulthood: A review. Obes Facts. 2009;2(1662-4025; 1662-4025; 3):187-95.
4. Coalter F. The social benefits of sport: An overview to inform the community planning process. sportscotland; 2005. Report No.: 98.
5. Bouchard C, Shephard RJ. Physical activity, fitness, and health: The model and key concepts. In: Bouchard C, Shephard RJ, Stephens T, editors. Physical Activity, Fitness and Health: international proceedings and consensus statement. Champaign, Ill: Human Kinetics; 1994. p. 77-88.
6. Department of Health. Start active, Stay active. A report on physical activity for health from the four home countries' chief medical officers. The Department of Health; London. 2011.
7. Janssen I, LeBlanc AG. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. Int J Behav Nutr Phys Act. 2010;7:40.
8. US Department of Health and Human Services. Physical activity guidelines for Americans. http://www.health.gov/paguidelines/guidelines/default.aspx; 2008.
9. Dobbins M, Husson H, DeCorby K, LaRocca RL. School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18 (review). Cochrane Database Syst Rev. 2013(2).
10. Faigenbaum AD. Strength training for children and adolescents. Pediatric and adolescent sports injuries. 2000;19(4):593-619.
11. Strauss RS, Rodzilsky D, Burack G, Colin M. Psychosocial correlates of physical activity in healthy children. Arch Pediatrics and Adolescent Medicine. 2001;155(8):897-902.
12. Biddle SH, Asare M. Physical activity and mental health in children and adolescents: A review of reviews. British journal of sports medicine. 2011;45:886-95.
13. Health Survey for England 2012. Volume 1: Health, social care and lifestyle. Leeds: The NHS Information Centre for health and social care; 2013.
14. Northern Ireland Statistics & Research agency. Young person's behaviours and attitudes survey bulletin 2010. Belfast: Central Survey Unit; 2011..
15. Northern Ireland Statistics & Research agency. Young person's behaviours and attitudes survey bulletin 2007. Belfast: Central Survey Unit; 2008.
16. The Scottish Health Survey (2012). Volume 1: Main report. Edinburgh: The Scottish Government; 2013.
17. Welsh Health Survey 2012. Cardiff: The Welsh Government; 2013.
18. Welsh Health Survey 2011. Cardiff: The Welsh Government; 2012.
19. Welsh Health Survey 2010. Cardiff: Welsh Assembly Government; 2011.
20. Welsh Health Survey 2009. Cardiff: The Welsh Assembly Government; 2010.
21. Welsh Health Survey 2008. Cardiff: The Welsh Assembly Government; 2009.
22. Welsh Health Survey 2007. Cardiff: The Welsh Assembly Government; 2008.
23. Biddle S, Whitehead S, O'Donovan T, Nevill M. Correlates of participation in physical activity for adolescent girls: A systemic review of recent literature. Journal of Physical Activity & Health. 2005;2:423-34.
24. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. Med Sci Sports Exerc. 2000 05;32(5):963-75.
25. National Institute for Health and Care Excellence. Physical activity and children: Correlates of physical activity in children: A review of quantitative systematic reviews. Review 2. NICE; 2007.
26. Gustafson SL, Rhodes RE. Parental correlates of physical activity in children and early adolescents. Sports Medicine. 2006;36(1):79-97.
27. van der Horst K, Paw MJ, Twisk JW, Van Mechelen W. A brief review on correlates of physical activity and sedentariness in youth. Med Sci Sports Exerc. 2007 08;39(8):1241-1250.

28. Hanson M, Chen E. Socioeconomic status and health behaviors in adolescence: A review of the literature. Journal of Behavioral Medicine. 2007;30:263-85.

29. Biddle S, Atkin AJ, Cavill N, Foster C. Correlates of physical activity in youth: A review of quantitative systematic reviews. International Review of Sport and Exercise Psychology. 2011;4(1):25-49.

30. Lee RE, Mama SK, Banda JA, Bryant LG, McAlexander KP. Physical activity opportunities in low socioeconomic status neighbourhoods. J Epidemiol Community Health. 2009;63(12):1021.

31. Rasberry CN, Lee SM, Robin L, Laris BA, Russell LA, Coyle KK, Nihiser AJ. The association between school-based physical activity, including physical education, and academic performance: A systematic review of the literature. Preventive medicine. 2011;52:S10-S20..

32. Brunton G, Thomas J, Harden A, Rees R, Kavanagh J, Oliver S, Shepherd J, Oakley A. Promoting physical activity amongst children outside of physical education classes: A systematic review integrating intervention studies and qualitative studies. Health Education Journal. 2005;64(4):323-38.

33. Rees R, Kavanagh J, Harden A, Shepherd J, Brunton G, Oliver S, Oakley A. Young people and physical activity: A systematic review matching their views to effective interventions. Health Educ Res. 2006 12;21(6):806-825.

34. Biddle S, Mutrie N. The psychology of physical activity determinants, well-being and interventions. 2nd ed. London: Routledge; 2008.

35. Strong WB, Malina RM, Blimkie CJ, Daniels SR, Dishman RK, Gutin B, et al. Evidence based physical activity for school-age youth. Journal of Pediatrics. 2005;146(6):732-737.

36. Biddle SJH, Wang CKJ, Kavussanu M, Spray CM. Correlates of achievement goal orientations in physical activity: A systematic review of research. European Journal of Sports Science. 2003;3(5):1-20.

37. Mulvihill C, Rivers K, Aggleton P. Physical activity 'at our time'. London: Health Education Authority; 2000.

38. Pugliese J, Tinsley B. Parental socialization of child and adolescent physical activity: A meta-analysis. Journal of Family Psychology. 2007;21(3):331-43.

39. Sawka KJ, McCormack GR, Nettel-Aguirre A, Hawe P, Doyle-Baker PK. Friendship networks and physical activity and sedentary behaviours among youth: A systematized review. Int J Behav Nutr Phys Act. 2013.

40. Ferreira I, van der Horst K, Wendel-Vos W, Kremers S, van Lenthe FJ, Brug J. Environmental correlates of physical activity in youth: A review and update. Obes Rev. 2007 03;8(2):129-54.

41. Stredt E, Liersch S, Walter U. Correlates of physical activity of children and adolescents: A systematic review of reviews. Health Education Journal. 2013.

42. Davison KK, Lawson CT. Do attributes in the physical environment influence children's physical activity? A review of the literature. International Journal of Behavioral Nutrition and Physical Activity. 2006;3(19).

43. van Sluijs EM, McMinn AM, Griffin SJ. Effectiveness of interventions to promote physical activity in children and adolescents: A systematic review of controlled trials. BMJ. 2007.

44. Kriemler S, Meyer U, Martin E, van Sluijs EM, Andersen LB, Martin BW. Effect of school-based interventions on physical activity and fitness in children and adolescents: A review of reviews and systematic update. BMJ. 2011;45:923-30.

45. Cale L, Harris J. Interventions to promote young people's physical activity: Issues, implications and recommendations for practice. Health Education Journal. 2006;65(4):320-37.

46. Lister-Sharp D, Chapman S, Stewart-Brown S, Sowden A. Health promoting schools and health promotion in schools: Two systematic reviews. Health Technol Assess. 1999;3(22).

47. van Sluijs EM, Kriemler S, McMinn AM. The effect of community and family interventions on young people's physical activity levels: A review of reviews and updated systematic reviews. Br J Sports Med. 2011;45:914-922.

48. National Institute for Health and Care Excellence. Promoting physical activity for children: Family and community. Review 7. NICE;2008.

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