

Promoting physical activity for children and young people

Evidence Update March 2015

A summary of selected new evidence relevant to NICE
public health guidance 17 'Promoting physical activity for children
and young people' (2009)

Evidence Update 77



Contents

Introduction	3
Key points	5
1 Commentary on new evidence	8
<i>National Policy</i>	8
1.1 National campaign	8
<i>High level policy and strategy</i>	8
1.2 Raising awareness of the importance of physical activity	8
<i>Local strategic planning</i>	8
1.3 Developing physical activity plans	8
1.4 Planning the provision of spaces and facilities	8
1.5 Local transport plans	11
<i>Local organisations: planning, delivery and training</i>	12
1.6 Responding to children and young people	12
1.7 Leadership and instruction	13
1.8 Training and continuing professional development	14
1.9 Multi-component school and community programmes	16
1.10 Facilities and equipment	16
1.11 Supporting girls and young women	19
1.12 Active and sustainable school travel plans	19
<i>Local practitioners: delivery</i>	20
1.13 Helping children to be active	20
1.14 Helping girls and young women to be active	23
1.15 Helping families to be active	23
Areas not currently covered by NICE PH17	24
2 New evidence uncertainties	28
Appendix A: Methodology	29
Appendix B: The Evidence Update Advisory Group and Evidence Update project team	33

Introduction

Evidence Updates are intended to increase awareness of new evidence – they do not replace current NICE guidance and do not provide formal practice recommendations.

Evidence Updates reduce the need for individuals, managers and commissioners to search for new evidence. For contextual information, this Evidence Update should be read in conjunction with the relevant public health guideline.

This Evidence Update provides a summary of selected new evidence published since the literature search was last conducted for the following NICE guidance:

¹  [Promoting physical activity for children and young people](#). NICE public health guidance 17 (2009)

A search was conducted for new evidence from 1 October 2011 to 11 August 2014. A total of 16,781 pieces of evidence were initially identified. After removal of duplicates, a series of automated and manual sifts were conducted to produce a list of the most relevant references. The remaining 25 references underwent a rapid critical appraisal process and then were reviewed by an [Evidence Update Advisory Group](#), which advised on the final list of 13 items selected for the Evidence Update. See [Appendix A](#) for details of the evidence search and selection process.

Evidence selected for inclusion in this Evidence Update may highlight a potential impact on guidance: that is, a high-quality study, systematic review or meta-analysis with results that suggest a change in practice. Evidence that has no impact on guidance may be a key read, or may substantially strengthen the evidence base underpinning a recommendation in the NICE guidance.

The Evidence Update gives a preliminary assessment of changes in the evidence base and a final decision on whether the guidance should be updated will be made by NICE according to its published processes and methods.

This Evidence Update was developed to help inform the review proposal on whether or not to update NICE public health guidance 17 ([NICE PH17](#)). The evidence identified, and feedback from the Evidence Update Advisory group, informed a decision about updating the guidance, which was subject to public consultation. For further information about the review decision see the [NICE PH17](#) webpage. The process of updating NICE guidance is separate from both the process of an Evidence Update and the review proposal.

See the [NICE public health guidance development process](#) for further information about updating public health guidelines.

Other relevant NICE guidance

The focus of the Evidence Update is on the guidance stated above. However, overlap with other NICE guidance has been outlined as part of the Evidence Update process. Where relevant, this Evidence Update therefore makes reference to the following guidance:

¹  [Physical activity and the environment](#). NICE public health guidance 8 (2008)

¹ [NICE-accredited guidance](#)

NICE Pathways

NICE pathways bring together all related NICE guidance and associated products in a set of interactive topic-based diagrams. The following NICE Pathways cover advice and recommendations related to this Evidence Update:

- [Physical activity](#). NICE Pathway

Feedback

If you would like to comment on this Evidence Update, please email contactus@evidence.nhs.uk

Key points

The following table summarises the key points for this Evidence Update and indicates whether the new evidence may have a potential impact on [NICE PH17](#). Please see the full commentaries for details of the evidence informing these key points.

The section headings used in the table below are taken from [NICE PH17](#).

Evidence Updates do not replace current NICE guidance and do not provide formal practice recommendations.

Key point	Potential impact on guidance	
	Yes	No
<p>Planning the provision of spaces and facilities</p> <p><i>School-based versus community-based after-school programmes</i></p> <ul style="list-style-type: none"> An after-school community-based physical activity programme appears to be associated with a cost-effective increase in physical activity among children aged 5–13 years compared with a school-based after-school programme (although the community programme involved more staff and comprised more staff-led activities). <p><i>Sharing school facilities with community organisations</i></p> <ul style="list-style-type: none"> Greater shared use of school facilities by community after-school physical activity programmes appears to increase participation in after-school programmes among children aged 11–14 years, without significantly increasing operating costs. The increase in participation levels associated with greater shared use appears to be more pronounced in girls than in boys. 		<p>✓</p> <p>✓</p>
<p>Local transport plans</p> <p><i>Safe Routes to School programme</i></p> <ul style="list-style-type: none"> A nationally funded programme ('Safe Routes to School') to encourage walking and cycling to school, including non-infrastructure based interventions such as education and encouragement, appears to increase levels of walking and cycling with a cumulative effect over time. 		<p>✓</p>
<p>Leadership and instruction</p> <p><i>A physical activity programme for early years daycare centres</i></p> <ul style="list-style-type: none"> The 'Nutrition and Physical Activity Self-Assessment for Child Care' (NAP SACC) programme to promote healthy weight in pre-school settings through both physical activity and nutrition, using staff and parent education and providing opportunities for play and physical activity, appears to increase physical activity levels among young children in early years daycare centres. 		<p>✓</p>

Key point	Potential impact on guidance	
	Yes	No
<p>Training and continuing professional development</p> <p>Professional development training in after-school programmes</p> <ul style="list-style-type: none"> A professional staff-development programme ('Movin' Afterschool') providing training in several aspects of after-school physical activity programmes ('the 5 M's': mission, motivation, management, monitoring and maximising) appears to reduce sedentary behaviour and increase some aspects of physical activity among children aged 4–13 years. 		✓
<p>Facilities and equipment</p> <p>Active free play with non-traditional play materials and managing adult risk perception</p> <ul style="list-style-type: none"> Providing non-traditional play materials in school playgrounds, accompanied by managing adults' perceived risk of free play, appears to increase physical activity during-break times. <p>Impact of school break-time interventions on physical activity</p> <ul style="list-style-type: none"> School break-time interventions appear to increase physical activity levels in children aged 3 to 11 years. The most effective interventions appear to be structured break-times, provision of playground equipment, teacher involvement, and combining interventions (such as playground markings plus equipment). 		✓ ✓
<p>Helping children to be active</p> <p>Physical activity interventions for pre-school children</p> <ul style="list-style-type: none"> Interventions aimed at increasing physical activity levels among pre-school children do appear to increase physical activity in this age group. Interventions with the largest effect include those that are unstructured and are outdoors. <p>Long-term effects of a movement skills intervention for pre-school children</p> <ul style="list-style-type: none"> An intervention targeting movement skills among pre-school children ('Tooty Fruity Vegie') appears to have sustained effects on object control skills in girls after 3 years. <p>Promoting motor development in disabled pre-school children</p> <ul style="list-style-type: none"> A tailored programme ('Young Athletes') designed to promote motor skill development in disabled young children appears to improve motor skills among pre-school children with an intellectual disability. 		✓ ✓ ✓
<p>Helping families to be active</p> <p>Community and family interventions</p> <ul style="list-style-type: none"> Evidence for the effect of family-based and community-based interventions on physical activity in children and young people is limited, but interventions targeted at families appear to have some effect. 		✓

Key point	Potential impact on guidance	
	Yes	No
<p>Areas not currently covered by NICE PH17</p> <p><i>Reducing sedentary behaviour</i></p> <ul style="list-style-type: none"> Interventions to reduce sedentary behaviour in children and young people appear to have some effect. However, the types of sedentary behaviour that should be targeted, how best to target them, and how these behaviours interact with physical activity levels, have not been firmly established. <p><i>Online interventions to promote physical activity</i></p> <ul style="list-style-type: none"> The tailored online intervention 'Youth of Rotterdam in Action' (YouRAction) to promote physical activity among young people aged 12–13 years, delivered in in a school setting, does not appear to increase levels of moderate-to-vigorous physical activity. 		<p>✓</p> <p>✓</p>

1 Commentary on new evidence

These commentaries focus on the 'key references' identified through the search process and prioritised by the EUAG for inclusion in the Evidence Update, which are shown in bold text. Supporting references provide context or additional information to the commentary. Section headings are taken from [NICE PH17](#).

National Policy

1.1 National campaign

No new key evidence for this section was selected for inclusion in this Evidence Update.

However, the Evidence Update Advisory Group noted that the '[Everybody active, every day](#)' framework is a national, evidence-based approach to support all sectors to embed physical activity into daily life that may need to be reflected in [NICE PH17](#).

Supporting reference

Public Health England (2014) [Everybody active, every day](#)

High level policy and strategy

1.2 Raising awareness of the importance of physical activity

No new key evidence for this section was selected for inclusion in this Evidence Update.

Local strategic planning

1.3 Developing physical activity plans

No new key evidence for this section was selected for inclusion in this Evidence Update.

1.4 Planning the provision of spaces and facilities

School-based versus community-based after-school programmes

[NICE PH17](#) recommendation 4 'Planning the provision of spaces and facilities' (for children and young people aged 18 and under, their families and carers) recommends:

- Providing children and young people with places and facilities (both indoors and outdoors) where they feel safe taking part in physical activities. These could be provided by the public, voluntary, community and private sectors (for example, in schools, youth clubs, local business premises and private leisure facilities). Local authorities should coordinate the availability of facilities, where appropriate. They should also ensure all groups have access to these facilities, including those with disabilities.

See [NICE PH17](#) for the full recommendation.

An observational prospective cohort study (n=91) in the USA by [Gesell et al. \(2013\)](#) compared the effectiveness and cost effectiveness of after-school physical activity programmes based in a community recreation centre or in a school. Children aged between 5 and 13 years (mean age=7.9 years) attending public elementary or middle schools in a single neighbourhood were eligible to join the study. Children were recruited from after-school

physical activity programmes based either in the community and run by the local parks department (n=54), or based at their school and operated by a national company (n=37).

Both programmes ran from 3–6 pm every school day and had similar formats, including time for snacking, homework, and play. The community programme was set in a recreation centre and involved staff-led sports and games (60 minutes activity per day). The school programme was set in a school cafeteria and had opportunities for arts, crafts and supervised play on the playground (45 minutes moderate activity 3 times a week, and 45 minutes vigorous activity twice a week). Hip-worn accelerometer data were collected for both programmes at baseline, 6 weeks, and 12 weeks. At each measurement period, data were collected for 5 consecutive days during the times that children attended the programmes. Data were retained only for children who had worn accelerometers on at least 3 out of 5 days for the given measurement period (data retention=91%). For the cost analysis, resource costs were based on estimates instead of accounting expenditures paid during the implementation. Namely, personnel time (including volunteer time) was valued using the median earning per hour of a comparable worker.

After 12 weeks, linear latent growth models suggested that the average difference in moderate-to-vigorous physical activity between the 2 groups of children was 14.7 percentage points ($p<0.001$) in favour of the community programme. In the cost analysis, total implementation costs for the 12-week study period were \$1184 (\$19.25 daily) per child for the community programme versus \$1087 (\$17.67 daily) per child for the school programme. Therefore, children in the school programme would have needed an additional daily investment of \$1.58 per child for 12 weeks to increase moderate-to-vigorous physical activity by 14.7 percentage points.

Limitations of the evidence included that:

- The after-school programmes were not identical. Notably, in the community-based programme all physical activity was staff-led, whereas in the school programme staff supervised for safety purposes only. Differential effects of the interventions may not therefore have resulted entirely from the change in setting.
- The study was based in 1 neighbourhood in the USA and may not be fully generalisable to the UK.
- Staff costs did not differ greatly even though the community programme had 9 staff (total cost \$380) and the school programme had 3 staff (total cost \$314). A full breakdown of these costs was not provided (although some staff in the community programme were volunteers, which could explain the difference in personnel cost).
- Hip-worn accelerometers do not measure the full range of physical activity (such as body movements when static).

The evidence suggests that an after-school community-based physical activity programme appears to be associated with a cost-effective increase in physical activity among children aged 5–13 years compared with a school-based after-school programme (although the community programme involved more staff and comprised more staff-led activities). This evidence is consistent with [NICE PH17](#) to provide facilities for children and young people to take part in physical activities in both the school and community setting.

Key reference

[Gesell SB, Sommer EC, Lambert EW et al. \(2013\) Comparative effectiveness of after-school programs to increase physical activity. Journal of Obesity vol. 2013: article ID 576821](#)

Sharing school facilities with community organisations

[NICE PH17](#) recommendation 4 'Planning the provision of spaces and facilities' (for children and young people aged 18 and under, their families and carers) recommends:

- Making school facilities available to children and young people before, during and after the school day, at weekends and during school holidays. These facilities should also be available to public, voluntary, community and private sector groups and organisations offering physical activity programmes and opportunities for physically active play.

Additionally, recommendation 11 'Supporting girls and young women' (for girls and young women aged 11–18) recommends:

- Offering school-based physical activities, including extra-curricular ones.

See [NICE PH17](#) for the full recommendations.

An observational study (30 schools; n=32,742) in the USA by [Kanters et al. \(2014\)](#) examined the impact of shared use of middle school (11–14 years) facilities on the amount and type of after-school physical activity programmes, and the operating costs of the facilities. All public middle schools in the largest school district in North Carolina participated in the study. After-school programs were assessed on the Structured Physical Activity Survey for frequency, duration, and type of structured physical activity programmes provided, and the number of children in each programme. Cost data (including labour, materials, utilities and facilities) were derived from financial data provided by the school district. Data were collected at 4 time points over 1 year. Shared use of school facilities was categorised by the amount of community use:

- Level 1: schools with 0 or 1 community programmes and fewer than 100 community participants.
- Level 2: schools with 2 to 4 community programmes and 100–250 community participants.
- Level 3: schools with 5 or more community programmes and over 250 community participants.

Based on the Kruskal–Wallis test, a significant positive correlation was seen between minutes of after-school physical activity programme and category of shared facility use ($H=17.64$, $p<0.01$). In follow-up Mann–Whitney tests, for girls, an increase in each level of shared use (that is from level 1 to 2, from level 2 to 3, and from level 1 to 3) was associated with a significant increase in programme participation ($p=0.01$). However among boys, a significant increase in programme participation was seen only for the increase in shared use from level 1 to level 3 ($p=0.01$). In terms of costs, no significant correlations were seen between shared use of facilities and operating expenses.

Limitations of the evidence included that:

- The study was based in 1 school district in the USA and may not be fully generalisable to the UK.
- Data were collected over 12 months, therefore costs may not have reflected expenses incurred from longer term wear and tear necessitating repair to facilities. Additionally, costs associated with school and community use could not be separated, therefore any increase in upkeep expenses resulting directly from increased community use could not be formally quantified.
- Data were sampled at 4 times over 1 year rather than continuously gathered, therefore some programmes and participants may have been missed by the study.
- Intensity of physical activity was not measured.

The evidence suggests that greater shared use of school facilities by community after-school physical activity programmes appears to increase participation in after-school programmes among children aged 11–14 years, without significantly increasing operating costs. The increase in participation levels associated with greater shared use appears to be more pronounced in girls than in boys. This evidence is consistent with recommendations in [NICE PH17](#) to make school facilities available to public, voluntary, community and private sector groups and organisations offering physical activity programmes and opportunities for physically active play. It is also consistent with offering school-based physical activities, including extra-curricular ones, to girls and young women aged 11–18 years.

Key reference

Kanters MA, Bocarro JN, Filardo M et al. (2014) [Shared use of school facilities with community organizations and afterschool physical activity program participation: a cost-benefit assessment](#). *Journal of School Health* 84: 302–9

1.5 Local transport plans

Safe Routes to School programme

[NICE PH17](#) recommendation 5 ‘Local transport plans’ (for children and young people aged 18 and under, their families and carers) recommends:

- Ensuring local transport and school travel plans continue to be fully aligned with other local authority plans which may impact on children and young people's physical activity.
- Ensuring local transport plans acknowledge any potential impact on opportunities for children and young people to be physically active. Transport plans should aim to increase the number of children and young people who regularly walk, cycle and use other modes of physically active travel.
- Continuing work with schools to develop, implement and promote school travel plans.

Additionally, recommendation 12 ‘Active and sustainable school travel plans’ (for children and young people aged 18 and under who travel to: pre-school or an early years facility; school or college; or local, out-of-school activities) recommends:

- Continuing to encourage a culture of physically active travel (such as walking or cycling).
- Developing a school travel plan which has physical activity as a key aim, in line with existing guidance.
- Ensuring schools provide suitable cycle and road safety training for all pupils.
- Encouraging children and young people, especially those who live within a 2-mile radius of their school or other community facilities, to walk, cycle or use another mode of physically active travel to get there.
- Working with local authorities to map safe routes to school.
- Involving children and young people, their parents and carers, the local community and external agencies in implementing the school travel plan.

See [NICE PH17](#) for the full recommendations.

A case-control study in the USA by [McDonald et al. \(2014\)](#) assessed the impact of the ‘Safe Routes to School’ (SRTS) programme on the proportion of students walking and cycling to school. The SRTS programme was established in 2005 to provide federal funding to encourage walking and cycling to school. This was achieved through projects to improve safety and reduce traffic, fuel consumption, and air pollution near schools. Funding was allocated to state departments of transportation, with a requirement to spend 10–30% of funds on non-infrastructure activities such as awareness and safety campaigns.

The present study evaluated the SRTS programme in Florida, Oregon, Texas and the District of Columbia. Data were gathered between 2007 and 2012 for 378 schools that had an SRTS

programme, and for 423 control schools that did not. About three-quarters of schools provided data at 1 or 2 time points, but some schools provided data at 3 or more time points. Travel reports were obtained from over 65,000 students and 16,000 parents. Multivariate regression models, utilising data from schools with and without SRTS programmes, were used to control for variables such as school and neighbourhood characteristics (for example, ease of walking) and time period (for example, petrol prices in some years may have influenced mode of travel).

At schools with SRTS programmes, 18% of children walked or cycled to school at baseline. Once the programme began, walking and cycling significantly increased by an average of 1.1 percentage points ($p=0.002$) for each year of participation. The model therefore predicted that, for example, after 5 years' participation, the absolute increase would be 5.5 percentage points (a relative increase of 31% on the baseline rate of 18% walking and cycling). A second model looked at the impact of individual aspects of SRTS programmes. Education and encouragement interventions (used in 288 schools) led to a significant increase in walking and cycling by an average of 0.9 percentage points ($p=0.025$) for each year of participation. This would equate to an absolute increase of 4.5 percentage points after 5 years (a relative increase of 25% on the baseline rate of 18% walking and cycling).

Limitations of the evidence included that:

- The study was based in the USA, where differences in infrastructure and government funding may reduce generalisability to the UK.
- The authors expressed concerns about self-selection bias (namely, it was up to individual schools whether to seek funding, and schools that did so may have differed in some way from those that did not). However, further models to examine this (performed on portions of the data set) was consistent with the overall models, and variables such as school characteristics were also controlled for.
- Observations from some schools were made at multiple times on the same day (such as morning and afternoon). However, sub-modelling using data from only 1 observation per time point gave similar results to the overall models.
- Interventions were grouped into broad themes and specific details were not discussed.

The evidence suggests that a nationally funded programme ('SRTS') to encourage walking and cycling to school, including non-infrastructure based interventions such as education and encouragement, appears to increase levels of walking and cycling with a cumulative effect over time. This evidence is consistent with [NICE PH17](#) that local transport plans should aim to increase the number of children and young people who regularly walk, cycle and use other modes of physically active travel, and that school travel plans should be developed that have physical activity as a key aim. The study also provides further evidence that the impact of interventions appears to be cumulative and sustained over time.

Key reference

McDonald NC, Steiner RL, Lee C et al. (2014) [Impact of the safe routes to school program on walking and bicycling](#). *Journal of the American Planning Association* 80: 153–67

Local organisations: planning, delivery and training

1.6 Responding to children and young people

No new key evidence for this section was selected for inclusion in this Evidence Update.

1.7 Leadership and instruction

A physical activity programme for early years daycare centres

[NICE PH17](#) recommendation 7 'Leadership and instruction' (for people who provide programmes or opportunities for children and young people aged 18 and under to be physically active) recommends:

- Ensuring staff and volunteers have the skills (including interpersonal skills) to design, plan and deliver physical activity sessions (including active play sessions) that meet children and young people's different needs and abilities. Those leading activities should make them enjoyable. The leaders should also be inspiring. They should raise children and young people's aspirations about what they can participate in – and the level of ability they can achieve. In addition, leaders should help foster children and young people's personal development.

It additionally recommends:

- From recommendation 10 'Facilities and equipment' (for children aged up to 11):
 - Providing daily opportunities for participation in physically active play by providing guidance and support, equipment and facilities.
- From recommendation 13 'Helping children to be active' (for children aged up to 11):
 - Providing a range of indoor and outdoor physical activities for children on a daily basis, including opportunities for unstructured, spontaneous play.
 - Providing opportunities at intervals throughout the day in pre-school establishments.
- From recommendation 15: 'Helping families to be active' (for children and young people aged 18 and under, their families and carers):
 - Encouraging parents and carers to get involved in physical activities with their children.

See [NICE PH17](#) for the full recommendations.

A cluster randomised controlled trial (RCT; 26 daycare centres, n=209 children) in the USA by [Bonis et al. \(2014\)](#) examined the effect of the 'Nutrition and Physical Activity Self-Assessment for Child Care' ([NAP SACC](#)) programme on physical activity levels. The NAP SACC programme was developed to promote healthy weight in pre-school settings. It facilitates gradual change through both physical activity and nutrition. Licensed child care facilities (for children aged 3–5 years, mean age=3.9 years) in Louisiana were recruited via letters sent out from the State Department of Public Health. The first 30 facilities to respond were enrolled, although 4 subsequently declined participation.

Centres were then randomised to either the NAP SACC intervention or to control (no intervention; though access was given to NAP SACC after the study). Four dietitians acted as NAP SACC consultants to intervention centres and delivered 4 workshops covering physical activity, overweight and nutrition. Educational information was also distributed to parents about physical activity and nutrition at home. Intervention centre directors completed the NAP SACC self-assessment tool: based on this and advice from consultants, directors chose 3 or 4 areas for improvement related to physical activity and nutrition. Physical activity areas were: active play and inactive time; play environment; supporting physical activity; and physical activity education and policy. Physical activity data were collected via hip-worn accelerometers for 9 hours across 2 days, both before and after the 6-month intervention.

In the NAP SACC group, mean levels of moderate-to-vigorous physical activity increased significantly from 24.3 minutes to 33.5 minutes ($p<0.05$), whereas the increase in the control group was non-significant (from 29.5 minutes to 29.9 minutes). The increase in moderate-to-

vigorous physical activity of 9.2 minutes in the NAP SACC group was significantly greater than the increase of 0.4 minutes in the control group ($p < 0.05$).

Limitations of the evidence included that:

- The study was based in the USA, where facilities for early years care and policies for managing play may be different to the UK (for example, 'free-flow play' may be used more often in the UK). Therefore results may not be fully generalisable.
- The authors noted that 4 days of accelerometer data would have been preferable, but a pilot study suggested that 2 days of data was suitable to determine an intervention effect.
- The authors also noted that a study period of 9–12 months would have been preferable to 6 months.
- Hip-worn accelerometers do not measure the full range of physical activity (such as body movements when static).
- Intervention centres chose which aspects of nutrition and physical activity to focus on, therefore the intervention was not uniform across all centres. Data for individual centres were not reported.
- Centres that responded first to the study recruitment letters were chosen, which may have biased inclusion towards more motivated centres.

The evidence suggests that the 'NAP SACC' programme to promote healthy weight in pre-school settings through both physical activity and nutrition, using staff and parent education and providing opportunities for play and physical activity, appears to increase physical activity levels among young children in early years daycare centres. This is broadly consistent with [NICE PH17](#) that: staff and leaders should have appropriate skills; opportunities for play and physical activity should be available in pre-school establishments; and parents and carers should get involved in physical activities with their children.

A UK-based study of NAP SACC is [currently underway](#).

Key reference

Bonis M, Loftin M, Ward D et al. (2014) [Improving physical activity in daycare interventions](#). *Childhood Obesity* 10: 334–41

Sector standards

[NICE PH17](#) recommendation 7 'Leadership and instruction' (for people who provide programmes or opportunities for children and young people aged 18 and under to be physically active) recommends:

- Ensuring informal and formal physical activity sessions for children and young people (including play) are led by staff or volunteers who have achieved the relevant sector standards or qualifications for working with children. This includes the requirements for child protection, health and safety, equality and diversity.

The Evidence Update Advisory Group noted it may need to be made clearer that the term 'sector standards' refers to the standards for child protection and health and safety, equality and diversity, as there are no physical activity leadership sector standards.

1.8 Training and continuing professional development

Professional development training in after-school programmes

[NICE PH17](#) recommendation 8 'Training and continuing professional development' (for people who provide and deliver physical activity programmes [formal and informal] and other opportunities for children and young people aged 18 and under to be physically active) recommends:

- Establishing continuing professional development (CPD) programmes for people involved in organising and running formal and informal physical activities. The education and training should enable them to:
 - give children and young people information and advice on physical activity
 - give children and young people confidence in their own abilities and motivate them to be physically active
- Monitoring and evaluating the impact of training on practitioner performance.
- Training people to deliver physical activity CPD programmes.

See [NICE PH17](#) for the full recommendation.

An uncontrolled pre-post study (n=580) in the USA by [Beets et al. \(2013\)](#) assessed the effect of the Movin' Afterschool intervention among 12 existing community-based after-school programmes (mean age=8.7 years, range 4.3–13.1 years). Movin' Afterschool is a professional development programme for staff working in after-school programmes, designed to increase children's physical activity. It comprised 6 monthly professional development training sessions centred on: mission (clearly defined policy and standards); motivation (giving choices, feedback and encouragement); management (managing safety, routines, and discipline); monitoring (ongoing evaluation); and maximising (implementing all aspects of training together). Sessions lasted 90 minutes and were delivered by trained professionals and university research staff. Three 60-minute booster sessions were also delivered.

Following training, the policy goals adopted by the after-school programmes were:

- 20 minutes of moderate-to-vigorous physical activity per day in 50% of children (increasing to 30 minutes in year 2).
- 40 minutes per day allocated for physical activity.
- Availability of supervised recreational equipment, and accessible areas for physical activity.

Data were collected for boys and girls separately using the System for Observing Play and Leisure Activity in Youth (SOPLAY). Outcomes measured were children's physical activity (the percentage of children engaged in sedentary, walking, or vigorous activity), staff behaviours (such as promoting physical activity), and environmental features (such as equipment). Observations were made at baseline over 1 week (before the intervention began) and approximately 6 months later (on a single randomly selected unannounced visit). Random effects models were used to evaluate changes in physical activity categories: sedentary, walking, and vigorous.

After the intervention, all after-school programmes met the policy goal of 40 minutes of allocated physical activity per day, but only 1 programme met the target of 20–30 minutes of moderate-to-vigorous physical activity per day in 50% of children. Across all after-school programmes, sedentary activity decreased in both boys (–11.8%, 95% confidence interval [CI] –21.8 to –1.8%) and girls (–11.4%, 95% CI –19.7 to –3.1%). Walking appeared to increase for both sexes (boys: 5.8%, 95% CI –2.3 to 14.0%; girls: 6.9%, 95% CI –0.3 to 14.0%), as did vigorous activity (boys: 6.5%, 95% CI 0.1 to 13.0%; girls: 4.6%, 95% CI –1.9 to 11.1%). However, for walking and vigorous activity, the confidence intervals were close to or crossed 0% therefore significance of these findings is uncertain (statistical significance tests not reported). For boys, vigorous activity post-intervention was significantly greater during organised activities (coefficient=19.3, 95% CI 1.7 to 36.9, p<0.05). Whereas for girls, a significant increase in vigorous activity was seen during indoor activities (coefficient=19.1, 95% CI 2.8 to 35.5, p<0.05).

Limitations of the evidence included that:

- No information was provided on how the 12 after-school programmes were selected or where the sites were based, therefore generalisability is difficult to determine.
- A control group was not used, so a causative relationship between the intervention and outcomes cannot firmly be established.
- Only 1 observation was made at each programme after the intervention, which may not have captured all effects. However, this approach was deliberate because staff were expected to implement their training every day.
- SOPLAY was used to calculate the percentage of children engaged in different types of activity, but could not provide data on how much time was spent in these activity states.

The evidence suggests that a professional staff-development programme ('Movin' Afterschool') providing training in several aspects of after-school physical activity programmes ('the 5 M's': mission, motivation, management, monitoring and maximising) appears to reduce sedentary behaviour and increase some aspects of physical activity among children aged 4–13 years. This is consistent with [NICE PH17](#) to establish continuing professional development programmes for people involved in organising and running formal and informal physical activities (particularly in regard to giving children advice, information, confidence and motivation, and also monitoring the impact of such programmes).

Key reference

Beets MW, Huberty JL, Beighle A (2013) [Systematic observation of physical activity in afterschool programs: preliminary findings from Movin' Afterschool intervention](#). *Journal of Physical Activity & Health* 10: 974–81

1.9 Multi-component school and community programmes

See Engelen et al. (2013) in 'Active free play with non-traditional play materials and managing adult risk perception' in section 1.10 'Facilities and equipment'.

1.10 Facilities and equipment

Active free play with non-traditional play materials and managing adult risk perception

[NICE PH17](#) recommendation 10 'Facilities and equipment' (for children aged up to 11) recommends:

- Ensuring opportunities, facilities and equipment are available to encourage children to develop movement skills, regardless of their ability or disability.
- Providing children with access to environments that stimulate their need to explore and which safely challenge them. (Examples include adventure playgrounds, parks, woodland, common land or fun trails.) Also providing them with the necessary equipment. The aim is to develop their risk awareness and an understanding of their own abilities as necessary life skills.
- Ensuring children have the opportunity to explore a range of physical activities to help them identify those they can enjoy by themselves and those they can do with friends and family.
- Providing daily opportunities for participation in physically active play by providing guidance and support, equipment and facilities. Keeping children motivated to be physically active by updating and varying the way physical activities are delivered (including the resources and environments used).

It additionally recommends:

- From recommendation 7 'Leadership and instruction' (for people who provide programmes or opportunities for children and young people aged 18 and under to be physically active):
 - Ensuring informal and formal physical activity sessions for children and young people (including play) are led by staff or volunteers who have achieved the relevant sector standards or qualifications for working with children. This includes the requirements for child protection, health and safety, equality and diversity.
- From recommendation 9 'Multi-component school and community programmes' (for children and young people aged 4 to 18 who attend school or other education institutions):
 - Advising families how to create a supportive home environment, such as advice on how to help their child become involved in an activity.
- From recommendation 13 'Helping children to be active' (for children aged up to 11):
 - Provide a range of indoor and outdoor physical activities for children on a daily basis, including opportunities for unstructured spontaneous play.

See [NICE PH17](#) for the full recommendations.

A cluster RCT (12 primary schools; n=226 children) in Australia by [Engelen et al. \(2013\)](#) examined the effects of providing non-traditional play materials in school playgrounds, and of modifying adults' perceived risks of free play, on physical activity. Catholic coeducational primary schools were approached through emails, phone calls and site visits, with study recruitment continuing until 12 schools were enrolled. At each of the selected schools, pupils (mean age=6.0 years, range 4.7–7.3 years) were approached at random until approximately 19 children per school were recruited. Schools were then randomised to the intervention or to control. The 13-week intervention comprised 2 aspects: introducing loose non-traditional play materials with no obvious play value (such as car tyres and milk crates) to the school playground; and teacher–parent discussion groups exploring perceived risks of children's free play. Control schools had standard break-times without the play materials, and did not have the teacher–parent intervention. Primary outcomes were total activity counts and moderate-to-vigorous physical activity during break-times, measured by hip-worn accelerometer.

Mixed-effect multilevel regression showed significant effects of the intervention on physical activity at break-times for:

- Total activity counts (9400 counts, 95% CI 3500 to 15,200 counts, p=0.002).
- Increase in moderate-to-vigorous physical activity (1.8 minutes, 95% CI 0.5 to 3.1 minutes, p=0.006). Namely, children from intervention schools engaged in 12% more moderate-to-vigorous physical activity than children at control schools.
- Decrease in sedentary activity (–2.1 minutes, 95% CI –3.8 to –0.5 minutes, p=0.01).

In 1 intervention school (n=16), children were also re-tested after 2 years, during which time the intervention play materials were still in use. Increases in total activity counts and moderate-to-vigorous physical activity from baseline were seen over these 2 years, although these increases were non-significant.

Limitations of the evidence included that:

- Blinding of the investigators analysing study data was not reported.
- Hip-worn accelerometers do not measure the full range of physical activity (such as carrying or throwing objects).
- The specific contribution of the teacher–parent intervention about risks of children's free play was not reported (but has been discussed in [Niehues et al. 2013](#)). However, many

teachers and parents commented that the process had made them re-think attitudes to risk and play.

- To allow all children in a school to use the play materials, rosters were introduced in some schools, which limited exposure to the materials.
- Physical activity was measured only during school hours.

The evidence suggests that providing non-traditional play materials in school playgrounds, accompanied by managing adults' perceived risk of free play, appears to increase physical activity during break-times. This is consistent with recommendations in [NICE PH17](#) such as providing access to environments that stimulate the need to explore and which safely challenge, and keeping children motivated to be physically active by updating and varying the way physical activities are delivered.

Further examples of using non-traditional play materials include [Scrapstore PlayPods](#) (which have undergone [an independent evaluation](#)). The Health and Safety Executive has also issued the following high-level statement about the benefits of challenging play opportunities: '[Children's play and leisure: promoting a balanced approach \(2012\)](#)'.

Key reference

Engelen L, Bundy AC, Naughton G et al. (2013) [Increasing physical activity in young primary school children – it's child's play: a cluster randomised controlled trial](#). *Preventive Medicine* 56: 319–25

Supporting references

Niehues AN, Bundy A, Broom A et al. (2013) [Everyday uncertainties: reframing perceptions of risk in outdoor free play](#). *Journal of Adventure Education and Outdoor Learning* 13: 223–37

Health and Safety Executive (2012) [Children's play and leisure: promoting a balanced approach](#)

Impact of school break-time interventions on physical activity

[NICE PH17](#) recommendation 10 'Facilities and equipment' (for children aged up to 11) recommends:

- Ensuring opportunities, facilities and equipment are available to encourage children to develop movement skills, regardless of their ability or disability.
- Providing children with access to environments that stimulate their need to explore and which safely challenge them. Also providing them with the necessary equipment.
- Providing daily opportunities for participation in physically active play by providing guidance and support, equipment and facilities. Keep children motivated to be physically active by updating and varying the way physical activities are delivered (including the resources and environments used)

In addition, 'Physical activity and the environment' ([NICE PH8](#)) recommends:

- Ensuring school playgrounds are designed to encourage varied, physically active play.
- Creating areas in primary schools (for instance, by using different colours) to promote individual and group physical activities such as hopscotch and other games.

See [NICE PH17](#) and [NICE PH8](#) for the full recommendations.

A systematic review and meta-analysis by [Erwin et al. \(2014\)](#) examined the effect of school break-time interventions on physical activity. Studies evaluating any break-time intervention with physical activity as an outcome were included. Exclusion criteria were: case studies; single-subject design (in which participants acted as their own controls); and studies where the break-time component was 1 of several intervention arms, and results were not specific to break-time physical activity.

A total of 13 studies (n=864) were identified. The interventions examined across the studies (some studies examined >1 intervention) were: playground equipment (4 studies); playground markings (3 studies); playground equipment and markings (3 studies); additional break-times

(1 study); loose materials (such as car tyres) on the playground (1 study); playing active video games (such as Nintendo Wii) at break-times (1 study); structured break-time (1 study); feedback on physical activity (1 study); and allocating space for play (1 study).

The mean age of participants ranged from 3 to 11 years. The following 7 domains were identified from the studies and independently coded: age; sex; intervention type; intervention duration; length of physical activity per intervention session; outcome measures; and study region. Effect size was measured using standardised mean gain, and effect sizes were pooled within and across studies for each domain separately. Moderator analyses were also performed to examine variables that modified the effect size.

Using a random effects model, the overall effect size across all studies for time in physical activity was 0.56 (standard error [SE]=0.07), suggesting a positive and significant mean difference between pre-test and post-test physical activity time after a break-time intervention. From the moderator analyses, physical activity levels were found to be influenced by:

- Age: an increase in age led to a significant decrease in change in post-intervention physical activity levels (estimated slope=-0.08, SE=0.03, $p<0.01$).
- Type of intervention: the greatest significant effect was seen for structured break-times (effect size=0.74, SE=0.11, $p<0.01$), followed by playground equipment alone (effect size=0.68, SE=0.11, $p<0.01$), 'other' (including teacher 'pep talk' training and feedback given to children's activity levels; effect size=0.50, SE=0.17, $p<0.01$), and combined playground markings and equipment (effect size=0.29, SE=0.05, $p<0.01$). The effect of playground markings alone was non-significant (effect size=0.01, SE=0.08, $p=0.90$).
- Duration of intervention: an increase in the total duration per intervention session (in minutes) led to a significant increase in physical activity levels (estimated slope=0.0002, SE=0.00002, $p<0.01$). However, the total duration of the intervention (in days) did not have a significant effect ($p=0.36$).

Limitations of the evidence included that: studies were not quality assessed; publication bias may have been present; and studies were not restricted to RCTs.

Evidence suggests that school break-time interventions appear to increase physical activity levels in children aged 3 to 11 years. The most effective interventions appear to be structured break-times, provision of playground equipment, teacher involvement, and combining interventions (such as playground markings plus equipment). This is broadly consistent with [NICE PH17](#) and [NICE PH8](#) to: ensure equipment is available to encourage children to develop movement skills; provide daily opportunities for physically active play by providing guidance and support; ensure school playgrounds encourage varied, physically active play; and create areas (for instance, by using different colours) to promote individual and group physical activities such as hopscotch and other games.

Key references

Erwin HE, Ickes M, Ahn S et al. (2014) [Impact of recess interventions on children's physical activity – a meta-analysis](#). *American Journal of Health Promotion* 28: 159–67

1.11 Supporting girls and young women

See Zask et al. (2012a) in 'Long-term effects of a pre-school movement skills intervention' in section 1.13 'Helping children to be active'.

1.12 Active and sustainable school travel plans

See McDonald et al. (2014) in 'Safe Routes to School programme' in section 1.5 'Local transport plans'.

Local practitioners: delivery

1.13 Helping children to be active

Physical activity interventions for pre-school children

[NICE PH17](#) recommendation 13 'Helping children to be active' (for children aged up to 11) recommends:

- Providing a range of indoor and outdoor physical activities for children on a daily basis, including opportunities for unstructured, spontaneous play.

See [NICE PH17](#) for the full recommendation.

A systematic review and meta-analysis by [Gordon et al. \(2013\)](#) examined the effect of physical activity interventions aimed at pre-school children on physical activity. Studies were included of any physical activity intervention targeted at pre-school children (namely those aged 2–5.9 years at baseline). A total of 15 studies (n=2618, mean age=4.1 years) were identified from the USA, Scotland, Australia, Belgium and Israel, of which 11 studies had a control group and 4 were uncontrolled. The interventions used by the studies included: adding physical activity time to the curriculum; providing education about physical activity; and environmental changes such playground equipment. Outcomes analysed were general physical activity (of all types and intensities) and moderate-to-vigorous physical activity. Effect sizes were calculated with a random effects model using Hedges' g (small effect size=0.20–0.49, medium=0.50–0.79, large=0.80 or more). Moderators of physical activity were also analysed.

Interventions had a small effect on general physical activity (Hedges g=0.44, 95% CI 0.24 to 0.65, p<0.05; 73 effect sizes, n=569 children) and a medium effect on moderate-to-vigorous physical activity (Hedges g=0.51, 95% CI 0.23 to 0.80 p<0.05; 39 effect sizes, n=358). The moderators that had the greatest significant effects on moderate-to-vigorous physical activity were interventions that: were unstructured (Hedges' g=1.36, 95% CI 0.85 to 1.84; 13 effect sizes, n=339); involved environmental change (Hedges' g=0.92, 95% CI 0.42 to 1.42; 18 effect sizes, n=313); or were outdoors (Hedges' g=0.87, 95% CI 0.38 to 1.35; 19 effects sizes, n=not reported). A large effect was also noted for interventions that lasted less than 4 weeks (Hedges g=1.28, 95% CI 0.88 to 1.68; 16 effect sizes, n=393). However, most short interventions involved environmental change, so the effect size may have been caused by intervention type and not necessarily duration.

Limitations of the evidence included that:

- Study quality was not formally assessed.
- Most studies were less than 24 weeks' duration so long-term effects are unclear.
- The studies used a wide variety of tools to measure physical activity including accelerometers, heart rate monitors, pedometers, direct observation and parental reports. The metrics used also varied – such as proportion or minutes of time spent in activity states.

The evidence suggests that interventions aimed at increasing physical activity levels among pre-school children do appear to increase physical activity in this age group. Interventions with the largest effect include those that are unstructured and are outdoors. This is consistent with [NICE PH17](#) that recommends both outdoor and unstructured spontaneous play.

Key reference

Gordon ES, Tucker P, Burke SM et al. (2013) [Effectiveness of physical activity interventions for preschoolers: a meta-analysis](#). *Research Quarterly for Exercise and Sport* 84: 287–94

Long-term effects of a movement skills intervention for pre-school children

[NICE PH17](#) recommendation 13 'Helping children to be active' (for children aged up to 11) recommends:

- Tailoring activities according to the child's developmental age and physical ability, and ensuring they are inclusive, progressive and enjoyable. The activities should develop the child's movement skills (such as crawling, running, hopping, skipping, climbing, throwing, catching and kicking a ball). Children should also experience more advanced activities such as swimming, cycling, playing football and dancing.

It also makes recommendations specifically relating to girls and young women (recommendation 11 'Supporting girls and young women'; and recommendation 14 'Helping girls and young women to be active').

See [NICE PH17](#) for the full recommendations.

A 3-year follow-up study (n=560) in Australia by [Zask et al. \(2012a\)](#) examined the long-term effects of the 'Tooty Fruity Vegie' programme – an obesity-prevention intervention aimed at pre-school children. The study was a long-term follow-up of the original quasi-experimental pre–post study of Tooty Fruity Vegie by [Zask et al. \(2012b\)](#). In the original study, pre-schools (for children aged 3–6 years) in New South Wales were asked to submit an expression of interest to participate, from which 18 schools were randomised to the intervention and 13 to control (total n=560). Tooty Fruity Vegie was a 10-month intervention comprising 2 terms of 10 sessions, with each session repeated twice a week. Alongside healthy eating strategies, the intervention focused on movement skills related to 6 locomotor skills (running, galloping, hopping, leaping, horizontal jumping, and sliding) and 6 object control skills (striking a stationary ball, stationary dribble, kicking, catching, overhand throwing, and underhand rolling).

Data were collected using the Test of Gross Motor Development-2 tool which measures the 12 locomotor and object control skills that were the focus of Tooty Fruity Vegie (and has been validated for children aged 3–10 years). Multi-level regression models for object control and locomotor skills were fitted with the variables 'time', 'intervention' (yes/no) and a 'time/intervention' interaction. If significant, models also included children's sex. Children were assessed at ages 4 (baseline), 5 and 8 years.

In the 3-year follow-up study at age 8 years, the overall follow-up rate was 29% (163/560). However further exclusions (for example, missing data from the original study) left a total of 137 children (24% of the original cohort) for analysis, of whom 53% were female. At age 8 years, girls in the intervention group maintained their object control skill advantage versus controls ($p=0.002$), but boys did not ($p=0.591$). Locomotor skills at this time point, however, did not differ significantly between intervention and control groups for girls and boys combined ($p=0.801$).

A substantial limitation of the evidence was that less than a quarter of the original study participants were included in follow-up analyses.

The evidence suggests that an intervention targeting movement skills among pre-school children ('Tooty Fruity Vegie') appears to have sustained effects on object control skills in girls after 3 years. This is consistent with [NICE PH17](#) that activities should develop the child's movement skills. It is also consistent with the recommendations in [NICE PH17](#) about helping and supporting girls and young women to be active. Although the recommendations about girls and young women are focused on those aged 11–18 years, whereas the study was among children aged 4–8 years. However, the sustained movement skills observed in girls suggest that early intervention may be of particular benefit to girls as they get older.

Key reference

Zask A, Barnett LM, Rose L et al. (2012a) [Three year follow-up of an early childhood intervention: is movement skill sustained?](#) *International Journal of Behavioral Nutrition and Physical Activity* 9: 127

Supporting reference

Zask A, Adams JK, Brooks LO et al. (2012b) [Tooty Fruity Veggie: an obesity prevention intervention evaluation in Australian preschools.](#) *Health Promotion Journal of Australia* 23: 10–15

Promoting motor development in disabled pre-school children

[NICE PH17](#) recommendation 13 'Helping children to be active' (for children aged up to 11) recommends:

- Tailoring activities according to the child's developmental age and physical ability, and ensuring they are inclusive, progressive and enjoyable.

Additionally, recommendation 3 'Developing physical activity plans' (for children and young people aged 18 and under, their families and carers) recommends:

- Ensuring children and young people from different socioeconomic and minority ethnic groups are actively involved in the provision of activities, and ensuring those with a disability are actively involved.

See [NICE PH17](#) for the full recommendations.

A cluster RCT (50 classes across 26 schools; n=233) in the USA by [Favazza et al. \(2013\)](#) examined the effectiveness of the Young Athletes programme – designed to promote motor skill development in disabled young children. Children with an intellectual disability and who could walk independently, follow simple directions, and perform relevant motor tasks were selected from pre-school classes (for children aged 3–5 years) in North Carolina and Rhode Island. Classes were randomly assigned to the Young Athletes intervention or to a control group of no intervention; 69% of classes were for children with and without disability. Intervention and control groups did not differ significantly for disability diagnosis or functional level; most children had either a developmental disability (72%) or an autism spectrum disorder (20%). The Young Athletes programme consisted of 24 motor skill lessons (such as walking, balancing, catching and kicking) delivered in three 30-minute sessions per week for 8 weeks. Motor tasks were matched to children's abilities. Information was also distributed to parents about activities that could be done at home.

Outcomes measured were:

- Motor skills:
 - Research staff used 3 subscales of the Peabody Developmental Motor Scales (second edition) to measure: locomotion, stationary control, and object manipulation.
 - Teachers used the Vineland II Teacher Rating Form to measure children's behaviour for: communication, daily living skills, socialisation, and motor skills.
- Perceived benefits: teachers and parents completed a post-intervention survey.

Scores on the Peabody Developmental Motor Subscales showed significant benefits of the Young Athletes programme versus control for locomotion ($p < 0.001$), object manipulation ($p < 0.001$) and stationary control ($p < 0.01$). Based on these scores, hierarchical linear modelling showed that children in the Young Athletes intervention had mean gains of 7–9 months on the age-equivalent scales versus mean gains of 3–5 months for the control group (namely, the intervention approximately doubled the rate of improvement in motor skills). Children in the Young Athletes intervention also had significant gains on the gross motor subscale of the Vineland II Teacher Rating Form ($p < 0.05$). From the perceived benefits survey, the most frequently reported benefit by teachers (62%) and parents (44%) was improved specific gross or fine motor skills in the Young Athletes group. Other less frequently

reported benefits included increased kindergarten readiness, and improved social and play skills.

Limitations of the evidence included that:

- Methods for the recruitment of schools and allocation to study groups were not described.
- Less than half of parents recorded data on how much of the intervention programme was performed in the home, so the 'dose' of the intervention for all children was uncertain.
- Translation of motor skills into physical activity was not measured by the study.

The evidence suggests that a tailored programme ('Young Athletes') designed to promote motor skill development in disabled young children appears to improve motor skills among pre-school children with an intellectual disability. This is consistent with recommendations in [NICE PH17](#) that activities should be tailored according to the child's developmental age and physical ability, and that children with a disability are actively involved in the provision of activities.

Key reference

Favazza PC, Siperstein GN, Zeisel SA et al. (2013) [Young Athletes program: impact on motor development](#). *Adapted Physical Activity Quarterly* 30: 235–53

1.14 Helping girls and young women to be active

See Zask et al. (2012a) in 'Long-term effects of a pre-school movement skills intervention' in section 1.13 'Helping children to be active'.

1.15 Helping families to be active

Community and family interventions

[NICE PH17](#) recommendation 15 'Helping families to be active' (for children and young people aged 18 and under, their families and carers) recommends:

- Encouraging parents and carers to get involved in physical activities with their children.

See [NICE PH17](#) for the full recommendation.

A review of reviews and an updated systematic review by [van Stuijs et al. \(2011\)](#) assessed the effectiveness of community-based and family-based interventions to promote physical activity in children and young people. The study first identified (via a non-systematic search) and summarised 3 recent previous systematic reviews. A systematic literature search and review was then performed of recent controlled trials. The literature search began from the latest search date of the most recent of the systematic reviews identified. Inclusion criteria for the search were: a healthy population aged 18 years or under; a main intervention promoting physical activity via behaviour change; an intervention based outside school or primary care; and no control group or a non-physical activity intervention in the control group.

All interventions were considered community interventions, unless 1 or more of the child's family members were actively involved, in which case they were designated family interventions. After-school interventions only for children at a specific school were excluded, but interventions using school facilities that were open to all children were considered to be community-based. In the first part of the study, 3 systematic reviews were analysed (including 13 family and 3 community interventions across all 3 reviews). In the subsequent literature search, a further 6 family and 4 community studies were identified. Methodological quality of the 10 new trials was assessed, with 5 of the 10 rated as high quality by the authors.

The 3 systematic reviews all concluded that evidence was limited, although the potential of family-based interventions was highlighted (6 of the 13 family-based interventions had a significant positive effect on physical activity, whereas none of the community interventions

demonstrated a significant positive effect). Similar results were seen in analysis of the studies from the new literature search: 3 family-based interventions showed significant positive effects on physical activity, whereas only 1 community-based intervention had a significant positive effect. Common components of effective versus ineffective interventions could not be identified.

Limitations of the evidence included that:

- Few studies assessed implementation of the intervention beyond attendance rates.
- No study reported recruitment rates as a proportion of those eligible or invited to attend, or on how well the study sample represented the target population. As a result, generalisability was uncertain.
- The authors stated that most studies were of poor quality and used small sample sizes.
- Of the 10 studies found by the new literature search, only 3 objectively measured physical activity, only 4 reported the validity of measures, only 3 reported follow-up of 6 months or longer, and none reported mediators of intervention effects.
- Only 1 reviewer performed the initial reviewing stages, and a potential for publication bias was also noted by the authors.

The evidence for the effect of family-based and community-based interventions on physical activity in children and young people is limited, but interventions targeted at families appear to have some effect. These results are consistent with [NICE PH17](#) to encourage parents and carers to get involved in physical activities with their children. However, limitations of the evidence base mean that further research on increasing children and young people's physical activity levels in family and community settings is needed.

Key reference

van Sluijs EM, Kriemler S, McMinn AM (2011) [The effect of community and family interventions on young people's physical activity levels: a review of reviews and updated systematic review](#). *British Journal of Sports Medicine* 45: 914–22

Areas not currently covered by NICE PH17

Reducing sedentary behaviour

[NICE PH17](#) does not make any recommendations specifically about reducing sedentary behaviour. However, guidance from the [Chief Medical Officer \(2011\)](#) states that all people, including children and young people, should minimise the amount of time spent being sedentary for extended periods. Additionally, investigation of sedentary behaviour featured in several of the [research recommendations from NICE PH17](#), including: 'Determine to what extent different types of physical activity displace others and the factors leading to sedentary behaviour over time.'

A review of reviews by [Biddle et al. \(2014\)](#) examined interventions to reduce sedentary behaviour in children and young people aged 18 years or under. A total of 10 systematic reviews and meta-analyses were identified that between them examined 238 studies of at least 42,000 participants (exact number of participants not stated). Among the 10 reviews, 8 focused mainly on reducing 1 aspect of sedentary behaviour, and the other 2 reviews focused on preventing obesity or changing several lifestyle behaviours. Where reviews gave an effect size, the size of the effect was established using Cohen's d (small effect size=0.19–0.49; moderate=0.50–0.79; large=0.8 or more).

The studies differed substantially, which prevented a meta-analysis and made summary and interpretation of results difficult. The main differences were:

- Defining sedentary behaviour – many studies used screen-viewing only, whereas others accounted for wider sedentary behaviours such as reading or talking on the phone.

- Measuring sedentary behaviour – some studies used self-report, others used accelerometers, and some studies used both.
- Intervention duration – length of intervention ranged from less than 1 month up to 4 years.
- Intervention frequency – weekly, biweekly and monthly deliveries were all observed.
- Intervention type – some studies focussed on sedentary behaviour only, whereas others looked at additional behaviours such as dietary intake and physical activity.

In the narrative summary, it was noted that all reviews concluded some effectiveness of interventions in reducing sedentary behaviour; either a reduction in time spent in these behaviours or improvements in other measures such as BMI. When effect sizes for reduction in sedentary time were reported, they were small but significant (greatest effect size = -0.29, 95% CI -0.35 to -0.22). Some moderators of increased efficacy were noted, including age less than 6 years, involvement of family, behaviour-based interventions, and electronic TV monitoring devices (although causality could not be established for all relationships). Firm conclusions could not be drawn on the long-term effects of interventions, nor could the effects of sex, ethnicity or intervention duration be firmly established.

Limitations of the evidence included that:

- Only 3 of the reviews performed quality assessments of the studies they included, in which it was noted that study quality varied and information needed to assess risk of bias was often missing.
- All reviews were published between 2006 and 2012 therefore were unlikely to capture effects of the most recent developments in screen viewing (such as smart phones and tablet computers).
- Reported outcomes related mainly to reductions in sedentary behaviour, and no information was provided on accompanying changes in or correlation with physical activity levels (for example, highly active children may need more time to rest). Neither was information provided on behaviours that may accompany sedentary activities (such as snacking while watching television).
- The review did not discuss disabled children or those with reduced mobility, who may need tailored interventions to address sedentary behaviour.

The evidence suggests that interventions to reduce sedentary behaviour in children and young people appear to have some effect. However, the types of sedentary behaviour that should be targeted, how best to target them, and how these behaviours interact with physical activity levels, have not been firmly established. Therefore, this evidence is unlikely to have an impact on current guidance. The evidence supports the conclusion of the [review decision for NICE PH17 \(April 2012\)](#) which stated that the evidence base was not yet sufficiently developed to warrant an update in this area.

The Evidence Update Advisory Group noted that further research was needed to examine: interventions targeting different types of sedentary behaviours, the effect of interventions across different contexts and settings, the most appropriate way to measure effects, and how sedentary behaviours interact with other areas such as diet and physical activity.

Understanding the most effective ways to reduce sedentary behaviour would align with guidance from the Chief Medical Officer that all people, including children and young people, should minimise the amount of time spent being sedentary for extended periods. Additionally, highlighting this advice to parents could also be useful, alongside current recommendations to ensure parents are aware of government advice on minimum levels of moderate-to-vigorous physical activity for children and young people,

Key reference

Biddle SJ, Petrolini I, Pearson N (2014) [Interventions designed to reduce sedentary behaviours in young people: a review of reviews](#). *British Journal of Sports Medicine* 48: 182–6

Supporting reference

Department of Health (2011) [UK physical activity guidelines](#)

Online interventions to promote physical activity

[NICE PH17](#) does not make any recommendations about the use of online interventions to promote physical activity.

A cluster RCT (54 classes across 12 schools; n=1213) in the Netherlands by [Prins et al. \(2014\)](#) examined the effect of a tailored, online intervention to promote physical activity among young people. Participants were all aged 12–13 years and in their first year of secondary school. In each participating school, 1–12 classes (depending on school size) were selected and all children in the selected classes were invited to take part.

School classes were randomly assigned to 1 of 3 study arms:

- ‘Youth of Rotterdam in Action’ (YouRAAction): a tailored online intervention to promote physical activity via written feedback, cartoons, quizzes and web-movies. The intervention comprised 3 sessions during 3 school lessons plus homework. All children in the class logged in to the website at the same time but worked individually. Lesson 1 focused on knowledge of physical activity and the appropriate level of activity. Lessons 2 and 3 motivated children to make changes in the areas of active transport, leisure time activity or sports. Goals and action plans were then set.
- ‘YouRAAction+e’: identical to YouRAAction but the website also provided a map showing local facilities for physical activity.
- Generic information (control): a non-tailored website with general information on physical activity and healthy eating, also implemented in 3 sessions over 3 lessons. The design of the website was identical to YouRAAction and was also called YouRAAction.

Moderate-to-vigorous physical activity levels were measured by self-report at baseline, and at 1 and 6 months post-intervention. Intervention compliance was measured by webserver logs. Questionnaires assessed children’s experience of the website. The 2 primary outcomes were: the proportion of children in moderate-to-vigorous physical activity for at least 1 hour per day over a week; and the number of minutes per day spent in moderate-to-vigorous physical activity. All data reported were unstandardised, multilevel linear or logistic regression analyses with class and individual as levels, adjusted for level of education.

At 6 months, no significant differences were seen for the number of children in moderate-to-vigorous physical activity for at least 1 hour per day between the control group and either the YouRAAction group (regression coefficient=–0.42, 95% CI –0.99 to 0.15) or the YouRAAction+e group (regression coefficient=–0.16, 95% CI –0.70 to 0.38). Similarly, no significant differences were seen for the number of minutes per day spent in moderate-to-vigorous physical activity between the control group and either the YouRAAction group (regression coefficient=0.01, 95% CI –0.14 to 0.17) or the YouRAAction+e group (regression coefficient=0.07, 95% CI –0.08 to 0.23).

Limitations of the evidence included that:

- Primary outcomes were measured by self-report which may have introduced bias (accelerometer data were collected but not reported because of high levels of non-compliance).
- Simultaneous use of the YouRAAction website by many children caused the server to slow down leading to login problems and difficulties using the site. This may have reduced the effect of the intervention.
- The methods used by the YouRAAction website were derived from data collected in adults and may not have been entirely applicable to children.

- Access to the full intervention (namely, number of children who accessed the third session as a proportion of those who accessed the first session) was significantly lower for both the YouRAAction group (24.0%) and YouRAAction+e group (21.7%) compared to the control group (54.4%; $p < 0.01$ for both). This disparity may have biased findings.

The evidence suggests that the tailored online intervention 'YouRAAction' to promote physical activity among young people aged 12–13 years, delivered in a school setting, does not appear to increase levels of moderate-to-vigorous physical activity. [NICE PH17](#) does not make any recommendations about the use of online interventions therefore this evidence is unlikely to have an impact on current guidance. The evidence supports the conclusion of the [review decision for NICE PH17 \(April 2012\)](#) that there was insufficient evidence about computer-based and online interventions to add further detail to the recommendations.

The Evidence Update Advisory Group noted that online interventions were a continuing area of investigation, but so far no firm evidence for their effect seems to have been established. Even in the school context studied by Prins et al. (2014), where adherence to the intervention can be monitored, there appeared to be compliance issues and no significant effect on physical activity was seen. The guidance review decision (April 2012) also expressed concerns about the rate of technological change in this field meaning that evidence was at high risk of obsolescence.

Smartphone-based technologies such as the NHS choices [Couch to 5K](#) app (which was [downloaded 209,000 times in its first month](#)) are now available, and these technologies may be an area for further investigation.

Key reference

Prins RG, Brug J, van Empelen P et al. (2012) [Effectiveness of YouRAAction, an intervention to promote adolescent physical activity using personal and environmental feedback: a cluster RCT](#). PLOS One 7: e32682

2 New evidence uncertainties

During the development of the Evidence Update, the following evidence uncertainties were identified for the UK Database of Uncertainties about the Effects of Treatments (UK DUETs).

Helping families to be active

- [The effect of community and family interventions on young people's physical activity levels](#)

Areas not currently covered by NICE PH17

- [Interventions designed to reduce sedentary behaviours in young people](#)

Further evidence uncertainties for promoting physical activity for children and young people can be found in the [UK DUETs database](#) and in the [NICE research recommendations database](#).

UK DUETs was established to publish uncertainties about the effects of treatments that cannot currently be answered by referring to reliable up-to-date systematic reviews of existing research evidence.

Appendix A: Methodology

Scope

The scope of this Evidence Update is taken from the scope of the reference guidance:

- [Promoting physical activity for children and young people](#). NICE public health guidance 17 (2009)

The scope of the Evidence Update specifically included evidence on reducing sedentary behaviours, active electronic games, and outcomes relating to self-esteem.

Searches

The original guidance consisted of 4 effectiveness reviews, 4 further reviews to provide background information, and a review of economic literature. Key terms from all 4 of the original effectiveness searches were combined into a single search for the Evidence Update.

Searches were conducted of the following databases, covering the dates 1 October 2011 (the end of the search period for the latest [review of the need to update NICE public health guidance 17](#)) to 11 August 2014:

- AMED (Allied and Complementary Medicine Database)
- CDSR (Cochrane Database of Systematic Reviews)
- CENTRAL (Cochrane Central Register of Controlled Trials)
- DoPHER (Database of Promoting Health Effectiveness Reviews)
- MEDLINE (Medical Literature Analysis and Retrieval System Online)
- MEDLINE In-Process
- NHS EED (Economic Evaluation Database)
- PsycINFO
- PubMed
- SPORTDiscus
- TRANSPORT
- TRoPHI (Trials Register of Promoting Health Interventions)

In addition, citation searches were undertaken using Web of Science for articles included in the 4 effectiveness reviews, and 2 systematic reviews on sedentary correlates (from the background information reviews). A call for evidence was also made to the Evidence Update Advisory Group.

Table 1 provides details of the MEDLINE search strategy used, which was adapted to search the other databases listed above.

Additionally, 1 study (McDonald et al. 2014) was identified outside of the literature search.

Figure 1 provides details of the evidence selection process. The list of evidence excluded after review by the Chair of the EUAG, and the full search strategies, are available on request from contactus@evidence.nhs.uk

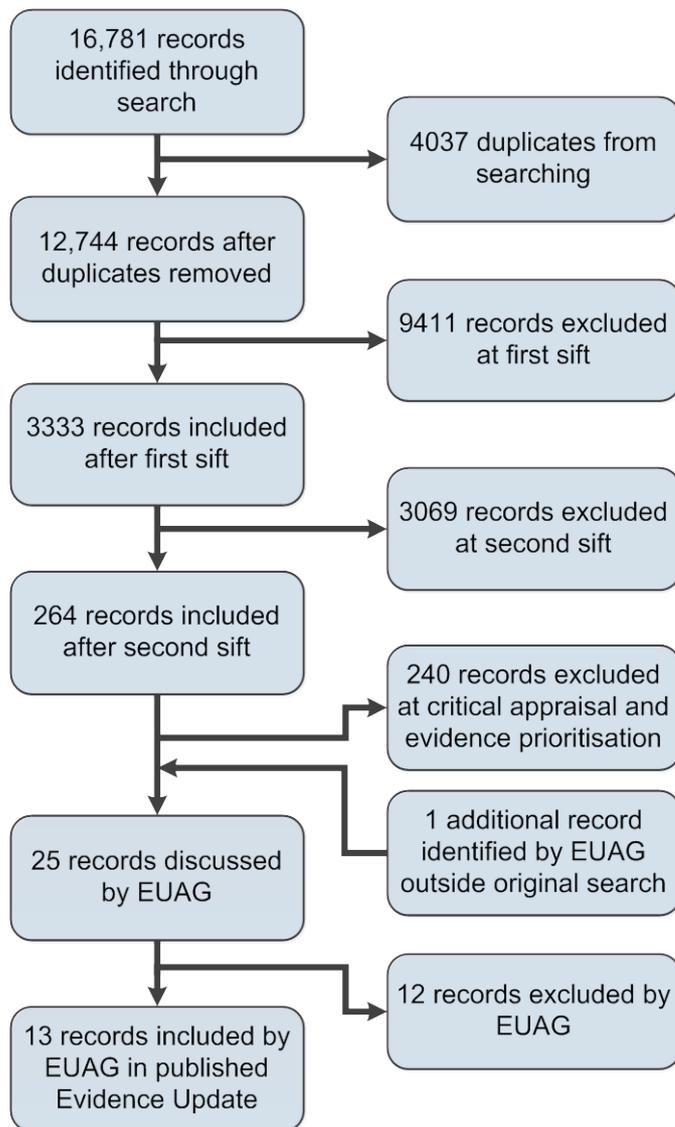
See the [NICE newsletters and alerts page](#) for a list of all published Evidence Updates.

Table 1 MEDLINE search strategy (adapted for individual databases)

1	Child\$.ti,ab.	36	recreation/
2	Kid\$1.ti,ab.	37	"Play and Playthings"/
3	Infant\$1.ti,ab.	38	Exercise/
4	Youth\$1.ti,ab.	39	activ\$ commut\$.ti,ab.
5	Toddler\$1.ti,ab.	40	((active or activity) adj5 travel\$.ti,ab.
6	girl\$1.ti,ab.	41	or/20-40
7	boy\$1.ti,ab.	42	((decreas\$ or reduc\$ or discourag\$) adj2 (sedentary or deskbound)).ti,ab.
8	Young\$.ti,ab.	43	(uptake or take up or increas\$ or impact\$ or effect\$ or improve\$ or enhance\$ or encourag\$ or support\$ or optimiz\$ or optimis\$ or adher* or access\$ or motivat\$ or accept\$ or satisfaction or compliance or comply or complie\$ or refus\$ or availabl\$ or provision or provid\$ or offer or incentive\$ or start\$ or attend\$ or campaign\$ or interven\$ or program\$ or activit\$ or project\$ or counsel\$ or advice or advise or advising or engage\$ or curriculum or curricula or initiative\$.ti,ab.
9	(baby or babies).ti,ab.	44	(promot\$ or uptak\$ or maintain\$ or sustain\$.ti,ab.
10	Child/	45	health promotion/ or intervention studies/
11	Child, Preschool/	46	(promot\$ or prevent\$ or reduc\$ or educat\$ or improv\$ or upstream\$ or ((population or communit\$) and intervention\$1)).ti,ab.
12	Infant/	47	or/42-46
13	exp Adolescent/	48	(local authorit\$ or local council\$ or health authorit\$.ti,ab.
14	young people\$.ti,ab.	49	(council\$ adj2 (provision or facilit\$ or service\$)).ti,ab.
15	young person\$.ti,ab.	50	Local Government/
16	teen\$1.ti,ab.	51	(county council\$ or borough council\$.ti,ab.
17	teenager\$.ti,ab.	52	(communit\$ adj setting\$.ti,ab.
18	(under 18 or under 18s).ti,ab.	53	Residence Characteristics/
19	or/1-18	54	(school or schools).ti,ab.
20	(physical adj5 (fit\$4 or activ\$3 or endur\$4)).ti,ab.	55	(preschool\$ or pre-school\$.ti,ab.
21	(exercise\$3 adj5 (fit\$4 or activ\$3 or endur\$4)).ti,ab.	56	(secondary education or further education or sixth form college*).ti,ab.
22	motor skill\$.ti,ab.	57	nurser\$.ti,ab.
23	(physical adj5 inactiv\$3).ti,ab.	58	creche\$.ti,ab.
24	physical\$ litera\$.ti,ab.		
25	(swim\$ or walk\$ or running or biking or bicycl\$ or bike\$.ti,ab.		
26	sport\$.ti,ab.		
27	(football or rugby or netball or cricket or hockey or rounders).ti,ab.		
28	(rollerblading or rollerskating or skating or skateboard\$.ti,ab.		
29	(jump\$1 or jumping or skip\$1 or skipping or hopping).ti,ab.		
30	(play\$1 or playing).ti,ab.		
31	games.ti,ab.		
32	physical education.ti,ab.		
33	exp "Physical Education and Training"/		
34	exp Dancing/		
35	exp Sports/		

59	(play group\$ or play centre\$ or play center\$ or playground\$).ti,ab.	77	child day care centers/
60	reception class\$.ti,ab.	78	fitness centers/
61	(leisure adj5 (centre\$1 or center\$1 or facilit\$)).ti,ab.	79	public facilities/ or swimming pools/
62	(fitness adj5 (centre\$1 or center\$1 or facilit\$)).ti,ab.	80	or/48-79
63	(gym*1 or gymnasium*).ti,ab.	81	(addresses or autobiography or bibliography or biography or case reports or clinical conference or comment or congresses or consensus development conference or consensus development conference, nih or dictionary or directory or duplicate publication or editorial or historical article or in vitro or interactive tutorial or interview or lectures or legal cases or legislation or letter or news or newspaper article or overall or patient education handout or periodical index or portraits or video-audio media or webcasts).pt.
64	parks.ti,ab.	82	(case report* or case series).ti.
65	parent groups.ti,ab.	83	81 or 82
66	kindergarten.ti,ab.	84	19 and 41 and 47 and 80
67	(family or families).ti,ab.	85	84 not 83
68	communit\$.ti,ab.	86	limit 85 to ed=20111001-20140801
69	(neighbourhood\$ or neighborhood\$).ti,ab.		
70	garden\$.ti,ab.		
71	(pitch or pitches).ti,ab.		
72	youth club\$.ti,ab.		
73	open space\$.ti,ab.		
74	(swim\$ adj3 pool\$).ti,ab.		
75	schools/		
76	nurseries/		

Figure 1 Flow chart of the evidence selection process



EUAG – Evidence Update Advisory Group

Appendix B: The Evidence Update Advisory Group and Evidence Update project team

Evidence Update Advisory Group

The Evidence Update Advisory Group is a group of topic experts who reviewed the prioritised evidence from the literature search and advised on the development of the Evidence Update.

Professor Gareth Stratton – Chair

Professor of Paediatric Exercise Science and Director of the Research Centre in Applied Sports, Technology, Exercise and Medicine, Swansea University

Mr Barry Causer

Public Health Commissioning Manager, Merton Council

Mr Steven Chown

Programme Development Manager, Play England

Professor Ashley Cooper

Professor of Physical Activity and Public Health, University of Bristol

Mr Peter Cooper

Children's Work Director, YMCA Fairthorne Group, Hampshire

Professor Stuart Fairclough

Professor of Physical Activity Education, Edge Hill University, Lancashire

Professor John Hutton

Professor of Health Economics, University of York

Professor Chris Laws

Emeritus Professor, University of Chichester

Ms Marianne Mannello

Assistant Director – Policy, Support and Advocacy, Play Wales

Dr Esther van Sluijs

Programme Leader (Track), MRC Epidemiology Unit and Centre for Diet and Activity Research (CEDAR), University of Cambridge

Mr Jonathan Williams

Co-Owner and Director, Urban Fitness London Group Ltd

Evidence Update project team

Marion Spring

Associate Director, Evidence Information Services

Simon Ellis

Associate Director, Centre for Public Health

Dr Chris Alcock

Clinical Lead, NICE Evidence Services

Chris Weiner

Consultant Clinical and Public Health Adviser, Evidence Information Services

Cath White

Programme Manager, Evidence Updates

Swapna Mistry

Project Manager, Evidence Updates

Catherine Jacob

Information Specialist, Evidence Updates

Hilary Chatterton

Analyst, Centre for Public Health

Patrick Langford

Editor, Evidence Updates

© National Institute for Health and Care Excellence, 2015. All rights reserved. NICE copyright material can be downloaded for private research and study, and may be reproduced for educational and not-for-profit purposes. No reproduction by or for commercial organisations, or for commercial purposes, is allowed without the written permission of NICE.