NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

PUBLIC HEALTH DRAFT GUIDANCE

Walking and cycling: local measures to promote walking and cycling as forms of travel or recreation

Introduction: scope and purpose of this draft guidance

What is this guidance about?

This guidance aims to set out how people can be encouraged to increase the amount they walk or cycle for travel or recreation purposes. This will help meet public health and other goals (for instance, to reduce traffic congestion, air pollution and greenhouse gas emissions). The recommendations cover:

- policy and planning
- local programmes
- schools, workplaces and healthcare.

This guidance does **not** cover:

- Environmental changes to encourage walking or cycling. (NICE's guidance on physical activity and the environment covers the physical infrastructure and planning needed to make non-motorised transport an easier option.)
- National actions to support walking and cycling, such as fiscal measures and other policy interventions to alter the balance between active and motorised travel in terms of cost and convenience.
- Measures to reduce the risk of unintentional injuries from walking and cycling.

Who is this guidance for?

The guidance is for commissioners, managers and practitioners involved in physical activity promotion or working on the environment, parks and leisure or transport planning. They could be working in local authorities, the NHS and other organisations in the public, private, voluntary and community sectors. It is also aimed at:

- employers
- estate managers
- highways authorities
- those involved in land use planning and development control
- private developers
- public transport operators
- others responsible for workplace travel and carbon reduction plans.

In addition, it will be of interest to people who promote walking and cycling in an unpaid capacity, those who want to walk or cycle more and other members of the public.

Why is this guidance being produced?

The Department of Health (DH) asked the National Institute for Health and Clinical Excellence (NICE) to produce this guidance.

The guidance should be implemented alongside other relevant guidance and regulations (for more details see sections 4 and 7 on implementation and related NICE guidance respectively).

How was this guidance developed?

The recommendations are based on the best available evidence. They were developed by the Programme Development Group (PDG).

Members of the PDG are listed in appendix A.

The guidance was developed in line with the NICE public health programme process. See appendix B for details.

Supporting documents used to prepare this document are listed in appendix E.

What evidence is the guidance based on?

The evidence that the PDG considered included: reviews of the evidence, economic modelling and the testimony of expert witnesses. Further detail on the evidence is given in the considerations section (section 3) and appendices B and C.

In some cases the evidence was insufficient and the PDG has made recommendations for future research.

More details on the evidence on which this guidance is based and NICE's processes for developing public health guidance are on the NICE website.

Status of this guidance

This is **draft** guidance.

This document does not include all sections that will appear in the final guidance. NICE is now inviting comments from stakeholders (listed on our website).

Note that this document is not NICE's formal guidance on walking and cycling. The recommendations made in section 1 are provisional and may change after consultation with stakeholders.

The stages NICE will follow after consultation are summarised below:

- The Group will meet again to consider the comments, reports and any additional evidence that has been submitted.
- After that meeting, the Group will produce a second draft of the guidance.
- The draft guidance will be signed off by the NICE Guidance Executive.

For further details, see 'The NICE public health guidance development process: An overview for stakeholders including public health practitioners, policy makers and the public (second edition, 2009)'.

The key dates are:

Closing date for comments: 19 June 2012.

Next PDG meeting: 17 July 2012.

Contents

1 Draft recommendations

The Programme Development Group (PDG) considers that the recommended approaches are highly cost effective.

The evidence statements underpinning the recommendations are listed in appendix C.

For the gaps in research, see appendix D.

The evidence reviews, supporting evidence statements and economic modelling report are available at the NICE website.

Benefits of walking and cycling

Increasing how much someone walks or cycles may increase their overall level of physical activity, leading to associated health benefits. It can also lead to:

- A reduction in car travel leading to reductions in air pollution, carbon dioxide emissions and congestion.
- A reduction in road danger and noise.
- An increase in the number of people of all ages who are out on the streets, getting to know each other, socialising and 'looking out' for each other, so encouraging a sense of local community.

Encouraging people to walk and cycle more

This guidance considers walking and cycling as a form of transport (for example, to get to work, school and the shops) and also as a recreational activity (for example, going for walks or cycling in the park or countryside).

Encouraging and enabling people to walk or cycle requires action on many fronts – and by many different sectors. A range of issues, including environmental, social, financial and personal factors, have to be addressed.

In addition to the recommendations made in this (and related) NICE guidance, other measures are needed to tackle the wider influences on walking or cycling. This includes reducing road dangers and re-allocating road space to create an environment that encourages people to walk and cycle (see the scope for further detail). Action in these areas is particularly important in tackling inequalities in health.

Local action

The action needed to increase levels of walking and cycling will vary according to people's local and personal circumstances. For instance, it will differ according to whether someone lives in an urban, semi-urban or rural area, the local traffic conditions or their perceptions of safety.

'Local' may refer to an area defined by geography or for administrative purposes. It may comprise an area larger than that covered by a single local authority such as Greater London, Manchester or Merseyside. It may also refer to a housing estate, a small town or a village.

Whose health will benefit?

Unless otherwise stated, the recommendations will benefit everyone.

Policy and planning

Recommendation 1 Involving public health professionals

Who should take action?

- Directors of public health.
- Public health portfolio holders.

What action should they take?

- Ensure a senior member of the public health team is responsible for promoting both walking and cycling. This includes getting all relevant sectors fully involved (see recommendation 2). The role is likely to be combined with responsibility for other forms of physical activity.

- Ensure the joint strategic needs assessment, the health and wellbeing strategy and other local needs assessments and strategies take into account the impact of impediments to walking and cycling on people's health.

- Ensure walking and cycling are considered alongside other interventions when aiming to achieve specific outcomes in relation to the local population's health (such as a reduction in the risk of cardiovascular disease or diabetes). These include outcomes identified through the joint strategic needs assessment process.

- Ensure local needs assessments and strategies are used to help identify and support local schemes to encourage walking and cycling (see recommendation 2) and to increase levels of both walking and cycling.

- Support coordinated, cross-sector working to promote walking and cycling. This includes ensuring NICE's recommendations on physical activity and the environment are implemented.

- Where possible, ensure all relevant sectors contribute resources and funding to encourage and support people to walk and cycle.

- Where appropriate, ensure walking and cycling are treated as separate activities which may require different approaches.

- Ensure walking and cycling projects are rigorously evaluated. This includes the use of control groups, where appropriate.

Recommendation 2 Ensuring all relevant policies and plans consider walking and cycling

Who should take action?

- Local authorities in particular, portfolio holders, lead members and directors responsible for:
    - children and young people's services
    - community safety

  - environment
  - health and wellbeing (including mental health)
  - parks and leisure
  - planning
  - regeneration and economic development
  - social services
  - transport.

- Local enterprise partnerships.

- Chief constables of police and police authorities and elected police commissioners.

- Voluntary and community agencies with an interest in walking and cycling.

What action should they take?

- Ensure local, high-level strategic policies and plans support and encourage both walking and cycling. This includes a commitment to invest sufficient resources to ensure more walking and cycling – to the benefit of individuals and the wider community. Relevant policies and plans include those on:
  - air quality
  - community safety
  - education
  - environment
  - health and wellbeing
  - land use, planning and development control
  - physical activity
  - regeneration and economic development
  - transport.

- Ensure the walking and cycling aspects of these plans are developed in conjunction with relevant voluntary and community organisations.

- Ensure strategies to promote walking and cycling address factors which influence activity at various levels – from policy down to the individual. This includes ensuring NICE's recommendations on physical activity and the environment are implemented.

- Assess the impact of relevant policies and decisions on people's ability to walk and cycle. Where necessary, amend them to ensure they support walking and cycling.

- Ensure plans on walking and cycling are implemented and evaluated.

Recommendation 3 Local activities

Who should take action?

Local authority directors and portfolio holders for:

- public health
- transport
- parks
- leisure services.

What action should they take?

- Develop coordinated, cross-sector programmes to promote walking and cycling for recreation as well as for transport. Aim to shift attention away from individual risk factors and isolated, small-scale interventions.

- Plan for cumulative increases in cycling and walking, based on a long-term vision of what is achievable and best practice. Walking and cycling programmes should form a core part of local transport investment planning, on a continuing basis, with pedestrians and cyclists given priority over motorised transport (in line with the Department for Transport's 'Manual for streets').

- Ensure programmes aim for an overall increase in walking and cycling among the local population (based on the joint strategic needs assessment and regularly updated, as necessary). Ensure they have the resources to

achieve this, taking into account the range of interventions needed to ensure all groups can participate.

- Ensure programmes tackle the behavioural and environmental factors that support or discourage people from walking and cycling. These should be identified in consultation with local communities, including people who do not walk or cycle regularly, as well as those who do. (Environmental factors can be tackled by implementing NICE's recommendations on physical activity and the environment.) Programmes should also take account of recommendations 13–18 in NICE's guidance on preventing cardiovascular disease, in particular, those relating to the need for long-term action.

- Ensure programmes:
    - where possible, comprise an integrated package of measures, implemented by all relevant sectors and stakeholders
    - are based on a realistic understanding of the extent of changes needed to encourage the population to change its behaviour
    - include communications strategies to publicise available facilities (such as walking or cycle routes) and to motivate people to use them
    - take account of the geography of the surrounding area (for instance, the connections with neighbouring local authority areas) as well as local factors such as major transport routes (road and rail), rivers and hills
    - are evaluated, including specific elements within them. This includes assessing how much walking and cycling individuals are doing. It also includes assessing the number of trips undertaken using different modes of transport by the local population overall. Where appropriate, control groups should be used.

Local programmes

Recommendation 4 Personalised travel plans

Who should take action?

Transport planners.

What action should they take?

Help those interested in changing their travel behaviour to make small, daily changes by commissioning personalised travel planning (PTP) programmes. These programmes should be based on current best practice and should:

- Identify those willing to make changes (including people at transitional points in their life, such as when moving house or school when they are more likely to be open to change).
- Contact those identified, either by phone or on the doorstep, and provide information and help, such as tickets, maps, timetables and, if required, more support to make different travel choices.

Recommendation 5 Cycling programmes

Who should take action?

- Local authority transport leads, transport planners and other transport department staff.
- Clinical commissioning groups.
- Public health practitioners.
- Voluntary sector and community organisations with an interest in walking and cycling.

What action should they take?

- Address infrastructure issues that may prevent people from wanting to cycle. Take into account NICE's recommendations on physical activity and the environment.

- Implement town-wide programmes to promote cycling for any purpose, (Note: 'town-wide' in this case could include other administrative areas such as cities or suburban areas.) Programmes could include:
    - provision of information, including maps and route signing
    - fun rides, recreational and sponsored group rides, school sports promotions
    - use of leisure routes on and off roads
    - use of off-road mountain bikes, BMX courses, circuits and parks
    - car-free events or days, virtual cycle races and links with cycle sports events
    - cycle hire schemes
    - intensive sessions in particular settings or aimed at particular groups, such as 'Bike to work' weeks, workplace challenges or activities aimed at children and families (such as 'Bike it', 'Bike club' and other school programmes)
    - activities and campaigns to emphasise the benefits of cycling (including benefits to health, reliability and ease of access to local facilities and services).

- Ensure programmes are based on an understanding of who might walk and cycle in the right circumstances, as well as on the behaviour and preferences of existing walkers and cyclists. Gain an understanding of the local population and the journeys taken (using all modes of transport) by using market segmentation tools. Also draw on data from the transport and physical activity elements of the joint strategic needs assessment.

- Ensure programmes are developed with the involvement of, and support from, schools and workplaces.

- Ensure cycle parking and residential storage issues are addressed.

- Ensure cycling routes are integrated with public transport links to support longer journeys. This includes providing secure cycle parking at public transport venues.

- Ensure training is available for those who are interested in cycling, either as a form of transport or as a recreational activity. Ensure training is sensitive to cultural issues, for instance, by providing women-only groups with female trainers. An example of a cycle training programme is the Department for Transport's 'Bikeability'.

- Consider providing specific support for people at a 'transition point' in their lives – for instance, when they are changing job, house or school, as they may be open to trying a new mode of transport as well.

- Use local media to publicise activities and to clarify links between different elements of the programme (for instance, the provision of maps, local cycling classes and local challenges and events). In addition, use local media to raise awareness of any new or improved infrastructure. Also provide success stories from different elements of the programme to create momentum for the campaign.

Recommendation 6 Walking: community-wide programmes

Whose health will benefit?

Inactive adults and children.

Who should take action?

- Clinical commissioning groups.

- Local transport leads, transport planners and other transport department staff.

- Public health practitioners.
- Local authority leisure services.

What action should they take?

- Address infrastructure issues that may prevent people from wanting to walk, such as traffic levels and speed. Take into account NICE's recommendations on physical activity and the environment.
- Develop walking programmes for inactive adults, based on an accepted theoretical framework for behaviour change. Ensure they address the issues preventing people living in deprived areas from participating. Programmes could include:
  - community-wide events, such as mass participation walking groups, community challenges and 'walkathons'
  - walks led by suitably trained walk leaders (paid or voluntary) and aimed at people who are currently inactive.
- Ensure events are welcoming for local people. This includes ensuring a variety of routes, paces and distances are on offer, at different times of the day (including evenings and on different days of the week or at the weekend) so that people with different preferences and physical abilities can participate. It also includes ensuring safety and cultural issues are addressed and that attendance rates remain high, especially among people who are usually inactive.
- Provide targeted information, tailored for individuals who want to go walking without joining a group or club. Offer continued support in line with recommendation 7.
- Ensure walking routes are integrated with public transport to support longer journeys. Signage should give details of the distance and walking time, in both directions, between public transport and key destinations.

- Develop and implement a publicity strategy to let the local community know about the walking opportunities.

This recommendation, together with recommendation 7, updates and replaces recommendation 6 from Four commonly used methods to increase physical activity (NICE public health guidance 2).

Recommendation 7 Walking: providing individual support including the use of pedometers

Whose health will benefit?

Inactive adults.

Who should take action?

- Clinical commissioning groups.
- Directors of public health and public health specialists with responsibility for physical activity.
- Local authority leisure services.

What action should they take?

- Ensure individual support is available for those participating in local walking programmes whether they walk as part of a group, informally with others, or alone. This includes help to assess their activity levels and to set goals which build on this. The aim should be to increase their step count gradually, rather than providing them with a set total to aim for.
- Provide additional, one-to-one support to encourage people to make walking habitual, on a long-term basis. This could be offered at 3-monthly intervals for up to a year. It could:
  - include individual, targeted information
  - be provided face-to-face, via the telephone, using new media (email, Internet or SMS) or using print-based materials
  - include goal-setting, monitoring and feedback

  - include the use of pedometers to support goal-setting, monitoring and feedback.

- Provide general information including:
  - maps, signs and other information about walking routes
  - details about how to visit places of interest on foot (such as shops, educational or recreational facilities).

- Only give people pedometers to use as part of a package which includes support, monitoring and feedback.

This recommendation, together with recommendation 6, updates and replaces recommendation 6 in Four commonly used methods to increase physical activity (NICE public health guidance 2).

Schools, workplaces and the NHS

Recommendation 8 Schools

Whose health will benefit?

- Pupils, siblings, their parents and carers.
- School staff.
- Visitors to schools.

Who should take action?

- Head teachers and school governors.
- Local authority school travel advisers and transport planners.
- Chief constables and police commissioners.
- Road safety officers.

What action should they take?

- Develop and implement school travel plans that encourage children to walk or cycle all or part of the way to school[1]. Integrate the plans with those of other local schools and other travel plans available for the local community[2].

- Head teachers should identify a walking or cycling champion (or champions) at a sufficiently senior position to coordinate activities. They should liaise with the local authority and other potential partners to address any environmental or organisational barriers to walking and cycling to school.

- Foster a culture that supports physically active travel for journeys to school (for staff, parents and students) and during the school day. This can be achieved by promoting the health benefits of cycling[3] or walking, by providing sufficient and secure cycle parking and by ensuring it is easy to get into the school grounds by foot or by bike. In addition, schools will need to provide suitable cycle and road safety training for all pupils[4].

- Work with local commissioners, particularly in transport and public health, to secure funding to support physically active school travel plans.

- Map safe routes to school and to local play and leisure facilities, taking into account the views of pupils, parents and carers, and in consultation with the local community[5].

[1] Adapted from recommendation 12 in Promoting physical activity for children and young people (NICE public health guidance 17).
[2] Adapted from recommendations 5 and 12 in Promoting physical activity for children and young people (NICE public health guidance 17).
[3] Adapted from recommendation 12 in Promoting physical activity for children and young people (NICE public health guidance 17).
[4] This is part of recommendation 12 in Promoting physical activity for children and young people (NICE public health guidance 17).
[5] Adapted from recommendation 12 in Promoting physical activity for children and young people (NICE public health guidance 17).

- Develop programmes to ensure the local environment around schools and the nearby catchment area provides opportunities for children to cycle or walk.

- Introduce regular 'walking buses' and other activities, such as 'Walk once a week' projects, which support and encourage walking and cycling to school[6].

- Set performance targets for school travel plans which are audited annually and which form part of delivery plans for strategic partnerships. Remedial action should be taken when agreed targets are not reached[7].

- Develop parents' and carers' awareness of the wider benefits of walking and cycling and other physically active modes of travel. For example, explain how it can improve children and young people's movement skills, social wellbeing, self-confidence and independence. Also explain how it can help children to explore and become more familiar (and at ease) with their local environment while, at the same time, being physically active[8].

- Ensure all children can take part in 'Bikeability' level 2 training (see the Department for Transport website for details).

Recommendation 9 Workplaces

Whose health will benefit?

Staff and others who use workplaces, including students and visitors.

Who should take action?

- Employers.

- Directors and senior staff including managers, health and safety staff, estates managers and human resources professionals.

[6] Adapted from recommendation 12 in Promoting physical activity for children and young people (NICE public health guidance 17).
[7] This is part of recommendation 12 from Promoting physical activity for children and young people (NICE public health guidance 17).
[8] This is part of recommendation 12 from Promoting physical activity for children and young people (NICE public health guidance 17).

- Active travel champions.

What action should they take?

- Develop strategies in consultation with staff (and other relevant stakeholders, for example, students in universities and colleges) to promote walking and cycling in and around the workplace[9].

- Liaise with local authority transport departments, neighbouring businesses and other partners to improve walking and cycling access to workplace sites. (Also see NICE's recommendations on physical activity and the environment.)

- Identify an 'active travel champion' within the workplace, at a sufficiently senior level, to coordinate activities such as led walking groups, more informal walking groups, workplace 'challenges' and promotional competitions (for instance, using pedometers).

- Active travel champions should ensure workplace walking programmes are developed using an evidence-based theoretical model of behaviour change. They should provide people who want to increase the amount they walk with individual support (see recommendation 7).

- Active travel champions should encourage walking during the working day. For example, they could encourage people to walk rather than taking the lift. In addition, they could develop or join schemes that give staff access to a pool of bicycles for short-distance business travel, or for discounted cycle purchases (such as the 'Cycle to work' scheme).

- Active travel champions should publish walking and cycling routes and circuits and provide people with tailored information, maps, routes and safety information.

See NICE recommendations on promoting physical activity in the workplace for further recommendations.

[9] This is adapted from recommendation 1 in Promoting physical activity in the workplace (NICE public health guidance 13).

Recommendation 10 NHS

Who should take action?

- Clinical commissioning groups.
- Primary care professionals.

What action should they take?

- Incorporate information on walking and cycling into physical activity advice given by health professionals. (See also NICE's recommendations on four commonly used methods to increase physical activity.)
- Ensure walking is one of the options in the 'Let's get moving' physical activity care pathway.
- Ensure people who express an interest in walking or cycling as a way of being more physically active are given information about appropriate local options. Also provide individual support and follow-up (see recommendation 7).

2 Public health need and practice

Physical activity is essential for good health (DH 2004). It can help reduce the risk of coronary heart disease, stroke and type 2 diabetes by up to 50%. It also keeps the musculoskeletal system healthy and promotes mental wellbeing.

New national physical activity guidelines were issued in 2011 (Chief Medical Officers of England, Scotland, Wales and Northern Ireland 2011) for: the under-5s, those aged 5–18, adults aged from 19–64 and for those aged 65 plus. Key points include the need to:

- be physically active at all ages
- participate in vigorous-intensity activity
- be flexible – how combining moderate and vigorous-intensity activity can be effective
- participate in daily activity
- address sedentary behaviour.

Depending on factors such as speed, walking and cycling can both be moderate or vigorous activities. For example, brisk walking (at a speed of 3 mph (6 kph) is categorised as **moderate intensity**, and cycling at around 10 mph (16 kph) is considered to be a **moderate-to-vigorous activity**.

Physical activity levels in England

Based on self-reporting, 61% of men (71% of women) in England aged 16 and over did not meet the national recommended levels[10] (Craig et al. 2009). The proportion of men who are physically active enough decreases markedly as they get older (from 53% at age 16–24 to 16% at 65 plus). The level of activity among women was considerably lower once they reach 65 plus. (Around 12% of women over 65 met the recommended levels compared to 28–36% of younger women.) (Craig et al. 2009).

[10] These figures refer to the pre-2011 guidelines for physical activity (that is: adults should be active for at least 30 minutes at least five times a week at moderate intensity or greater).

Black African and Asian adults and black Caribbean women were less likely to achieve the recommendations than the general population (The Information Centre 2006).

Sixty three per cent of girls (72% of boys) aged between 2 and 15 report being physically active for 60 minutes or more on 7 days a week (girls' activity declines after the age of 10) (The Information Centre 2008). However, objective data suggest this is an overestimate. Only 2.5% (5.1% of boys, 0.4% of girls) actually did more than 60 minutes of moderate-to-vigorous physical activity daily (Riddoch et al. 2007).

The Chief Medical Officers' 2011 report notes: 'there is a clear causal relationship between the amount of physical activity people do and all-cause mortality. While increasing the activity levels of all adults who are not meeting the recommendations is important, targeting those adults who are significantly inactive (that is, engaging in less than 30 minutes of activity per week) will produce the greatest reduction in chronic disease' (Chief Medical Officers of England, Scotland, Wales, and Northern Ireland 2011).

Walking and cycling

Walking is reported to be the most common – and cycling the fourth most common – recreational and sporting activity undertaken by adults in Britain (Fox and Rickards 2004). Walking (for any purpose) accounted for between 37% and 45% of the time that women of all ages spent doing moderate or vigorous physical activity. It also accounted for between 26% and 42% of the time devoted to such activities by men of all ages (Belanger et al. 2011). As a result, it is the most important way all adults can achieve the recommended levels of physical activity.

Bicycles are used for around 2% of journeys in Britain – compared to about 26% in the Netherlands, 19% in Denmark and 5% in France (Ministry of Transport, Public Works and Water Management 2009). Yet of all trips made in Great Britain in 2009, 20% covered less than 1 mile and more than half (56%) of car journeys covered less than 5 miles (Department for Transport

2010a). Today, on an average day in London, it is estimated that around 4.3 million trips are 'potentially cyclable' (Transport for London 2010).

The majority (85.8%) of adults claim they can ride a bicycle (around 92.9% of men and 79% of women) (Department for Culture Media and Sport 2011). However, the average time spent travelling on foot or by bicycle in Britain has decreased from 12.9 minutes per day in 1995/97 to 11 minutes per day in 2007 (Department for Transport 2010a).

Air pollution

Motorised transport in urban areas of England is associated with poor air quality, congestion, collisions and physical inactivity – each costing society around £10 billion a year (Department for Transport 2009a). The cost of greenhouse gas emissions and the annoyance associated with noise are smaller, but still significant. In the case of greenhouse gases, costs are expected to rise sharply in future years (Department for Transport 2009a).

Exposure to air pollution is a significant cause of mortality in England. The House of Commons environmental audit report on air quality noted that: 'poor air quality reduces the life-expectancy of everyone in the UK by an average of 7 to 8 months and up to 50,000 people a year may die prematurely because of it' (House of Commons Environmental Audit Committee 2010).

Air pollution is caused by a range of factors and people's exposure depends on the level of emissions, dispersion and other factors. Particulate matter, especially small particles less than 10 or 2.5 microns (PM_{10} or $PM_{2.5}$) in diameter, has a significant impact on health. Other significant pollutants include nitrogen oxides (NO_x) and ozone.

Industrial sources produce a larger percentage of PM_{10} and NO_x than road transport (46% and 30% respectively for NO_x and 36% and 18% for PM_{10}). However, road transport is responsible for up to 70% of air pollution in urban areas where most human exposure to air pollution occurs (House of Commons Environmental Audit Committee 2010).

Greenhouse gas emissions from domestic transport in Great Britain stayed at the same level between 1990 and 2009 (around 120 $MtCO_2e$[11]). Over this period, an improvement in the fuel economy of new cars was offset by increases in mileage. At the same time, the overall emission of greenhouse gases from all sources in this country has decreased. As a result, as a percentage, the proportion from transport has increased from 16% to 22%. Ninety per cent of these emissions are from road transport (58% from cars and around 30% from heavy goods vehicles and light vans) (Department for Transport 2010a).

Climate change, driven by human emissions of gases such as carbon dioxide, will lead to higher temperatures, more frequent extreme weather events, changes in rainfall and weather patterns, food and waterborne diseases and changes in distribution of vector-borne diseases. This will all have a significant impact on health in England (and globally). Changes associated with migration, following events such as flood or famine and higher levels of stress from extreme events are also likely to have a negative effect (World Health Organization 2009).

[11] Million tonnes of carbon dioxide equivalent. Various gases (such as methane) have a different impact on the warming of the atmosphere. Converting to $MtCO_2e$ enables a direct comparison of the impact of different gases or mixtures on the atmosphere.

3 Considerations

The Programme Development Group (PDG) took account of a number of factors and issues when developing the recommendations.

3.1 The PDG noted that encouraging people to walk or cycle for recreation purposes is different from encouraging them to walk or cycle as a mode of transport.

3.2 The PDG considered walking and cycling as two separate activities.

3.3 Most people could fit these activities into their daily lives and both are relatively cheap or may save money.

Evidence

3.4 Evidence related to walking and cycling comes from a number of different professional sectors, in particular, transport and health. Each sector has its own approach to research and evaluation which can lead to difficulties in identifying and interpreting the evidence.

3.5 Health sector evidence tends to be gathered by controlling all available factors to help pin down a causal link with health. While this provides greater certainty about cause and effect, it tends to limit investigation to topics which lend themselves to this strict approach, such as promotional work with individuals or within a limited setting such as a school. Transport and other professional sectors are more likely to address population-level factors – and are more likely to have had a range of outcomes or intentions in mind. For instance, both public health and transport professionals might have an interest in the benefits of cycling. However, the former would want to know how it impacts on someone's level of physical activity (and hence health). Transport professionals, meanwhile, might want to know which particular journey would be cycled (and hence, the impact on motor traffic and congestion

levels). As a result, while both groups might have a legitimate interest in activities that raise cycling levels, the outcomes of evaluations might be different.

3.6 It is difficult to apply the findings of non-UK cycling studies to the situation in England (including the findings from older literature) because it is so different: levels of cycling are considerably higher in many other countries.

3.7 Walking interventions appear to be effective if tailored to people's needs and aimed at either the most sedentary groups – or at those who are most motivated to change. Evidence showed that interventions could work if aimed at individuals (brief advice, supported use of pedometers, support and encouragement provided via the telephone or Internet), households (marketing activities) or groups.

3.8 Evidence showed that community-wide promotional activities combined with an improved infrastructure, had the potential to increase cycling rates by modest amounts. Studies of marketing activities aimed at individuals reported a consistent, positive effect on cycling behaviour. However, the PDG noted that more robust study designs were needed.

3.9 Practical experience indicates that two particular factors play a key role in increasing walking and cycling rates: having a 'champion' who has changed their own walking or cycling behaviour, and effective local authority support.

3.10 Four interventions, including two multi-component interventions (Cycling Demonstration Towns and Sustainable Travel Towns) were included in the economic modelling. Using cost per quality-adjusted life years (QALY) gained, the interventions were highly cost effective, even when the effect disappeared after year 1. The PDG noted that the key factors influencing the outcome of the

economic model were: threshold cost, level of effects, decay in effects and costs related to initial effects. Members also noted the importance of offering the most appropriate interventions for different local settings and needs.

3.11 Data from a UK randomised control trial (RCT) was used to model the effect of led walks. The PDG raised concerns because the RCT showed no difference in effect between led walks and the provision of advice only. The results were not used for the recommendations. Using evidence from an evaluation of 'Get walking, keep walking', a large UK study, produced a cost per QALY of around £2700.

3.12 In addition to a cost–utility analysis, cost–benefit ratios were also calculated for environmental and traffic outcomes. These considered a range of benefits associated with increased walking or cycling and a consequent change in motor vehicle miles driven. The methodology was based on that used by the Department for Transport. However, health benefits (which account for most of the benefits calculated using the Department for Transport methodology) were not included, as these had been calculated in the cost–utility analysis.

3.13 The PDG recognised the importance of considering children. However the modelling did not consider under-18s due to a lack of direct evidence on children's behaviour in many of the studies.

Pedometers

3.14 Pedometers are cheap, effective and 'user-friendly'. The PDG noted that they may play an important role in helping people to walk more, provided they are used within a programme involving monitoring, support and goal setting. However, the PDG also noted that the use of set targets (such as 10,000 steps a day) was unlikely to be helpful if it did not take into account someone's

current level of activity. In addition, some people may be put off if pedometers are used as part of a competition.

Wider influences

3.15 A wide range of factors influence whether or not people walk or cycle. Many were outside the scope of this guidance. In particular, the PDG noted that environmental factors such as the quality, accessibility and availability of walking and cycling networks are likely to be important. Other issues, such as the relative costs, are also likely to be significant. As a result, it recommended that this guidance should be implemented in conjunction with other related NICE recommendations, in particular, on environmental issues.

3.16 The scope for this guidance included an adapted logic model (Sallis et al. 2006) which sets out local factors and interventions which can impact on walking and cycling rates. It demonstrates the conceptual link between local interventions targeting the physical or social environment (or individuals) and intermediate outcomes in relation to walking and cycling. These outcomes, in turn, link to impacts on health, the environment and other areas (such as the economy). The model also highlights how local policy, resources and other factors influence the effectiveness of local interventions to improve rates if walking and cycling. For example, a decision to use cycling as a form of transport can be influenced by the level and speed of traffic, attitudes to safety, the ability to plan and execute a route, and the ability to carry baggage. (Please note: although national factors such as legislation and fuel duty also have an important impact, these are not included here.)

3.17 A number of legal issues differentiate England from parts of continental Europe, where levels of cycling are significantly higher. In parts of continental Europe, ‘strict liability’ means that pedestrians or cyclists injured in a collision involving a motor vehicle do not have to prove fault in seeking compensation. In

addition, drivers have a civil responsibility to have insurance that will pay vulnerable victims independently of fault, while not changing criminal responsibility (see ‘Expert paper 2’). Such legal requirements may act as an incentive for drivers to behave in a way that protects the most vulnerable road users.

3.18 The PDG noted that relatively few people in England cycle on a regular basis for transport purposes. This is not the case in other parts of Europe. For example, in Denmark and the Netherlands, it is considered the norm to use a bicycle for many journeys. Age is not necessarily a barrier. In the Netherlands, people aged 54–74 use a bicycle for 26% of all their journeys, while those aged over 75 use one for 19% of their journeys. The PDG considered these examples as aspirational goals.

3.19 The PDG noted that moving towards the higher levels of cycle use seen in some Northern European countries is a process that will involve change over a prolonged period. It also noted that some of these changes are beyond the scope of this guidance. However, it felt that substantial public health benefits (such as increased levels of physical activity and reduced emissions of air pollutants) could be achieved as part of such a process.

3.20 The PDG noted a range of issues which, if tackled in isolation, are unlikely to lead to a significant increase in walking or cycling. It also noted that tackling such issues could, nevertheless, provide a necessary foundation for interventions which will have a significant impact. For example, a key factor preventing people from walking and cycling is the danger (and perceived danger) facing them on or near roads, paths or trails. The PDG discussed a range of measures that may help overcome this problem. These included:

- Making people aware of the comparatively low risks posed on the roads.

- Making motorists and cyclists aware of the needs of pedestrians.
- Making motorists aware of the needs of cyclists (for instance, noting that they should give way, where appropriate, avoid causing a hazard by pavement parking and avoid closely overtaking cyclists).
- Appropriate enforcement of the Highway code, based on the danger and nuisance caused.
- The role of traffic-calming measures where there's potential to encourage a growth in cycling or walking.
- The needs of children and older people (see NICE guidance on strategies to prevent unintentional injuries among under-15s and on road design).

3.21 Action to increase walking and cycling rates may reduce motor traffic volume and the PDG was concerned that the resulting benefits (of reduced congestion and reduced air pollution) are not lost. For example, less traffic could lead to increases in vehicle speed, or a decision to drive for journeys previously undertaken using other modes of transport. Members noted that action to ensure this does not happen could include a re-allocation of road space, in line with the reduced volume of motor traffic, or restricting motor vehicle access.

3.22 Local roads may be 'challenging' for children. Achieving 'Bikeability' level 3 (being able to deal with all types of road conditions and more challenging traffic situations) may be important (at least for older children).

Physical activity

3.23 Most people can walk, including groups such as older people and those with some functional difficulties. While the majority of adults

(85.8%) in the UK say they can ride a bike (Department of Culture, Media and Sport 2011), cycling as a means of transport is a minority activity (as is, to a lesser extent, walking). It accounts for a small percentage of all journeys – and for a small part of overall physical activity in this country. Nevertheless, 43% of adults own a bicycle and 14% use it at least monthly (Department for Transport 2009b). Cycling remains popular among children and young people, with 29% of those aged 11–15 years cycling regularly (Sport England, undated).

3.24 In London, an estimated 4.3 million trips a day (around two thirds taken by car, the remainder mainly by bus) could be cycled.

Inequalities

3.25 Cyclists are more likely to be young, middle class, male and white.

3.26 For many people in England, walking, or using some other kind of physically active travel as the norm may not represent a lifestyle choice. Rather, they do it because they do not have access to a car.

3.27 People in households without a car walk, on average, 284 miles per year, compared to 176 miles per year walked by people in households with a car (Department for Transport 2010b). People who are most physically active do not necessarily walk or use a bicycle as a mode of transport. For some, the fact they have access to a car may have a positive influence on their physical activity levels. (This is particularly true for older women, for example, because they may use a car to travel to an activity class or to a pleasant place to walk.)

3.28 The distance walked in Great Britain varies per person per year. In the quintile with the lowest household income, the distance walked is 223 miles, then it is 202, 182 and 177 miles respectively for people in the next three quintiles. In the quintile with the highest

household income, people walk an average 201 miles per year. For cycling, the distance increases across the spectrum. Miles cycled per person per year is 32 in the lowest two quintiles, then 39, 49 and 77 miles respectively (Department for Transport 2010b).

3.29 One way of encouraging people to walk or cycle as a form of transport might be to restrict car journeys, particularly for short trips. However, this might disadvantage car owners living in areas where the environment is not conducive to walking or cycling, or where there is little real alternative to driving. On the other hand, reducing car use could have a positive influence on the environment, by reducing vehicle numbers and air pollution.

3.30 The PDG discussed the possible impact of the recommendations on inequalities. It acknowledged that those who are better off may have more opportunity to respond to the choices offered. To address this, the PDG emphasised that implementation of the recommendations should be accompanied by action to address the other barriers to physical activity, such as a hostile and degraded environment.

Barriers and facilitators

3.31 When making transport choices, habit is important for most people, most of the time. Rather than considering the options, people go into default mode (for instance, driving a particular journey because they always drive that journey, or because they always drive). Choosing to use a different mode of transport from usual is likely to require more planning and thought. For instance, choosing to cycle might mean finding the appropriate clothing, getting the bike out, route planning and allowing time for a trip of an uncertain duration. The PDG noted that many of these factors may no longer be significant barriers when walking or cycling becomes the norm and the benefits are realised. For instance, both will usually involve reliable and more predictable journey times. Many journeys may

also be quicker, as well as being more healthy. There are also wider community benefits from reduced congestion and pollution.

3.32 The PDG noted that the times when someone has to reconsider their transport choices (such as when changing job or school, retiring or moving house) may offer an important point at which to influence their behaviour.

3.33 Despite walking and cycling being different activities, sometimes they are grouped together. The PDG felt this was unhelpful, as barriers and facilitators to walking and cycling vary – and, in turn, they differ according to whether the activity is chosen for transport or recreational purposes. They can also be specific to the purpose and location of the trip – and to the person undertaking it. Successful interventions to increase cycling and walking need to take into account this wide range of factors.

3.34 Walking and cycling, like any form of transport, involve exposure to a certain level of risk. This includes the risk of injury from falls or from collisions and exposure to air pollution. These risks are not unique to transport involving physical activity.

3.35 Risk of injury or collision is a key consideration when walking and cycling in places where there are other people. As well as the actual level of risk, the perception of risk is important. The PDG noted that cyclists and pedestrians are more vulnerable in the event of a collision than those in a motor vehicle. At the same time, they are less likely to cause injury in the event of a collision due to their lower mass and lower speed of travel.

3.36 The PDG concurred that transport planning could be a way to reduce the dangers on the road for all road users. Reductions in motorised traffic volumes and speeds, increased driver awareness of the risks of poor driving and the need to fully consider pedestrians and cyclists might be factors considered by such plans.

3.37 Attitudes to walking and cycling are generally positive or neutral. However, a combination of factors discourages people for whom it is a question of choice, rather than necessity, from taking up physically active travel. These include:

- Concerns about the physical environment, in particular, with regard to perceptions of safety. Motor traffic is a major deterrent for many potential and current cyclists. Similarly, many potential walkers restrict their journeys on foot because of their perception that empty streets, particularly at night, are dangerous.

- Complex household routines (especially for those with young children). For most people it is a combination of circumstances that prevent them from walking or cycling for everyday travel. These include: the logistics of organising and moving with (sometimes tired) children, pressures of time and other commitments, the paraphernalia needed for walking and cycling, and parental concerns about safety.

- The perception that walking and cycling are not things to do as a matter of routine.

Wider impacts

3.38 Traffic volume and speed act as barriers to walking and cycling (for recreation, as well as for transport purposes). The PDG noted that the level of motor traffic creates congestion which, in turn, imposes costs on the economy, through loss of productive time. Motor vehicles are also major contributors to air and noise pollution, as well as to carbon dioxide emissions.

3.39 Increasing the amount people walk or cycle, particularly in urban areas, results in a change in exposure to air pollution. Moving journeys from motorised transport to walking or cycling may alter individual exposure to air pollution, while reducing the total emissions of pollutants. Modelling by De Hartog et al. (2010)

suggests that an individual's risk from increased exposure to air pollutants is modest in comparison with the benefits of them being more physically active. In addition, the overall decrease in air pollutant emissions benefits the health of the whole population. The PDG noted that a range of other potential benefits might accrue from a shift to physically active travel. These include reductions in road danger, noise, congestion and emissions of carbon dioxide. Walking and cycling can also benefit local communities by encouraging more people of all ages to be out on the streets, so making streets appear less threatening.

3.40 Personal exposure to air pollution is influenced by route choice. Routes which avoid busy roads may have much lower levels of air pollutants.

3.41 In addition to the standard cost–utility calculations, the economic modelling included an assessment of the cost–benefit ratios for selected costs associated with environmental pollution and congestion. In most cases, interventions to promote walking and cycling led to greater benefits than costs, when considering their impact on congestion, infrastructure, collisions, local air quality, noise, greenhouse gases and indirect taxation. Only for Cycling Demonstration Town interventions were the costs greater than the benefits. However, the modelling did not include the substantial benefits (likely to be in excess of 80% of the total) to be gained from reducing the range of health conditions associated with not being physically active enough. (These were calculated separately.)

This section will be completed in the final document.

4 Implementation

NICE guidance can help:

- Local authorities improve the health and wellbeing of people in their area.
- Local NHS organisations, local authorities and other local partners benefit from any identified cost savings, disinvestment opportunities or opportunities for re-directing resources.
- National and local organisations improve quality and health outcomes and reduce health inequalities.
- Commissioners and providers of NHS organisations, social care and children's services meet national priorities and the requirements of the DH's 'Operating framework for 2011/12'.
- Provide a focus for integration and partnership working across social care, the NHS and public health organisations.

NICE will develop tools to help organisations put this guidance into practice. Details will be available on our website after the guidance has been issued.

5 Recommendations for research

The Programme Development Group (PDG) recommends that the following research questions should be addressed. It notes that 'effectiveness' in this context relates not only to the size of the effect, but also to cost effectiveness and duration of effect. It also takes into account any harmful/negative side effects.

All the research should aim to identify differences in effectiveness among groups, based on characteristics such as socioeconomic status, age, gender and ethnicity.

5.1 What types of evaluation are appropriate for complex, population-wide interventions aiming to increase rates of walking and cycling? Issues to consider include: population-level health outcomes such as pollution emissions and exposure, the impact of an intervention on risk and danger and other, wider outcomes of interest such as the impact on the local economy. Approaches should be developed to take account of the backgrounds and needs of the different professional groups involved in helping to influence walking and cycling for transport or recreation. This includes professionals working in public health, transport, environment, economic development and regeneration.

5.2 What key factors influence the effectiveness of population-level or whole-area approaches to encouraging walking or cycling? How do these factors interact? (Specifically, how do infrastructure changes, promotion of these changes, promotion of walking and cycling generally, the provision of individual support and approaches in specific settings interact?) How does effectiveness vary between different geographical areas?

5.3 How do local factors influence the effectiveness of specific approaches to encouraging walking or cycling? (This includes people's level and perception of risk, the degree of connectivity for

cycling trips, and the local 'visibility' of cycling or walking as a mode of transport.) How do these factors interact with personal factors (such as willingness to try walking or cycling) and how do these personal factors influence effectiveness? In particular, do local factors influence the effectiveness of cycle training and personalised travel planning?

5.4 What key factors ensure people continue to walk or cycle in the long term (over a year)? How do individual interventions (such as follow-up or goal-setting) interact with environmental factors (such as distance, perception of danger or provision of facilities) in encouraging people to continue to walk or cycle?

5.5 What key factors influence differences in walking and cycling behaviour among different groups – and what are the implications for interventions aiming to achieve population-level change and reduce inequalities? This should take into account transport-related variables such as level of car ownership.

More detail on the gaps in the evidence identified during development of this guidance is provided in appendix D.

6 Updating the recommendations

This section will be completed in the final document.

7 Related NICE guidance

Published

Preventing type 2 diabetes: population and community interventions. NICE public health guidance 35 (2011)

Preventing unintentional road injuries among under-15s: road design. NICE public health guidance 31 (2010)

Strategies to prevent unintentional injuries among under-15s. NICE public health guidance 29 (2010)

Prevention of cardiovascular disease. NICE public health guidance 25 (2010)

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

Mental wellbeing and older people. NICE public health guidance 16 (2008)

Promoting physical activity in the workplace. NICE public health guidance 13 (2008)

Community engagement. NICE public health guidance 9 (2008)

Physical activity and the environment. NICE public health guidance 8 (2008)

Behaviour change. NICE public health guidance 6 (2007)

Four commonly used methods to increase physical activity. NICE public health guidance 2 (2006)

Under development

Preventing type 2 diabetes: risk identification and interventions for high-risk individuals (publication expected June 2012)

Obesity: working with local communities (publication expected November 2012)

Physical activity advice in primary care (publication expected May 2013)

Overweight and obese children and young people: lifestyle weight management services (publication expected October 2013)

Overweight and obese adults: lifestyle weight management services (publication expected January 2014)

8 Glossary

Moderate-intensity physical activity

Moderate-intensity physical activity requires a degree of effort and noticeably increases the heart rate. Examples include brisk walking, housework and domestic chores.

Moderate-to-vigorous physical activity

Moderate-to-vigorous physical activity requires a large amount of effort, causes rapid breathing and a substantial increase in heart rate. Examples include running and climbing briskly up a hill.

Virtual cycle races

These are competitions where participants log the number of miles they have cycled on their own or as part of a team. The aim is to cycle a predetermined number of miles over a certain time. A target could be, for example, to cycle the number of miles it would take to travel from Lands End to John O'Groats.

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Appendix A Membership of the Programme Development Group (PDG), the NICE project team and external contractors

Programme Development Group

PDG membership is multidisciplinary. The Group comprises public health practitioners, clinicians, local authority officers, teachers, social care professionals, representatives of the public, academics and technical experts as follows.

Ralph Bagge Community Member

Nick Cavill Director, Cavill Associates

Adrian Davis Public Health and Transport Consultant, NHS Bristol

Charlie Foster Programme Leader, University of Oxford

Mark Frost Senior Transport Planner, London Borough of Hounslow

Melvyn Hillsdon Associate Professor of Exercise and Health Behaviour, University of Exeter

Philip Insall Director, Health, Sustrans

Tim Jones Research Fellow, Land Use and Transportation Planning, Oxford Brookes University

Patrick Lingwood Walking and Cycling Officer, Bedford Borough Council

Susie Morrow Community Member

Nanette Mutrie Professor of Exercise and Sport Psychology, University of Strathclyde

Jennifer Roberts Professor of Economics, University of Sheffield

Harry Rutter (Chair) Director, National Obesity Observatory

NICE project team

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Hugo Crombie Lead Analyst

Charlotte Haynes Analyst

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Kim Jeong Technical Adviser, Health Economics

Victoria Axe Project Manager

Sue Jelley Senior Editor

Alison Lake Editor

External contractors

Evidence reviews

Review 1 was carried out by the School of Health and Related Research (ScHARR), University of Sheffield. The principal authors were: Lindsay Blank, Roy Jones, Helen Buckley Woods and Nick Payne.

Review 2 was carried out by ScHARR, University of Sheffield. The principal authors were: Maxine Johnson, Lindsay Blank, Roy Jones, Helen Buckley Woods and Nick Payne.

Cost effectiveness

The review of economic evaluations was carried out by ScHARR, University of Sheffield. The principal authors were Laurence Blake and Alan Brennan.

The economic modelling was carried out by ScHARR, University of Sheffield. The principal authors were Laurence Blake and Alan Brennan.

Expert testimony

Expert paper 1 by Phillipa Hunt, Living Streets

Expert paper 2 by Colin Pooley, Lancaster University

Expert paper 3 by Chris Peck, CTC, the national cyclists' organisation

Expert paper 4 by Ed Plowden, Bristol City Council

Expert paper 5 by David Ogilvie and Jenna Panter, MRC Epidemiology Unit

Expert paper 6 by John Pucher, Rutgers University

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Appendix B Summary of the methods used to develop this guidance

Introduction

The reviews, primary research, expert testimony and economic modelling report include full details of the methods used to select the evidence (including search strategies), assess its quality and summarise it.

The minutes of the Programme Development Group (PDG) meetings provide further detail about the Group's interpretation of the evidence and development of the recommendations.

All supporting documents are listed in appendix E and are available at the NICE website.

Guidance development

The stages involved in developing public health programme guidance are outlined in the box below.

1. Draft scope released for consultation

2. Stakeholder meeting about the draft scope

3. Stakeholder comments used to revise the scope

4. Final scope and responses to comments published on website

5. Evidence reviews and economic modelling undertaken and submitted to PDG

6. PDG produces draft recommendations

7. Draft guidance (and evidence) released for consultation

8. PDG amends recommendations

9. Final guidance published on website

10. Responses to comments published on website

Key questions

The key questions were established as part of the scope. They formed the starting point for the reviews of evidence and were used by the PDG to help develop the recommendations. The overarching questions were:

Which local interventions are effective and cost effective at promoting and increasing cycling and walking for recreational and travel purposes?

Which local interventions are effective and cost effective at changing population-level norms and behaviour in relation to cycling and walking for recreational and travel purposes?

What factors help or hinder the planning and delivery of walking and cycling-related interventions for recreation or travel purposes?

What factors help or prevent people from walking and cycling for recreation or travel?

What health and other outcomes may be achieved by increasing cycling and walking for travel and recreation?

These questions were made more specific for each review (see reviews for further details).

Reviewing the evidence

Effectiveness reviews

One review of effectiveness was conducted (review 1).

Identifying the evidence

A number of databases were searched in August 2011 for papers relating to walking and cycling published since 1990. See the review for details of the databases searched.

In addition, specific websites were examined and papers from stakeholders and members of the PDG were considered.

Selection criteria

Studies were included in the effectiveness review if they considered the impact of local interventions to raise awareness of, encourage or increase uptake of, walking and cycling for recreational and travel purposes.

Studies were excluded if they covered:

- national policy, fiscal or legislative changes
- local interventions which solely aimed to change the physical environment.

Other reviews

A review of barriers and facilitators (review 2) was conducted.

Identifying the evidence

A number of databases were searched in August 2011 for papers relating to walking and cycling published since 1990. See the review for details of the databases searched.

In addition, specific websites were examined and papers from stakeholders and members of the PDG were considered.

Selection criteria

Studies were included if they focused on interventions identified in the scope and addressed barriers and facilitators to walking and cycling.

Studies were excluded if they focused on:

- National policy, fiscal and legislative changes.
- Local interventions which solely aimed to change the physical environment (such as traffic-calming measures, provision of cycle parking facilities or construction of cycle routes).

Quality appraisal

Included papers were assessed for methodological rigour and quality using the NICE methodology checklist, as set out in the NICE technical manual 'Methods for the development of NICE public health guidance' (see appendix E). Each study was graded (++, +, –) to reflect the risk of potential bias arising from its design and execution.

Study quality

++ All or most of the checklist criteria have been fulfilled. Where they have not been fulfilled, the conclusions are very unlikely to alter.

+ Some of the checklist criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are unlikely to alter the conclusions.

– Few or no checklist criteria have been fulfilled. The conclusions of the study are likely or very likely to alter.

The evidence was also assessed for its applicability to the areas (populations, settings, interventions) covered by the scope of the guidance. Each evidence statement concludes with a statement of applicability (directly applicable, partially applicable, not applicable).

Summarising the evidence and making evidence statements

The review data was summarised in evidence tables (see full reviews).

The findings from the reviews were synthesised and used as the basis for a number of evidence statements relating to each key question. The evidence statements were prepared by the external contractors/public health collaborating centres (see appendix A). The statements reflect their judgement of the strength (quality, quantity and consistency) of evidence and its applicability to the populations and settings in the scope.

Cost effectiveness

There was a review of economic evaluations and an economic modelling exercise.

Review of economic evaluations

Studies were identified by searching the NHS Economic Evaluation Database (NHSEED). An additional search was undertaken using an economics study filter.

The search focused on health economic studies that dealt with:

- interventions to increase walking and/or cycling and reported relevant health-related outcomes
- cost–benefit analysis results studies which considered wider outcomes, including travel, congestion and pollution.

Simplified search strategies were also used to search another economic specific database EconLit.

Economic modelling

An economic model was constructed to incorporate data from the reviews of effectiveness and cost effectiveness. The results are reported in: 'Walking and cycling: local measures to promote walking and cycling as forms of travel or recreation: health economic and modelling report'.

How the PDG formulated the recommendations

At its meetings in November 2011 and January, February and March 2012, the Programme Development Group (PDG) considered the evidence, expert reports and cost effectiveness to determine:

- whether there was sufficient evidence (in terms of strength and applicability) to form a judgement
- where relevant, whether (on balance) the evidence demonstrates that the intervention or programme/activity can be effective or is inconclusive
- where relevant, the typical size of effect (where there is one)
- whether the evidence is applicable to the target groups and context covered by the guidance.

The PDG developed draft recommendations through informal consensus, based on the following criteria:

- Strength (type, quality, quantity and consistency) of the evidence.
- The applicability of the evidence to the populations/settings referred to in the scope.
- Effect size and potential impact on the target population's health.
- Impact on inequalities in health between different groups of the population.
- Equality and diversity legislation.
- Ethical issues and social value judgements.
- Cost effectiveness (for the NHS and other public sector organisations).

- Balance of harms and benefits.
- Ease of implementation and any anticipated changes in practice.

The PDG noted that effectiveness can vary according to the context. For instance, geographical factors such as population density in rural or urban areas influence the likelihood of walking or cycling being a viable option for utility travel.

Where evidence was lacking, the PDG also considered whether a recommendation should only be implemented as part of a research programme.

Where possible, recommendations were linked to an evidence statement(s) (see appendix C for details). Where a recommendation was inferred from the evidence, this was indicated by the reference ‘IDE’ (inference derived from the evidence).

Appendix C The evidence

This appendix lists the evidence statements and links them to the relevant recommendations. (See appendix B for the key to quality assessments.) Note: the evidence statements in review 1 (see appendix A) were amended by NICE and endorsed by the Programme Development Group (PDG). This appendix includes the amended evidence statements from review 1.

Appendix C also lists six expert reports and their links to the recommendations and sets out a brief summary of findings from the economic analysis.

The evidence statements are short summaries of evidence, in a review, report or paper (provided by an expert in the topic area). Each statement has a short code indicating which document the evidence has come from. The letter(s) in the code refer to the type of document the statement is from, and the numbers refer to the document number, and the number of the evidence statement in the document.

Evidence statement number R1.ES1 indicates that the linked statement is numbered 1 in the document 'Evidence statements on the effectiveness of local interventions to promote cycling and walking for recreational and travel purposes'. **Evidence statement numbered R2.ES1** indicates that the linked statement is numbered 1 in the document 'Synthesis of evidence relating to barriers and facilitators to implementing interventions that promote cycling and walking, and to carrying out cycling and walking for recreational and travel purposes'. **Evidence statement EM.ES1** indicates that the linked statement is numbered 1 in 'Interventions to promote cycling and walking for recreational and travel purposes: Health economic and modelling report'

The reviews, expert reports and economic analysis are available online. Where a recommendation is not directly taken from the evidence statements, but is inferred from the evidence, this is indicated by **IDE** (inference derived from the evidence).

Where the PDG has considered other evidence, it is linked to the appropriate recommendation below. It is also listed in the additional evidence section of this appendix.

Recommendation 1: IDE; Additional evidence expert papers 2, 4, 6

Recommendation 2: IDE; Additional evidence expert papers 2, 4, 6

Recommendation 3: Evidence statements R1.ES5, R1.ES6, R1.ES7; Additional evidence expert papers 2, 4, 6

Recommendation 4: Evidence statements R1.ES4, EM.ES4

Recommendation 5: Evidence statements R1.ES3, R1.ES5, R1.ES6, R1.ES7, R1.ES9, R1.ES12, R1.ES19, R2.ES9, R2.ES15, R2.ES18, EM.ES3, EM.ES5; Additional evidence expert papers 2, 3, 4, 5, 6

Recommendation 6: Evidence statements R1.ES1, R1.ES2, R1.ES7, R1.ES13, R1.ES18, R1.ES21, R1.ES22, R2.ES1, R2.ES2, R2.ES3, R2.ES5, R2.ES6, R2.ES10, R2.ES12, R2.ES13, EM.ES1, EM.ES3; Additional evidence expert papers 1, 5

Recommendation 7: Evidence statements R1.ES13, R1.ES14, R1.ES18, R1.ES21, R1.ES22, R2.ES3, R2.ES13, EM.ES2; Additional evidence expert paper 5

Recommendation 8: Evidence statements R1.ES8, R1.ES9, R1.ES10a, R1.ES10b, R1.ES10c, R2.ES15, R2.ES16, EM.ES1; Additional evidence expert paper 1

Recommendation 9: Evidence statements R1.ES11, R1.ES15, R1.ES16, R1.ES17, R1.ES23, R2.ES2, R2.ES4, R2.ES7, R2.ES9, R2.ES18; Additional evidence expert papers 1, 3

Recommendation 10: Evidence statements R1.ES20, R2.ES2, R2.ES4

Evidence statements

Please note that the wording of some evidence statements has been altered slightly from those in the evidence review(s) to make them more consistent with each other and NICE's standard house style.

Evidence statement R1.ES1: Population-level change in mass-media interventions to increase

There was inconsistent evidence from two studies[1,2] (both [+]) on the effectiveness of mass-media interventions (which included paid advertisements [TV, radio, cable, newspapers], billboards/posters, public relations, educational activities and community participation), delivered in the community in increasing population levels of walking for leisure or travel in adults up to 1 year post intervention. One before-and-after (BA)[1] study showed no effect on walking (the reporting of data in this study was poor) and one cross-sectional (CS)[2] study showed a small, but positive effect on walking.

One (+) BA study[1] (UK n=3476, 12 months) – 40-second TV advert supported by a telephone helpline – showed no change in the number of days spent walking for at least 30 minutes: mean of 4.26 days in 1995 and 4.13 days in 1996, no significance statistics given.

One (+) CS study[2] (USA n=297, 5 months) – billboard, newspaper, radio, and poster advertisements – showed that those exposed to the campaign were more likely to walk for at least 10 minutes on more days of the week than the control group (5.2 days versus 4.52 days t[7]=2.34, p=0.02).

Population-level evidence on mass-media interventions to increase walking is partially applicable to the UK as one study was conducted in the UK. The differing environment in the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Wimbush (1998)

[2] Wray (2005)

Evidence statement R1.ES2: Multi-component community-based interventions to promote walking

There was inconsistent evidence from six studies concerning the effectiveness of multi-component interventions on increasing population levels of walking for leisure or travel in the long term. Four non-randomised control studies (nRCT)[1,2,3,4] papers (three [+] and one [++]) showed positive effects on walking and two nRCT[5,6]papers (one [++] and one [+]) indicated that the interventions were not effective in increasing walking.

One (+) nRCT[1] (Australia n=two wards, 2 years) – park modifications, media campaign, walking maps – showed that those in the intervention ward were more likely than those in the control ward to have walked in the 2 weeks prior to follow up (89.3% versus 81.0% respectively; X2=11.51, p=0.001), and within-ward analysis indicated that walking increased from baseline in the intervention ward (X2[1]=5.85, p=0.016), but not in the control ward (X2[1]=0.07, p=0.794). There was no difference in the number reaching adequate levels of physical activity (health department recommendations).

One (++) nRCT[5] (USA n=1233, 12 months) – individually tailored newsletters, interpersonal activities that stressed social support, community-wide events such as walk-a-thons – showed that rates of 7-day walking for any purpose or for exercise declined slightly in the intervention communities compared with the comparison sites (-1.4 min, p=0.91; and -5.6, p=0.37 respectively).

One (+) nRCT[6] (USA n=1531, 12 months) as above found that the change in walking was higher in intervention (11.7 minutes) than comparison (6.5 minutes), although not statistically significant. Percentage of respondents who met the recommendation for walking was the same across the intervention and comparison areas: 22.2% and 21.6%, p=0.811.

One (+) nRCT[2] (USA n=1472, 8 weeks) – paid advertising, public relations events to generate media coverage, public health educational activities at work sites, churches and local organisations – found a 23% increase in

walking observations in the intervention community versus a 6% decrease in the comparison community (OR 1.31, 95% CI 1.14–1.50; p<0.0001).

One (++) nRCT[3] (USA n=1472, 12 months) – paid advertisements (TV, radio, cable, newspapers), public relations and community participation – found that the least active group in the intervention population were more likely than control population to have increased daily walking (OR=1.72, 95%CI 1.01–2.95).

One (+) nRCT[4] (USA n=4 communities, 8 weeks) – four interventions: Welch Walks (WW): paid media, media relations, community activities; Broome County (BC) walks (BC): WW components + website; Wheeling walks and West Virginia (WV) walks: BC components +12-week participatory planning, policy and environmental changes – found that 32% of insufficiently active persons in Wheeling Walks reported meeting the criteria for regular walking immediately post campaign compared to an 18% increase in the comparator community (OR=2.12, 95%CI 1.41–2.24). An increase in reaching regular walking was observed for the most sedentary group in WV walks (p<0.05). The intervention community in Welch walks demonstrated a twofold (OR=2.0 95%CI 1.01–3.97) gain in weekly walking by at least 30 minutes versus the comparison community. Forty one per cent of the BC walks intervention community increased walking by 30 minutes per week compared to 30% in the control (OR=1.56 95%CI 1.07–2.28).

The population-level evidence on multi-component interventions to increase walking is only partially applicable to the UK as studies were conducted in the US and Australia. The differing environment in the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] New South Wales Health Department (2002)

[2] Reger (2002)

[3] Reger-Nash (2005)

[4] Reger-Nash (2006)

[5] Brownson (2004)

[6] Brownson (2005)

Evidence statement R1.ES3: Population-level change in mass-media interventions to increase walking and cycling – Australia 'Walk to work day'

Moderate evidence from one BA study reported in two papers[1,2] (both [+]) suggests that the mass-media campaign 'Australia walk to work day' (a collaborative annual event in which members of the public are encouraged to walk [or cycle] to work) may be effective in increasing population levels of walking and cycling for travel in adults up to 1 year post intervention. This intervention resulted in positive effects on both walking and cycling.

One(+)[1] study (n=1100, at least 1 year) found that overall, total weekly minutes of moderate physical activity increased by 20 minutes per week ($t[1087]=4.76$, $p<0.005$ with, an decrease in the proportion who were inactive -4.0% $p<0.005$). Significant population increase in total walk time (+16minutes per week $t[780]=2.04$, $p<0.05$) in participants who were employed, and in minutes spent walking increased by 21 minutes per week in 'passive commuters' ($t[535] = 2.42$, $p< 0.05$).

One (+)[2] study (n=1100, 2 months) found a significant population-level increase in health enhancing active commuting (3.9%, p=0.01).

The evidence on mass-media interventions to increase walking and cycling is only partially applicable to the UK as studies were conducted in Australia. The differing environment in Australia must be considered in reference to these studies. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Merom (2005)
[2] Merom (2008)

Evidence statement R1.ES4: Population-level change in TravelSmart as an intervention to increase walking and cycling

Weak evidence from a series of evaluation reports (ER)[1,2] (both [+]) suggests that TravelSmart is effective in increasing population levels of walking and cycling for travel in adults (who volunteered to participate) at least over 1 year. TravelSmart uses 'Individualised travel marketing' (ITM) which aims to highlight travel choices 'people may not know they have' by providing locally relevant information and support to households. The evidence is moderate as the reports only present percentage change data and limited methodologies. The intervention targets individuals, but data is reported at population level.

One (+) evaluation report[1] (Australia n=5 regions, various) found household projects routinely showed decreases in car use of 4–15% and rise in use of walking, cycling and public transport.

One (+) evaluation report[2] (UK n=19 regions, various) found cycling for travel increased by between 14% and 69%, travel by walking increased between 9% and 29%, travel by car decreased at each site by between 10 and 14%, overall sustainable travel trips increased at each site (between 9% and 29%).

The evidence on this intervention to increase walking and cycling is fully applicable to the UK as most of the data reported is from UK sites. However, the differing environment in Australia must be considered in reference to the data collected there. Individual local contexts as well as the setting will also impact on the applicability of data from individual sites.

[1] TravelSmart (2006)

[2] TravelSmart (2011)

Evidence statement R1.ES5: Population-level change in cycle demonstration towns as interventions to increase cycling

There is moderate evidence indicating that cycling demonstration towns (CDT) (multi-component interventions to increase cycling in six towns) are effective in increasing population levels of cycling for active travel in the general population up to 10 years post intervention. One (-) ER[1], one (+) BA[2]

and one (+) interrupted time series (ITS) study[3] showed positive effects on cycling in cycle demonstration towns, although the significance of the effects is not reported. See also R1.ES7 and R1.ES6.

One (+) ITS[3] (UK n= six towns, 4 years) found automatic counter data indicated an average increase in cycles counted of 27%. Proportion of pupils cycling to school at least once a week increased from 12% pre-survey to 26% post-survey.

One (-) ER[1] (UK n=6 towns, 10 years) found data from automatic cycle counts indicated a 12% increase overall in usage of cycle routes and up to 60% at specific sites (this report also uses data from other interventions).

One (+) BA[2] (UK n=1500, 4 years) found the proportion of adult cycling for at least 30 minutes once or more per month increased from 11.8% in 2006 to 15.1% in 2008, an increase of 3.3%-points or 28%.

The evidence on cycle demonstration town is directly applicable as it was conducted in the UK.

[1] Cope (2011)
[2] Sloman (2009)
[3] Cope (2009)

Evidence statement R1.ES6: Population-level change in multi-component interventions to increase cycling

Weak evidence from one (+) nRCT[1] study suggests that multi-component interventions are not effective in increasing population levels of cycling in the general population up to 2 years post intervention, but may result in increased use of bicycle paths and increase in cycling among new/beginner cyclists. See also R1.ES5.

One (+) nRCT[1] (n=909, 2 years) – multi-component community-based intervention including: organised bike rides and events, cycling skills courses, distribution of cycling maps of the area, local press coverage – found significantly greater use of the bicycle paths in the intervention area (28.3%)

at follow-up compared with the comparison area (16.2%) p<0.001. No self-reported increase in residents who said they cycled in the last year, however, significantly more ‘novice’/beginner riders had cycled in the last year in the intervention area (11.5% versus1.4% in the comparison area; p=0.013).

The population-level evidence on multi-component interventions to increase cycling is only partially applicable to the UK as the study was conducted in Australia. The differing environment in Australia must be considered in all studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Rissel (2010)

Evidence statement R1.ES7: Population-level change in multi-component interventions to increase walking and cycling in adults

Weak evidence from four (two [+], two [-]) of five[1,2,3,4,5] studies indicates that multi-component interventions delivered in the community are effective in increasing population levels of walking and cycling for travel and/or leisure up to 9 years post-intervention. Evidence from the three BA[1,2,3], and one ITS[4], showed mostly positive effects of community interventions to encourage cycling and walking for travel and/or leisure. One (+) nRCT[5] indicated that multi-component interventions may reduce a natural decline in walking in women and that among those with a low educational level, cycling may show a small increase. See also R1.ES5 and R1.ES6.

One (+) BA[1] (Belgium n=438, 1 year) – physical activity promoted in the entire city of Ghent. Central theme of '10,000 steps/day', with secondary taglines of 'every step counts') and 'every revolution (of bicycle pedals) counts', pedometers given – found that 47.5% increased average step counts by 896 steps/day or more at 1-year follow-up (no statistical analysis; cycling was ‘converted’ to step counts).

One (-) BA[2] (USA n=not reported, 12 months) – multi-component intervention to increase safe physical activity opportunities and encourage walking and biking for short trips – found the number of people seen using active

transportation increased from 1028 in 2005 to 1853 in 2006 (63% increase). Walking to school more than doubled at three of four schools engaged for at least 2 years (no other analysis).

One (+) BA[3] (UK n=at least 12,000, 4 years) – three 'Sustainable travel towns' which implemented intensive town-wide Smarter Choice Programmes to encourage use of non-car options; bus use, cycling and walking, and less single occupancy cars – found that cycle trips per head grew substantially in all three towns by 26–30%. Comparison towns cycle trips decreased. Walking trips per head grew substantially by 10–13% compared to a national decline in similar towns.

One (-) ITS[4] (USA n=not reported, 1 year) – Project U-Turn, active transportation (biking, walking, and transit use) through an integrated approach to active living, ran for 5 years, targeting 36,000. City-wide count of people using active transport, showed an increase of 63% over 1 year, limited study details provided. Also had a major schools component and reported an increase in walking over time, no statistics given.

One (+) nRCT[5] (Netherlands n=3114, 5 years) – community-based project with 790 lifestyle interventions, 361 were physical activity focused, example: printed guides of walking and cycling routes – found that there was a smaller decline in walking in women in the intervention compared to control region (-0.3 hours/week versus -2.3 hours/week; $p \leq 0.05$); and among those with a low education level there was a significant difference in change in cycling and walking in the intervention versus control region (0.2 hours/week versus -0.3 hours week respectively for cycling and 0.0 hours/week versus -2.2 hours week for walking; both $p \leq 0.05$).

The population-level evidence on multi-component interventions to increase walking and cycling in adults is only partially applicable to the UK as one studies was conducted in the UK. The differing environment in the USA and Europe must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] De Cocker (2009)

[2] Hendricks (2009)

[3] Sloman (2010)

[4] TenBrink (2009)

[5] Wendel-Vos (2009)

Evidence statement R1.ES8: Population-level change in multi-component interventions to increase walking and cycling in children

Inconsistent evidence from three studies[1,2,3] on the effectiveness of school-based multi-component interventions to increase levels of walking and cycling for children. Evidence from two (+) BA studies[1,2] showed positive effects on school population-level walking in children however evidence from one (++) cluster randomised control study (RCT)[3] showed no effect on cycling and walking for school travel.

One (+) BA[1] (UK n=179, 41 months) – school travel plan group developed a walking bus scheme, incentive scheme 'going for gold' included children cycling or scooting to school, also cycle training, pedestrian training, park and walk scheme, curriculum work, school assemblies and newsletters – found walking to school increased from 30% to 58.8%, cycling to school increased from 0– 4%.

One (++) cluster RCT[3] (UK n=21 schools, 12 months) – multi-component school travel plans were developed by a school travel coordinator – found the proportion of children walking or cycling to school was not affected by the intervention.

One (+) BA[2] (UK n=11 schools, up to approximately 18 months) – 'Safe routes to school'– identified and created safe routes to school, invites community-wide involvement, full-time educator employed to develop curriculum and volunteer team leader in each school – found an increase in number of school trips made by walking (64%) and biking (114%).

The population-level evidence on multi-component interventions to increase walking and cycling in children is applicable to the UK as all studies were

conducted in the UK. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Cairns (2006a)
[2] Staunton (2003)
[3] Rowland (2003)

Evidence statement R1.ES9: School-based change in interventions to increase cycling in children

Weak evidence from one (+) BA study[1] suggests that school-based multi-component interventions may be effective in increasing school population levels of cycling in children. Evidence showed positive effects on walking at the school population level.

The study[1] (UK n=52 schools, 1 year) – 'Bike it': school travel plans, cycling champions in schools to demonstrate to parents and pupils that cycling is a popular choice. Percentage of school pupils cycling to school every day increased from 3% to 10%. Number of pupils cycling at least once a week increased from 10% to 27%. Number of pupils who never cycled decreased from 80% to 55%.

The evidence on multi-component interventions to increase cycling in children is applicable in the UK as the study was carried out in the UK.

[1] Sustrans (2008)

Evidence statement R1.ES10a: Walking school bus interventions to increase walking

Moderate evidence from three (+) BA studies[1,2,3] and one (+) nRCT[4] suggests that walking school bus interventions may be effective in increasing levels of walking at the school population level for children up to 30 months post-intervention.

One (+) BA[1] (UK n=309, 14 months) – walking school buses supported by environmental interventions such as street lighting on walking routes – found

that participants walking increased from 60% to 68.3%, 25% of that was due to walking buses.

One (+) nRCT[2] (USA n=3 primary schools, follow up 6 months after baseline) – Walking School Bus (WSB). The school implemented three routes staffed by parent volunteers, and were compared to two nearby schools without a WSB – found that the number of children who walked to school increased from baseline to follow up by 25% (from 19–26%). Comparison schools showed a decrease in the proportion of children walking to school over the same period (no data given).

One (+) BA[3] (UK n=64, 18–30 months) – walking buses at five schools. Information sent home to parents to encourage participation – found that there was an overall average increase of 513 metres walked per day. For children that had previously walked to school the WSB resulted in an average increase of only 19 metres/day, for those that previously travelled to school by a mixture of car and walking: average increase of 309 metres/day and for those that previously regularly travelled by car to get to school: average increase of 1549 metres/day (no statistical analyses reported). Participation in the walking buses declined over time.

One (+) nRCT[4] (USA n=643, 12 months) – WSB run by a part-time coordinator and parent volunteers. The intervention included three routes which ranged from 0.3 to 1.5 miles and took 15–40 minutes. The WSB operated once or twice a week – found that higher proportions of students walked to the intervention (25% +/- 2%) versus the control schools (7% +/-1%: $p<0.001$). Significant increase in walking to school in intervention school from 20% (+/-2%) at baseline.

The evidence on school-based walking sessions to increase walking is partially applicable to the UK as two studies were conducted in the UK. The differing environment in the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Bickerstaff (2000)

[2] Johnston (2006)

[3] Mackett (2005)

[4] Mendoza (2009)

Evidence statement R1.ES10b: School-based interventions using pedometers to increase walking

Moderate evidence from one (+) cluster RCT[1]and one (+) ITS[2] suggests that school-based walking interventions which incorporate pedometers may be effective in increasing levels of walking at the school population level for children up to 12 weeks post intervention.

One (+) ITS[2] (USA n=169, 6 weeks) – pedometers and a 'Fit bits' programme to implement physical activity breaks in the classroom – mean steps increased from 19,149 (95%CI 18,224–20,073) week 1 to 21,248 (95%CI 19,730-22,765) week 6 ($p<0.001$) found that overall, walking peaked at week 3; and younger students had a stronger response to the intervention.

One (+) cluster RCT[1] (New Zealand n=85, 12 weeks) – physical activity self-monitoring and educative programme – the pedometer (PED) group set daily step targets, and the minutes (MIN) group set daily time based activity goals – found that both intervention groups had significant increase in steps between baseline and week 12 ($p<0.001$), no significant differences between time points for the control group ($p=0.23$).

The evidence on school-based walking sessions to increase walking is only partially applicable to the UK as studies were undertaken in the USA and New Zealand. The differing environments in these countries must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Schofield (2005)

[2] Cirignano (2010)

Evidence statement R1.ES10c: School-based walking session interventions to increase walking

Inconsistent evidence from five studies (reported in six papers[1,2,3,4,5,6]) on the effectiveness of school-based walking session interventions in increasing levels of walking at the school population level for children up to 48 months post intervention. Evidence from one (+) nRCT[1] and two (+) BA studies (reported in three papers[2,3,4]) showed positive effects on school population walking. However one (+) nRCT[5] showed no effect on walking and one (+) cluster RCT[6] had conflicting evidence concerning the intervention effect on walking for school travel.

One (+) BA[2] (UK n=585, 48 months) –'Walk on Tuesday and Thursday' (WOTT) encouraged walking to school, included incentives – found that walking to school increased from 53.3% to 58.7% (percentages only reported). Also reported in a second (+) BA[3].

One (+) nRCT[1] (UK n=60, 10 weeks) – school-based active travel project. Active travel was integrated into the curriculum, and participants used interactive travel planning resources at home – found that mean distance travelled to school by walking increased significantly more in the intervention (389%) than the control (17%: t[38]=-4.679, p<0.001, 95% CI -315 to -795 m).

One (+) nRCT[5] (UK n=13 schools, 4 weeks) – interventions linked to national walk to school week – found no difference between intervention and control schools in walking before or after the intervention.

One (+) cluster RCT[6] (Australia n=24 schools, 2 months) – health promoting schools policy: classroom activities, pedometer-based walking activities (some schools) development of school travel access guides, parent newsletters, and improving environments with local councils – found that, based on student survey data while both intervention and control groups increased walking by about 4% from baseline, there was no statistically significant difference in mean percentages of change in mode of transport to or from school from baseline to follow-up between the intervention and control groups (no data

given).But parent survey data (n=807) indicated a significant increase in walking trips by students in the intervention compared to control schools (28.8% versus 19%, p=0.05).

One (+) BA[4] (Australia n=234, 4 weeks) – classroom activities supported by a weekly newsletter to encourage walking to school – found the percentage of walking trips increased by 3.4% and car trips decreased by 3.4%.

The evidence on school-based walking sessions to increase walking is partially applicable to the UK as three studies were conducted in the UK. The differing environments in Australia must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] McKee (2007)
[2] Cairns (2006b)
[3] Cairns (2006c)
[4] Zaccari (2003)
[5] Tapestry (2003)
[6] Wen (2008)

Evidence statement R1.ES11: Population-level change in workplace-based interventions to increase independent walking and cycling

Weak evidence from one (+) BA study[1] and one (+) ITS[2] indicates that multi-component interventions delivered in the workplace are effective in increasing population levels of walking and cycling

One (+) ITS[1] (UK n=1850 to 2829 in each of four staff surveys, 9 years) – university transport plan: limiting the number of available parking spaces and permits, improving, installing secure cycle storage, subsidised cycle purchase scheme, car share scheme, free bus travel, and discounted season tickets – found that respondents who usually walked to work increased from 19 to 30% ($Z=4.24$, $p<0.001$) and regular cyclists increased from 7.0% to 11.8% (not significant).

One (+) BA[2] (UK n=2240, 3 years) – Well@Work programmes which consisted of a diverse set of initiatives and actions aimed at promoting and supporting healthy lifestyles – found an increase of 9% in the proportion of employees participating in active travel (walking or cycling), significant increase in employees cycling (4%) or walking (8%) to work.

The population-level evidence on multi-component interventions to increase walking and cycling in adults is applicable to the UK as both studies were conducted in the UK. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Bull (2008)
[2] Brockman (2011)

Evidence statement R1.ES12: Individual-level change from participation event to increase cycling

Weak evidence from one study suggests that a mass participation intervention may be effective in increasing individual-level cycling for leisure in adults. Evidence from one (+) BA study[1] showed a positive effect on cycling 1 month after the intervention.

One (+) BA[1] (Australia n=918, 2 months) – mass cycling event – found that participants with low pre-event self-reported cycling ability reported an average of four sessions of cycling in the month before the event and an average of 6.8 sessions in the month after the event ($t=5.25$, $p<0.001$).

The evidence on mass participation event intervention to increase cycling is only partially applicable to the UK as the study was conducted in Australia. The differing environment in Australia must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Bowles (2006)

Evidence statement R1.ES13: Individual-level change in community delivered targeted health information interventions to increase walking

Moderate evidence from six studies[1,2,3,4,5,6] suggests that individual, targeted provision of health information (including printed media, telephone support and text messages) delivered in the community are effective in increasing individual levels of walking for leisure or travel in adults up to 1 year post intervention. Five (++) RCTs[1,2,3,4,5] showed positive effects on walking. One further (++) RCT[6] also showed positive effects on walking, but was designed to test intervention fidelity.

One (++) RCT[1] (USA n=117, 3 months) – ten weekly emails containing links to a webpage with an interactive information tailoring tool to promote physical activity – found that walking increased at a faster rate in the intervention group than the control group (β=15.04 [SE=8.38], p=.035 [one-tailed]). Intervention group increased walking by 69 minutes/week versus 32 minutes/week in control.

One (++) RCT[2] (Australia n=399, 10 weeks) – print only (participants were mailed self-help brochures weekly for 3 weeks) or print plus telephone (participants received the same print programme plus three weekly telephone support calls – found that both intervention groups significantly increased time reported walking for exercise per week (from 130 to 147 minutes: t[1,277] =-3.50, p<0.001; and from 132 to 150 minutes, t[1,106]= -2.44, p=0.016).

One (++) RCT[3] (USA n=197, 6 months) – counselling weekly telephone calls to assess physical activity levels and problem solve how to fit adequate walking activity into their week – found that women in the intervention group reported more time walked each day than the control women (F [1,191]=4.10, p<0.05).

One (++) RCT[4] (USA n=253, 12 months) – telephone calls with or without counselling, or a control video – found that women in the intervention group showed a linear increase in walking from baseline to 6 months (latent growth

analysis to assess the relationship between time and intervention group membership).

One (++) RCT[5] (UK n=149, 4 weeks) – two theory-based interventions consisting of forming 'implementation intentions' along with text message reminders to achieve walking-related plans or goals – found a differential change across groups in brisk walking or fast walking (F [2,130]= 3.12, p=0.048). Two intervention groups which differed in having a plan reminder or goal reminder had a 45% and 42% increase of at least 2 days a week meeting physical activity daily guidelines respectively, with a 22% increase in the control group.

One (++) RCT[6] (USA n=50, 12 months) – two interventions consisting of forming 'implementation intentions' along with text message reminders to achieve walking-related plans or goals using social cognitive theory (SCT) – found the greatest increase in walking in interventions that adhered more closely to SCT. High fidelity intervention increased walking by 34.23 minutes a week (+/-81.91) compared to a low fidelity increase of 7.91 minutes a week (+/-47.93, F=3.207 p=0.08).

The evidence on community delivered health information interventions is only partially applicable to the UK as most studies were conducted in Australia or the USA with only one UK study included. The differing environment in Australia and the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

Note: pedometers are a technology which offers an opportunity to present individualised information about walking and so are closely linked to the studies above. Use of pedometers is related to goal setting and monitoring rather than to delivery of information about health benefits or methods to overcome barriers. Studies may use pedometers as one of a number of factors to support increases in walking, in common with other approaches, or may use pedometers solely as a means of measuring change. Pedometer studies are considered below.

[1] Dunton (2008)

[2] Humpel (2004)

[3] Nies (2003)

[4] Nies (2006)

[5] Prestwich (2010)

[6] Rovniak (2005)

Evidence statement R1.ES14: Individual-level change in community-based pedometer interventions to increase walking

Moderate evidence from 12 studies suggests that pedometer-based interventions delivered in the community are effective in adults (or women only) to increase individual levels of walking for leisure or travel, up to 6 months post intervention. Evidence from five (++) RCTs[1,2,3,4,12] and 2 BA studies[5,6,] (one [+] and one[-]) showed positive effects on walking for leisure and/or travel in adults. This is supported by data from a (-) CS study[7]. However, one (++) RCT[8] found that short-term improvements in walking 4 weeks post intervention had decreased by 12 months follow-up. Evidence from one (++) RCT[9] and one (+) BA study[10] showed substantial positive effects on walking for leisure and/or travel in women. An additional (++) RCT[11] found that a pedometer-based intervention increased walking in environments with low aesthetics, but not in those with aesthetically pleasing environments.

One (++) RCT[8] (UK n=61, 52 weeks) – walking programme with goals set in minutes, or steps or using a pedometer – found that the pedometer group increased walking at 4 weeks ($p<0.001$), but decreased between 4 weeks and 12 months. No change in minutes or control groups.

One (++) RCT[1] (UK n=130, 4 weeks) – motivational component had three stages: participants were shown 10 statements about what would make it easier for them to walk more, asked to complete a scale to show how confident they would be about walking in each situation, and discussed with facilitator and walking plan developed; pedometers were worn – found a significant difference in number of minutes spent walking to week 2 between the control group (M=138.7, SD=93.3) and the intervention group (M=22.5

SD=100.3), from a mean of 19.8 minutes to 32.2 minutes per day (increase of over 60%). Also a significant increase in the number of minutes spent walking per week for intervention group from week 1 to week 4 (mean 287.3, SD=129.4 t[46]=8.12, p<0.001).

One (+) BA[10] (USA n=36, 6 weeks) – women who were designated as insufficiently active were given brochures and pedometers and were sent emails. Participants received a pedometer, 6 weeks of step log sheets, self-addressed envelopes, and three commercial brochures describing strategies based on transtheoretical model (TTM) for increasing physical activity and the risks and benefits of physical activity – found that participants significantly increased their total walking minutes from baseline (median 55) to post intervention (median 245: Z=4.03, p=0.001) including walking while at work (Z=2.79, p=0.005, d=0.63), for transport (Z=2.86, p=0.004, d=0.60) and during leisure time (Z=3.54, p=0.001, d=0.81).

One (++) RCT[2] (Japan n=68,12 weeks) – feedback based on accelerometer daily physical activity, number of daily steps and time spent performing daily moderate physical activity (MPA) which was provided to each participant every 2 weeks. Participants were recommended to accumulate 9000 steps and 30 minutes of MPA per day – found a significant group interaction for steps (f=10.53, p<0.01). The intervention group increased their steps by 16% (7811 +/-3268 to 9046 +/-2620 steps). There was no significant change in the control group.

One (++) RCT[3] (Australia n=314, 3 months) – self-help booklet based on social cognitive theory constructs, plus six weekly diaries printed on reply-paid postcards (WP group), plus a pedometer (WPP group). Three incremental stages, starting with short walks (<15 minutes) 3 days a week, typically by incidental walking, gradually increasing the duration of walks to 3 to 4 days, then (continuously) walking briskly for 30 minutes – found that the mean change in total sessions of all-purpose walking/week increased within all groups from baseline, but increased the most within WPP. The control group had a mean increase of 1.2 sessions/week (95% CI: 0.6-1.8, t=3.97, p<0.001);

WP: 1.3 sessions/week (0.5–2.0, t=3.32, p<0.001); WPP: 2.3 sessions/week (1.6–3.1, t=6.30, p<0.001). Leisure time walking sessions/week for the previous 3 months also increased within all groups, with both WP (2.0 sessions/week 1.6–2.4, t=9.49, p<0.001) and WPP (2.1 sessions/week 1.7–2.6, t=9.63, p<0.001) showing a significantly larger increase than the control group (0.9 sessions/week 0.6–1.2, t=5.82, p<0.001). There was a similar pattern for leisure time walking minutes/week for the previous 3 months, but only the WPP group (66 minutes/week 50–82, t=8.05, p<0.001) showed a significant increase compared to the control group (34 minutes/week 21–48, t=5.03, p<0.001). The WPP group was also more likely than controls to meet physical activity recommendations. Unclear if the provision of pedometers provides benefit over and above standardized structure walking programme.

One (++) RCT[11] (Australia n=369, 3 months) – participants received a single mail-out of a self-help walking programme (WP) or the same programme plus a pedometer (WPP) – found that only the WPP group were significantly more likely than controls to increase total walking time (Exp [b] = 2.53, p<0.01) and to undertake regular walking (OR=5.85, 95% CI 2.60–12.2) where environment aesthetics (level of greenery and interesting scenery) were perceived to be low; while in aesthetically pleasing environments, the differences in walking measures between intervention and control groups were non-significant.

One (+) BA[5] (Japan n=56, 4 months) – subjects were given a pedometer and instructed to walk at least 7,500 steps each day. They were also given additional monthly advice on healthy diet and lifestyle provided in a newsletter – found the mean steps per day increased significantly from 9389 to 11846 (p<0.01).

One (++) RCT[9] (USA n=24, 24 weeks) – given pedometer and initially, all (post-menopausal) women were prescribed a distance of 1.4 km/day above their baseline. Distance was then increased by 0.5 km/day until the desired walking distance was met – found that the intervention group increased their

daily walking by 4300 steps (2.9 ± 0.2 km/day); significantly different from baseline and from the control group (both $p<0.05$).

One (++) RCT[4] (Australia n=26, 12 weeks) – participants (overweight middle-aged women) in the pedometer group were told to record their pedometer steps on a daily basis for 12 weeks; those in the control group were asked to wear a sealed pedometer for 12 weeks with weekly recording. The pedometer group was also encouraged to reach a daily step goal of 10,000 steps/day – found that the pedometer group daily average number of steps at weeks 6 (8321 ± 884 steps/day) and 12 (9703 ± 921 steps/day) were significantly higher than the baseline daily average (of 6242 ± 541 steps/day: $p=0.046$ and $p=0.035$) respectively.

One (-) BA[6] (USA n=12, 2 weeks) – participants over 65 years of age; site-specific walking route maps, health counselling session with individualised goal-setting and pedometers – average daily pedometer steps increased between baseline (M=3020, SD=1858) and week 1 (M=4314, SD=2627; $t[11]=-2.99$, $p=0.012$) and week 2 (M=4246, SD=2331; $t[11]=3.42$, $p=0.006$) found that all participants met their daily step goals in week 1 while 50% met their step goals in week 2.

One (-) CS[7] (Canada n=41, 6 months) – lending pedometers to patrons of five public libraries. The pedometers were loaned for maximum of 9 weeks. Education packages were handed out with the pedometer including: information on pedometer use, physical activity/walking recommendations, maps of local trails, and a walking challenge questionnaire – found that 39.5% indicated they walked more since borrowing the pedometer and 60.5% reported walking about the same.

One (++) RCT[12] (n=79 12 weeks) – the sessions were based on the Transtheoretical Model of exercise behaviour change. Strategies used included enhancing motivation, overcoming barriers and developing appropriate walking plans. Followed a 12-week pedometer-based walking program – found a significant increase in steps/day for the intervention group between baseline (M=6802, SD=3212) and week 12 (M=9977, SD=4669,

t(38)=-6.06, p<0.001, d=0.79, CI 2,115–4236). No significant difference was observed in the control group (t(39)= -0.50, p=0.618, CI -463–770).

The evidence on community pedometer interventions to increase walking is only partially applicable to the UK. Three studies were conducted in the UK, with the majority in the USA, Australian, Canada, and Japan. The differing environments must be considered in reference to the studies, particularly for those conducted in Japan. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Darker (2010)
[2] Koizumi (2009)
[3] Merom (2007)
[4] Pal (2009)
[5] Miyazaki (2011)
[6] Rosenberg (2009)
[7] Ryder (2009)
[8] Baker (2011)
[9] Moreau (2001)
[10] Dinger (2005)
[11] Merom (2009)
[12] Baker (2008b)

Evidence statement R1.ES15: Individual-level change in workplace pedometer interventions to increase walking

Moderate evidence from 11 studies suggests that pedometer-based interventions delivered in the workplace may be effective in increasing individual levels of walking for leisure or travel, up to 12 months post intervention. Evidence from three (++) RCTs[2,3,4], one (+) nRCT[5], two (+) BA[6,7] and two (+) ITS studies[8,9] showed positive effects on walking for leisure and/or travel in the short term (up to 12 weeks). However, one (+) ITS study[10] which used a competition format, saw the initial increase in walking decline

over 12 weeks. One (+) nRCT[11] found significant increases in walking 12 months after the intervention, while another (++) RCT[1] found that initial increase in walking declined by 52 weeks follow-up.

A (++) RCT[1] (UK n=50, 52 weeks) – walking programme with goals set in steps using an open pedometer for feedback – found that both groups significantly increased step counts from baseline to week 4. Significantly greater number of participants in the intervention (77%) compared with the control (54%) achieved their week 4 goals (X2= 4.752, p=0.03). There was no significant change in step counts from week 4–16 and a significant decrease from week 16–52.

A (+) ITS[10] (USA n=640 (in 64 teams of 10), 12 weeks) – competition-based employer sponsored physical activity programme using pedometers. Employees formed groups of 10 to undertake the challenge of attaining 10,000 steps per participant per day – found that total weekly steps for all teams combined increased between weeks 1 and 8 ($p<0.0001$), but declined from weeks 9–12. Increase in total weekly step count between week 1 and 12 not significant. Significant difference in team steps, with post-hoc comparisons indicating significant differences from baseline step counts during weeks 6–8 ($F=71.15$, $p<0.001$) but not at the end of the programme.

A (+) nRCT[11] (Australia n=205, 12 months) – staff defined as inactive received a 3-month self-help walking programme and pedometer plus four maintenance newsletters over 9 months to assist them to maintain their new activity levels. Control received pedometer and programme but no maintenance – found that both intervention groups significantly increased minutes walking ($p=0.01$). Change in moderate or vigorous physical activity (MVPA) minutes was significantly higher in the standard plus maintenance group compared with the standard group (118 minutes versus 69 minutes, $P=0.029$). No significant differences between groups were observed for total physical activity (161 minutes versus 117 minutes, $P=0.187$).

A (+) ITS[9] (Canada n=106, 12 weeks) – adoption phase: participants met in workplace-based groups with a facilitator for 30–60 minutes each week during

a lunch break. Set individual steps per day goals and self-monitored their progress using a pedometer to record daily accumulated steps taken. Then adherence measured for 8 weeks – found that steps per day increased (from 7,029 +/- 3,100 [SD] at baseline to a plateau of 10,480 +/- 3,224 steps/day by 3.96 +/- 3.28 weeks of the intervention). Some decreases in activity relative to baseline steps per day, (ranging from -2.4% to -20.6% [12.0% ± 7.6%]).

A (+) nRCT[5] (Australia n=56, 6 weeks) – the intervention group received a pedometer and step logs. Set a daily step goal based on the previous week's step counts. They received weekly email reminders to wear the pedometer and return that week's log. They also received three commercial brochures. The control group received the intervention but without commercial brochures, intervention emails contained transtheoretical model (TTM)-based strategies – found that daily steps increased significantly (from 6419 ± 2386 during week 1 to 7984 ± 2742 during week 6: $p<0.001$) for both groups combined. Increases did not differ between groups.

A (+) ITS[8] (USA n=206, 10 weeks) – each day participants put on pedometers upon arriving at work, prior to getting out of their cars. To increase motivation, participants were encouraged to develop teams, and each team chose a team leader. Weekly motivational emails were sent to participants – found a significant increase in the number of steps per week for weeks 2, 3, 4, 6 and 8 compared to baseline ($p=0.001$).

A (++) RCT[2] (UK n=64, 10 weeks) – walking routes which employed prescribed walks around campus with participants asked to complete at least 15 minutes continuous brisk walking every day and 'Walking in task' which encouraged the accumulation of step counts through the working day – found a decrease in steps for the control group (-767 steps/day) and increases in intervention groups for walking routes (+926 steps/day) and walking in tasks (+997 steps/day). (Control versus walking routes $p<0.008$, control versus walking in tasks $p<0.005$).

A (++) RCT[3] (UK, Australia and Spain n=64, 70 and 80 respectively, 10 weeks) – participants in the first intervention group were directed to increase

their step count through brisk, sustained, route-based walking during work breaks. The second intervention group was asked to engage in incidental walking and accumulate step counts during working tasks, both groups were instructed to use pedometers to motivate and regulate walking – found that average step count data decreased in the control group (-391 steps/day t=1.76; p <0.08) and significant increases in both the routes (968 steps/day; t=3.9; p<0.001) and the incidental group (699 steps/day; t=2.5; p<0.014).

A (+) BA[6] (USA n=290, 12 weeks) – participants wore a pedometer at least 5 days per week for 12 weeks and completed questionnaires assessing demographic information. After baseline (week 1) they were given suggested number of steps to meet recommendations, instructions for goal-setting and other behaviour-change strategies to gradually increase number of daily steps – found that the average number of steps increased from week 1 to week 6 (p<0.001) and week 12 (p=0.002).

A (++) RCT[4] (Canada n=63, 1 week) – intervention group pedometer was worn for 1 week for all waking hours to encourage walking. Control (non-pedometer) participants were informed they could wear a pedometer the following week – found that, compared to the no pedometer group, the pedometer group reported more walking (F=5.22, p=0.03).

A (+) BA[7] (USA n=188, 10 weeks) – participants were provided with pedometers and given personalised daily and weekly step goals over the 10 week intervention. Local strategies available to the participants included walking groups, marked walking circuits and posted walking maps – found a mean increase of 1503 steps (38% increase over baseline). Mean weekly step counts values for all intervention weeks were significantly higher than baseline (p<0.01).

The evidence on workplace pedometer interventions to increase walking is partially applicable to the UK. Three studies were conducted in the UK but most studies were conducted abroad: in USA, Australia, Canada or Spain which may limit the applicability in some cases. The differing environments

must be considered in reference to the studies. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Baker (2008a)
[2] Gilson (2007)
[3] Gilson (2009)
[4] Spence (2009)
[5] Dinger (2007)
[6] Jackson (2008)
[7] Warren (2010)
[8] Faghri (2008)
[9] Chan (2004)
[10] Behrens (2007)
[11] Borg (2010)

Evidence statement R1.ES16: Individual-level change in workplace delivered targeted health information interventions to increase walking

Weak evidence from two studies suggests that individual, targeted provision of health information delivered in the workplace (including flyers, email, telephone calls, website postings, and information booths) may be effective in increasing individual levels of walking for leisure or travel in adults up to 24 weeks post intervention. One (+) RCT study[1] showed a positive effect on walking and one (+) BA study[2] showed a small (borderline significance) positive effect on walking.

A (+) RCT[1] (USA n=135, 24 weeks) – phone calls once a week versus every 3 weeks, and structured versus non-structured feedback – survival curves indicated that there was a significant effect on walking for treated (the combined four treatment conditions) versus the control condition (LD=17.661 $p<0.001$) and for frequency of prompting (those prompted once a week against every 3 weeks) (LD=17.719, $p<0.0001$).

A (+) BA[2] (USA, n=not reported, 2 weeks) – promotional material distributed via flyers, email, website postings, and at bi-weekly information booths – borderline statistically significant increases in walking counts on a route ('Path to health') from baseline midway through the campaign (p=0.069) and following the campaign: (p=0.075 – p values only reported).

The evidence on workplace health information interventions is only partially applicable to the UK as the studies were conducted in the USA. The differing environment in the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Lombard (1995)
[2] Napolitano (2006)

Evidence statement R1.ES17: Individual-level change in workplace delivered targeted health information interventions to increase walking and cycling

Moderate evidence from one (++) RCT study[1] suggests that individual, targeted provision of health information (including a booklet of interactive materials, social marketing and individualised marketing strategies) in the workplace may be effective in increasing individual levels of walking, but not cycling, for travel in adults for up to 6 months post intervention. See also R1.ES4.

A (++) RCT[1] (UK n=295, 6 months) – interactive materials based on the transtheoretical model of behaviour change: choosing routes, maintaining personal safety, shower and safe cycle storage information, and useful contacts – found a significant increase in time per week spent walking to work (mean 125 minutes/week intervention versus 61 minutes/week control), but no difference in average weekly minutes of cycling between cyclists in the intervention group (n=9) and control group (n=9).

The evidence on health information intervention to increase walking and cycling is applicable to the UK as the study was conducted in the UK.

Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Mutrie (2002)

Evidence statement R1.ES18: Individual level change in multi-component interventions to increase walking

Weak evidence from two (++) BA studies[1,2] suggests that multi-component interventions have a positive effective on increasing individual levels of walking for leisure or travel up to three months post intervention.

A (+) BA[1] (USA n=124, 8 weeks) – multi physical activity and dietary program, pedometers – found post intervention that 46.2% (n=43) met the 10,000 steps/day criteria for high activity (no further statistics). This increased from 11.8% at baseline. Average steps increased from 5969stpes/day to 9757 steps/day

A (+) BA[2] (USA n=53, 3 months) – sponsored walking groups, improving walking routes, providing information about walking options, and advocating for pedestrian safety – found self reported walking activity increased from 65 to 109 minutes per day: 44.1% increase (95%CI= 28.0-60.2, p=0.001). The proportion that reported being at least moderately active for at least 150 minutes per week increased from 62% to 81% (19.2 % increase 95% CI= 2.2, 36.3 P=018);

The individual level evidence on multi-component interventions to increase walking is only partially applicable to the UK as studies were conducted in the USA. The differing environment in the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Clarke (2007)
[2] Krieger (2009)

Evidence statement R1.ES19: Individual level change from cycle training interventions to increase cycling

Weak evidence from one BA (+) study[1] suggests that cycle training interventions may be effective in increasing individual levels of cycling for active travel amongst those not cycling at baseline, up to 2 months post intervention.

A (+) BA[1] (Aus n=81, 2 months) – practical skills development and supervised on road or cycle path training. Free courses for beginner and intermediate level cyclists were conducted. Promoted through flyers, posters, media releases, articles and TV and newspaper adverts – found non cyclists at baseline reported significant increase ($p<0.001$) in minutes cycling.

The individual level evidence on multi-component interventions to increase cycling is only partially applicable to the UK as the study was conducted in Australia. The differing environment in Australia must be considered in all studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Telfer (2006)

Evidence statement R1.ES20: Individual level change in healthcare delivered multi-component interventions to increase both walking and cycling in adults

Moderate evidence from 1 (++) RCT study[1] concerning the effect of multi-component interventions on increasing individual levels of both walking and cycling for travel and/or leisure up to 18 months post intervention indicated a positive effect on cycling but no effect on walking.

A (++) RCT[1] (Sweden n=120, 18 months) – physician meetings, physical activity prescriptions, group counselling, and bicycle provision; control and intervention groups received pedometers – found the intervention group was more likely to achieve recommended level of cycling than controls (38.7% versus. 8.9%, OR=7.8, 95%CI 4.0-15.0, $p<0.001$) but there was no difference

in compliance with the walking recommendation (45.7 versus. 39.3%, OR 1.2, 95%CI 0.7-2.0, p=0.5). Commuting by car and public transport were reduced by 34% (P<0.01) and 37% (P<0.001), respectively in the whole sample, with no differences between groups.

The individual level evidence on multi-component interventions to increase walking and cycling in adults is only partially applicable to the UK as the study was conducted in the Sweden. The differing environment in Sweden must be considered in reference to this study. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Hemmingsson

Evidence statement R1ES21: Individual level change in community based led walking group interventions to increase walking

Inconsistent evidence from 5 studies[1,2,3,4,5] on the effects of a community-based led walking group interventions on walking. 1 (++) RCT[5], 1 (++) clustered RCT[2], 1 (++) nRCT[1] and 1 BA (+) study[3] showed positive effects on walking from community-based walking group interventions; but evidence from a further (++) RCT[4] showed no difference between groups at 12 months.

A (++) nRCT[1] (UK n=7883, 12 weeks) - “Get walking, keep walking”: Bespoke, led walks and sessions aimed at encouraging children and young people to walk – found 67% of participants increased the amount of exercise they did each week. Walking from “place to place” increased by 1.1 day/week and walking for leisure by 1 day/week.

A (++) cluster RCT[2] (USA n=501, 6 months) – leader-led walking group activity or an information-only control group – found significant increase observed in walking activity: p <0.05.

A (+) BA[3] (Australia n=169, 6 months) – walk leaders received a prescriptive progressive weekly exercise program guided by social cognitive theory, that contained written information on the appropriate length for the walking program; stretching exercises; and ball skills, such as side twist leader ball,

participants aged 65-74 – found baseline mean walking time for recreation was one hour (SD =1.65), increasing to 2.69 hours (SD =2.02) per week by the end of the program.

A (++)RCT[4] (UK n=260, 12 months) – accompanied walks were provided at several different times in the day and evening, during the week and at weekends, and were led by lay volunteers – found at 12 months, although both walking and control groups increased activity (by 35.7% and 22.6% respectively; 95% CI 0.003% to 25.9%) p=0.05), there was no significant difference between them.

A (++)RCT[5] (USA n=114, 20 weeks) – efficacy based Exercise classes were conducted by trained exercise specialists and employed brisk walking as the aerobic component – found at the end of the 20 week program, subjects in the intervention group walked more miles per week than the control group: $p<0.05$.Intervention group subjects also walked more often ($p<0.01$) and accumulated more minutes ($p<0.01$) than control

The evidence on community based walking group sessions to increase walking is only partially applicable to the UK as only two studies were conducted in the UK. The differing environment in the USA and Australia must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] CLES (2011)

[2] Fisher (2004)

[3] Jancey (2008)

[4] Lamb (2002)

[5] McAuley (1994)

Evidence statement R1.ES22: Individual level change in interventions to increase independent community based walking

Weak evidence from 2 (+) BA studies[1,2] and 1 (++) RCT[3] suggests that interventions to increase independent community based walking may be effective in increasing individual walking for leisure, exercise or travel up to 13 weeks post intervention in adults or the whole community.

A (+)BA[1] (Canada n=39, 8 weeks) - “mall walking programme”, participants provided with pedometers. Participants self selected the pace, time, and frequency of walking. Encouraged to attend as often as possible between 8am and 10am Monday to Friday – found average daily mall walk steps increased from 5055 (SD 1374) to 5969 (SD 1543): p=0.002, and average daily mall walk time increased from 42.9 (SD 10.6) min to 50.4 (SD 13.5) min: p=0.002.

A (+)RCT[3] (Aus n=88, 13 weeks) – participants: post-natal women; information, goal setting consultations, activity and self-monitoring daily planner, tailored SMS, nominated social support person – found frequency of walking for exercise (days/week) increased over time in the intervention compared to control group (time×group interaction effect F(2,85)=5.38, p=0.023, medium effect size partial η2=0.06); while change in duration of walking did not show a significant time×group interaction effect (p=0.081; effect size partial η2=0.05), there was a significant group effect with increases in walking duration in the intervention compared to control (p=0.005; medium to large effect size partial η2=0.09).

A (+) BA[2] (USA n=16, 12 weeks) – walking intervention facilitated by community health workers. Weekly sessions encouraged participants to accumulate at least 30 min of moderate intensity walking on most/all days of the week – found that exposure to the programme resulted in significant increase in walking: 915.8 metabolic equivalent min/week, p=0.002.

The evidence on interventions to increase independent community based walking may not be applicable to the UK as studies were conducted in the USA and Canada. The differing environment in the USA must be considered in reference to the studies conducted there. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Culos-Reed (2008)

[2] Mier (2011)

[3] Fjeldsoe (2010)

Evidence statement R1.ES23: Indivdual level change in workplace based interventions to increase independent walking

Inconsistent evidence from 2 (++) RCT studies[1,2] concerning workplace walking session interventions (conducted in universities) effectiveness in increasing individual levels of walking for staff and/or student participants up to 12 months post intervention. Evidence from 1 RCT[1] showed positive effects on walking while one RCT[2] showed no effect on walking.

A (++)RCT[1] (USA n=32, 32 weeks) – sedentary adults; walking presecription: three brisk walking conditions: 30 continuous minutes, three 10-minute bouts, or 30 minutes made up of any combination of bouts each at least 5 minutes long; 1 hour information & modelling session followed by weekly meetings with an activity counsellor for 15 weeks. Behavioural methods used to promote adherence: goal setting and mastery, self-management techniques, weekly personal feedback, problem solving, behavioural contracting Participants paid $50, refunded on successful completion] – found self-reported walking for all intervention groups significantly increased throughout the program: $F(6, 186)= 26.16$; $p<0.001$.

A (++) RCT[2] (USA n=26, 6 weeks) – two eight week walking for fitness classes – found that neither group increased walking time or number of steps significantly over time.

The evidence on workplace (university) based walking sessions to increase walking is only partially applicable to the UK as the studies were conducted in the USA. The differing environments must be considered in reference to the studies conducted in the US. Individual local contexts as well as the setting will also impact on the applicability of individual studies.

[1] Coleman (1999)

[2] Eastep (2004)

Evidence statement R2.ES1: Providers' and researchers' views of barriers and facilitators to planning and delivering interventions to increase walking

Moderate evidence from four studies suggests that facilitators to planning and delivering interventions included organisational support and sufficient planning time. It may be beneficial to include volunteer leaders at the planning stage.

Having previous experience in marketing and a conceptual framework facilitated recruitment efforts. Personal satisfaction, social interaction and a positive rapport with group members were motivational effects of leading walking groups.

Barriers to planning and delivery included lack of inter-organisational collaboration. This was facilitated by introducing staff in different organisations to each other and being clear about shared goals. Employing an individual to co-ordinate between organisations was a facilitator to implementation.

De-motivators to being involved in organising and monitoring groups included researchers' perceived workload, efforts required for effective recruitment, lack of support from and feelings of responsibility for group members.

A (+) UK evaluation[1] suggested that sufficient planning time is required for successful implementation of a family-based intervention. Involvement of proposed walking leads at the planning stage was suggested as a way of increasing their engagement with the programme.

A US (+) pilot evaluation[2] reported that walking group policy makers supported the walking group by promoting the intervention and assisting with recruitment. Administrative support was also supplied, and events were organised.

A (+) study[3] that included interviews from the UK reported that the process of recruiting members to a walking group was draining on time and resources for the organisers, and some volunteers lacked skills in recruitment. Having experience in marketing and a conceptual framework around recruitment was a facilitator to recruiting new members. However, word of mouth was regarded as the most effective recruitment strategy.

A pilot evaluation[2] reported that running the walking group provided a sense of personal satisfaction for organisers as well as an opportunity for personal development and health promotion. Interaction with club members was a motivator for organisers.

Collaboration with other organisations was an issue in two studies[1,2], due to a focus on their own organisation and lack of communication. In one study[2] this meant that walking routes were not shared and events were less well attended. Club directors could also feel isolated. In the other study[1], collaboration between a walking association and a family support group was improved through members getting to know each other and being clear that goals were to be shared, and that interventions would run alongside each other rather than new initiatives replacing existing ones. Coordination by one designated officer also facilitated implementation.

One study[2] reported that group organisers expressed views about their burden of responsibility for the wellbeing and safety of members, especially if leadership was not shared. Recruitment and maintenance of membership numbers were regarded as a burden, and strategies were developed by the club to limit drop-out. Having to walk at a slow pace with other members was a de-motivator.

One UK (+) interview study[4] found that carrying out routine physiological measurements in a pedometer study was regarded as a burden for researchers.

Findings from these studies have partial applicability to other walking groups. The organisation of walking interventions will differ across countries, regions

and groups. Groups may have different goals, and recruit specific populations. There is no reason to believe that the barriers and facilitators described are not applicable to other similar interventions.

[1] Milton et al. (2011)

[2] Nguyen et al. (2005)

[3] Matthews et al. (undated)

[4] Shaw et al. (2011)

Evidence statement R2.ES2 Participants' views about motivators and barriers to participating in interventions to increase walking

Moderate evidence from five studies suggests that participating in a walking intervention motivated people to walk through the presence of role models, organised routes, and the support of being part of a group.

Families were motivated by the opportunity for children to participate in an activity that was free of charge. For others, the opportunity to improve health and enjoy fresh air and nature were motivational.

Barriers to motivation include conflicts between walking activities and work / school schedules, and cultural lack of acceptance in regard to work-based activity.

One US (+) pilot evaluation[1] reported that having access to a role model and to organised walk routes were motivators to attendance. For women, having the support and security of a group was a motivator (one [++] focus groups, US) [2]. For families, the opportunity for children to participate in activities with the family, free of charge, and outside of nursery hours were incentives (one [+] evaluation, UK)[3]. For adults, a sense of routine and structure was valued for those who were not in employment (one [+] focus groups, UK) [4].

Participants in one (+) UK focus groups study[4] were motivated by the opportunity to improve their health and be out in the fresh air and natural environment.

However, barriers to participation included conflicting schedules with school attendance[3] or workplace responsibilities (one [+] interviews, UK) [5]. In a workplace setting, they also reported that increasing walking time required acceptance from colleagues, and this varied depending on the status of the employee within the organisation.

Applicability: The findings from these studies are applicable to other walking groups. The acceptability of walking interventions will depend upon specific walking group characteristics, settings and aims. There is no reason to believe that the barriers and facilitators reported are not applicable to interventions implemented in the UK.

[1] Nguyen et al. (2005)
[2] Burroughs et al. (2006)
[3] Milton et al. (2011)
[4] Hynds and Allibone (2009)
[5] Gilson et al. (2008)

Evidence statement R2.ES3 Participants' views about maintaining participation in interventions to increase walking

Moderate evidence from ten studies provided evidence regarding factors associated with maintenance of participation.

Social interaction and social support were major factors in maintaining participation. Maintenance was also related to the extent to which activities could be integrated into daily life.

Monitoring activity, providing people remembered to self-monitor, could increase motivation, though it could also introduce unwanted competition between members.

Other motivators included variation in walking routes, and incentives such as gifts.

Barriers to maintenance included the difficulty of integrating walking and attendance at clubs into daily routines. Boredom, dissatisfaction with elements

of the club, and incongruent aims were reported factors associated with discontinued membership.

The social factor associated with walking in groups was supported by six studies[1,2,3,4,5,6]. The social factor was particularly strong for women and older adults. One (+) UK focus group study[5] reported a strong bond and sense of loyalty to the group that facilitated attendance. For men, the social factor was not so important with males tending to prefer walking alone (one [++] focus groups, US)[7].

Support was also important; in one intervention[7], feedback from providers was welcome, though e-mail was the preferred mode.

A US (+) RCT[2] highlighted the importance of family and friends in supporting the maintenance of walking behaviours. Walking also had a positive effect on interactions with family members.

A UK (+) interview study[8] reported that walking to deliver messages at work instead of e-mailing created a greater sense of community.

An important aspect of walking was the ability to integrate interventions into daily life. The ability to turn up without booking was a positive factor for some, and a sense of routine and structure was valued for those who were not in employment (one [+] focus groups, UK) [5].

However, one study[1] reported that women in particular found difficulty integrating extra walking into daily routines. Life changes, coinciding schedules and other commitments were also a barrier[2,4,5,9]. Wearing female-oriented clothing such as high heels was a barrier to walking while at work[2,8,9]. For African–American women, it was difficult to focus on self-based activities[4].

Monitoring activities was reported as a motivator. Two studies[1,10] reported that pedometer use and the process of self-monitoring increased walking behaviours. One[5] reported that step counting gave a sense of achievement.

However, a US observation and interviews (+) study[6] found that in older adults (mainly female), pedometer use and fitness objectives conflicted with the moral economy (shared values regarding social interaction) of the walking group, which was based on sociability rather than competition. In addition, people often forget to complete logs, or to use their pedometer[10].

Other incentives included rewards and gifts[7].

One study[9] reported that the atmosphere of the club, mismatch between aims of the club and aims of the participant, as well as the pace required to walk could be barriers to participation in walking interventions. Another[1] also added that boredom could dissuade attendance, and for African–American women, one study reported lack of objectives as potential barriers[4].

Applicability: The findings from these studies are applicable to other walking groups. The motivation to maintain walking behaviour within an intervention will depend upon individual circumstances and requirements as well as the characteristics and aims of the club. There is no reason to believe that the barriers and facilitators reported are not applicable in the UK.

[1] Shaw et al. (2011)
[2] Nies and Motyka (2006)
[3] Milton et al. (2011)
[4] Dunn (2008)
[5] Hynds and Allibone (2009)
[6] Copleton (2009)
[7] Burroughs et al. (2006)
[8] Gilson et al. (2008)
[9] Nguyen et al. (2005)
[10] Zoellner et al. (2009)

Evidence statement R2.ES4: Participants' views of the benefits of participating in a walking intervention

Moderate evidence from eight studies highlighted the reported benefits of walking as part of a walking intervention.

Perceived benefits to walking were reported to facilitate motivation and hence walking behaviour (one [+] focus groups, US) [1]. Such benefits could be emphasised when encouraging participation in interventions.

Reported benefits included physical and psychological benefits, adding variety to the day and getting out of the house or office. Walking could provide a sense of peace and solitude, and was also fun, providing an opportunity to be out in fresh air and see the sights.

Reported physical benefits were feeling healthy[1], (one [++] focus groups, US)[2], and fit (one [+] pilot evaluation, US)[3], (one [+] RCT, US)[4], increased energy[4], (one [+] interview studies, UK)[5], lower blood pressure[4], weight loss[1,4] and improved body shape[1].

Psychological benefits included enhanced mood[4,5], stress reduction[1,2,4], mental and emotional satisfaction[4], feeling rejuvenated[4], and having meditative or spiritual feelings[1]. Feeling tired at the end of a walk was associated with a sense of achievement (one [+] focus groups, UK)[6].

In a workplace intervention, walking was reported to add variety to the day and improved output at work[5]. For a group of previously sedentary adults, walking became fun, and was a chance to get out of the house[3]. Walking for one group of mid-age women allowed them time to think, time out of the office, time with the family and fresh air[4].

Benefits reported from two (+) pedometer-based interventions included seeing the sights (interviews, UK)[7], and socialising with members of the group (observation and interviews, US)[8].

Applicability: The findings from these studies are applicable to other walking groups. Benefits of walking may differ by setting, though there is no reason to believe that the benefits reported are not applicable in those settings within the UK.

[1] Dunn (2008)

[2] Burroughs et al. (2006)

[3] Nguyen (2005)

[4] Nies and Motyka (2006)

[5] Gilson et al. (2008)

[6] Hynds and Allibone (2009)

[7] Shaw (2011)

[8] Copleton (2009)

Evidence statement R2.ES5: Walking intervention participant's views of perceived barriers to walking

Moderate evidence from seven studies highlighted perceived barriers to walking for participants of walking interventions. These included physical and psychological limitations, environmental barriers, and poor weather conditions.

Physical barriers to continuing with the walking programme included health problems such as arthritis (one [+] focus groups, US) [1], and physical limitations such as illness and injuries (one [+] RCT,US)[2]. Tiredness and depression also prevented some women from continuing attendance[1].

Poor weather conditions or hot weather were reported disincentives to walking[1,2] (one [+] interviews,UK[3]; one [+] pilot evaluation, US[4];one [++] focus groups, US[5];one [+] focus groups, UK[6]). One study reported costs of participation as a barrier[4].

Lack of access to the walking route, and obstacles such as poorly maintained stiles along the walking route were also reported barriers[6].

Applicability: The findings from these studies are applicable to other walking groups. The barriers to participation in walking interventions might depend upon individual circumstances, such as age and physical fitness as well as seasonal weather conditions. Weather conditions may be better, or more extreme, in the US, Canada and Australia than in the UK, though there is no reason to believe that the barriers reported are not applicable in the UK.

[1] Dunn (2008)

[2] Nies and Motyka (2006)

[3] Shaw (2011)

[4] Nguyen et al. (2005)

[5] Burroughs et al. (2006)

[6] Hynds and Allibone (2009)

Evidence statement R2.ES6: Suggested strategies to overcoming barriers to maintaining walking in a walking intervention

Moderate evidence from two studies highlighted reported strategies to overcome perceived barriers to participating in walking interventions. These included making time, and integrating walking into daily life as well as thinking positively.

A (+) US RCT[1] reported strategies including scheduling time to walk, problem-solving and using motivators such as positive thinking and focusing on the long-term benefits. Goals were more achievable if walking was made a priority and was fitted into daily life as much as possible. Similarly, a (+) US study[2] (focus groups) reported that for African–American women, weaving walking into family life was a strategy that allowed themselves and the family to participate.

Applicability: The findings from these studies are applicable to other walking groups. The ability to implement strategies to overcome barriers to participation in walking interventions will depend upon individual circumstances.

[1] Nies and Motyka (2006)

[2] Dunn (2008)

Evidence statement R2. ES7: Providers' views about effective intervention components that motivate walking and cycling

Moderate evidence from one study suggests that workplace efforts to encourage walking and cycling are most successful where they attend to cultural attitude, access, security and available facilities. Incentives and provision of equipment are also motivating.

The (+) study (survey and interviews, UK)[1] provides evidence that, across 20 workplace initiatives, walking and cycling are increased where good onsite and offsite access is available, along with provision of showers, drying and changing facilities. Organised walks at lunchtime and cycling groups were an incentive.

Organisational attitude was important, with some workplaces marketing the benefits of walking to staff. Motivators such as complementary products or financial incentives were used.

For cycling, the ability to borrow equipment or receive discounts on cycling equipment was important, as was having secure parking for cycles.

Applicability: Findings from this study were taken from a range of workplace initiatives within the UK and so are applicable in UK workplace settings.

[1] Cairns et al. (2010)

Evidence statement R2.ES9: Participants' views about taking part in interventions to increase cycling

Moderate evidence from one exploratory study and one evaluation showed that facilitators to a led cycling intervention were a feeling of safety and acceptance that was obtained from cycling in a group.

Provision of acceptable equipment and the need not to wear a helmet was a facilitator for boys.

In a workplace-based cycling intervention, facilitators included the provision of storage and changing facilities and raised awareness about benefits.

The (++) exploratory study (focus groups, UK)[1] elicited community members' views about use of a cycle trail and a proposed intervention that included led cycling groups.

The main facilitator to using the trail for led cycle groups was the protection of riding together in a group. For young women, the image of cycling as 'uncool'

was an issue, but this barrier would be lessened if they were cycling with friends.

Image was also an issue for boys, whose participation would be facilitated by the provision of the 'right' bike, and not having to wear a cycling helmet.

The (+) UK evaluation study[2] (found that the main influences on increase in cycling following an intervention were the provision of workplace cycling facilities, a house or job move that made cycling more attractive, and heightened awareness of the importance of physical activity for health. Welcomed and best used measures were secure cycle parking, showering and changing facilities, and cycle purchase loans.

Applicability: The findings from these UK-based studies are applicable to other potential cycling interventions. The motivation to participate in cycling interventions might depend upon individual circumstances, as well as local geography and usage of the proposed site. Some areas of the UK may be more or less attractive as cycling venues than the one described here. Workplaces will also differ in provision of facilities, and interventions may be affected by factors outside the control of organisers, such as weather conditions.

[1] Cavill and Watkins (2007)
[2] Cleary et al. (2000)

Evidence statement R2.ES10: Young people's views about walking for travel or leisure (not related to an intervention)

Moderate evidence from one interview study and one survey study suggests that walking for leisure was facilitated by walking as a social event or as part of a challenge.

Barriers to walking for travel or leisure for young people are mainly related to lack of time. In addition, having a lot to carry and wearing shoes that were not comfortable were disincentives. Young people report busy lives as a barrier to

walking for transport. For men, walking was not sufficiently vigorous to be considered ‘exercise’.

The (++) UK interview study[1] reported that young people, and especially young men, did not regard walking as vigorous enough to provide exercise. Walking for transport required too much time out of a busy day. Walking for leisure was only acceptable if it included some form of teamwork or challenge. For those that did walk for transport, listening to music was a facilitator as it drowned out noise from traffic and construction sites.

The (+) US survey study[2] reported that undergraduates found that lack of time, having a lot to carry, and wearing shoes that were uncomfortable were the most highly rated barriers.

Applicability: The findings from these studies are applicable to young people in the UK and US. Evidence reflects aspects of daily life that alter with changes through the life course. Participants in this study are constricted by timescales associated with the working day that might not apply to some other populations. There are also specific gender differences in perceptions of walking for fitness.

[1] Darker et al. (2007)
[2] Dunton et al. (2006)

Evidence statement R2.ES12: Older people’s views about walking for travel or leisure (not related to an intervention)

Moderate evidence from six studies suggests that the main facilitator to walking for travel or leisure in older adults was social interaction.

Barriers to walking for travel or leisure for older adults are related to limited mobility and fears for safety. These factors were mediated by the external environment, with fears of falling or of swift traffic being commonly voiced.

Walking indoors was a relatively safe and comfortable alternative if designed appropriately. Walking indoors also incorporated a social aspect to walking.

Older adults reported factors that impacted on safety as the main barriers. When walking outside, narrow pavements and obstacles such as parked cars on pavements, and construction sites were barriers to access (one [-] interviews, UK)[1]. Traffic was also an issue, with cycle tracks and bus lanes creating hazards. Suggested improvements were wider pavements and better provision for cyclists.

In addition, two focus group studies from Canada (one [++][2] and one [+][3]) reported that fear of falling was a barrier to older adults, particularly in icy weather. Uneven pavements and car parks that are not designed for pedestrians were hazards. Older adults often require more time to cross roads, and it was reported that fast roads and poor visibility at crossroads were barriers to outdoor walking.

Suggestions for improving the walking experience for this group were access to toilets and seating, as well as adequate access to local amenities and pedestrianised shopping areas. Making sure that pavements were smooth and clear of snow and ice was also a factor[2].

A (+) UK survey [4] reported that obstructions to mobility included crossings without dropped kerbs, narrow footpaths, and a dropped curb with a steep angle. The authors report that 19% of people aged >80 years could not reach key places if they need to pass through a gap of 1000 mm.

Two studies assessed indoor walking for older adults. A (++) observations and interviews study from the UK[5] reported on mall walking that not only contributed to improved physical activity, but also provided a social network and a meaningful work replacement following retirement. Routines were adapted and events were organised in a relatively safe environment compared to outdoors.

For older adults in assisted living facilities, a (++) focus group study from the US[6] reported similar facilitators in corridor walking, such as relative safety of being indoors, and the social incentive of meeting people in the corridors. Handrails were valued, as well as appropriate flooring, seating in corridors

and adequate toilet arrangements. Public rooms needed to be thoughtfully placed to allow residents optimum access.

Reported barriers to this activity[6] were the lack of varied things to see compared with outside. Facilities with outdoor walking areas provided an opportunity to overcome this barrier providing the walking surfaces were adequate.

Applicability: The findings from these studies are applicable to older adults in the UK and North America. The evidence reflected safety concerns that alter with changes through the life course such as ageing. Participants in this study were constricted by limited mobility that might not apply to some other populations. Social interaction is important for this population to prevent social exclusion.

[1] Newton et al. (undated)
[2] Lockett (2005)
[3] Ripat et al. (2010)
[4] Mackett et al. (2001)
[5] Duncan et al. (1995)
[6] Lu et al. (2011)

Evidence statement R2.ES13: Views of people from deprived areas about walking for travel or leisure (not related to an intervention)

Moderate evidence from two studies suggests that the main barriers to walking for travel or leisure in people from deprived areas were safety, lack of time and lack of motivation.

Women were constricted by perceived dangers from the external environment, family commitments, lack of motivation and lack of walking companions.

There was evidence that participants were either out of the habit of walking, or that walking was enforced due to a lack of options.

For men, walking was not sufficiently vigorous to be considered ‘exercise’.

Two studies assessed the views of populations from deprived groups. One (+) UK interview study[1] reported that males did not associate walking with exercise as it is not strenuous enough. Women more often preferred to walk with someone else rather than alone, so walking with a friend, or children was an incentive. Walking with a dog was a motivator for men or women.

Though health benefits such as weight management and reducing aggression or boredom were recognised by those that did maintain walking activities, there was a habit of not walking that needed to be broken. Lack of motivation, other commitments, lack of time and bad weather were all barriers to continuing walking[1].

A (+) UK interview study[2] examined the experiences of women without access to a car and reported feelings of social exclusion due to having to walk in neglected areas and often with very young children, who were tired. Women often had to walk long distances to shops, and feared for their children's safety at busy roads.

Applicability: The findings from these studies are applicable to people living in deprived areas in the UK. The evidence reflected safety concerns associated with perceived environmental dangers. Participants in this study were constricted by reduced options that might not apply to some other populations. Social interaction is important for this population to increase the feeling of safety, particularly for women. There were also specific gender differences in perceptions of walking for fitness.

[1] Ipsos/MORI (unpublished report)

[2] Bostock (2001)

Evidence statement R2.ES15: Views about barriers and facilitators to active travel to school (walking and / or cycling for transport)

Moderate evidence from nine studies suggested that the main facilitators to active travel included the social aspect of walking and spending time with friends, or having quality time with parents.

Barriers for schoolchildren contemplating active travel to and from school were parental and children's lack of time and dangers from traffic and from intimidation or attack by other people. The missed opportunity by schools to develop children's existing awareness, and displaying conflicting messages was also a barrier. Peer pressure was an important factor for this age group in terms of choices.

Other reported barriers included distance, carrying heavy bags, and poor weather conditions. Parental habits and commitments as well as fears for their children's safety were also influential on decisions about walking.

Barriers to cycling for children included a lack of cycle lanes and a lack of facilities to store bicycles.

The perceived image of cycling, and a dislike of wearing cycling helmets was also reported to be a barrier.

Walking or cycling

Three studies (one [++] focus groups, UK[1]; one [++] focus groups, US[2]; and one [+] survey and interviews, UK[3]) identified recognition in parents and children that walking or cycling would be beneficial to health and could increase a child's confidence and sense of independence around roads. In addition, two studies[1], (one [+] focus groups, UK)[4] reported that walking with a parent provided valuable time together. Spending time with friends was an important social aspect for older children[1].

However, barriers to walking or cycling included lack of time[1,2,3,4]; parents often needed to accompany children to different schools and arrive at their place of work in time. Children and parents would need to get out of bed much earlier in the morning in order to fit in walking. Laziness was reported as a reason for not using active travel[1].

Peer pressure and the trend toward car ownership was a factor, particularly for cycling, which for some groups was socially unacceptable. Schools may

also miss opportunities to develop children's knowledge about sustainable transport choices[3].

A US (+) survey[5]and an Australian (+) survey[6] found that among children that did not walk to school, distance was the most commonly reported barrier, followed by traffic danger. Parents restricted their children to playing close to home on their bicycles (one [+] focus groups, UK)[7].

Children having to carry heavy bags of books and equipment was a barrier to both walking and cycling[1,3,4], as were bad weather, dark mornings[1,2,4] and hilly terrain[4].

For older children who travel without an adult, there were fears for personal safety[1,2], of accidents and abductions[2], of strangers and bullies[4,7] and of busy traffic[1,2,4,7]. Environmental factors such as poor lighting, secluded areas or woodland on the journey exacerbated these fears[1,2,4,7].

A (+) survey from Australia[8] showed that parental perceptions were a factor in decisions to walk. These included parents own physical activity habits, parental working schedules, and parental concerns about safety. Having to attend out-of-school activities was also a factor.

Cycling

Cycling was associated with particular barriers, such as lack of cycle lanes, and general support for cycling at school such as provision to store bicycles and helmets[1,4]. Fear of having a bicycle stolen was a disincentive[1,7].

The image that cycling conveyed was an issue for some. For teenage girls, cycling was perceived as childish[4]. For children that did cycle, the 'coolest' bike was required[4], and cycling helmets were regarded as 'uncool'[1,] (one [+] action research, Australia[9]), lacking in style and fit, with consequences such as negative comments from others[9]. In addition, cycling impacted on personal appearance; for example, cycling helmets dishevelled one's hair[1].

Applicability: The findings from these studies are partially applicable as the findings are specific to schoolchildren. While some barriers and facilitators to

active travel are applicable to any population, schoolchildren and their parents face particular issues pertaining to safety and practicalities for children. Some barriers differ by age group and gender.

[1] Kirby (2008)
[2] Ahlport et al. (2008)
[3] Halden Consultancy (2003)
[4] Granville et al. (2002)
[5] Beck et al. (2008)
[6] Yeung et al. (2008)
[7] Davis and Jones (1996) and Davis (2001)
[8] Ziviani et al. (2004)
[9] Stevenson and Lennie (1992)

Evidence statement R2.ES16: Suggestions for strategies to encourage active travel to school (walking and / or cycling for transport)

Moderate evidence from five studies provided suggestions for strategies that might encourage safe active travel in schoolchildren.

Suggested strategies included environmental improvements to increase safety, changing attitudes to car use, school-based campaigns to assist in cycling skills and awareness, and personal-level encouragement by provision of storage facilities and better design of cycling helmets.

Suggested strategies that may overcome some of the reported barriers included employing crossing patrols near to schools (one [++] focus groups, US[1]), escort schemes, traffic calming schemes, and pedestrian training (one [+] focus groups, UK[2]).

A (+) survey from the UK[3] reported that modifying attitudes to car-centredness would be a useful policy; more so than promoting general environmental awareness.

To reduce cycling accidents, improved cycle paths and compulsory helmet wearing was suggested in one (+) study (action research, Australia)[4].

Other suggestions included schools organising walking and cycling groups, providing training in cycling proficiency, and support such as storage for wet clothes and bicycles (one [++] focus groups, UK[5])[,2 4].

Improved design of cycling helmets might impact on their use and on cycling behaviour by children[4].

Applicability: The findings from these studies are partially applicable as the findings are specific to schoolchildren. While some suggestions to encourage active travel are applicable to any population, schoolchildren and their parents face particular issues pertaining to safety and practicalities for this age group.

[1] Ahlport et al. (2008)
[2] Granville et al. (2002)
[3] Black et al. (2001)
[4] Stevenson and Lennie (1992)
[5] Kirby (2008)

Evidence statement R2.ES18: Adult views about cycling for transport

Moderate evidence from five studies was available regarding barriers and facilitators to adult cycling for transport.

Benefits of cycling for transport were reported motivators, such as the ability to travel relatively quickly through traffic, the feeling of autonomy and freedom, and benefits for health and the environment. Cycling rather than driving could be encouraged by workplace initiatives.

Barriers to cycling were reported such as obstacles in the road, pollution and poor weather. Carrying bags and changes of clothing required after getting wet were also reported disincentives.

Cycling for transport requires negotiating space on the road; major barriers were traffic volume, inconsiderate driving and lack of adequate cycling tracks.

Some cycling behaviours were perceived as inappropriate by some other road users, giving cyclists a poor image and limited relationship with drivers.

Cycling was perceived as male, white and middle class. There was evidence that resistance to this image from female cyclists includes adopting and disseminating ideas for a feminine cycling image.

Reported benefits from commuting by bicycle included swiftness of travel through busy traffic, not having to rely on public transport, and improved fitness (for men) or body shape (for women). An additional factor was reassurance that the environment is being protected (one [+] interviews, UK[1]).

Parents were reported to drive less to work when cycling was encouraged by their workplace (one [+] survey, Australia[2]).

However, cyclists in the city report a number of obstacles that can interrupt the journey, such as poor road surfaces, manhole covers, glass, rough gutters, hilly terrain, parked cars and buses. In addition, pollution and bad weather can be a disincentive (one [++] interviews, UK[3]; one [+] survey and interviews, UK[4]). A (+) survey from Australia[5] reported that women cyclists preferred off-road paths compared to roads with no facilities, and off-road paths compared to on-road lanes.

Commuting by cycle often involved carrying extra clothes to work and extra time at work to get changed from cycling outfits to work attire, including re-styling hair after wearing a helmet[1]. Lack of available facilities was a barrier to cycling, as were saddle-soreness and tiredness[4].

Cycling on the road also requires negotiation with other road users. Cyclists reported fears of traffic and of accidents[1] which meant having to be constantly alert for other traffic in order not to collide, and feeling vulnerable when crossing traffic to turn right[3].

Cyclists reported feeling segregated and invisible on the road[3]. In areas where cycling is traditionally less prominent, there was a ‘strangeness’ about cycling, which was internalised by cyclists. There was also a perception that cycling is a male (predominantly white) activity, and some women felt the need to construct their own cycling identity, which could mean resisting the ‘blokey’

image and embracing femininity (for example, wearing heels while cycling; using blogs to reinforce identity)[1].

Applicability: The findings from these studies are applicable to cyclists who commute in the UK and Australia. Differences in experiences between cycling populations (gender, ethnicity e.t.c.) and between settings in their promotion and support of cycling need to be taken into account.

[1] Steinbach et al. (2011)
[2] Wen et al. (2010)
[3] McKenna and Whatling (2007)
[4] Gaterslaben et al. (2007)
[5] Garrard et al. (2008)

Evidence statement R2.ES19: Views about cycling identities

Moderate evidence from one (+) UK focus groups and interviews study[1] that obtained car driver views of adult cycling identities.

Cycling for transport requires negotiating space on the road. Some cycling behaviours were perceived as inappropriate by some other road users, giving cyclists a poor image and limited relationship with drivers.

Car drivers reported being fearful of collisions, since cars and cycles travel at different speeds, and gave cyclists a wide berth. Some cyclists were reported as behaving poorly on the roads, for example passing through red lights, and this contributed for some, to cyclists having a negative image. Drivers that cycled were more likely to have empathy with cyclists on the road. Cycling proficiency testing, road taxes and compulsory helmet wearing were suggestions for improving the status of cyclists on the road.

Applicability: Findings from this study are applicable to car drivers in the UK. How cyclists are perceived by other road users and the impact that this may have for cyclists needs to be taken into account.

[1] Granville et al. (2001)

Evidence statement EM.ES1: Led walking including 'Walking school bus'

Moderate evidence from four studies suggests that led walking interventions (seven different interventions analysed in four studies) could be cost effective.

A Spanish study[1]: 6-month programme to promote walking-based exercise via a supervised exercise programme with three 50-minute sessions per week. Incremental cost per QALY range of €94– 871 per QALY.

A US study[2]: community-based social support strategies, including organised walking groups, home visits and phone calls, and newsletters, maps and handouts. Incremental cost per QALY of $27,373 and $39,690 for the two different led walking interventions versus do nothing.

A UK study[3]: organised community walking groups. The two organised walking group interventions showed a cost per QALY of £301 and £475.

Another UK study[4]: walking bus intervention designed to encourage schoolchildren to walk to school. Incremental cost per QALY estimated to be approx. £4007 per QALY gained.

The evidence is partially applicable to the UK, with two of the studies UK-based, and the other international studies concerning interventions that could be of UK relevance.

[1] Gusi (2008)
[2] Roux (2008)
[3] Pringle (2010)
[4] Fordham (2008)

Evidence statement EM.ES2: Pedometer

Moderate evidence from one Australian study[1] suggests pedometer interventions could be cost effective: pedometer interventions, which used a meta-analysis of eight randomised control trials. Pedometer interventions maintained a net saving even when the intervention effect was modelled to decay completely by the end of the first year. That is, the modelled lifetime

cost savings to the health service outweighed the pedometer costs as well as providing health benefits.

The evidence is partially applicable to the UK as similar pedometer interventions are of relevance.

[1] Cobiac (2009)

Evidence statement EM.ES3: Media campaigns

Moderate evidence from one UK study[1]suggests media campaigns could be cost-effective: media campaigns circulating maps of walking and cycling routes. The cost-per-QALY of £86 for provision of a healthy living map with walking and cycling routes, and £288 for the promotion of walking and cycling through printed media.

The evidence is applicable to the UK.

[1] Pringle (2010)

Evidence statement EM.ES4: Community health information (TravelSmart)

Moderate evidence from one Australian study[1] suggests TravelSmart interventions could be cost-effective: TravelSmart intervention with individualised information to households on travel choices measuring change in the number of walking and cycling trips made per week. The TravelSmart programme resulted in a cost of $18,000 per disability-adjusted life year (DALY) assuming 50% decay per annum. The TravelSmart programme had net savings with annual decay rates of 0% and 25%, but costs rose to $41,000 per DALY at 75%, and $63,000 per DALY at 100% decay.

The evidence is partially applicable to the UK as the TravelSmart style intervention is relevant in the UK.

[1] Cobiac (2009)

Evidence statement EM.ES5: Multi-component (Cycling Demonstration Towns)

Moderate evidence from one UK study[1] suggests that the Cycling Demonstration Towns projects have a good benefit/cost rate.

The study: infrastructure measures such as the building of cycle paths, combined with a programme of education and marketing aimed at the general population. Benefits converted to monetary values and compared with the initial investment and running costs to produce a benefit–cost ratio. A range of 2.6–3.5 was given, reflecting the different approaches available for estimating accident and absenteeism benefits. Under all but the most pessimistic of scenarios considered, the benefit–cost ratio remained above one.

The evidence on cycle demonstration town is directly applicable as it was conducted in the UK.

[1] Cope (2010)

Additional evidence

- Expert paper 1 ‘Paving the way for everyday walking: ‘Living Streets’ interventions and public health’
- Expert paper 2 ‘Making walking and cycling normal: key findings from the understanding walking and cycling research project’:
- Expert paper 3 ‘Programmes to promote cycling – evidence for NICE from CTC’:
- Expert paper 4 ‘Evidence to NICE PDG walking and cycling: experience from Bristol City Council and cycling city (2008–2011)’: Ed Plowden, Bristol City Council
- Expert paper 5 ‘Submission to the NICE programme development group on walking and cycling’
- Expert paper 6 ‘Effectiveness of interventions to increase cycling’.

Economic modelling

Overall, all the interventions modelled were found to be highly cost effective, with each estimated to cost below £10,000 per quality-adjusted life years (QALYs) gained.

The economic model was constructed to incorporate, where possible, data from the reviews of effectiveness and cost effectiveness. In addition, it built on the relationship between:

- physical activity and relative risk of mortality
- levels of walking and cycling and overall physical activity
- levels of walking and cycling and motorised travel (especially driving distance, but also driving time and number of trips).

Four interventions were modelled:

- Two multi-component interventions (Cycling Demonstration Towns and SustainableTravel Towns).
- Personalised travel advice (TravelSmart).
- Use of pedometers.
- Community-based led walks.

Health outcomes were expressed using QALYs gained and incremental net benefit (INB).

Wider impacts (environmental and traffic-related outcomes) were based on a limited selection of environmental outcomes and the value of a statistical life, expressed in terms of environmental benefit-cost ratios. The ratios were calculated based on the framework used by the Department for Transport.

It should be noted, that in the Department for Transport framework, most of the calculated benefits derived from health outcomes related to increased physical activity (up to 83%). However, health outcomes were excluded when

calculating the environmental benefit-cost ratio, as they had been considered separately in a cost–utility analysis. Thus the results should be interpreted with caution.

A series of ‘what if’ analyses was undertaken to determine if the level of cost is justified for interventions producing a particular level of effect. In addition, the trade-off between narrow interventions with large effects per person were compared with wider interventions leading to smaller effects per person.

A number of assumptions were made which could underestimate or overestimate the cost effectiveness of the interventions. The results of the modeling were non-linear. The key factors influencing outcome were: threshold cost, level of effects, decay in effects and costs related to initial effects.

The specific scenarios considered and the full results can be found in ‘Interventions to promote cycling and walking for recreational and travel purposes: Health economic and modelling report’.

Appendix D Gaps in the evidence

The Programme Development Group (PDG) identified a number of gaps in the evidence related to the programmes under examination based on an assessment of the evidence. These gaps are set out below.

1. There is a lack of UK evidence on whether or not interventions to increase walking or cycling for transport or leisure result in a decrease or increase in participation in other types of physical activity. Evidence is needed for a range of groups within different community settings.

2. There is a lack of evidence on whether people who cycle for recreational purposes eventually adopt it as a form of transport.

3. There is a lack of evidence on the long-term health, social and environmental impact of short-term interventions to increase walking or cycling. Specifically, there is a lack of evidence on the impact of interventions to encourage walking, cycling or both, for a range of groups within different community settings.

4. There is a lack of evidence on whether it is effective and cost effective to support physically active travel as a segment of a longer journey. Specifically, it is not clear whether such support increases walking or cycling levels and, if it does, how this impacts on the environment.

5. There is a lack of UK evidence on whether differences in urban and rural settings and environments impact on the implementation and effectiveness of interventions to increase walking or cycling. Evidence is needed for a range of groups within different community settings.

6. There is a lack of evidence on the barriers to, and facilitators for, inter-sector and inter-agency collaboration to promote walking and cycling. Evidence is also needed on the interventions that could overcome any identified barriers. Barriers may include the working cultures of different professionals.

7. There is a lack of UK evidence on how effective and cost effective it is to address walking and cycling together or separately. Specifically, there is a lack of evidence on how combining interventions impacts on their effectiveness – and whether multiple interventions have a positive, synergistic effect. Evidence is needed for a range of groups within different community settings.

8. There is a lack of evidence on how people can be helped to make walking or cycling an habitual activity. Evidence is needed for a range of groups within different community settings.

9. There is a lack of UK evidence on the extent to which the provision of a free bus service impacts on walking levels. Evidence is needed for a range of groups within different community settings.

10. There is a lack of UK evidence on the impact that an individual's perception of distance has on their view of how viable cycling or walking is as a mode of transport. There is also a lack of evidence on what interventions can effectively change someone's perception of distance as a barrier to walking and cycling. Evidence is needed for a range of groups within different community settings.

11. There is a lack of UK evidence on the social constructs which act as barriers to, and facilitators for, the uptake of walking or cycling as a mode of transport. Evidence is needed for a range of groups within different communities.

Appendix E Supporting documents

Supporting documents are available at the NICE website.

These include the following.

- Evidence reviews:
    - Review 1: ‘Systematic review and narrative synthesis of the effectiveness of local interventions to promote cycling and walking for recreational and travel purposes’, and ‘Evidence statements on the effectiveness of local interventions to promote cycling and walking for recreational and travel purposes’
    - Review 2: ‘Synthesis of evidence relating to barriers and facilitators to implementing interventions that promote cycling and walking, and to carrying out cycling and walking for recreational and travel purposes’.

- Economic modeling: ‘Interventions to promote cycling and walking for recreational and travel purposes: Health economic and modelling report’.

- Expert papers:
    - Expert paper 1 ‘Paving the way for everyday walking: Living Streets interventions and public health’
    - Expert paper 2 ‘Making walking and cycling normal: key findings from the understanding walking and cycling research project’
    - Expert paper 3 ‘Programmes to promote cycling – evidence for NICE from CTC’
    - Expert paper 4 ‘Evidence to NICE PDG walking and cycling: experience from Bristol City Council and cycling city (2008–2011)’
    - Expert paper 5 ‘Submission to the NICE programme development group on walking and cycling’

  - Expert paper 6 ‘Effectiveness of interventions to increase cycling’.

For information on how NICE public health guidance is developed, see:

- ‘Methods for development of NICE public health guidance (second edition, 2009)’
- ‘The NICE public health guidance development process: An overview for stakeholders including public health practitioners, policy makers and the public (second edition, 2009)’